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PEER REVIEW STATUS:

This manuscript was submitted to the Journal of Micropaleontology (eISSN: 2041-4978). It has come back from review with recommendations for revision. The authors are currently in the process of revising the manuscript and expect no major changes of the age model presented in this version.

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Abstract. The Norwegian Sea is crucial for ocean circulation and global climate and has therefore long been a focus in paleoceanography. However, precise dating of sediments has often proved difficult, due to poor preservation and endemism among microfossils and the discontinuous nature of many records. One important Norwegian Sea Site, Ocean Drilling Program (ODP) Site 643, is of particular interest, because of its location and long stratigraphic reach. Previously published magneto- and biostratigraphic age models diverge by ~1 Myr in the lower and middle Miocene, insufficient for global correlations. Here we present new palynological, notably dinoflagellate cyst (dinocyst) data from the lower and middle Miocene of ODP Site 643 and integrate these with existing palynostratigraphies of ODP Site 643. Additionally, we perform $^{40}Ar/^{39}Ar$ dating on selected tephra layers. We use these, combined with other microfossil bioevents, to reinterpret the existing magnetostratigraphy and construct a revised Oligocene to Recent biomagnetostratigraphic age model for this Site. We confirm the occurrence of three early and middle Miocene hiatuses and one early Pleistocene hiatus and refine their duration. Our age model further indicates a substantially older age for lower and middle Miocene sediments than previous dating has suggested. Finally, we combine our new age model with the integrated palynostratigraphy to provide updated ages of dinocyst bioevents and zone boundaries, which are at least applicable to the Norwegian Sea.

1 Introduction

As the location of North Atlantic Deep Water (NADW) formation, the Nordic Seas are a crucial area for the Atlantic Meridional Overturning Circulation (AMOC) and hence for global climate. Oceanographic changes in this region during the Neogene have been linked to both tectonically induced gateway changes (Wright and Miller, 1996; Jakobsson et al., 2007; Ehlers and Jokat, 2013, De Schepper et al., 2015) and global climate (Müller-Michaelis and Uenzelmann-Neben, 2014). A prerequisite to understand the governing mechanisms and the precise timing of important warming and cooling climate events, and their link to the AMOC, is the accurate dating of sediments. However, absolute dating of sediments in the Nordic Seas is problematic (Deep Sea Drilling Project (DSDP) Leg 38: Schrader et al., 1976; Ocean Drilling Project (ODP) Leg 104: Goll, 1989; ODP Leg 151: Hull et al., 1996; ODP Leg 162: Raymo et al., 1999).

Traditional biostratigraphy based on calcareous nannofossils and foraminifera is affected by low diversity and evolutionary turnover at high latitudes (Parker et al., 1999; Matthiessen et al., 2009). For sediments older than the Pliocene, poor preservation of calcareous fossils in the Nordic Seas due to a combination of low carbonate productivity and strong dissolution poses an additional complication (Spiegler and Jansen, 1989). Finally, the stratigraphic discontinuity of many records strongly reduces the applicability of carbonate-based oxygen and stable carbon isotope stratigraphy (e.g. Matthiessen et al., 2009).

Siliceous microfossils are more commonly preserved than calcareous fossils in Nordic Sea Neogene sediments (Schrader et al., 1976; Goll, 1989; Hull et al., 1996; Raymo et al., 1999) and have potential for regional biostratigraphy. Indeed, a wealth of biostratigraphic data on diatoms, radiolarians and silicoflagellates has been generated on DSDP (Leg 38) and ODP (Legs 104, 151 & 162) cores (Bjørklund, 1976; Dzinoridze et al., 1978; Martini and Müller, 1976; Schrader and Fenner, 1976; Ciesielski et al., 1989; Goll and Bjørklund, 1989; Locker and Martini, 1989; Koç and Scherer, 1996; Locker, 1996; Amigo, 1999). However, incomplete recovery and high proportions of endemic species – particularly among radiolarians – have hampered the development of a robust regional stratigraphic framework. Improvements in paleomagnetic calibrations for the middle Miocene through Pliocene at ODP Leg 151 Sites have provided much better constraints (Koç and Scherer, 1996; Channell et al., 1999). However, integrated biomagnetostratigraphic models at high temporal resolution at various sites are now needed to link regional paleoceanographic and paleoenvironmental proxy data to records from elsewhere.

Shipboard and shore-based palynologists working on DSDP and ODP legs in the final three decades of the previous millennium have established that organic-walled dinoflagellate cysts (dinocysts) are the only microfossils that are ubiquitous throughout the entire Nordic Sea Neogene (DSDP Leg 38: Manum, 1976; ODP Leg 104: Manum et al., 1989; Mudie, 1989; ODP Leg 151: Poulsen et al., 1996; ODP Leg 162: Williams and Manum, 1999; Smelror, 1999). Dinocyst biostratigraphy is therefore still regularly applied, for example to improve dating of the Tjörnes section on Iceland (Verhoeven et al., 2011) and ODP Leg 151 Site 911 in the Fram Strait (Grøsfjeld et al., 2014). Recent work has established magnetostratigraphic calibrations of dinocyst bioevents in sediments from ODP Leg 151 Site 907 in the Iceland Sea (Schreck et al., 2012) and ODP Leg 104 Site 642 in the Norwegian Sea (De Schepper et al., 2017), providing reliable ages for the middle Miocene through Pliocene (~14-2.6 Ma). The generally high Nordic Sea dinocyst diversity implies that multiple bioevents are available that can be correlated to regions outside the Nordic Seas. This, combined with taxonomic advances and improved dating of events over the last decades make dinocysts potentially the most powerful microfossil group for biostratigraphic correlations for the Neogene of the Nordic Seas.

In addition to the stratigraphic work carried out on sediments recovered during ODP Leg 151 (Koç and Scherer, 1996; Schreck et al., 2012), we here aim to develop an integrated age model for ODP Leg 104 Site 643 in the Norwegian Sea (Fig. 1). At present, this Site is influenced by the Norwegian Atlantic Current, a northward branch of the North Atlantic Current (NAC) (Gascard et al., 2004; Newton et al., 2018). ODP Site 643 is therefore ideally located to serve as a bridge between globally recognized bioevents and those of more endemic Nordic Sea species. A magnetic polarity record (Bleil, 1989), as well as biostratigraphic constraints (Goll, 1989 and references therein) are available, but were never fully integrated, resulting in discrepancies between the age models of up to ~1 Myr.

To establish an updated integrated biomagnetostratigraphy for Site 643 and thereby revisit magnetostratigraphic calibration ages for bioevents, we 1) perform a new stratigraphic study based on dinocysts and some acritarchs on lower and middle Miocene sediments, and integrate our results with previously published stratigraphies, 2) compile published ages for Oligocene-Pleistocene dinocyst, diatom, radiolarian and planktic foraminifer bioevents recorded at ODP Site 643, and 3) perform $^{40}Ar/^{39}Ar$ dating on selected Miocene tephra layers at ODP Site 643. The compiled biostratigraphic ages and $^{40}Ar/^{39}Ar$ ages allow us to update the magnetostratigraphic interpretation based on inclination and newly azimuthally corrected declination, and properly identify hiatuses at ODP Site 643. Based on the integrated age model, we recalibrate dinocyst events to the Geological Time Scale 2012 (Gradstein et al., 2012).

2 Methods

2.1 Material

ODP Leg 104 Hole 643A (67°42.9' N, 1°02.0' E) was drilled in 1985 on the lower western slope of the outer Vøring Plateau in the eastern Norwegian Sea at 2753 m water depth (Fig. 1; Shipboard Scientific Party, 1987). Drilling penetrated 565.2 metres of sediments, of which 449.2 m was recovered (total recovery: 79.5 %), with an estimated age range of 0 to 44.5 Ma (Goll, 1989). Based on shipboard analyses (Table S1), the sedimentary sequence was divided into five lithological units, of which unit II was subdivided into three subunits (Shipboard Scientific Party, 1987). Here we consider units I-IV and the upper part of unit V (Fig. 2; Fig. S1). Unit I (0-49.42 metres below seafloor (mbsf), Pleistocene to Recent) consists of alternating interbedded dark carbonate-poor glacial muds, sandy muds, and light carbonate-rich interglacial muds. Unit IIA (49.42-63.80 mbsf, Pliocene to Pleistocene) consists of siliceous nannofossil ooze and minor amounts of muds. Unit IIB (63.80-81.30 mbsf, upper Miocene to Pliocene) consists of sandy and siliceous muds with minor amounts of nannofossil ooze. Unit IIC (81.30-100.15 mbsf, upper Miocene) comprises diatomaceous nannofossil ooze and siliceous muds, with minor amounts of diatom ooze. Unit III (100.15-274.05 mbsf, lower to upper Miocene) primarily consists of diatom ooze, with minor amounts of siliceous muds and nannofossil-diatom ooze. Unit IV (274.05-400.70 mbsf, lower Miocene) consists of monotonous dark, compaction-laminated mudstone, with minor amounts of chalk and siliceous mudstone. Unit V (400.70-565.20 mbsf) consists of zeolitic mudstone, mostly intensively compacted and laminated. Tephra layers of varying composition are present in Units I-III. To achieve an integrated stratigraphy for the early Oligocene to Recent, we focus on the upper ~460 metres of the recovered section. Sediments below this interval have been biomagnetostratigraphically dated to the early Oligocene and Eocene by Eldrett et al. (2004).

2.2 Revised mbsf

Core expansion and generally good core recovery often led to individual core recovery percentages of >100% and overlapping depths in the shipboard mbsf scale between the lowermost parts of a core and the top of the directly underlying core (Shipboard Scientific Party, 1987). Because only one hole was drilled at Site 643, no direct information is available on the stratigraphic thickness of core gaps. This has to be accounted for in the identification of bioevents and hiatuses, particularly those located at or close to core boundaries. In the integrated biostratigraphy of Goll (1989), sample depths in cores with recovery >100% were rescaled to fit to a recovery of 100%, which prevents overlap between subsequent cores, but gaps between the cores, which typically comprise in the order of 0.5 m (e.g. Lisiecki and Herbert, 2007; Wilkens et al., 2013; Dickens and Backman, 2013; Vallé et al., 2017) were not accounted for.

We here construct a revised mbsf (R-mbsf) in a pragmatic way (Table S2). Subsequent cores were appended to the recovered length of the previous core if the recovery of the latter was >100%, or to the drilled length if the recovery was <100%. Additionally, 0.5 m was added between each core to account for missing sediment in core gaps. Sample depths in mbsf (Shipboard Scientific Party, 1987) or rescaled mbsf (Goll, 1989) reported in previous studies were recalculated to mbsf from the original ODP sample codes (Core-Section-cm), and subsequently converted to R-mbsf.

2.3 Palynological analyses

Thirty-one samples were selected for palynological analysis (Table S3). The samples were processed according to standard palynological processing techniques in use at Utrecht University (e.g. Brinkhuis et al., 2003). In short, the samples were crushed and weighted (~1 gram of sediment). A tablet with a known amount (20848 ± 3.3%) of *Lycopodium clavatum* spores was added to each sample to facilitate quantification of palynomorphs. The samples were then treated with 30% HCl to remove carbonates and 38% cold HF to remove silicates. After each acid step, the samples were neutralised with water and centrifuged (after HCl) or left to settle for 20 hours (after HF) and decanted. The residues were sieved with 15 µm and 250 µm nylon meshes to obtain the 15-250 µm fraction. All samples were treated with ultrasound for five minutes to break up agglutinated particles of the residue. A droplet of homogenized residue was mixed with glycerine jelly, mounted on a microscope slide and sealed. A minimum of 250 marine palynomorphs was identified per sample and determined to the species level, where possible, with an Olympus CX21 light microscope at 400x magnification. All slides are stored in the collection of the Laboratory of Palaeobotany and Palynology, Department of Earth Sciences, Utrecht University.

2.4 Bioevents

Lowest Occurrences (LO) and Highest Occurrences (HO) represent the lowest and highest in-situ stratigraphic occurrences of taxa, and we assign ages to these bioevents based on First Appearance Datums (FAD) and Last Appearance Datums (LAD). Similarly, LPOs and HPOs (FPADs/LPADs) represent the lowest and highest persistent (successive) occurrences of taxa. New results from palynology were combined with palynostratigraphy of Mudie (1989) and Manum et al. (1989) down to Core 49X, resulting in a combined high-resolution dinocyst and acritarch stratigraphy for ODP Hole 643A. Where possible, species names were updated to the most recent nomenclature and taxonomy of DINOFLAJ3 (i.e. Williams et al., 2017). Taxonomic junior and senior synonyms were individually assessed before being synonymized. The processing of new palynological samples allowed the identification of known, but often also recently described species, which were not reported by Mudie (1989) or Manum et al. (1989). As a consequence, their work could not be included in determining their bioevent depths, leading to somewhat larger errors. We use diatom and planktic foraminifer bioevents identified by the Shipboard Scientific Party (1987) and Ciesielski and Case (1989). Radiolarian events were identified from Goll and Bjørklund (1989). Species nomenclature mostly follows these authors, but has been updated when necessary for comparison with newer studies. We have noticed that sample codes in the older literature are sometimes inconsistent with the sampling reports from the ODP sampling data base. In those cases we have adopted the sampling codes of the data base.

Selected dinocyst event ages from literature are recalibrated to GTS2012 using available independent stratigraphy in the original publications. Selected diatom, planktic foraminifer and radiolarian ages are directly derived from the original publications, but have been updated to GTS2012 using linear interpolation between rescaled magnetic reversals. Since the biostratigraphy in this study mainly serves as a means to constrain the magnetostratigraphic interpretation rather than as a direct age estimate, we chose to define confining bioevents at their extreme position: the globally first FAD or last LAD and the highest/lowest possible depth of a LO/HO, i.e. the lowest/highest sample with the presence of a species. This is based on 1) the plausibility that environmental factors caused a species to appear/disappear at Site 643 after/before the globally first FAD/last LAD, while the opposite is unlikely, especially if the event has been documented by many studies, and 2) the plausibility that the real LO/HO of a species occurs below/above the reported LO/HO if the species has a very low abundance in these sediments, while the opposite can only be explained by sediment caving or reworking.

2.5 ^{40}Ar/^{39}Ar dating

Eighteen samples were selected for ^{40}Ar/^{39}Ar dating. Sample selection was based on the description of tephras by the Shipboard Scientific Party (1987) and Despraires et al. (1989). One additional sample was taken after visual core inspection (Table S4). Samples were washed and sieved over a 90 µm sieve. Feldspar minerals were separated using standard heavy liquid (2.55 and 2.59 g cm^{-3}) using a miniaturized centrifugal system. A subset of selected samples was further cleaned with distilled water in an ultrasonic bath. Finally, these samples were hand-picked under a microscope.

Samples were wrapped in 6 mm Al packages and loaded into 25 mm diameter Al cups together with Fish Canyon tuff sanidine as neutron flux monitor. Samples were irradiated at the OSU Triga reactor in the CLICIT facility for 18 hours. After irradiation samples and standards were unpacked and loaded in a 185 hole Cu tray and baked overnight at 250 °C under vacuum. This tray is then placed in a doubly pumped vacuum chamber with Zn-S window and baked overnight at 120 °C under high vacuum. This sample chamber is connected to a ThermoFisher NGPrep gas purification line with four additional SEAS-NP10 getters, a cold finger, an ion gauge, two inlets and two pipette systems. We connected a CO_2 laser in combination with the sample chamber to one inlet. Samples are heated using a 25W Synrad CO_2 laser. Sample gas is exposed to three of the NP10 getters (two hot and 1 cold) in the gas purification line during 3 minutes before expansion into the ARGUS VI+ for analyses.

The ARGUS VI+ at the Vrije Universiteit, Amsterdam, is a high sensitivity, low resolution multi-collector noble gas mass spectrometer with an internal volume of 710 ml. The mass spectrometer is equipped with four Faraday cups at the H2, H1, AX and L1 positions and two compact discrete dynodes (CDDs) at positions L2 and L3. The system is equipped with a 10^{12} Ohm amplifier on H2 and 10^{13} Ohm amplifiers on H1, AX and L1 cups. The resolution of the system is ~200 and therefore does not resolve hydrocarbon or chlorine interferences. The ARGUS VI+ has a NP10 getter and ion gauge on the source of the mass spectrometer. The NP10 getter is run cold and the ion gauge is turned off, because of its pumping capacity for argon. Depending on beam size, samples are either run on H2 – L2 for higher intensity samples, or H1 – L3 for low intensity samples (Table S5).

Bias between the different detectors has been monitored by 1) measurement of ^{40}Ar air pipettes across the different Faraday cups; 2) measurement of ^{40}Ar blanks on all detectors and 3) by measurement of mass 44 CO_2 in dynamic mode on all detectors. Systematic bias up to 7% is found, but is reproducible over periods of weeks. Similar to Phillips and Matchan (2013) we did not apply bias corrections, but analyzed samples and standards in the same tray (and thus at more or less the same time) alternating with air pipettes of different intensities in the same range as the samples and standards. Line blanks were measured every 2-3 unknowns and were subtracted from succeeding sample data. Data reduction is done in ArArCalc (Koppers, 2002). Ages are calculated with Min et al. (2000) decay constants and 28.201 ± 0.022 Ma for FCs (Kuiper et al., 2008). The atmospheric air value of 298.56 from Lee et al. (2006) is used. The correction factors for neutron interference reactions are (2.64 ± 0.02) x10^{-4} for $(^{36}Ar/^{37}Ar)_{Ca}$, (6.73 ± 0.04) x10^{-4} for $(^{39}Ar/^{37}Ar)_{Ca}$, (1.21 ± 0.003) x10^{-2} for $(^{38}Ar/^{39}Ar)_K$ and (8.6 ± 0.7) x10^{-4} for $(^{40}Ar/^{39}Ar)_K$. All errors are quoted at the 1σ level, unless mentioned otherwise, and include all analytical errors.

2.6 Paleomagnetism

We use paleomagnetic data from Bleil (1989) (Fig. 2). In addition to measurements of natural remanent magnetization (NRM), Bleil (1989) presented inclination and declination data by applying systematic step-wise demagnetization treatments on each sample. Steps of 2.5 and 5 mT were typically applied up to 10 mT, followed by 5 mT steps up to 20 or 30 mT and 10 mT steps beyond that stage. For most samples, demagnetization was taken to the 50 mT level, which generally exceeded the median destructive field.

Absolute or relative azimuthal core orientations are not available for ODP Site 643, which has hampered the use of declination data for polarity interpretation. Bleil (1989) therefore based the polarity interpretation solely on inclinations, which, due to the steep geomagnetic field inclinations at high latitudes, can provide an unambiguous interpretation, but offers a less reliable result. In order to also use declination for assessing the polarity interpretation, we chose to azimuthally reorient the declination data. Assuming a general correlation between inclination and declination in each core, we rotated declination data such that mean (excluding outliers >1σ) northward (360°) and southward (180°) core declination was aligned with positive and negative inclination, respectively. The resulting correction factor was applied to all declination data in the core, preserving the intersample variability. The polarity signal was subsequently reinterpreted, in which inclination data was considered leading and declination and NRM intensity were used to assess confidence in the assigned polarity.

3 Results

3.1 Palynostratigraphy

During palynological analysis of 31 new lower to middle Miocene samples, 105 dinocyst and 9 acritarch in-situ taxa were identified (Tables S6 & S7). Of these, 19 dinocyst and 2 acritarch taxa could not be identified at species level based on previous work at ODP Site 643 (Manum et al., 1989; Mudie, 1989) or other literature and are reported at the genus level or higher. These taxa are mostly rare and confined to a few samples and are therefore not further considered. Reworked Paleogene dinocysts were encountered in five samples, but did not exceed two specimens per sample.

Integration of our results with palynostratigraphy of Manum et al. (1989) and Mudie (1989) from the top of Hole 643A (recent) down to core 49X (lowest Oligocene) yielded a total of 216 dinocyst and 11 acritarch taxa. Of these, 55 dinocyst taxa remain in open nomenclature, while 12 dinocyst and 2 acritarch taxa have previously only been described informally. Taxa that are considered questionably synonymous are included both separately (sensu stricto, s.s.) and combined (sensu lato, s.l.). Full stratigraphic ranges of dinocyst and acritarch taxa are presented in Table S6 and explanations on the synonymization of individual taxa are included in Table S7.

3.2 Bioevents

More than 300 bioevents were assessed for their potential to constrain the magnetostratigraphic interpretation and sediment age. However, many were not very useful due to problems with taxonomy or poor age constraints from the literature. Additionally, LOs/HOs with FADs/LADs >~5 Myr earlier/later than the expected age of the sediment (Bleil, 1989; Goll, 1989) were excluded, as these LOs/HOs are assumed to be diachronous. These events are consistent with available age models for Site 643, but do not provide additional information on the sediment age for the here considered interval. This resulted in 45 useful dinocyst events, 16 diatom events, 1 planktic foraminifer event, and 1 radiolarian event (Table 1; Fig. 3; Fig. S1). Bioevents are present throughout the studied interval with a peak of bioevents in the middle Miocene. Siliceous bioevents are absent below the diagenetic front of opal at ~300 R-mbsf. Updated nomenclature and some stratigraphic notes are included in Table S7 (dinocysts and acritarchs) and Table S8 (diatoms, planktic foraminifer and radiolarian). Tables S9 and S10 list the literature used for age derivations of bioevents.

3.3 $^{40}Ar/^{39}Ar$

Four of the eighteen samples analyzed contained sufficient amounts of material for radio-isotope dating. Due to initial calibration and blank problems with the novel ARGUS VI+ noble gas mass spectrometer, analysis occurred about one year after irradiation. This implies that it was not possible to accurately measure the ^{37}Ar signal ($t_{1/2}$ of ^{37}Ar is 35.5 days) required for neutron interference reactions on Ca. As a result, corrections for neutron interference reactions are less reliable and measured K/Ca values may be incorrect. In all cases where ^{37}Ar signals were lower than blank values, we set negative intensities to zero (Table S11; Fig. S2). Note, that the density separation of 2.55-2.59 g cm^{-3} should only include the K-rich sanidine fraction in our experiments, in which case impact of Ca neutron interference corrections is minor, and exclude the Ca rich plagioclase fraction.

Tephra T1 (sample 16H 6W 46.0-48.0 cm): 12 single grains have been analyzed. Intensities range from 2 – 60 times ^{40}Ar blank. Most samples show low amounts of radiogenic $^{40}Ar^{*}$. The three samples with a radiogenic $^{40}Ar^{*}$ yield >70% give a weighted mean age with full external error of 17.59 (2 SE: ± 0.94) Ma (and an outlier of ~21.8 Ma).

Tephra T2 (sample 17X 1W 41.0-43.5 cm): 10 single grains have been analyzed. Intensities range from 1.2 – 19 times ^{40}Ar blank. Most samples show low amounts of radiogenic $^{40}Ar^{*}$. Samples with a radiogenic $^{40}Ar^{*}$ yield >55% give a weighted mean age with full external error of 18.34 (2 SE: ± 1.79) Ma.

Tephra T3 (sample 22X 3W 128.0-130.0 cm): 16 single grains have been analyzed, but the measured ^{40}Ar intensity is hardly above blank values. Three exceptions are two older Paleocene grains and one highly non-radiogenic sample. Therefore, no reliable age could be obtained.

Tephra T4 (sample 28X 2W: 148.0-150.0 cm): 19 grains have been analyzed of which 4 grains in two steps. The measured ^{40}Ar intensities range from just >1 to 110 times above blank values with the majority between 3 and 10. The age range of samples with >60% $^{40}Ar^{*}$ is 16.86-21.53 Ma and does not provide information on eruption age.

Overall, two (T3, T4) of the $^{40}Ar/^{39}Ar$ experiments did not yield reliable data and two (T1, T2) of the experiments suggest an age of ~17-19 Ma. Highly precise ages were not obtained.

3.4 Magnetic polarity signal

Azimuthally reoriented declination data generally confirm the inclination-based magnetic polarity interpretation (Table S12; Fig. 2). Our interpretation differs slightly from that of Bleil (1989) (Fig. 3), mostly to the extent that we consider some excursions to represent true reversals and vice versa. We did not assign polarities to most of the interval between 230.60 R-mbsf and 266.94 R-mbsf, due to frequently changing polarity and poor directional stability of the demagnetization data, associated with extremely low (<10^{-4} A m^{-1}) NRM intensity (Bleil, 1989).

4 Discussion

4.1 New bio-magnetostratigraphic age model of ODP 643 Hole A

A revised age model for the Oligocene-recent section of ODP Hole 643A is constructed (Table 2; Figs. 3 & 4; Fig. S1) using the selected bioevents (Table 1) and tephra $^{40}Ar/^{39}Ar$ ages (Table S11; Fig. S2) as constraints on the magnetostratigraphic interpretation. Recognized magnetostratigraphic tie points have been converted to the Geomagnetic Polarity Time Scale

(GPTS2012) of Ogg (2012) (Fig. 3). Below 315.16 R-mbsf, dated at ~19.73 Ma, magnetostratigraphic interpretation was not reliable and the age model is solely based on biostratigraphy (Fig. 4). At a depth of 491.89 R-mbsf, the top of magnetochron C13n was identified (Eldrett et al., 2004), which marks the earliest Oligocene (Fig. 4).

Our selected bioevent and tephra $^{40}Ar/^{39}Ar$ ages, although partly in agreement with previous age models by Goll (1989) and Bleil (1989) (both recalibrated to GTS2012), differ in some key aspects (Fig. 3; Fig. S1). Our magnetostratigraphic interpretation of the lower-middle Miocene below 143.82 R-mbsf is ~1.5 Myr older than the interpretation of Bleil (1989) and slightly older than the age model of Goll (1989). Additionally, a different magnetostratigraphic interpretation was chosen for two upper Miocene-Pliocene sections (34.70-53.26 R-mbsf and 63.61-88.82 R-mbsf) and the magnetostratigraphy was refined for the middle Miocene section between 104.04 and 124.09 R-mbsf. The depth and duration of hiatuses of Goll (1989) have been evaluated, which has led to some minor changes in depth and larger adjustments in duration, including the removal of some hiatuses.

To understand correspondence and differences between our age model and that of previous work, we briefly discuss how Goll (1989) and Bleil (1989) constructed their models. The age model presented by Goll (1989) strongly relied on regional intercomparison of sediments recovered during DSDP Leg 38 in 1974 and ODP Leg 104. This allowed the identification of ten hiatus-bounded Neogene sequences of laterally strongly varying thickness, classified in a synthemic system (sensu Salvador, 1987), clustered into two synthems (NSN1.0 & NSN2.0) and ten subsynthems (NSN1.1-1.6 & NSN2.1-2.4) (Fig. 2). Subsynthem 1.3 is absent at Site 643 (Goll, 1989). Boundaries (i.e. hiatuses) were denoted by their encompassing (sub)synthem, e.g. H1.1/1.2. The synthemic system was based on assemblage zones and biostratigraphic events, rather than lithological criteria and most synthems and hiatuses were based on the radiolarian stratigraphy of Goll and Bjørklund (1989). While the use of this nomenclature was controversial at the time (Murphy and Salvador, 1988) and is still debated to date (Ruban, 2015; Lucchi, 2019), we adhere to the use of these synthems and bounding hiatuses as a means to easily compare our interpretation with that of Goll (1989).

Bleil (1989) principally focused on recognizing paleomagnetic reversals, rather than presenting a full age model. He acknowledged the existence of several hiatuses, based on the radiolarian stratigraphy of Goll and Bjørklund (1989), but did not assess their duration. Intervals surrounding possible hiatuses are therefore indicated with a dashed line in Fig. 4 and Fig. S1. The existence of some hiatuses between ~37 and ~113 R-mbsf has been questioned by Bruns et al. (1998) based on the lack of sedimentological evidence and they propose that H2.1/2.2, H2.2/2.3 and H2.3/2.4 are in fact artefacts of prolonged reduced sedimentation rates or reduced fossil preservation.

In the below discussion, we use our R-mbsf depth scale. To avoid confusion with depth scales used in previous work, we include sample codes where such confusion may occur.

4.1.1 INTERVAL 0-63.61 R-mbsf, 0-4.30 Ma

Our magnetostratigraphic interpretation in the interval 0-63.61 R mbsf (top of C3n.1r) is consistent with available biostratigraphic constraints (Table 1; Fig. 3; Fig. S1). It is also essentially identical to that of Bleil (1989), with the addition that the single normal polarity sample at 37.11 R-mbsf is interpreted to represent C1r.2n and tied to the middle of this subchron (Table 2; Fig. 3). C2n and C2r.1n are absent in this record, which we interpret to represent a hiatus, consistent with H2.3/2.4 of Goll (1989) (Fig. 4). Although Bruns et al. (1998) questioned the existence of this hiatus, we consider the lithological boundary between Unit I and Unit II at 52.97 R-mbsf to correspond to a hiatus. This implies that the reversed polarity interval at 37.41-52.49 R-mbsf represents a truncated C1r.3r. While it is unknown how much of the lower part of C1r.3r is missing, this subchron is probably mostly complete, as downward extrapolation of the sedimentation rate (22.5 m Myr^{-1}) between the overlying tie points suggests an age of 1.86 Ma, which is older than the onset of C1r.3r at 1.78 Ma. Any age much younger than 1.78 Ma at 52.49 R-mbsf would result in a sharp and unrealistic increase in sedimentation rate. We therefore assign an age of 1.78 Ma to 52.49 R-mbsf and derive an age of 1.80 Ma for the end of hiatus H2.3/2.4 (Table 2; Figs. 3 & 4), with the notion that this age could be slightly younger. The onset of H2.3/2.4 is placed at 2.52 Ma, based on extrapolation of the sedimentation rate (5.1 m Myr^{-1}) between the underlying tie points. C2An.1r and C2An.2r are also absent in the paleomagnetic record, but are assumed to fall within the unsampled interval at 55.31-57.16 R-mbsf.

4.1.2 INTERVAL 63.61-88.82 R-mbsf, 4.30-8.77 Ma

Our magnetostratigraphic interpretation between the top of C3n.1r at 63.61 R-mbsf and the top of C4An at 88.82 R-mbsf differs from that of Bleil (1989) and the age model of Goll (1989) (Figs. 3 & 4). While Goll (1989) proposed two hiatuses (H2.1/2.2 at ~73.85 R-mbsf and H2.2/2.3 at ~66.60 R-mbsf) in this interval, and Bleil (1989) inferred the existence of a longer single hiatus, we consider the paleomagnetic record to be consistent with continuous slow sedimentation because there is no biostratigraphic or lithological evidence for gaps in the record (Goll, 1989; Bruns et al., 1998). The low resolution paleomagnetic sampling could have easily resulted in missing several subchrons in this condensed section. The average sedimentation rate between 63.61 and 75.48 R-mbsf of 3.8 m Myr^{-1} (Table 2) is similar to the suggested sedimentation rate of 4.6 m Myr^{-1} by Bruns et al (1998). The discrepancy between magnetostratigraphy and the biostratigraphic age model in this interval as noted by Goll (1989) is reduced with our new interpretation, compared to that of Bleil (1989).
Our interpretation of this interval is consistent with most available biostratigraphic constraints (Table 1; Fig. 3; Fig. S1). While the LAD of *Batiacasphaera hirsuta* (83.15 R-mbsf/8.35 Ma (Schreck et al., 2012)) suggests a slightly older age, its LAD may be younger if some specimens interpreted as reworked by Schreck et al. (2012) are in fact in situ. Additionally, its LAD is currently only described by Schreck et al. (2012) and some regional diachroneity is possible. The LAD of *Operculodinium piaseckii* (74.83 R-mbsf/7.90 Ma (Piasecki, 2003)) could not be reconciled with the magnetostratigraphic interpretation and *O. piaseckii* may have a younger LAD at ODP Site 643.

4.1.3 INTERVAL 88.82-107.15 R-mbsf, 8.77-9.90 Ma

The magnetostratigraphic interpretation in the interval 88.82-107.15 R-mbsf follows Bleil (1989), with the addition that the single reversed polarity sample at 105.34 R-mbsf is interpreted to represent C4Ar.3r and tied to the middle of this subchron (Table 2; Fig. 3). A major hiatus, consistent with H1.6/2.1 of Goll (1989) (Fig. 4) is placed at 107.15 R-mbsf. H1.6/2.1 was originally based on the absence of the Radiolarian *Eucoronis fridtjofnanseni* Zone between 107.15 R-mbsf (11H-CC, 46-49) and 108.73 R-mbsf (12H-1, 105-107) (Goll and Bjørklund, 1989). Additionally, an abrupt change in the silicoflagellate assemblage was reported between 99.48 R-mbsf (11H-2, 70-72) and 109.88 R-mbsf (12H-2, 70-72), with fourteen HOs and one LO (Ciesielski et al., 1989). It is further accompanied by several closely spaced dinocyst and diatom bioevents. The HO *of Hystrichostrogylon membraniphorum* (s.l.) at 107.99 R-mbsf suggests the hiatus is located above this depth. The lithological boundary between subunit IIC and unit III has been defined at 106.63 R-mbsf (11H-7, 35), but may be more gradual considering the pattern of alternating lithology around this depth. The hiatus is therefore placed at 107.15 R-mbsf, close to the reported lithological boundary, but within the range of the radiolarian assemblage change.

The paleomagnetic signal is continuously normal across this depth and does not provide any diagnostic information. The termination of H1.6/2.1 is therefore dated at 9.90 Ma, based on downward extrapolation of the sedimentation rate (12.2 m Myr^{-1}) between the overlying tie points (Table 2).

This interpretation is confirmed by most biostratigraphic constraints (Table 1; Fig. 3; Fig. S1), but some discrepancies exist between our magnetostratigraphic interpretation and biostratigraphy. The LAD of *Cerebrocysta irregularis* (93.57 R-mbsf/10.28 Ma (Schreck et al., 2012)) suggest an older age, but it has so far only been dated by Schreck et al. (2012) and may have a younger age at ODP Site 643. Following Schreck et al. (2012), we have tentatively synonymised *C. irregularis* with *Tectatodinium* sp. 4 of Manum et al. (1989). The highest confirmed specimen of *C. irregularis* occurs at 108.30 R-mbsf and is consistent with our magnetostratigraphic interpretation. The LAD of *Cerebrocysta poulsenii* (103.58 R-mbsf/9.87 Ma (De Verteuil and Norris, 1996)) suggests a slightly older age than our interpretation, but its age assignment is tied to 67% of NN9, and a slight deviation from this relatively imprecise assignment would be consistent with our interpretation.

4.1.4 INTERVAL 107.15-122.11 R-mbsf, 13.30-14.29 Ma

This interval is equivalent with NSN1.6 and NSN1.5 of Goll (1989) (Fig. 4). Bleil (1989) did not provide a magnetostratigraphic interpretation for this interval due to insufficient biostratigraphic constraints. Our new biostratigraphic constraints (Table 1; Fig. 3; Fig. S1) indicate that the section 109.44-122.11 R-mbsf can be interpreted as a mostly complete sequence of reversals from C5ABn through C5ADn (Table 2; Fig. 3).

The interpretation of the overlying section 107.15-109.44 R-mbsf is less straightforward. A hiatus (H1.5/1.6) was proposed by Goll (1989) based on the absence of Radiolarian 'Interzone B' between 110.23 R-mbsf (12H-2, 105-107) and 111.73 R-mbsf (12H-3, 105-107) (Goll and Bjørklund, 1989). Silicoflagellate stratigraphy also indicates that a brief hiatus may exist between 109.88 R-mbsf (12H-2, 70-72) and 114.38 R-mbsf (12H-5, 70-72) (Ciesielski et al., 1989), based on the clustering of six HOs and five LOs between these two samples.

The presence of slump and debris flow deposits, alternating with normal pelagic sedimentation, between 109.18 and 113.23 R-mbsf suggests that this interval may in fact be characterized by multiple small hiatuses. Their total duration, combined with periods of deposition, is constrained by the top of C5ABr (111.64-112.04 R-mbsf/13.61 Ma) and the HO of *H. membraniphorum* (s.l.) (107.99 R-mbsf/13.27 Ma (Zegarra and Helenes, 2011)) and suggests a rapid alternation of deposition and non-deposition. The apparent low sedimentation rate within C5ABr could either indicate another small hiatus in this subchron, or, if representing continuous sedimentation, may have contributed to a mistaken hiatus assignment by Goll and Bjørklund (1989) and Ciesielski et al. (1989). We therefore conclude that this interval is best approximated by continuous sedimentation. In the absence of clear magnetostratigraphic or biostratigraphic constraints, we infer ages for this interval by upward extrapolation of the average sedimentation rate (15.1 m Myr^{-1}) between the top of C5ABr and hiatus H1.4/1.5 (see next paragraph). The onset of hiatus H1.6/2.1 is accordingly dated at 13.30 Ma, consistent with the HO of *H. membraniphorum* (s.l.).

Another hiatus (H1.4/1.5) was proposed by Goll (1989) at the bottom of H1.5 (Fig. 4). It was originally defined by the absence of the Radiolarian *Actinomma plasticum* Zone and *Cyrtocapsella kladaros* Subzone B between 121.72 R-mbsf (13H-3, 104-107) and 123.22 R-mbsf (13H-4, 104-107) (Goll and Bjørklund, 1989), suggesting the absence of ~250 ky (*C. kladaros* Subzone B is located above Subzone A, but is erroneously depicted below Subzone A in Fig. 2 of Goll and Bjørklund (1989)). We interpret this hiatus to fall within C5ADn, consistent with Bleil (1989). As a result, this hiatus cannot be constrained by magnetostratigraphy. Several dinocyst events occur around this depth, but they do not unambiguously indicate a hiatus. Based on descriptions and photographs of the core material, a sudden lithological change from diatom ooze to diatom ooze/diatomaceous mud occurs at 122.11 R-mbsf (13H-3, 143) (Shipboard Scientific Party, 1987). Consequently, we tentatively confirm a hiatus (H1.4/1.5; Table 2; Figs. 3 & 4) at this depth. The termination of this hiatus could theoretically be anywhere between its onset at 14.53 Ma (see sect. 4.1.5) and the top of C5ADn at 14.16 Ma. Here we chose to date it at 14.29 Ma, at 1/3 between these tie points, which results in a similar duration as suggested by Goll and Bjørklund (1989).

4.1.5 INTERVAL 122.11-143.82 R-mbsf, 14.53-15.04 Ma

The magnetostratigraphic interpretation in the interval 122.11-143.82 R-mbsf follows Bleil (1989) and includes a complete sequence of reversals from C5ADn through C5Bn.1r (Table 2; Fig. 3). Upward extrapolation of the average sedimentation rate between the top of C5Bn.1n and the top of C5ADr yields an age of 14.53 Ma for the onset of hiatus H1.4/1.5. A paleomagnetic reversed excursion is present from 122.24 through 123.34 R-mbsf, which could be synchronous with a similar tentative excursion reported by Sant et al. (2016) in the lower part of C5ADn in Serbia. Alternatively, the excursion could represent C5ADr and the underlying sequence would be interpreted as complete down to C5Br. Accordingly, this would imply an earlier onset and termination of hiatus H1.4/1.5 of 14.62 Ma and 14.32 Ma, as well as a minor change in the onset of hiatus H1.6/2.1, as this is calculated by upward extrapolation.

Both interpretations are in conflict with the FAD of *Achomosphaera andalousiensis* (127.40 R-mbsf/13.12 Ma (Dybkjær and Piasecki, 2010)) and the FAD of *Crucidenticula punctata* (130.20 R-mbsf/13.4 Ma (Barron Diatom Catalog in Lazarus et al., 2014)) (Table 1; Fig. 3; Fig. S1). The LO of *A. andalousiensis* occurs in an isolated sample, but its LPO occurs at 111.30 R-mbsf. This depth would be more, but not fully, consistent with the FAD of Dybkjær and Piasecki (2010). Our alternative interpretation is not supported by the FAD of *Denticulopsis hyalina* (134.70 R-mbsf/14.9 Ma (Barron et al., 1985a)) and the

FAD of *Unipontidinium aquaeductum* (136.74 R-mbsf/15.16 Ma (Bijl et al., 2018)) and we therefore prefer the original interpretation for this interval of Bleil (1989), which is supported by most biostratigraphic constraints.

Hiatus H1.2/1.4 (Fig. 4), reported at the bottom of this section (Goll, 1989), is primarily based on the absence of the Radiolarian *Cyrtocapsella eldholmi* Zone (Goll and Bjørklund, 1989), between 142.75 R-mbsf (15H-4 25-27) and 145.05 R-mbsf (15H-5 105-107), suggesting the absence of ~300 ky. The literature regarding diatom stratigraphy is confusing at best. Goll (1989) noted that the initial diatom stratigraphy (Shipboard Scientific Party, 1987) suggests a much longer hiatus (absence of the *Denticulopsis lauta* Zone (termed NNPD4) and possibly portions of the upper *Actinocyclus ingens* Zone (NNPD3) and lowermost *Denticulopsis hustedtii*/*D. lauta* Zone (NNPD5)). The absence of the *D. lauta* Zone was based on the concurrent LO of *D. lauta* and *D. hustedtii*. However, Ciesielski and Case (1989) have questionably adjusted the LO of *D. hustedtii* from 137.10 R-mbsf (14H-CC, 48-51) to 125.97 R-mbsf (13H-6, 69-71), rendering the diatom zonation scheme of the Shipboard Scientific Party (1987) problematic. In addition, the species *D. hustedtii* was later emended, so that *D. simonsenii* now includes specimens previously attributed to *D. hustedtii* (Yanagisawa and Akiba, 1990), making it unclear which species was found by the Shipboard Scientific Party (1987). Re-examination of the material is needed to clarify the taxonomy and stratigraphy of these taxa. Six silicoflagellate bioevents occur between 140.21 R-mbsf (15H-2, 71-73) and 150.20 R-mbsf (16H-2, 70-72) (Ciesielski et al., 1989), but none have been chronostratigraphically calibrated. A paleomagnetic reversal occurs between 143.46 R-mbsf and 143.86 R-mbsf. Finally, a 12 cm volcanic ash layer (Shipboard Scientific Party, 1987) is present between 143.88 and 144.00 R-mbsf (15H-4, 138-150).

We constrain the depth of this hiatus between the LOs of *D. lauta* and *Cestodiscus peplum* at 143.77 R-mbsf and the uppermost normal polarity sample below this depth at 143.86 R-mbsf, which we interpret as the truncated upper part of C5Cn.2n (see sect. 4.1.6). This puts the hiatus at 143.82 R-mbsf, just above the ash layer.

The termination of this hiatus falls within C5Bn.1r in our primary interpretation, identical to that of Bleil (1989). This subchron is probably mostly complete, as downward extrapolation of the sedimentation rate (15.7 m Myr^{-1}) between the overlying tie points suggests an age of 15.73 Ma, which is older than the onset of C5Bn.1r at 15.03 Ma. Any age much younger than 15.03 Ma at 143.46 R-mbsf would result in a sharp and unrealistic increase in sedimentation rate. We therefore assign an age of 15.03 Ma to 143.46 R-mbsf and arrive at an age of 15.04 Ma for the end of hiatus H1.2/2.4 (Table 2; Figs. 3 & 4), with the notion that this age could be slightly younger. Similarly, if the termination falls within C5Br in our alternative interpretation, we could infer a maximal age of 16.00 Ma for the end of H1.2/1.4 based on downward extrapolation between the top of C5Br and the truncated bottom of C5Br, but this would be inconsistent with the global FAD of *D. lauta* (143.77 R-mbsf/15.9 Ma (Barron Diatom Catalog in Lazarus et al., 2014)) and the more recent dating of 15.57-15.7 Ma by Cody et al. (2008) (Table S10). Our primary interpretation is therefore preferred.

4.1.6 INTERVAL 143.82-315.16 R-mbsf, 16.30-19.73 Ma

In contrast to Bleil (1989), who interpreted sedimentation to be continuous across hiatus H1.2/1.4, our new tephra $^{40}Ar/^{39}Ar$ ages, as well as the LAD of *Thalassiosira fraga* (157.85 R-mbsf/15.96 Ma (Pälike et al., 2010)) suggest that sediments below 143.82 R-mbsf are substantially older than above this depth (Fig. 3; Fig. S1). $^{40}Ar/^{39}Ar$ samples T1 and T2 suggest ages of 17.59 (2 SE: ± 0.94) Ma and 18.34 (2 SE: ± 1.79) Ma for 155.96 and 158.79 R-mbsf respectively. We therefore interpret the magnetostratigraphic record below 143.82 R-mbsf to represent a mostly complete reversal sequence from C5Cn.2n through C6r (Table 2; Fig. 3), which is consistent with available biostratigraphic constraints (Table 1; Fig. 3; Fig. S1). An assignment to older magnetochrons would lead to discrepancies with biostratigraphy.

Sediments directly below hiatus H1.2/1.4 are interpreted as the truncated top of C5Cn.2n. This subchron is probably mostly complete, as upward extrapolation of the sedimentation rate (19.7 m Myr^{-1}) between the underlying tie points suggests an age of 16.27 Ma, which is younger than the top of C5Cn.2n at 16.30 Ma. Any age much older than 16.30 Ma at 143.86 R-mbsf would result in a sharp and unrealistic increase in sedimentation rate. We therefore assign an age of 16.30 Ma to 143.86 R-mbsf and arrive at an age of 16.30 Ma for the onset of hiatus H1.2/1.4 (Table 2; Figs. 3 & 4), with the notion that this age could be slightly older.

NRM intensities below 143.82 R-mbsf are often less than 10^{-4} A m^{-1} and directional stability of the demagnetization data is often poor in this interval (Bleil, 1989). Our polarity interpretation of the inclination and declination signal, which mostly follows Bleil (1989), is therefore tentative at places. C5Dr.1n could not be unequivocally recognized and the top of C5Er may be linked to two different depths. These have therefore not been used as tie points.

The top of C6r is tentatively recognized at 314.65 R-mbsf between a continuously normal polarity section and a single reversed polarity sample, below which there are insufficient paleomagnetic samples for further interpretation.

4.1.7 INTERVAL 315.16-491.89 R-mbsf, 19.73-33.16 Ma

Age interpretation of this section relies on biostratigraphy only. A hiatus (H1.1/1.2) was tentatively proposed by Goll (1989) at the boundary of lithological units III and IV at 291.48 R-mbsf (Fig. 4), but we see no indication of a hiatus at this level. Unit IV was originally classified as monotonous terrigenous mudstones, contrasting the highly productive biogenic siliceous oozes and muds in Unit III (Shipboard Scientific Party, 1987). Sedimentation of the two units was interpreted to be separated by a period of (deep) burial and subsequent uplift and erosion. This interpretation was questioned by Henrich (1989), who concluded that the boundary was purely the result of diagenesis during early burial and compaction.

Goll (1989) found only limited evidence for the existence of a hiatus. The top of NSN1.1 was dated at ~19.7 Ma by extrapolation of the sedimentation rate, such that the LO of *Evittosphaerula paratabulata* (Manum et al., 1989) was coeval with this event at Hole 642D. However, the use of *E. paratabulata* as a regional marker may be problematic, as this species is known to occur in the Norwegian Sea from the middle Oligocene upwards (Manum, 1976; 1979). No other indications for a hiatus were found in biostratigraphy and we therefore assume that sedimentation was continuous across this boundary.

Our biostratigraphy-based age model for this section should be regarded as tentative only. Tie points were chosen that are consistent with available bioevents, while minimizing changes in sedimentation rate. Sedimentation rates above ~455.81 R-mbsf appear to have been higher (~20 m Myr^{-1}) than below this depth (~5.7 m Myr^{-1}). We include the top of C13n at 491.89 R-mbsf as a tie point to the Eocene-Oligocene age model for Hole 643A by Eldrett et al. (2004).

4.2 New bioevent ages and revised zonation

Our new age model (Fig. 4) allows a revised dating of bioevents at ODP Site 643. Bioevent ages are here derived from the mean depth between the lowest/highest sample with the presence of a species and the adjacent sample, in contrast to the bioevents previously used for constructing the age model. Revised ages for palynological samples are included in Table 3 and Table S6, while revised sample and bioevent ages for other microfossils can be obtained by applying our age model to stratigraphies of Donally (1989) (Calcareous nannofossils), Ciesielski et al. (1989) (Silicoflagellates), Spiegler and Jansen (1989) (Planktic foraminifera), Goll and Bjørklund (1989) (Radiolarians) and Osterman and Qvale (1989) (Benthic foraminifera). While the Shipboard Scientific Party (1987) included an initial diatom stratigraphy, adapted diatom events were presented by Ciesielski & Case (1989). Updated ages of bioevents initially used as broad constraints to interpret the magnetostratigraphy in this study are included in Table 1 and Fig. 5 (dinocysts only).

The integration of our new palynological results with palynostratigraphies of Manum et al. (1989) and Mudie (1989) leads to modifications to their dinocyst zonations. We therefore provisionally include a revised Oligocene-recent dinocyst zonation scheme (Table 3; Fig. 5). Here we only assess the occurrences of zonation boundary markers and refer to Manum et al. (1989) and Mudie (1989) for full discussions on zonation assemblages. Ages and depths for the following zones are updated based on this study and are depicted in Table 4.

4.2.1 *Islandinium minutum - Brigantedinium simplex* Zone

This zone follows the *Multispinula minuta – B. simplex* Zone of Mudie (1989), who defined the lower boundary by the LOs of *I. minutum* (as *M. minuta*) and *B. simplex*.

4.2.2 *Filisphaera filifera - Achomosphaera andalousiensis* Zone

This zone combines the *F. filifera* Zone and *A. andalousiensis* Zone of Mudie (1989), who defined the boundary between these zones by the LOs of *F. filifera* and *Tectatodinium pellitum* and the HO of *A. andalousiensis*. The determination of *T. pellitum* by Mudie (1989) has been questioned by Head (1994) and its LO may therefore not be applicable as a boundary marker. Both *F. filifera* and *T. pellitum* have been found to occur further downcore (Manum et al., 1989 and this study), while *A. andalousiensis* is found within the *F. filifera* Zone by Mudie (1989). The lower boundary is defined by HO of *U. aquaeductus*.

4.2.3 *Unipontidinium aquaeductus - Achomosphaera andalousiensis* Zone

This zone combines the *Impagidinium aquaeductum* Zone of Mudie (1989) and the *A. andalousiensis* Zone of Manum et al. (1989), who defined the lower boundary by the LO of *A. andalousiensis*. The lower boundary is here redefined by the LPO of *A. andalousiensis*, to exclude the isolated and possibly questionable occurrence further downcore of Mudie (1989).

4.2.4 *Unipontidinium aquaeductus* Zone

This zone mostly follows the *I. aquaeductum* Zone of Manum et al. (1989), who defined the lower boundary by the LO of *U. aquaeductus* (as *I. aquaeductum*). The lower boundary is here redefined by the LPO of *U. aquaeductus*, to exclude the isolated occurrence further downcore of Mudie (1989).

4.2.5 *Labyrinthodinium truncatum - Apteodinium spiridoides* Zone

This zone combines the *L. truncatum* Zone and *Emslandia spiridoides* Zone of Manum et al. (1989), who defined the boundary between these zones by the LO of *L. truncatum* and the HOs of *A. spiridoides* (as *E. spiridoides*) and *Cribroperidinium tenuitabulatum* as substitute. *L. truncatum* (s.s.) has been found to occur further downcore (Mudie, 1989 and this study), and *A. spiridoides* and *C. tenuitabulatum* have been found to occur near the top of the *L. truncatum* Zone (this study). The lower boundary is defined by the HO of *Cordosphaeridium cantharellus*.

4.2.6 *Impagidinium patulum* Zone

This zone mostly follows the *I. patulum* Zone of Manum et al. (1989), who defined the lower boundary by the LO of *I. patulum*. The lower boundary is here redefined by the LPO of *I. patulum*, to exclude the two isolated and possibly questionable occurrences further downcore of this study.

4.2.7 *Evittosphaerula paratabulata* Zone

This zone mostly follows the *E. paratabulata* Zone of Manum et al. (1989), who defined the lower boundary by the LO of *E. paratabulata*. The lower boundary is here redefined by the LPO of *E. paratabulata*, to exclude the isolated and questionable occurrence further downcore of this study. We note that the use of *E. paratabulata* as a regional marker may be problematic, as this species is known to occur in the Norwegian Sea from the middle Oligocene upwards (Manum, 1976; 1979).

4.2.8 *Cyclopsiella lusatica* Zone

This zone follows the *Ascostomocystis granosa* Zone of Manum et al. (1989), who defined the lower boundary by the LO of the acritarch *C. lusatica* (as *A. granosa*) and the LO of *Invertocysta tabulata* as substitute.

4.2.9 *Systematophora*? sp. 1 Zone

This zone follows the *Systematophora* sp. 1 Zone of Manum et al. (1989), who defined the lower boundary by the LO of *Systematophora*? sp. 1. The genus is here considered questionable.

4.2.10 *Leptodinium italicum* Zone

This zone follows the *Impagidinium* sp. 1 Zone of Manum et al. (1989), who defined the lower boundary by the LO of *L. italicum* (as *Impagidinium* sp. 1).

4.2.11 *Reticulatosphaera actinocoronata* Zone

This zone follows the *Areosphaeridium*? *actinocoronatum* Zone of Manum et al. (1989), who defined the lower boundary by the HO of *Enneadocysta arcuata* (as *Areosphaeridium arcuatum*).

4.2.12 *Chiropteridium lobospinosum* Zone

This zone mostly follows the *C. lobospinosum* Zone of Manum et al. (1989), who defined the lower boundary by the LO of *C. lobospinosum*, but included one lower sample without marker species 'by implication'. This sample, which is below the interval considered in this study, is here excluded from the *C. lobospinosum* Zone.

5 Conclusions

We present an improved biomagnetostratigraphic age model for Oligocene-recent sediments of ODP Hole 643A, which is confirmed by $^{40}Ar/^{39}Ar$ dating. Our revised age model is similar to the magnetostratigraphic interpretation of Bleil (1989) for Pleistocene to upper Miocene sediments, but indicates a substantially older age (~1.5 Myr) for middle and lower Miocene sediments. We confirm and refine four major hiatuses of Goll (1989), dated at 1.80-2.52 Ma, 9.90-13.30 Ma, 14.29-14.53 Ma and 15.04-16.30 Ma. Sedimentation is otherwise mostly continuous although sedimentation rates vary. Based on the revised age model, we update ages of bioevents and dinocyst zonal boundaries at ODP Hole 643A, which can be used as stratigraphic backbone for other Nordic Sea sites.

Data availability

All raw data associated with this paper are available in the Supplementary Tables and will be stored in the PANGAEA database upon publication of the paper.

Sample availability

Palynological slides processed for this study are stored in the collection of the Laboratory of Palaeobotany and Palynology, Department of Earth Sciences, Utrecht University, The Netherlands.

Author contributions

TJTV led the study and designed the research with FS and AS. TJTV, VBB and FS carried out the palynology. KFK performed $^{40}Ar/^{39}Ar$ dating and wrote the sections on this. TJTV compiled, integrated and interpreted the data with input from FS, KFK and AS. TJTV wrote the paper with input from all authors.

Competing interests

FS is a member of the editorial board of the journal. The other authors declare that they have no conflict of interest.

Acknowledgements

This research used samples and data provided by the International Ocean Discovery Program (IODP) and its predecessors. AS thanks the European Research Council for Consolidator Grant 771497 entitled SPANC. This work was carried out under the program of the Netherlands Earth System Science Centre (NESSC), financially supported by the Dutch Ministry of Education, Culture and Science. We thank Natasja Welters (Utrecht University) for laboratory assistance, Roel van Elsas (Vrije Universiteit Amsterdam) for his support with mineral separation and Chris van Baak (formerly Utrecht University; now CASP) and Martin Head (Brock University) for discussions.

References

Amigo, A.E., 1999. Miocene silicoflagellate stratigraphy: Iceland and Rockall Plateaus, in: Raymo, M.E., Jansen, E., Blum, P., Herbert, T.D. (Eds.), Proceedings of the Ocean Drilling Program, Scientific Results, Vol. 162. Ocean Drilling Program, College Station, TX, USA, pp. 63–81. https://doi.org/10.2973/odp.proc.sr.162.001.1999

Barron, J.A., Keller, G., Dunn, D.A., 1985a. A multiple microfossil biochronology for the Miocene, in: Kennett, J.P. (Ed.), The Miocene Ocean: Paleoceanography and Biogeography, Memoir 163. The Geological Society of America, Boulder, CO, USA, pp. 21–36.

Bijl, P.K., Houben, A.J.P., Bruls, A., Pross, J., Sangiorgi, F., 2018. Stratigraphic calibration of Oligocene–Miocene organic-walled dinoflagellate cysts from offshore Wilkes Land, East Antarctica, and a zonation proposal. J. Micropalaeontology 37, 105–138. https://doi.org/10.5194/jm-37-105-2018

Bjørklund, K.R., 1976. Radiolaria from the Norwegian Sea, Leg 38 of the Deep Sea Drilling Project, in: Talwani, M., Udintsev, G. (Eds.), Initial Reports of the Deep Sea Drilling Project, Vol. 38. U.S. Government Printing Office, Washington, D.C., USA, pp. 1101–1168. https://doi.org/10.2973/dsdp.proc.38.131.1976

Bleil, U., 1989. Magnetostratigraphy of Neogene and Quaternary sediment series from the Norwegian Sea: Ocean Drilling Program, Leg 104, in: Eldholm, O., Thiede, J., Taylor, E. (Eds.), Proceedings of the Ocean Drilling Program, Scientific Results, Vol. 104, Proceedings of the Ocean Drilling Program. Ocean Drilling Program, College Station, TX, USA, pp. 829–901. https://doi.org/10.2973/odp.proc.sr.104.1989

Brinkhuis, H., Munsterman, D.K., Sengers, S., Sluijs, A., Warnaar, J., Williams, G.L., 2003. Late Eocene–Quaternary Dinoflagellate Cysts from ODP Site 1168, off Western Tasmania, in: Exon, N.F., Kennett, J.P., Malone, M.J. (Eds.), Proceedings of the Ocean Drilling Program, Scientific Results, Vol. 189. Ocean Drilling Program, College Station, TX, USA, pp. 1–36. https://doi.org/10.2973/odp.proc.sr.189.105.2003

Bruns, P., Dullo, W.-C., Hay, W.W., Frank, M., Kubik, P., 1998. Hiatuses on Vøring Plateau: sedimentary gaps or preservation artifacts? Mar. Geol. 145, 61–84. https://doi.org/10.1016/S0025-3227(97)00111-4

Channell, J.E.T., Amigo, A.E., Fronval, T., Rack, F., Lehman, B., 1999. Magnetic stratigraphy at Sites 907 and 985 in the Norwegian-Greenland Sea and a revision of the Site 907 composite section, in: Raymo, M.E., Jansen, E., Blum, P., Herbert, T.D. (Eds.), Proceedings of the Ocean Drilling Program, Scientific Results, Vol. 162. Ocean Drilling Program, College Station, TX, USA, pp. 131–148. https://doi.org/10.2973/odp.proc.sr.162.036.1999

Ciesielski, P.F., Case, S.M., 1989. Neogene Paleoceanography of the Norwegian Sea Based Upon Silicoflagellate Assemblage Changes in ODP Leg 104 Sedimentary Sequences, in: Eldholm, O., Thiede, J., Taylor, E. (Eds.), Proceedings of the Ocean Drilling Program, Scientific Results, Vol. 104. Ocean Drilling Program, College Station, TX, USA, pp. 527–541. https://doi.org/10.2973/odp.proc.sr.104.166.1989

Ciesielski, P.F., Hasson, P., Turner Jr., J.W., 1989. The Stratigraphy of Neogene Silicoflagellates from the Norwegian Sea, ODP Leg 104, in: Eldholm, O., Thiede, J., Taylor, E. (Eds.), Proceedings of the Ocean Drilling Program, Scientific Results, Vol. 104. Ocean Drilling Program, College Station, TX, USA, pp. 497–525. https://doi.org/10.2973/odp.proc.sr.104.164.1989

Cody, R.D., Levy, R.H., Harwood, D.M., Sadler, P.M., 2008. Thinking outside the zone: High-resolution quantitative diatom biochronology for the Antarctic Neogene. Palaeogeogr. Palaeoclimatol. Palaeoecol. 260, 92–121. https://doi.org/10.1016/j.palaeo.2007.08.020

De Schepper, S., Beck, K.M., Mangerud, G., 2017. Late Neogene dinoflagellate cyst and acritarch biostratigraphy for Ocean Drilling Program Hole 642B, Norwegian Sea. Rev. Palaeobot. Palynol. 236, 12–32. https://doi.org/10.1016/j.revpalbo.2016.08.005

De Schepper, S., Schreck, M., Beck, K.M., Matthiessen, J., Fahl, K., Mangerud, G., 2015. Early Pliocene onset of modern Nordic Seas circulation related to ocean gateway changes. Nat. Commun. 6, 8659. https://doi.org/10.1038/ncomms9659 de Verteuil, L., Norris, G., 1996. Miocene Dinoflagellate Stratigraphy and Systematics of Maryland and Virginia. Micropaleontology 42 Suppl., 186. https://doi.org/10.2307/1485926

Despraires, A., Maury, R.C., Joron, J.-L., Bohn, M., Tremblay, P., 1989. Distribution, Chemical Characteristics, and Origin of Ash Layers from ODP Leg 104, Vøring Plateau, North Atlantic, in: Eldholm, O., Thiede, J., Taylor, E. (Eds.), Proceedings of the Ocean Drilling Program, Scientific Results, Vol. 104. Ocean Drilling Program, College Station, TX, USA, pp. 337–356. https://doi.org/10.2973/odp.proc.sr.104.120.1989

Dickens, G.R., Backman, J., 2013. Core alignment and composite depth scale for the lower Paleogene through uppermost Cretaceous interval at Deep Sea Drilling Project Site 577. Newsletters Stratigr. 46, 47–68. https://doi.org/10.1127/0078-0421/2013/0027

Donnally, D.M., 1989. Calcareous Nannofossils of the Norwegian-Greenland Sea: ODP Leg 104, in: Eldholm, O., Thiede, J., Taylor, E. (Eds.), Proceedings of the Ocean Drilling Program, Scientific Results, Vol. 104. Ocean Drilling Program, College Station, TX, USA, pp. 459–486. https://doi.org/10.2973/odp.proc.sr.104.156.1989

Dybkjær, K., Piasecki, S., 2010. Neogene dinocyst zonation for the eastern North Sea Basin, Denmark. Rev. Palaeobot. Palynol. 161, 1–29. https://doi.org/10.1016/j.revpalbo.2010.02.005

Dzinoridze, R.N., Jousé, A.P., Koroleva-Golikova, G.S., Kozlova, G.E., Nagaeva, G.S., Petrushevskaya, M.G., Strelnikova, N.I., 1978. Diatom and Radiolarian Cenozoic Stratigraphy, Norwegian Basin; DSDP Leg 38, in: Talwani, M., Udintsev, G. (Eds.), Initial Reports of the Deep Sea Drilling Project, Vol. 38, 39, 40, 41 (Suppl.). U.S. Government Printing Office, Washington, D.C., USA, pp. 289–427. https://doi.org/10.2973/dsdp.proc.38394041s.119.1978

Ehlers, B.-M., Jokat, W., 2013. Paleo-bathymetry of the northern North Atlantic and consequences for the opening of the Fram Strait. Mar. Geophys. Res. 34, 25–43. https://doi.org/10.1007/s11001-013-9165-9

Eldrett, J.S., Harding, I.C., Firth, J. V., Roberts, A.P., 2004. Magnetostratigraphic calibration of Eocene–Oligocene dinoflagellate cyst biostratigraphy from the Norwegian–Greenland Sea. Mar. Geol. 204, 91–127. https://doi.org/10.1016/S0025-3227(03)00357-8

Gascard, J.-C., Raisbeck, G., Sequeira, S., Yiou, F., Mork, K.A., 2004. The Norwegian Atlantic Current in the Lofoten basin inferred from hydrological and tracer data (129I) and its interaction with the Norwegian Coastal Current. Geophys. Res. Lett. 31, L01308. https://doi.org/10.1029/2003GL018303

Goll, R.M., 1989. A Synthesis of Norwegian Sea Biostratigraphies: ODP Leg 104 on the Vøring Plateau, in: Eldholm, O., Thiede, J., Taylor, E. (Eds.), Proceedings of the Ocean Drilling Program, Scientific Results, Vol. 104. Ocean Drilling Program, College Station, TX, USA, pp. 777–826. https://doi.org/10.2973/odp.proc.sr.104.203.1989

Goll, R.M., Bjørklund, K.R., 1989. A New Radiolarian Biostratigraphy for the Neogene of the Norwegian Sea: ODP Leg 104, in: Eldholm, O., Thiede, J., Taylor, E. (Eds.), Proceedings of the Ocean Drilling Program, Scientific Results, Vol. 104. Ocean Drilling Program, College Station, TX, USA, pp. 697–737. https://doi.org/10.2973/odp.proc.sr.104.205.1989

Gradstein, F.M., Ogg, J.G., Schmitz, M.D., Ogg, G.M., 2012. The Geologic Time Scale 2012. Elsevier, Amsterdam, The Netherlands. https://doi.org/10.1016/C2011-1-08249-8

Grøsfjeld, K., De Schepper, S., Fabian, K., Husum, K., Baranwal, S., Andreassen, K., Knies, J., 2014. Dating and palaeoenvironmental reconstruction of the sediments around the Miocene/Pliocene boundary in Yermak Plateau ODP Hole 911A using marine palynology. Palaeogeogr. Palaeoclimatol. Palaeoecol. 414, 382–402. https://doi.org/10.1016/j.palaeo.2014.08.028

Head, M.J., 1994. Morphology and Paleoenvironmental Significance of the Cenozoic Dinoflagellate Genera Tectatodinium and Habibacysta. Micropaleontology 40, 289–321. https://doi.org/10.2307/1485937

Henrich, R., 1989. Diagenetic Environments of Authigenic Carbonates and Opal-CT Crystallization in Lower Miocene to Upper Oligocene Deposits of the Norwegian Sea (ODP Site 643, Leg 104), in: Eldholm, O., Thiede, J., Taylor, E. (Eds.), Proceedings of the Ocean Drilling Program, Scientific Results, Vol. 104. Ocean Drilling Program, College Station, TX, USA, pp. 233–247. https://doi.org/10.2973/odp.proc.sr.104.119.1989

Hull, D.M., Osterman, L.E., Thiede, J., 1996. Biostratigraphic Synthesis of Leg 151, North Atlantic-Arctic Gateways, in: Thiede, J., Myhre, A.M., Firth, J. V., Johnson, G.L., Ruddiman, W.F. (Eds.), Proceedings of the Ocean Drilling Program, Scientific Results, Vol. 151. Ocean Drilling Program, College Station, TX, USA, pp. 627–644. https://doi.org/10.2973/odp.proc.sr.151.146.1996

Jakobsson, M., Backman, J., Rudels, B., Nycander, J., Frank, M., Mayer, L., Jokat, W., Sangiorgi, F., O'Regan, M., Brinkhuis, H., King, J., Moran, K., 2007. The early Miocene onset of a ventilated circulation regime in the Arctic Ocean. Nature 447, 986–990. https://doi.org/10.1038/nature05924

Koç, N., Scherer, R.P., 1996. Neogene Diatom Biostratigraphy of the Iceland Sea Site 907, in: Thiede, J., Myhre, A.M., Firth, J. V., Johnson, G.L., Ruddiman, W.F. (Eds.), Proceedings of the Ocean Drilling Program, Scientific Results, Vol. 151. Ocean Drilling Program, College Station, TX, USA, pp. 61–74. https://doi.org/10.2973/odp.proc.sr.151.108.1996

Koppers, A.A.P., 2002. ArArCALC—software for 40Ar/39Ar age calculations. Comput. Geosci. 28, 605–619. https://doi.org/10.1016/S0098-3004(01)00095-4

Kuiper, K.F., Deino, A., Hilgen, F.J., Krijgsman, W., Renne, P.R., Wijbrans, J.R., 2008. Synchronizing Rock Clocks of Earth History. Science (80-.). 320, 500–504. https://doi.org/10.1126/science.1154339

Lazarus, D., Barron, J.A., Renaudie, J., Diver, P., Türke, A., 2014. Cenozoic Planktonic Marine Diatom Diversity and Correlation to Climate Change. PLoS One 9, e84857. https://doi.org/10.1371/journal.pone.0084857

Lee, J.-Y., Marti, K., Severinghaus, J.P., Kawamura, K., Yoo, H.-S., Lee, J.B., Kim, J.S., 2006. A redetermination of the isotopic abundances of atmospheric Ar. Geochim. Cosmochim. Acta 70, 4507–4512. https://doi.org/10.1016/j.gca.2006.06.1563

Lisiecki, L.E., Herbert, T.D., 2007. Automated composite depth scale construction and estimates of sediment core extension. Paleoceanography 22, PA4213. https://doi.org/10.1029/2006PA001401

Locker, S., 1996. Cenozoic Siliceous Flagellates from the Fram Strait and the East Greenland Margin: Biostratigraphic and Paleoceanographic Results, in: Thiede, J., Myhre, A.M., Firth, J. V., Johnson, G.L., Ruddiman, W.F. (Eds.), Proceedings of the Ocean Drilling Program, Scientific Results, Vol. 151. Ocean Drilling Program, College Station, TX, USA, pp. 101–124. https://doi.org/10.2973/odp.proc.sr.151.102.1996

Locker, S., Martini, E., 1989. Cenozoic Silicoflagellates, Ebridians, and Actiniscidians from the Vøring Plateau (ODP Leg 104), in: Eldholm, O., Thiede, J., Taylor, E. (Eds.), Proceedings of the Ocean Drilling Program, Scientific Results, Vol. 104. Ocean Drilling Program, College Station, TX, USA, pp. 543–585. https://doi.org/10.2973/odp.proc.sr.104.204.1989

Lucchi, F., 2019. On the use of unconformities in volcanic stratigraphy and mapping: Insights from the Aeolian Islands (southern Italy). J. Volcanol. Geotherm. Res. 385, 3–26. https://doi.org/10.1016/j.jvolgeores.2019.01.014

Manum, S.B., Boulter, M.C., Gunnarsdottir, H., Rangnes, K., Scholze, A., 1989. Eocene to Miocene Palynology of the Norwegian Sea (ODP Leg 104), in: Eldholm, O., Thiede, J., Taylor, E. (Eds.), Proceedings of the Ocean Drilling Program, Scientific Results, Vol. 104. Ocean Drilling Program, College Station, TX, USA, pp. 611–662. https://doi.org/10.2973/odp.proc.sr.104.176.1989

Manum, S.B., 1976. Dinocysts in Tertiary Norwegian-Greenland Sea Sediments (Deep Sea Drilling Project Leg 38), with Observations on Palynomorphs and Palynodebris in Relation to Environment, in: Talwani, M., Udintsev, G. (Eds.), Initial Reports of the Deep Sea Drilling Project, Vol. 38. U.S. Government Printing Office, Washington, D.C., USA, pp. 897–919. https://doi.org/10.2973/dsdp.proc.38.129.1976

Manum, S.B., 1979. Two new Tertiary dinocyst genera from the Norwegian Sea: Lophocysta and Evittosphaerula. Rev. Palaeobot. Palynol. 28, 237–248. https://doi.org/10.1016/0034-6667(79)90026-5

Martini, E., Müller, C., 1976. Eocene to Pleistocene Silicoflagellates from the Norwegian-Greenland Sea (DSDP Leg 38), in: Talwani, M., Udintsev, G. (Eds.), Initial Reports of the Deep Sea Drilling Project, Vol. 38. U.S. Government Printing Office, Washington, D.C., USA, pp. 857–895. https://doi.org/10.2973/dsdp.proc.38.128.1976

Matthiessen, J., Knies, J., Vogt, C., Stein, R., 2009. Pliocene palaeoceanography of the Arctic Ocean and subarctic seas. Philos. Trans. R. Soc. A Math. Phys. Eng. Sci. 367, 21–48. https://doi.org/10.1098/rsta.2008.0203

Min, K., Mundil, R., Renne, P.R., Ludwig, K.R., 2000. A test for systematic errors in 40Ar/39Ar geochronology through comparison with U/Pb analysis of a 1.1-Ga rhyolite. Geochim. Cosmochim. Acta 64, 73–98. https://doi.org/10.1016/S0016-7037(99)00204-5

Mudie, P.J., 1989. Palynology and Dinocyst Biostratigraphy of the Late Miocene to Pleistocene, Norwegian Sea: ODP Leg 104, Sites 642 to 644, in: Eldholm, O., Thiede, J., Taylor, E. (Eds.), Proceedings of the Ocean Drilling Program, Scientific Results, Vol. 104. Ocean Drilling Program, College Station, TX, USA, pp. 587–610. https://doi.org/10.2973/odp.proc.sr.104.174.1989

Müller-Michaelis, A., Uenzelmann-Neben, G., 2014. Development of the Western Boundary Undercurrent at Eirik Drift related to changing climate since the early Miocene. Deep. Res. Part I Oceanogr. Res. Pap. 93, 21–34. https://doi.org/10.1016/j.dsr.2014.07.010

Murphy, M.A., Salvador, A., 1988. Unconformity-bounded stratigraphic units: Discussion and reply. Geol. Soc. Am. Bull. 100, 155–156. https://doi.org/10.1130/0016-7606(1988)100<0155:UBSUDA>2.3.CO;2

Newton, A.M.W., Huuse, M., Brocklehurst, S.H., 2018. A Persistent Norwegian Atlantic Current Through the Pleistocene Glacials. Geophys. Res. Lett. 45, 5599–5608. https://doi.org/10.1029/2018GL077819

Ogg, J.G., 2012. Geomagnetic Polarity Time Scale, in: Gradstein, F.M., Ogg, J.G., Schmitz, M.D., Ogg, G.M. (Eds.), The Geologic Time Scale 2012. Elsevier, Amsterdam, The Netherlands, pp. 85–113. https://doi.org/10.1016/B978-0-444-59425-9.00005-6

Osterman, L.E., Qvale, G., 1989. Benthic Foraminifers from the Vøring Plateau (ODP Leg 104), in: Eldholm, O., Thiede, J., Taylor, E. (Eds.), Proceedings of the Ocean Drilling Program, Scientific Results, Vol. 104. Ocean Drilling Program, College Station, TX, USA, pp. 745–768. https://doi.org/10.2973/odp.proc.sr.104.159.1989

Pälike, H., Lyle, M., Nishi, H., Raffi, I., Gamage, K., Klaus, A., the Expedition 320/321 Scientists, 2010. Proceedings of the Integrated Ocean Drilling Program, vol. 320/321. Integrated Ocean Drilling Program Management International, Inc., Tokyo, Japan.

Parker, W.C., Feldman, A., Arnold, A.J., 1999. Paleobiogeographic patterns in the morphologic diversification of the Neogene planktonic foraminifera. Palaeogeogr. Palaeoclimatol. Palaeoecol. 152, 1–14. https://doi.org/10.1016/S0031-0182(99)00049-8

Phillips, D., Matchan, E.L., 2013. Ultra-high precision 40Ar/39Ar ages for Fish Canyon Tuff and Alder Creek Rhyolite sanidine: New dating standards required? Geochim. Cosmochim. Acta 121, 229–239. https://doi.org/10.1016/j.gca.2013.07.003

Piasecki, S., 2003. Neogene dinoflagellate cysts from Davis Strait, offshore West Greenland. Mar. Pet. Geol. 20, 1075–1088. https://doi.org/10.1016/S0264-8172(02)00089-2

Poulsen, N.E., Manum, S.B., Williams, G.L., Ellegaard, M., 1996. Tertiary Dinoflagellate Biostratigraphy of Sites 907, 908, and 909 in the Norwegian-Greenland Sea, in: Thiede, J., Myhre, A.M., Firth, J. V., Johnson, G.L., Ruddiman, W.F. (Eds.), Proceedings of the Ocean Drilling Program, Scientific Results, Vol. 151. Ocean Drilling Program, College Station, TX, USA, pp. 255–287. https://doi.org/10.2973/odp.proc.sr.151.110.1996

Raymo, M.E., Jansen, E., Blum, P., Herbert, T.D., 1999. Proceedings of the Ocean Drilling Program, Scientific Results, vol. 162. Ocean Drilling Program, College Station, TX, USA.

Ruban, D.A., 2015. Worldwide application of synthem stratigraphy in the 21st century: a bibliographical survey. Proc. Geol. Assoc. 126, 307–313. https://doi.org/10.1016/j.pgeola.2015.03.008

Salvador, A., 1987. Unconformity-bounded stratigraphic units. Geol. Soc. Am. Bull. 98, 232–237. https://doi.org/10.1130/0016-7606(1987)98<232:USU>2.0.CO;2

Sant, K., Mandic, O., Rundić, L., Kuiper, K.F., Krijgsman, W., 2018. Age and evolution of the Serbian Lake System: integrated results from Middle Miocene Lake Popovac. Newsletters Stratigr. 51, 117–143. https://doi.org/10.1127/nos/2016/0360

Schlitzer, R., 2016. Ocean Data View. https://odv.awi.de.

Schrader, H.-J., Fenner, J., 1976. Norwegian Sea Cenozoic Diatom Biostratigraphy and Taxonomy, in: Talwani, M., Udintsev, G. (Eds.), Initial Reports of the Deep Sea Drilling Project, Vol. 38. U.S. Government Printing Office, Washington, D.C., USA, pp. 921–1099. https://doi.org/10.2973/dsdp.proc.38.130.1976

Schrader, H.-J., Bjørklund, K.R., Manum, S.B., Martini, E., van Hinte, J., 1976. Cenozoic Biostratigraphy, Physical Stratigraphy and Paleooceanography in the Norwegian-Greenland Sea, DSDP Leg 38 Paleontological Synthesis, in: Talwani, M., Udintsev, G. (Eds.), Initial Reports of the Deep Sea Drilling Project, Vol. 38. U.S. Government Printing Office, Washington, D.C., USA, pp. 1197–1211. https://doi.org/10.2973/dsdp.proc.38.133.1976

Schreck, M., Matthiessen, J., Head, M.J., 2012. A magnetostratigraphic calibration of Middle Miocene through Pliocene dinoflagellate cyst and acritarch events in the Iceland Sea (Ocean Drilling Program Hole 907A). Rev. Palaeobot. Palynol. 187, 66–94. https://doi.org/10.1016/j.revpalbo.2012.08.006

Shipboard Scientific Party, 1987. Site 643: Norwegian Sea, in: Eldholm, O., Thiede, J., Taylor, E. (Eds.), Proceedings of the Ocean Drilling Program, Initial Reports, Vol. 104. Ocean Drilling Program, College Station, TX, USA, pp. 455–615. https://doi.org/10.2973/odp.proc.ir.104.105.1987

Smelror, M., 1999. Pliocene–Pleistocene and redeposited dinoflagellate cysts from the western Svalbard margin (Site 986): biostratigraphy, paleoenvironments, and sediment provenance, in: Raymo, M.E., Jansen, E., Blum, P., Herbert, T.D. (Eds.), Proceedings of the Ocean Drilling Program, Scientific Results, Vol. 162. Ocean Drilling Program, College Station, TX, USA, pp. 83–97. https://doi.org/10.2973/odp.proc.sr.162.011.1999

Spiegler, D., Jansen, E., 1989. Planktonic Foraminifer Biostratigraphy of Norwegian Sea Sediments: ODP Leg 104, in: Eldholm, O., Thiede, J., Taylor, E. (Eds.), Proceedings of the Ocean Drilling Program, Scientific Results, Vol. 104. Ocean Drilling Program, College Station, TX, USA, pp. 681–696. https://doi.org/10.2973/odp.proc.sr.104.157.1989

Vallé, F., Westerhold, T., Dupont, L.M., 2017. Orbital-driven environmental changes recorded at ODP Site 959 (eastern equatorial Atlantic) from the Late Miocene to the Early Pleistocene. Int. J. Earth Sci. 106, 1161–1174. https://doi.org/10.1007/s00531-016-1350-z

Verhoeven, K., Louwye, S., Eiríksson, J., De Schepper, S., 2011. A new age model for the Pliocene–Pleistocene Tjörnes section on Iceland: Its implication for the timing of North Atlantic–Pacific palaeoceanographic pathways. Palaeogeogr. Palaeoclimatol. Palaeoecol. 309, 33–52. https://doi.org/10.1016/j.palaeo.2011.04.001

Wilkens, R.H., Dickens, G.R., Tian, J., Backman, J., the Expedition 320/321 Scientists, 2013. Data report: revised composite depth scales for Sites U1336, U1337, and U1338, in: Pälike, H., Lyle, M.W., Nishi, H., Raffi, I., Gamage, K., Klaus, A., the Expedition 320/321 Scientists (Eds.), Proceedings of the Integrated Ocean Drilling Program, Vol. 320/321. Integrated Ocean Drilling Program Management International, Inc., Tokyo, Japan, p. 158. https://doi.org/10.2204/iodp.proc.320321.209.2013

Williams, G.L., Fensome, R.A., MacRae, R.A., 2017. The Lentin and Williams index of fossil dinoflagellates 2017 edition. Am. Assoc. Stratigr. Palynol. Contrib. Ser. 48.

Williams, G.L., Manum, S.B., 1999. Oligocene–early Miocene dinocyst stratigraphy of Hole 985A (Norwegian Sea), in: Raymo, M.E., Jansen, E., Blum, P., Herbert, T.D. (Eds.), Proceedings of the Ocean Drilling Program, Scientific Results, Vol. 162. Ocean Drilling Program, College Station, TX, USA, pp. 99–109. https://doi.org/10.2973/odp.proc.sr.162.030.1999

Wright, J.D., Miller, K.G., 1996. Control of North Atlantic Deep Water Circulation by the Greenland-Scotland Ridge. Paleoceanography 11, 157–170. https://doi.org/10.1029/95PA03696

Yanagisawa, Y., Akiba, F., 1990. Taxonomy and phylogeny of the three marine diatom genera, Crucidenticula, Denticulopsis and Neodenticula. Bull. Geol. Surv. Japan 41, 197–301.

Zegarra, M., Helenes, J., 2011. Changes in Miocene through Pleistocene dinoflagellates from the Eastern Equatorial Pacific (ODP Site 1039), in relation to primary productivity. Mar. Micropaleontol. 81, 107–121. https://doi.org/10.1016/j.marmicro.2011.09.005

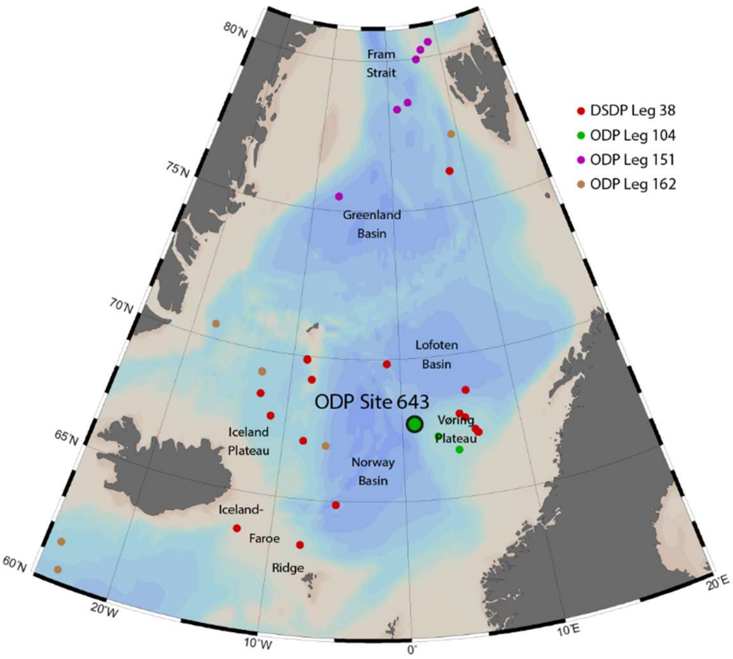
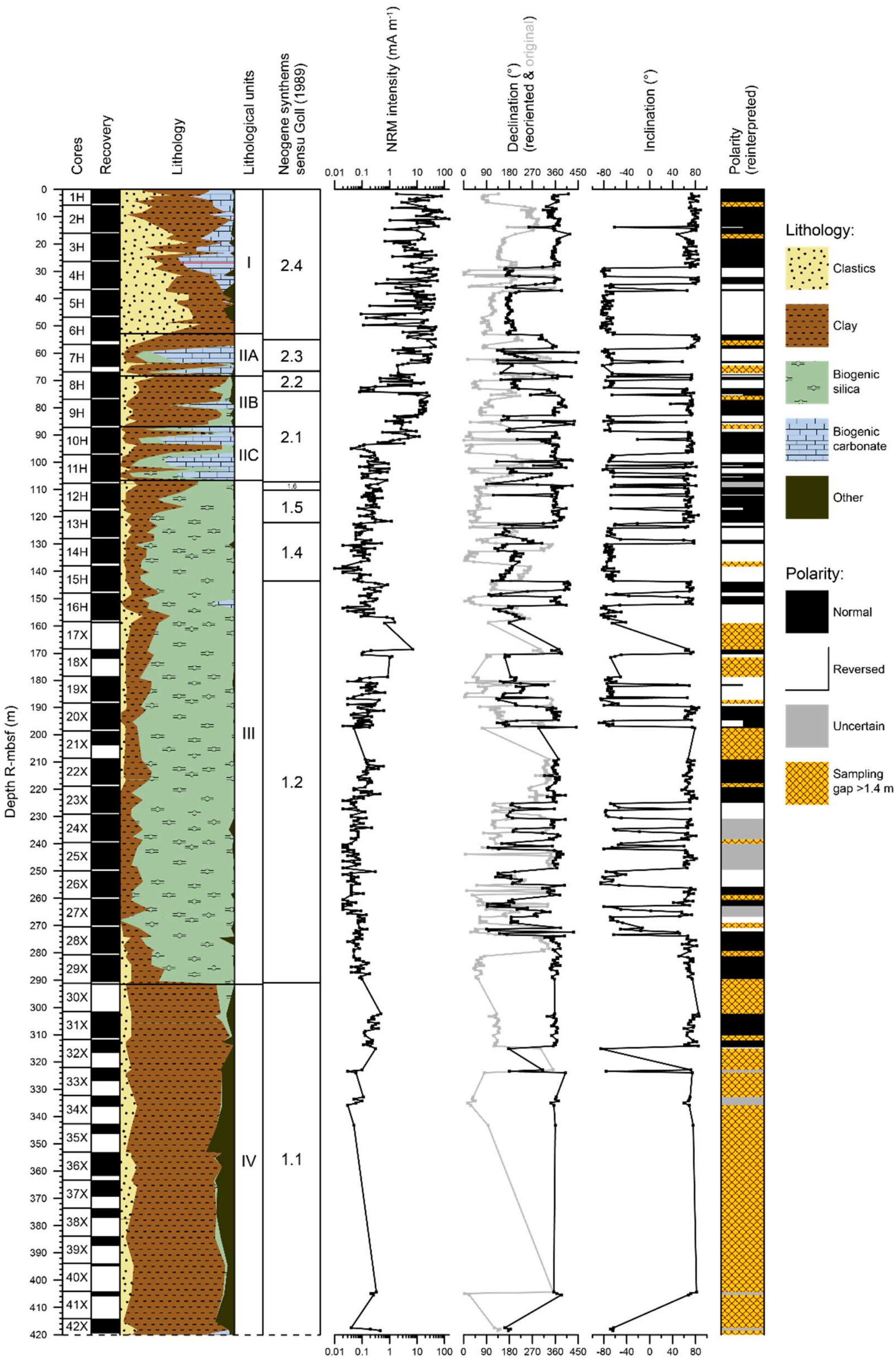


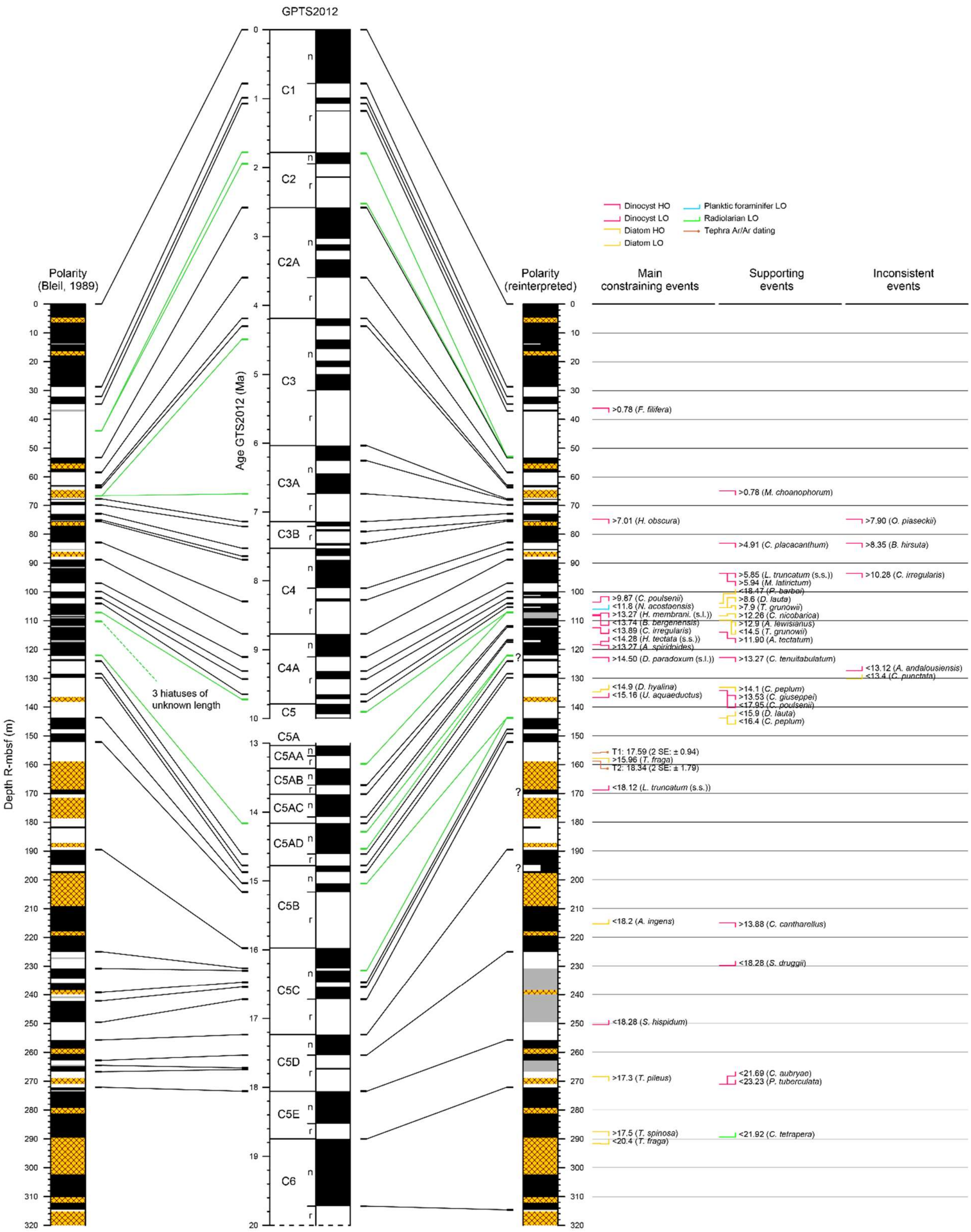
Figure 1: Map of the modern Nordic Seas with the location of ODP Site 643 and other DSDP and ODP Sites. Map generated with Ocean Data View (Schlitzer, 2016).

Figure 2: Recovery, lithology, synthems and polarity interpretation of ODP Hole 643A for the interval with paleomagnetic data. Recovery and lithology from the Shipboard Scientific Party (1987) (data available in Tables S1 and S2). Synthems according to Goll (1989). Original paleomagnetic data from Bleil (1989), with azimuthally reoriented declination and reinterpretation of the polarity signal from this study (data available in Table S12).



Cores
Recovery
Lithology
Lithological units
Neogene synthems sensu Goll (1989)
NRM intensity (mA m⁻¹)
Declination (°) (reoriented & original)
Inclination (°)
Polarity (reinterpreted)
Depth R-mbsf (m)
I
IIA
IIB
IIC
III
IV
2.4
2.3
2.2
2.1
1.6
1.5
1.4
1.2
1.1
Lithology:
Clastics
Clay
Biogenic silica
Biogenic carbonate
Other
Polarity:
Normal
Reversed
Uncertain
Sampling gap >1.4 m

Figure 3: Correlation of the paleomagnetic polarity signal to GPTS2012, with constraining ages (GTS2012, in Ma) of bioevents and $^{40}Ar/^{39}Ar$ dating (data available in Tables 1 and 2 and Tables S11 and S12). Bioevents are indicated at the depth of the lowest/highest sample with the presence of a species and ages indicate the global FAD/LAD (see sect. 2.4). Question marks indicate unexplained subchrons or excursions. Colours used for the polarity record are explained in Fig. 2. The correlation of Bleil (1989), updated to GPTS2012, is displayed for comparison.


GPTS2012
Polarity (Bleil, 1989)
Polarity (reinterpreted)
Main constraining events
Supporting events
Inconsistent events
Dinocyst HO
Dinocyst LO
Diatom HO
Diatom LO
Planktic foraminifer LO
Radiolarian LO
Tephra Ar/Ar dating
Depth R-mbsf (m)
Age GTS2012 (Ma)
3 hiatuses of unknown length
>0.78 (F. filifera)
>7.01 (H. obscura)
>9.87 (C. poulsenii)
<11.8 (N. acostaensis)
>13.27 (H. membrani. (s.l.))
<13.74 (B. bergenensis)
<13.89 (C. irregularis)
<14.28 (H. tectata (s.s.))
>13.27 (A. spiridoides)
>14.50 (D. paradoxum (s.l.))
<14.9 (D. hyalina)
<15.16 (U. aquaeductus)
T1: 17.59 (2 SE: ± 0.94)
>15.96 (T. fraga)
T2: 18.34 (2 SE: ± 1.79)
<18.12 (L. truncatum (s.s.))
<18.2 (A. ingens)
<18.28 (S. hispidum)
>17.3 (T. pileus)
>17.5 (T. spinosa)
<20.4 (T. fraga)
>0.78 (M. choanophorum)
>4.91 (C. placacanthum)
>5.85 (L. truncatum (s.s.))
>5.94 (M. latirictum)
<18.47 (P. barboi)
>8.6 (D. lauta)
>7.9 (T. grunowii)
>12.26 (C. nicobarica)
>12.9 (A. lewisianus)
<14.5 (T. grunowii)
>11.90 (A. tectatum)
>13.27 (C. tenuitabulatum)
>14.1 (C. peplum)
>13.53 (C. giuseppei)
<17.95 (C. poulsenii)
<15.9 (D. lauta)
<16.4 (C. peplum)
>13.88 (C. cantharellus)
<18.28 (S. druggii)
<21.69 (C. aubryae)
<23.23 (P. tuberculata)
<21.92 (C. tetrapera)
>7.90 (O. piaseckii)
>8.35 (B. hirsuta)
>10.28 (C. irregularis)
<13.12 (A. andalousiensis)
<13.4 (C. punctata)

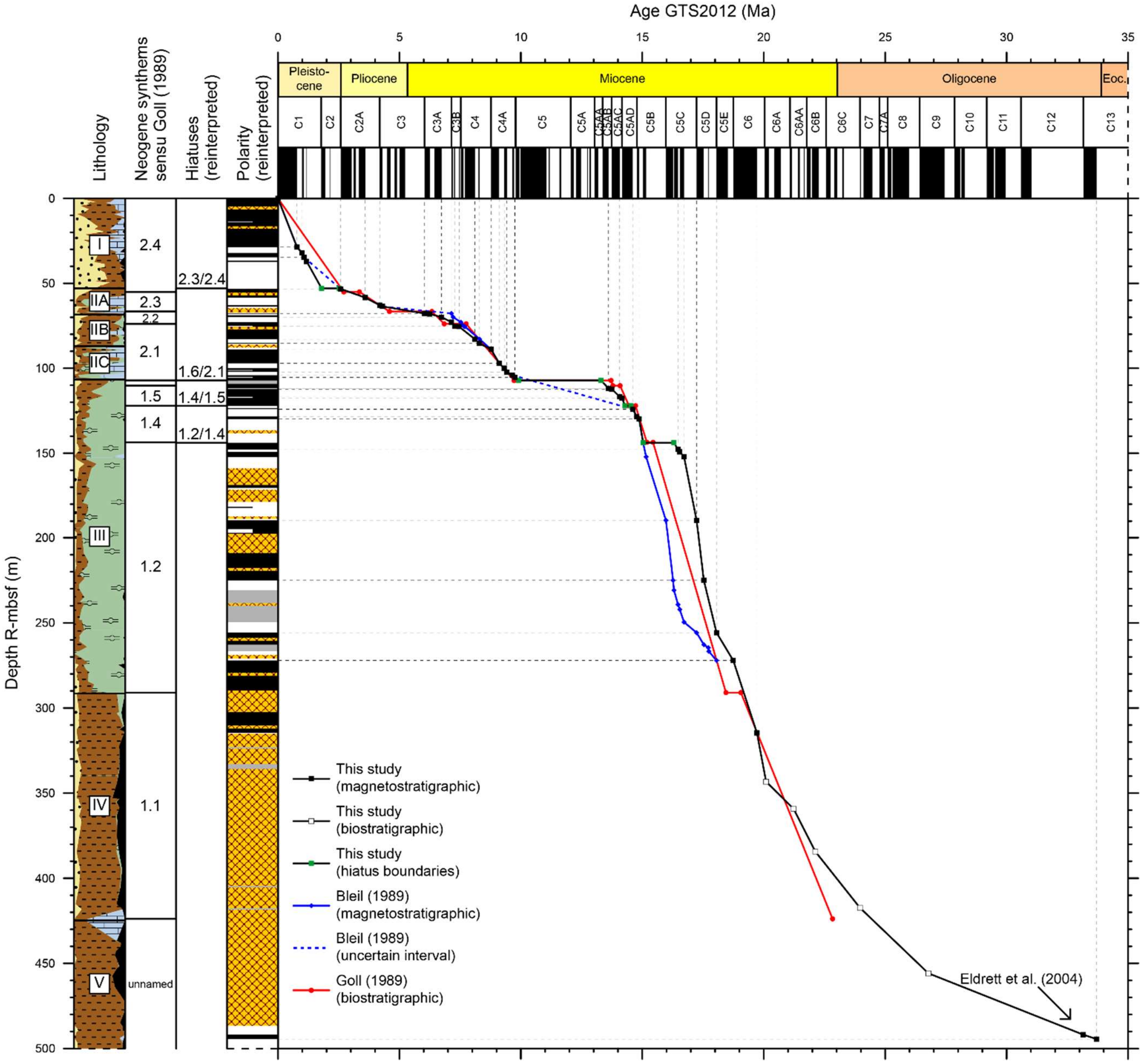


Figure 4: Age-depth plots for Oligocene to Recent sediments of ODP Hole 643A. Colours used for the lithology and the polarity record are explained in Fig. 2. Magnetostratigraphic tie points of Bleil (1989) are directly linked to GPTS2012 and tie points of Goll (1989) were updated to GTS2012 using linear interpolation between rescaled magnetic reversals.

Figure 5: Revised dinocyst bioevents and zonation of ODP Hole 643A, based on integration of new dinocyst counts with those of Manum et al. (1989) and Mudie (1989), calibrated to GTS2012 with the revised age model (data available in Tables 1, 3 and 4). Bioevent ages are derived from the mean depth between the lowest/highest sample with the presence of a species and the adjacent sample.

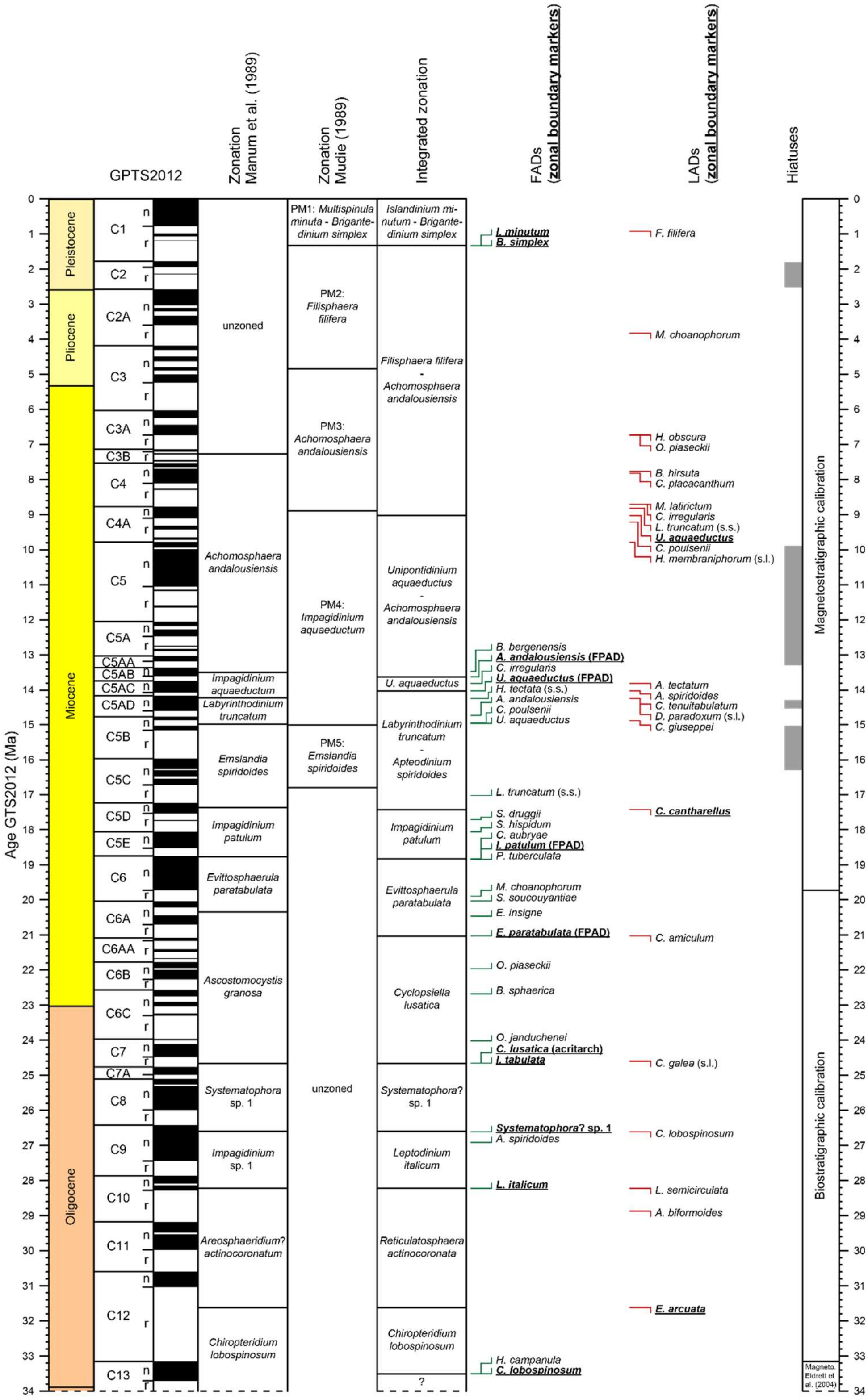

GPTS2012
Zonation Manum et al. (1989)
Zonation Mudie (1989)
Integrated zonation
FADs (zonal boundary markers)
LADs (zonal boundary markers)
Hiatuses
Age GTS2012 (Ma)
Pleistocene
Pliocene
Miocene
Oligocene
unzoned
Achomosphaera andalousiensis
Impagidinium aquaeductum
Labyrinthodinium truncatum
Emslandia spiridoides
Impagidinium patulum
Evittosphaerula paratabulata
Ascostomocystis granosa
Systematophora sp. 1
Impagidinium sp. 1
Areosphaeridium? actinocoronatum
Chiropteridium lobospinosum
PM1: Multispinula minuta - Brigantedinium simplex
PM2: Filisphaera filifera
PM3: Achomosphaera andalousiensis
PM4: Impagidinium aquaeductum
PM5: Emslandia spiridoides
Islandinium minutum - Brigantedinium simplex
Filisphaera filifera - Achomosphaera andalousiensis
Unipontidinium aquaeductus - Achomosphaera andalousiensis
U. aquaeductus
Labyrinthodinium truncatum - Apteodinium spiridoides
Impagidinium patulum
Evittosphaerula paratabulata
Cyclopsiella lusatica
Systematophora? sp. 1
Leptodinium italicum
Reticulatosphaera actinocoronata
Chiropteridium lobospinosum
I. minutum
B. simplex
B. bergenensis
A. andalousiensis (FPAD)
C. irregularis
U. aquaeductus (FPAD)
H. tectata (s.s.)
A. andalousiensis
C. poulsenii
U. aquaeductus
L. truncatum (s.s.)
S. druggii
S. hispidum
C. aubryae
I. patulum (FPAD)
P. tuberculata
M. choanophorum
S. soucouyantiae
E. insigne
E. paratabulata (FPAD)
O. piaseckii
B. sphaerica
O. janduchenei
C. lusatica (acritarch)
I. tabulata
Systematophora? sp. 1
A. spiridoides
L. italicum
H. campanula
C. lobospinosum
F. filifera
M. choanophorum
H. obscura
O. piaseckii
B. hirsuta
C. placacanthum
M. latirictum
C. irregularis
L. truncatum (s.s.)
U. aquaeductus
C. poulsenii
H. membraniphorum (s.l.)
A. tectatum
A. spiridoides
C. tenuitabulatum
D. paradoxum (s.l.)
C. giuseppei
C. cantharellus
C. amiculum
C. galea (s.l.)
C. lobospinosum
L. semicirculata
A. biformoides
E. arcuata
Magnetostratigraphic calibration
Biostratigraphic calibration
Magneto: Eldrett et al. (2004)

Table 1: Bioevents used for constraining the biomagnetostratigraphic interpretation. TS = This study, Ma = Manum et al. (1989), Mu = Mudie (1989), CC = Ciesielski and Case (1989), SP = Shipboard Scientific Party (1987), GB = Goll and Bjørklund (1989). Taxonomic and stratigraphic comments are listed in Tables S7 and S8. Sample depths are indicated by their top depth. References for global FADs and LADs are listed in Tables S9 and S10. Global FADs and LADs in bold are considered consistent with the revised age model, while those in italics are inconsistent.

Species reported by:	Microfossil	Event	Species	Upper sample				Lower sample				Upper sample (mbsf)	Lower sample (mbsf)	Upper sample (R-mbsf)	Lower sample (R-mbsf)	Mean depth (R-mbsf)	LO/HO depth (R-mbsf)	Global FAD/LAD (Ma)	Revised age at LO/HO depth (Ma)	Revised age at mean depth (Ma)	Revised age calibration	Comments in Table:
TS, Ma, Mu	Dc	LAD	*Filisphaera filifera*	3H	CC	W	18-20	4H	CC	W	9-11	24.610	33.980	25.920	36.120	31.020	36.120	**0.78**	**1.14**	0.92	Magn.	
TS, Ma, Mu	Dc	LAD	*Melitasphaeridium choanophorum*	6H	CC	W	7-9	7H	CC	W	7-9	51.890	60.760	55.440	64.810	60.125	64.810	**0.78**	**4.80**	3.82	Magn.	
TS, Ma, Mu	Dc	LAD	*Labyrinthodinium truncatum* (s.s.)	9H	CC	W	30-32	10H	5	W	31-33	81.640	87.610	86.690	93.570	90.130	93.570	**5.85**	**8.96**	8.82	Magn.	
TS, Ma, Mu	Dc	LAD	*Hystrichosphaeropsis obscura*	7H	CC	W	25-27	8H	6	W	48-50	60.940	70.280	64.990	74.830	69.910	74.830	**7.01**	**7.27**	6.74	Magn.	
TS, Ma, Mu	Dc	LAD	*Operculodinium piaseckii*	7H	CC	W	25-27	8H	6	W	48-50	60.940	70.280	64.990	74.830	69.910	74.830	*7.90*	*7.27*	6.74	Magn.	S7
TS, Ma, Mu	Dc	LAD	*Cleistosphaeridium placacanthum*	8H	CC	W	28-30	9H	5	W	30-32	71.580	78.100	76.130	83.150	79.640	83.150	**4.91**	**8.12**	7.82	Magn.	S7
TS, Ma	Dc	LAD	*Batiacasphaera hirsuta*	8H	6	W	48-50	9H	5	W	30-32	70.280	78.100	74.830	83.150	78.990	83.150	*8.35*	*8.12*	7.76	Magn.	S7
TS, Ma	Dc	LAD	*Minisphaeridium latirictum*	9H	5	W	30-32	10H	5	W	31-33	78.100	87.610	83.150	93.570	88.360	93.570	**5.94**	**8.96**	8.71	Magn.	
TS, Ma	Dc	LAD	*Cerebrocysta irregularis*	9H	5	W	30-32	10H	5	W	31-33	78.100	87.610	83.150	93.570	88.360	93.570	*10.28*	*8.96*	8.71	Magn.	S7
TS, Ma	Dc	LAD	*Cerebrocysta poulsenii*	10H	5	W	31-33	11H	5	W	30-32	87.610	97.100	93.570	103.580	98.575	103.580	**9.87**	**9.59**	9.21	Magn.	S7
CC	D	FAD	*Proboscia barboi*	11H	5	W	70-72	11H	6	W	70-72	97.500	99.000	103.980	105.480	104.730	103.980	**18.47**	**9.64**	9.70	Magn.	
CC	D	LAD	*Thalassiosira grunowii*	11H	5	W	70-72	11H	6	W	70-72	97.500	99.000	103.980	105.480	104.730	105.480	**7.9**	**9.76**	9.70	Magn.	
CC	D	LAD	*Denticulopsis lauta*	11H	5	W	70-72	11H	6	W	70-72	97.500	99.000	103.980	105.480	104.730	105.480	**8.6**	**9.76**	9.70	Magn.	
CC	PF	FAD	*Neogloboquadrina acostaensis*	11H	6	W	130-136	?				99.600	?	106.080	?	106.080	106.080	**11.8**	**9.81**	9.81	Magn.	
TS, Ma	Dc	LAD	*Hystrichostrogylon membraniphorum* (s.l.)	11H	5	W	30-32	12H	1	W	31-33	97.100	100.610	103.580	107.990	105.785	107.990	**13.27**	**13.35**	9.79	Magn.	
TS	Dc	FAD	*Batiacasphaera bergenensis*	12H	1	W	62-64	12H	3	W	62-64	100.920	103.920	108.300	111.300	109.800	108.300	**13.74**	**13.37**	13.47	Magn.	
CC	D	LAD	*Crucidenticula nicobarica*	11H	6	W	70-72	12H	1	W	70-72	99.000	101.000	105.480	108.380	106.930	108.380	**12.26**	**13.38**	9.88	Magn.	
CC	D	LAD	*Araniscus lewisianus*	11H	CC	W	46-49	12H	2	W	70-72	100.670	102.500	107.150	109.880	108.515	109.880	**12.9**	**13.48**	13.39	Magn.	
CC	D	FAD	*Thalassiosira grunowii*	12H	2	W	70-72	12H	3	W	70-72	102.500	104.000	109.880	111.380	110.630	109.880	**14.5**	**13.48**	13.53	Magn.	
TS, Ma	Dc	FAD	*Cerebrocysta irregularis*	12H	4	W	31-33	12H	5	W	31-33	105.110	106.610	112.490	113.990	113.240	112.490	**13.89**	**13.76**	13.81	Magn.	
TS, Ma	Dc	LAD	*Apteodinium tectatum*	12H	4	W	31-33	12H	5	W	31-33	105.110	106.610	112.490	113.990	113.240	113.990	**11.90**	**13.87**	13.81	Magn.	S7
TS, Ma, Mu	Dc	LAD	*Apteodinium spiridoides*	12H	5	W	31-33	13H	1	W	64-66	106.610	110.440	113.990	118.320	116.155	118.320	**13.27**	**14.19**	14.03	Magn.	
TS	Dc	FAD	*Habibacysta tectata* (s.s.)	13H	1	W	64-66	13H	4	W	62-64	110.440	114.920	118.320	122.800	120.560	118.320	**14.28**	**14.19**	14.25	Magn.	
TS, Ma	Dc	LAD	*Cribroperidinium tenuitabulatum*	13H	1	W	64-66	13H	4	W	62-64	110.440	114.920	118.320	122.800	120.560	122.800	**13.27**	**14.56**	14.25	Magn.	
TS, Ma	Dc	LAD	*Distatodinium paradoxum* (s.l.)	13H	1	W	64-66	13H	4	W	62-64	110.440	114.920	118.320	122.800	120.560	122.800	**14.50**	**14.56**	14.25	Magn.	
TS, Ma, Mu	Dc	FAD	*Achomosphaera andalousiensis*	13H	CC	W	20-22	13H	CC	W	28-30	119.520	119.600	127.400	127.480	127.440	127.400	*13.12*	*14.74*	14.74	Magn.	S7
CC	D	FAD	*Crucidenticula punctata*	14H	2	W	70-72	14H	3	W	70-72	121.500	123.000	130.200	131.700	130.950	130.200	*13.4*	*14.87*	14.88	Magn.	S8
CC	D	LAD	*Cestodiscus peplum*	14H	3	W	70-72	14H	4	W	70-72	123.000	124.500	131.700	133.200	132.450	133.200	**14.1**	**14.91**	14.90	Magn.	
TS, Ma	Dc	LAD	*Cribroperidinium giuseppei*	14H	1	W	68-70	14H	5	W	32-34	119.980	125.620	128.680	134.320	131.500	134.320	**13.53**	**14.92**	14.89	Magn.	
TS, Ma	Dc	FAD	*Cerebrocysta poulsenii*	14H	5	W	32-34	15H	1	W	68-70	125.620	129.480	134.320	138.680	136.500	134.320	**17.95**	**14.92**	14.95	Magn.	
CC	D	FAD	*Denticulopsis hyalina*	14H	5	W	70-72	14H	6	W	70-72	126.000	127.500	134.700	136.200	135.450	134.700	**14.9**	**14.93**	14.94	Magn.	S8
TS, Ma, Mu	Dc	FAD	*Unipontidinium aquaeductus*	14H	CC	W	12-14	15H	1	W	68-70	128.040	129.480	136.740	138.680	137.710	136.740	**15.16**	**14.95**	14.96	Magn.	
CC	D	FAD	*Denticulopsis lauta*	15H	4	W	127-129	15H	5	W	71-73	134.570	135.510	143.770	144.710	144.240	143.770	**15.9**	**15.04**	16.32	Magn.	
CC	D	FAD	*Cestodiscus peplum*	15H	4	W	127-129	15H	5	W	71-73	134.570	135.510	143.770	144.710	144.240	143.770	**16.4**	**15.04**	16.32	Magn.	
SP	D	LAD	*Thalassiosira fraga*	15H	CC	W	39-42	16H	CC	W	26-28	138.190	148.150	147.390	157.850	152.620	157.850	**15.96**	**16.80**	16.73	Magn.	
TS, Ma, Mu	Dc	FAD	*Labyrinthodinium truncatum* (s.s.)	18X	1	W	48-50	19X	1	W	50-52	157.780	167.300	168.860	178.880	173.870	168.860	**18.12**	**16.95**	17.02	Magn.	
TS, Ma	Dc	LAD	*Cordosphaeridium cantharellus*	22X	1	W	55-57	22X	5	W	30-32	195.850	201.600	209.170	214.920	212.045	214.920	**13.88**	**17.45**	17.42	Magn.	
CC	D	FAD	*Actinocyclus ingens*	22X	5	W	69-71	23X	2	W	70-72	201.990	207.300	215.310	221.120	218.215	215.310	**18.2**	**17.45**	17.48	Magn.	
TS	Dc	FAD	*Sumatradinium druggii*	24X	1	W	55-57	25X	1	W	52-54	215.450	225.220	229.790	240.060	234.925	229.790	**18.28**	**17.61**	17.70	Magn.	
TS	Dc	FAD	*Sumatradinium hispidum*	26X	1	W	52-54	27X	1	W	59-61	235.020	244.890	250.410	260.800	255.605	250.410	**18.28**	**17.97**	18.05	Magn.	
CC	D	LAD	*Triceratium pileus*	27X	2	W	70-72	27X	6	W	70-72	246.500	252.500	262.410	268.410	265.410	268.410	**17.3**	**18.59**	18.46	Magn.	
TS, Ma	Dc	FAD	*Cousteaudinium aubryae*	28X	1	W	52-54	28X	7	W	30-32	254.620	263.400	271.030	279.810	275.420	271.030	**21.69**	**18.70**	18.82	Magn.	
TS	Dc	FAD	*Pyxidinopsis tuberculata*	28X	1	W	52-54	29X	1	W	50-52	254.620	264.400	271.030	281.310	276.170	271.030	**23.23**	**18.70**	18.84	Magn.	
CC	D	LAD	*Thalassiosira spinosa*	29X	2	W	70-72	29X	5	W	70-72	266.100	270.600	283.010	287.510	285.260	287.510	**17.5**	**19.10**	19.05	Magn.	
GB	R	FAD	*Cyrtocapsella tetrapera*	29X	6	W	105-107	29X	CC	W	39-42	272.450	273.690	289.360	290.600	289.980	289.360	**21.92**	**19.14**	19.16	Magn.	S8
SP	D	FAD	*Thalassiosira fraga*	30X	CC	W	52-55	31X	CC	W	42-45	274.220	293.310	291.650	311.240	301.445	291.650	**20.4**	**19.20**	19.42	Magn.	S8
TS, Ma, Mu	Dc	FAD	*Melitasphaeridium choanophorum*	33X	1	W	62.5-64.5	34X	1	W	47.5-49.5	303.725	313.375	322.695	332.845	327.770	322.695	**22.96**	**19.83**	19.89	Bio.	
TS	Dc	FAD	*Sumatradinium soucouyantiae*	34X	1	W	47.5-49.5	35X	1	W	62-64	313.375	323.320	332.845	343.290	338.068	332.845	**21.69**	**19.96**	20.03	Bio.	
TS	Dc	FAD	*Exochosphaeridium insigne*	35X	1	W	62-64	36X	1	W	59-61	323.320	333.090	343.290	353.560	348.425	343.290	**20.10**	**20.10**	20.46	Bio.	
TS, Ma	Dc	LAD	*Caligodinium amiculum*	36X	1	W	59-61	36X	5	W	30-32	333.090	338.800	353.560	359.270	356.415	359.270	**21.23**	**21.23**	21.03	Bio.	S7
TS, Ma, Mu	Dc	FAD	*Operculodinium piaseckii*	38X	2	W	29-31	39X	1	W	30-32	353.890	362.100	375.360	384.070	379.715	375.360	*16.93*	*21.80*	21.96	Bio.	S7
TS, Ma, Mu	Dc	FAD	*Batiacasphaera sphaerica*	39X	1	W	55-57	41X	1	W	18-20	362.350	381.280	384.320	404.250	394.285	384.320	**22.12**	**22.12**	22.68	Bio.	
TS, Ma, Mu	Dc	FAD	*Operculodinium janduchenei*	42X	3	W	19-21	42X	4	W	19-21	393.890	395.390	417.360	418.860	418.110	417.360	**23.96**	**23.96**	24.02	Bio.	
TS, Ma, Mu	Dc	FAD	*Invertocysta tabulata*	42X	4	W	19-21	44X	1	W	30-32	395.390	410.300	418.860	434.770	426.815	418.860	**25.80**	**24.07**	24.65	Bio.	
Ma	Dc	LAD	*Chiropteridium galea* (s.l.)	42X	3	W	19-21	44X	1	W	30-32	393.890	410.300	417.360	434.770	426.065	434.770	**20.55**	**25.24**	24.60	Bio.	S7
Ma	Dc	LAD	*Chiropteridium lobospinosum*	45X	5	W	29-31	46X	1	W	82-84	425.990	430.220	451.080	455.810	453.445	455.810	**22.98**	**26.78**	26.60	Bio.	
TS, Ma, Mu	Dc	FAD	*Apteodinium spiridoides*	46X	1	W	82-84	46X	2	W	82-84	430.220	431.720	455.810	457.310	456.560	455.810	**30.58**	**26.78**	26.91	Bio.	
TS, Ma	Dc	FAD	*Leptodinium italicum*	46X	5	W	82-84	47X	1	W	90-92	436.220	440.000	461.810	466.140	463.975	461.810	**29.46**	**27.84**	28.22	Bio.	
Ma	Dc	LAD	*Licracysta semicirculata*	46X	5	W	82-84	47X	1	W	90-92	436.220	440.000	461.810	466.140	463.975	466.140	**25.82**	**28.60**	28.22	Bio.	
Ma	Dc	LAD	*Achilleodinium biformoides*	47X	1	W	90-92	47X	3	W	90-92	440.000	443.000	466.140	469.140	467.640	469.140	**25.99**	**29.13**	28.87	Bio.	
Ma	Dc	LAD	*Enneadocysta arcuata*	48X	5	W	90-92	48X	6	W	90-92	455.600	457.100	482.440	483.940	483.190	483.940	**30.82**	**31.75**	31.62	Bio.	
Ma	Dc	FAD	*Chiropteridium lobospinosum*	49X	4	W	30-32	50X	1	W	30-32	463.200	468.400	490.660	496.400	493.530	490.660	**33.16**	**32.94**	33.51	Magn.	
TS, Ma	Dc	FAD	*Heteraulacacysta campanula*	49X	4	W	30-32	50X	1	W	30-32	463.200	468.400	490.660	496.400	493.530	490.660	**37.99**	**32.94**	33.51	Magn.	

Table 2: Magnetostratigraphic and biostratigraphic tie points for the revised Oligocene to Recent age model of ODP Hole 643A. Hiatus ages are extrapolated from surrounding tie points. Notes: A. Extrapolated using minimal age of C4Ar.3r; B. Extrapolated using maximal age of C4Ar.3r; C. Sedimentation rate extrapolated from average between the top of C5ABr and H1.4/1.5; D. The termination of H1.4/1.5 could theoretically be anywhere between its onset at 14.533 Ma and the top of C5ADn at 14.163 Ma. Here dated at 14.286 Ma, at 1/3 between these tie points.

Tie point	Min. depth (R-mbsf)	Max. depth (R-mbsf)	Chosen depth (R-mbsf)	Min. age (Ma)	Max. age (Ma)	Chosen age (Ma)	Sed. rate (m Myr^{-1})	
Top C1n			0.000			0.000		I
							36.75	I
Top C1r.1r	28.500	28.900	28.700			0.781		I
							16.33	I
Top C1r.1n	31.900	32.260	32.080			0.988		I
							31.19	Sensu Bleil (1989)
Top C1r.2r	34.500	34.900	34.700			1.072		
							22.52	This study
Middle C1r.2n			37.110	1.173	1.185	1.179		I
							25.68	I
Truncated bottom C1r.3r			52.490		1.778	1.778		I
							25.68	I
H2.3/2.4			52.970	?	?	1.80 2.52		I I
							5.05	This study
Top C2An.1n	53.110	53.410	53.260			2.581		
							5.05	Sensu Bleil (1989)
Top C2Ar	58.190	58.590	58.390			3.596		I
							7.58	I
Top C3n.1n	62.640	63.100	62.870			4.187		I
							6.55	Sensu Bleil (1989)
Top C3n.1r	63.420	63.800	63.610			4.300		
							2.39	This study
Top C3An.1n	67.570	67.920	67.745			6.033		I
							1.51	I
Top C3An.1r	67.920	68.230	68.075			6.252		I
							3.75	I
Top C3Ar	69.660	70.100	69.880			6.733		I
							7.38	I
Top C3Bn	72.670	73.100	72.885			7.140		I
							15.31	I
Top C3Br.2r	74.930	75.280	75.105			7.285		I
							2.22	I
Top C3Br.2n	75.280	75.680	75.480			7.454		I
							11.36	I
Top C4r.1r	82.710	83.110	82.910			8.108		I
							14.20	I
Middle C4r.1n			85.310	8.254	8.300	8.277		I
							7.11	This study
Top C4An	88.620	89.020	88.820			8.771		
							24.58	Sensu Bleil (1989)
Top C4Ar.1r	96.520	97.540	97.030			9.105		I
							14.13	I
Top C4Ar.1n	99.740	100.140	99.940			9.311		I
							19.57	I
Top C4Ar.2r	102.040	102.340	102.190			9.426		I
							8.37	Sensu Bleil (1989)
Top C4Ar.2n	103.840	104.240	104.040			9.647		
							12.21	This study
Middle C4Ar.3r			105.340	9.721	9.786	9.754		I
							12.21	I
H1.6/2.1	107.150	107.990	107.150	9.82 A ?	9.98 B ?	9.90 13.30		I I
							15.14 C	I
Top C5ABr	111.640	112.040	111.840			13.608		I
							3.05	I
Top C5ACn	112.040	112.440	112.240			13.739		I
							13.61	I
Top C5ACr	116.540	116.950	116.745			14.070		I
							7.53	I
Top C5ADn	116.950	117.940	117.445			14.163		I
							37.81	I
H1.4/1.5	122.110	122.110	122.110	14.16	14.53	14.29 D 14.53		I I
							26.08	This study
Top C5ADr	123.940	124.240	124.090			14.609		
							26.08	Sensu Bleil (1989)
Top C5Bn.1n	128.260	128.580	128.420			14.775		I
							15.68	Sensu Bleil (1989)
Top C5Bn.1r	129.760	130.060	129.910			14.870		
							83.64	This study
Truncated bottom C5Bn.1r			143.460		15.032	15.032		I
							83.64	I
H1.2/1.4	143.770	143.860	143.815	? ?	? ?	15.04 16.30		I I
							23.08	I
Truncated Top C5Cn.2n			143.860	16.303		16.303		I
							23.08	I
Top C5Cn.2r	147.260	148.260	147.760			16.472		I
							19.72	I
Top C5Cn.3n	148.960	149.360	149.160			16.543		I
							16.85	I
Top C5Cr	151.960	152.360	152.160			16.721		I
							72.72	I
Top C5Dn	189.340	189.740	189.540			17.235		I
							119.09	I
Top C5Dr.1r	224.780	225.280	225.030			17.533		I
							58.74	I
Top C5En	255.250	256.250	255.750			18.056		I
							23.66	I
Top C6n	271.870	272.370	272.120			18.748		I
							43.66	I
Top C6r	314.130	315.160	314.645			19.722		I
							76.59	I
LO *E. insigne*			343.290		20.10	20.10		I
							14.08	I
HO *C. amiculum*			359.270	21.23		21.23		I
							28.07	I
LO *B. sphaerica*			384.320		22.12	22.12		I
							17.97	I
LO *O. janduchenei*			417.360		23.96	23.96		I
							13.66	I
HO *C. lobospinosum* & LO *A. spiridoides* mean			455.810	22.98	30.58	26.78		I
							5.66	This study
Top C13n	491.010	492.770	491.890			33.157		
							4.65	Sensu Eldrett et al. (2004)
Top C13r	493.810	495.070	494.440			33.705		I

Table 3: Integrated range chart of selected dinocyst and acritarch species, sorted by lowest occurrence. TS = This study, Ma = Manum et al. (1989), Mu = Mudie (1989). Species abundance is maximum of abundances if multiple species have been combined (Table S7): e.g. R + C = C. ? = uncertain determination, cf = specimens resembling the described species, r = suspected reworking. Species abundance: This study: A = abundant (>25%), C = common (2-25%), R = rare (<2%), - = not present. Percentage relative to total dinocysts. Manum et al. (1989): A = abundant (>25%), C = common (2-25%), R = rare (<2%), - = not present. Percentages relative to total marine palynomorphs. Mudie (1989): A = abundant (>49%), C = common (10-49%), R = rare to frequent (1-9%), - = not present. Percentages relative to total marine palynomorphs. Hashed fields indicate samples with species not reported on by Manum et al. (1989) or Mudie (1989), while their presence is likely in their studied interval, based on the counts by other authors, including this study. Events used in this study are indicated in grey, with solid lines indicating LO/HO and dashed lines indicating LPO/HPO.

Zonation Manum et al. (1989)	Zonation Mudie (1989)	Integrated zonation	Sample reference	Top depth (mbsf)	Top depth (R-mbsf)	Core	Section	Half	Interval (cm)	Revised age (Ma)
unzoned	PM1: *Multispinula minuta - Brigantedinium simplex*	*Islandinium minutum - Brigantedinium simplex*	Mu	3.010	3.010	1H	3	W	1-3	0.08
			Mu	5.240	5.240	1H	CC	W	18-20	0.14
			Mu	14.920	15.420	2H	CC	W	3-5	0.42
			Mu	24.460	25.770	3H	CC	W	3-5	0.70
			Mu	24.610	25.920	3H	CC	W	18-20	0.71
			Mu	33.980	36.120	4H	CC	W	9-11	1.14
	PM2: *Filisphaera filifera*	*Filisphaera filifera - Achomosphaera andalousiensis*	Mu	43.050	46.100	5H	CC	W	8-10	1.53
			Mu	43.230	46.280	5H	CC	W	26-28	1.54
			Mu	51.890	55.440	6H	CC	W	7-9	3.01
			Mu	60.760	64.810	7H	CC	W	7-9	4.80
	PM3: *Achomosphaera andalousiensis*		Mu	60.940	64.990	7H	CC	W	25-27	4.88
Achomosphaera andalousiensis			Ma	70.280	74.830	8H	6	W	48-50	7.27
			Mu	71.580	76.130	8H	CC	W	28-30	7.51
			Ma	78.100	83.150	9H	5	W	30-32	8.12
			Mu	81.430	86.480	9H	CC	W	9-11	8.44
			Mu	81.640	86.690	9H	CC	W	30-32	8.47
	?		Ma	87.610	93.570	10H	5	W	31-33	8.96
	PM4: *Impagidinium aquaeductum*	*Unipontidinium aquaeductus - Achomosphaera andalousiensis*	Mu	90.770	96.730	10H	CC	W	5-7	9.09
			Ma	97.100	103.580	11H	5	W	30-32	9.59
			Mu	100.630	107.110	11H	CC	W	42-44	9.90
			Ma	100.610	107.990	12H	1	W	31-33	13.35
?			TS	100.920	108.300	12H	1	W	62-64	13.37
			TS	103.920	111.300	12H	3	W	62-64	13.57
Impagidinium aquaeductum		*Unipontidinium aquaeductus*	Ma	105.110	112.490	12H	4	W	31-33	13.76
			Ma	106.610	113.990	12H	5	W	31-33	13.87
?		*Labyrinthodinium truncatum - Apteodinium spiridoides*	TS	110.440	118.320	13H	1	W	64-66	14.19
			TS	114.920	122.800	13H	4	W	62-64	14.56
Labyrinthodinium truncatum			Ma	117.610	125.490	13H	6	W	31-33	14.66
			Mu	119.520	127.400	13H	CC	W	20-22	14.74
			Mu	119.600	127.480	13H	CC	W	28-30	14.74
			TS	119.980	128.680	14H	1	W	68-70	14.79
			Ma	125.620	134.320	14H	5	W	32-34	14.92
?			Mu	128.040	136.740	14H	CC	W	12-14	14.95
	?		TS	129.480	138.680	15H	1	W	68-70	14.97
			TS	135.480	144.680	15H	5	W	68-70	16.34
Emslandia spiridoides			Ma	136.580	145.780	15H	6	W	28-30	16.39
	PM5: *Emslandia spiridoides*		Mu	138.140	147.340	15H	CC	W	34-36	16.45
			Mu	138.170	147.370	15H	CC	W	37-39	16.46
			Ma	138.600	148.300	16H	1	W	30-32	16.50
			TS	138.900	148.600	16H	1	W	60-62	16.51
			Mu	148.120	157.820	16H	CC	W	23-25	16.80
	unzoned		TS	148.240	158.820	17X	1	W	44-46	16.81
			Ma	157.610	168.690	18X	1	W	31-33	16.95
			TS	157.780	168.860	18X	1	W	48-50	16.95
			TS	167.300	178.880	19X	1	W	50-52	17.09
			Ma	174.600	186.180	19X	6	W	30-32	17.19
			TS	176.720	188.800	20X	1	W	42-44	17.22
			Ma	184.100	196.180	20X	6	W	30-32	17.29
?			TS	186.340	199.160	21X	1	W	54-56	17.32
			TS	195.850	209.170	22X	1	W	55-57	17.40
Impagidinium patulum		*Impagidinium patulum*	Ma	201.600	214.920	22X	5	W	30-32	17.45
			TS	205.650	219.470	23X	1	W	55-57	17.49
			Ma	211.400	225.220	23X	5	W	30-32	17.54
			TS	215.450	229.790	24X	1	W	55-57	17.61
			Ma	221.200	235.540	24X	5	W	30-32	17.71
			TS	225.220	240.060	25X	1	W	52-54	17.79
			Ma	226.500	241.340	25X	2	W	30-32	17.81
			Ma	232.500	247.340	25X	6	W	30-32	17.91
			TS	235.020	250.410	26X	1	W	52-54	17.97
			Ma	240.800	256.190	26X	5	W	30-32	18.07
			TS	244.890	260.800	27X	1	W	59-61	18.27
			Ma	250.610	266.520	27X	5	W	31-33	18.51
?			TS	254.620	271.030	28X	1	W	52-54	18.70
Evittosphaerula paratabulata		*Evittosphaerula paratabulata*	Ma	263.400	279.810	28X	7	W	30-32	18.92
			TS	264.400	281.310	29X	1	W	50-52	18.96
			Ma	271.700	288.610	29X	6	W	30-32	19.13
			TS	273.800	291.230	30X	CC	W	10-12	19.19
			TS	284.050	301.980	31X	1	W	55-57	19.43
			Ma	285.300	303.230	31X	2	W	30-32	19.46
			Ma	293.600	312.070	32X	1	W	30-32	19.66
			TS	293.800	312.270	32X	1	W	50-52	19.67
			Ma	303.630	322.600	33X	1	W	53-54	19.83
			TS	303.725	322.695	33X	1	W	62.5-64.5	19.83
			TS	313.375	332.845	34X	1	W	47.5-49.5	19.96
			Ma	314.700	334.170	34X	2	W	30-32	19.98
?			TS	323.320	343.290	35X	1	W	62-64	20.10
			TS	333.090	353.560	36X	1	W	59-61	20.83
Ascostomocystis granosa		*Cyclopsiella lusatica*	Ma	338.800	359.270	36X	5	W	30-32	21.23
			TS	342.870	363.840	37X	1	W	57-59	21.39
			Ma	345.500	366.470	37X	3	W	20-22	21.49
			TS	352.650	374.120	38X	1	W	55-57	21.76
			Ma	353.890	375.360	38X	2	W	29-31	21.80
			Ma	362.100	384.070	39X	1	W	30-32	22.11
			TS	362.350	384.320	39X	1	W	55-57	22.12
			Ma	381.280	404.250	41X	1	W	18-20	23.23
			Ma	390.890	414.360	42X	1	W	19-21	23.80
			Ma	392.390	415.860	42X	2	W	19-21	23.88
			Ma	393.890	417.360	42X	3	W	19-21	23.96
			Ma	395.390	418.860	42X	4	W	19-21	24.07
Systematophora sp. 1		*Systematophora*? sp. 1	Ma	410.300	434.770	44X	1	W	30-32	25.24
			Ma	411.800	436.270	44X	2	W	30-32	25.35
			Ma	413.300	437.770	44X	3	W	30-32	25.46
			Ma	414.800	439.270	44X	4	W	30-32	25.57
			Ma	417.800	442.270	44X	6	W	30-32	25.79
			Ma	421.490	446.580	45X	2	W	29-31	26.10
			Ma	424.490	449.580	45X	4	W	29-31	26.32
			Ma	425.990	451.080	45X	5	W	29-31	26.43
Impagidinium sp. 1		*Leptodinium italicum*	Ma	430.220	455.810	46X	1	W	82-84	26.78
			Ma	431.720	457.310	46X	2	W	82-84	27.04
			Ma	436.220	461.810	46X	5	W	82-84	27.84
Areosphaeridium? actinocoronatum		*Reticulatosphaera actinocoronata*	Ma	440.000	466.140	47X	1	W	90-92	28.60
			Ma	443.000	469.140	47X	3	W	90-92	29.13
			Ma	444.500	470.640	47X	4	W	90-92	29.40
			Ma	446.000	472.140	47X	5	W	90-92	29.66
			Ma	449.600	476.440	48X	1	W	90-92	30.43
			Ma	452.600	479.440	48X	3	W	90-92	30.96
			Ma	454.100	480.940	48X	4	W	90-92	31.22
			Ma	455.600	482.440	48X	5	W	90-92	31.49
Chiropteridium lobospinosum		*Chiropteridium lobospinosum*	Ma	457.100	483.940	48X	6	W	90-92	31.75
			Ma	458.700	486.160	49X	1	W	30-32	32.14
			Ma	460.200	487.660	49X	2	W	30-32	32.41
			Ma	461.700	489.160	49X	3	W	30-32	32.67
			Ma	463.200	490.660	49X	4	W	30-32	32.94
		?	*Ma*	*468.400*	*496.400*	*50X*	*1*	*W*	*30-32*	
and deeper occurrences in Manum et al. (1989) or Eldrett et al. (2004)										

Species used for constraining age model																																						Additional zonal markers						
Achilleodinium biformoides	*Licracysta semicirculata*	*Cleistosphaeridium placacanthum*	*Cordosphaeridium cantharellus*	*Enneadocysta arcuata*	*Distatodinium paradoxum* (s.l.)	*Chiropteridium lobospinosum*	*Heteraulacacysta campanula*	*Chiropteridium galea* (s.l.)	*Leptodinium italicum*	*Minisphaeridium latirictum*	*Apteodinium spiridoides*	*Caligodinium amiculum*	*Invertocysta tabulata*	*Operculodinium janduchenei*	*Batiacasphaera hirsuta*	*Batiacasphaera sphaerica*	*Operculodinium piaseckii*	*Cribroperidinium tenuitabulatum*	*Apteodinium tectatum*	*Hystrichosphaeropsis obscura*	*Exochosphaeridium insigne*	*Sumatradinium soucouyantiae*	*Melitasphaeridium choanophorum*	*Cribroperidinium giuseppei*	*Pyxidinopsis tuberculata*	*Cousteaudinium aubryae*	*Filisphaera filifera*	*Sumatradinium hispidum*	*Hystrichostrogylon membraniphorum* (s.l.)	*Sumatradinium druggii*	*Labyrinthodinium truncatum* (s.s.)	*Unipontidinium aquaeductus*	*Cerebrocysta poulsenii*	*Achomosphaera andalousiensis*	*Habibacysta tectata* (s.s.)	*Cerebrocysta irregularis*	*Batiacasphaera bergenensis*	*Systematophora ?* sp. 1	*Cyclopsiella lusatica* (acritarch)	*Invertocysta tabulata*	*Evittosphaerula paratabulata*	*Impagidinium patulum*	*Islandinium minutum*	*Brigantedinium simplex*

Table 4: Revised zonation boundaries and markers. Sample depths are indicated by their top depth.

Zone	Event	Species	Upper sample	Lower sample	Upper sample (mbsf)	Lower sample (mbsf)	Upper sample (R-mbsf)	Lower sample (R-mbsf)	Mean depth (R-mbsf)	Revised age at mean depth (Ma)
Islandinium minutum - Brigantedinium simplex										
	FAD FAD	*Islandinium minutum* *Brigantedinium simplex*	4H CC W 9-11	5H CC W 8-10	33.980	43.050	36.120	46.100	41.110	1.33
Filisphaera filifera - Achomosphaera andalousiensis										
	LAD	*Unipontidinium aquaeductus*	10H 5 W 31-33	10H CC W 5-7	87.610	90.770	93.570	96.730	95.150	9.03
Unipontidinium aquaeductus - Achomosphaera andalousiensis										
	FPAD	*Achomosphaera andalousiensis*	12H 3 W 62-64	12H 4 W 31-33	103.920	105.110	111.300	112.490	111.895	13.63
Unipontidinium aquaeductus										
	FPAD	*Unipontidinium aquaeductus*	12H 5 W 31-33	13H 1 W 64-66	106.610	110.440	113.990	118.320	116.155	14.03
Labyrinthodinium truncatum - Apteodinium spiridoides										
	LAD	*Cordosphaeridium cantharellus*	22X 1 W 55-57	22X 5 W 30-32	195.850	201.600	209.170	214.920	212.045	17.42
Impagidinium patulum										
	FPAD	*Impagidinium patulum*	28X 1 W 52-54	28X 7 W 30-32	254.620	263.400	271.030	279.810	275.420	18.82
Evittosphaerula paratabulata										
	FPAD	*Evittosphaerula paratabulata*	36X 1 W 59-61	36X 5 W 30-32	333.090	338.800	353.560	359.270	356.415	21.03
Cyclopsiella lusatica										
	FAD FAD	*Cyclopsiella lusatica* (acritarch) *Invertocysta tabulata*	42X 4 W 19-21	44X 1 W 30-32	395.390	410.300	418.860	434.770	426.815	24.65
Systematophora ? sp. 1										
	FAD	*Systematophora* ? sp. 1	45X 5 W 29-31	46X 1 W 82-84	425.990	430.220	451.080	455.810	453.445	26.60
Leptodinium italicum										
	FAD	*Leptodinium italicum*	46X 5 W 82-84	47X 1 W 90-92	436.220	440.000	461.810	466.140	463.975	28.22
Reticulatosphaera actinocoronata										
	LAD	*Enneadocysta arcuata*	48X 5 W 90-92	48X 6 W 90-92	455.600	457.100	482.440	483.940	483.190	31.62
Chiropteridium lobospinosum										
	FAD	*Chiropteridium lobospinosum*	49X 4 W 30-32	50X 1 W 30-32	463.200	468.400	490.660	496.400	493.530	33.51

Supplementary Figures and Tables

Figure S1: Age-depth plots for Oligocene to Recent sediments of ODP Hole 643A, with constraining bioevents and $^{40}Ar/^{39}Ar$ dating. Bioevents are indicated at the depth of the lowest/highest sample with the presence of a species and ages indicate the global FAD/LAD (see sect. 2.4). Colours used for the lithology and the polarity record are explained in Fig. 2. Magnetostratigraphic tie points of Bleil (1989) are directly linked to GPTS2012 and tie points of Goll (1989) were updated to GTS2012 using linear interpolation between rescaled magnetic reversals.

Figure S2: $^{40}Ar/^{39}Ar$ ages of single grains both for ^{37}Ca corrected and uncorrected samples. See sect. 2.5 and 3.3 for explanation. Errors are 1σ analytical uncertainty.

Table S1: Sediment composition of Hole 643A (Shipboard Scientific Party, 1987). Percentages, when necessary, rescaled to a total of 100%. Trace amounts not included.

Table S2: Applied R-mbsf offsets for ODP Hole 643A.

Table S3: Newly processed palynological samples from ODP Hole 643A.

Table S4: Sampled and selected tephra layers.

Table S5: Detectors ARGUS VI+.

Table S6: Integrated range chart of dinocyst and acritarch species, sorted by nomenclatural status and lowest occurrence. TS = This study, Ma = Manum et al. (1989), Mu = Mudie (1989). Species abundance is maximum of abundances if multiple species have been combined (Table S7): e.g. R + C = C. ? = uncertain determination, cf = specimens resembling the described species, r = suspected reworking. Species abundance: This study: A = abundant (>25%), C = common (2-25%), R = rare (<2%), - = not present. Percentage relative to total dinocysts. Manum et al. (1989): A = abundant (>25%), C = common (2-25%), R = rare (<2%), - = not present. Percentages relative to total marine palynomorphs. Mudie (1989): A = abundant (>49%), C = common (10-49%), R = rare to frequent (1-9%), - = not present. Percentages relative to total marine palynomorphs.

Table S7: Synonymization and updated nomenclature of dinocysts and acritarchs, and stratigraphic notes. Taxa are sorted by nomenclatural status and lowest occurrence (see Table S6). TS: This study, Ma: Manum et al. (1989), Mu: Mudie (1989). Species with open nomenclature retain the name of Mudie (1989) or Manum et al. (1989), unless an identical name is used in this study or the other publication, in which case the source publication is added to the name. Arabic and roman numbers are considered synonymous. E.g. "*Pyxidiella* sp. 1 of Manum et al. (1989)" and "*Pyxidiella* sp. 1 of Mudie (1989)", but "*Aireinana* sp. 1".

Table S8: Updated nomenclature of diatoms, radiolarians and planktic foraminifers, and stratigraphic notes. CC: Ciesielski and Case (1989), SP: Shipboard Scientific Party (1987), GB: Goll and Bjørklund (1989).

Table S9: Ages and references used for deriving global FADs and LADs of dinocyst events used for constraining the revised biomagnetostratigraphic age model of Hole 643A. Events are sorted by their stratigraphic occurrence in Hole 643A (See Table 1).

Table S10: Ages and references used for deriving global FADs and LADs of diatom, planktic foraminifer and radiolarian events used for constraining the revised biomagnetostratigraphic age model of Hole 643A. Events are sorted by their stratigraphic occurrence in Hole 643A (See Table 1).

Table S11: $^{40}Ar/^{39}Ar$ results on single grains and calculations for the applied ages.

Table S12: Paleomagnetic results of Bleil (1989), calculations for azimuthally reoriented declination and polarity interpretation.

Supplementary references

Açıkalın, S., Vellekoop, J., Ocakoğlu, F., Yılmaz, İ.Ö., Smit, J., Altıner, S.Ö., Goderis, S., Vonhof, H., Speijer, R.P., Woelders, L., Fornaciari, E., Brinkhuis, H., 2015. Geochemical and palaeontological characterization of a new K-Pg Boundary locality from the Northern branch of the Neo-Tethys: Mudurnu – Göynük Basin, NW Turkey. Cretac. Res. 52, 251–267. https://doi.org/10.1016/j.cretres.2014.07.011

Anthonissen, E.D., Ogg, J.G., 2012. Cenozoic and Cretaceous Biochronology of Planktonic Foraminifera and Calcareous Nannofossils, in: Gradstein, F.M., Ogg, J.G., Schmitz, M.D., Ogg, G.M. (Eds.), The Geologic Time Scale 2012. Elsevier, Amsterdam, The Netherlands, pp. 1083–1127. https://doi.org/10.1016/B978-0-444-59425-9.15003-6

Baldauf, J.G., Barron, J.A., 1991. Diatom Biostratigraphy: Kerguelen Plateau and Prydz Bay Regions of the Southern Ocean, in: Barron, J.A., Larsen, B. (Eds.), Proceedings of the Ocean Drilling Program, Scientific Results, Vol. 119. Ocean Drilling Program, College Station, TX, USA, pp. 547–598. https://doi.org/10.2973/odp.proc.sr.119.135.1991

Barron, J.A., 1983. Latest Oligocene through early middle Miocene diatom biostratigraphy of the eastern tropical Pacific. Mar. Micropaleontol. 7, 487–515. https://doi.org/10.1016/0377-8398(83)90012-9

Barron, J.A., 1985a. Late Eocene to Holocene Diatom Biostratigraphy of the Equatorial Pacific Ocean, Deep Sea Drilling Project Leg 85, in: Mayer, L., Theyer, F. (Eds.), Initial Reports of the Deep Sea Drilling Project, Vol. 85. U.S. Government Printing Office, Washington, D.C., USA, pp. 413–456. https://doi.org/10.2973/dsdp.proc.85.108.1985

Barron, J.A., 1985b. Miocene to Holocene planktic diatoms, in: Bolli, H.M., Saunders, J.B., Perch-Nielsen, K. (Eds.), Plankton Stratigraphy, vol. 2. Cambridge University Press, Cambridge, UK, pp. 763–809.

Barron, J.A., 1992. Neogene diatom datum levels in the Equatorial and North Pacific, in: Ishizaki, K., Saito, T. (Eds.), Centenary of Japanese Micropaleontology. Terra Scientific Publishing Company, Tokyo, Japan, pp. 413–425.

Barron, J.A., 2003. Planktonic marine diatom record of the past 18 m.y.: Appearances and extinctions in the Pacific and Southern Oceans. Diatom Res. 18, 203–224. https://doi.org/10.1080/0269249X.2003.9705588

Barron, J.A., 2005. Diatom biochronology for the Early Miocene of the Equatorial Pacific. Stratigraphy 2, 281–309.

Barron, J.A., Browning, J., Sugarman, P., Miller, K.G., 2013. Refinement of late-Early and Middle Miocene diatom biostratigraphy for the East Coast of the United States. Geosphere 9, 1286–1302. https://doi.org/10.1130/GES00864.1

Barron, J.A., Gladenkov, A.Y., 1995. Early Miocene to Pleistocene Diatom Stratigraphy of Leg 145, in: Rea, D.K., Basov, I.A., Scholl, D.W., Allan, J.F. (Eds.), Proceedings of the Ocean Drilling Program, Scientific Results, Vol. 145. Ocean Drilling Program, College Station, TX, USA, pp. 3–19. https://doi.org/10.2973/odp.proc.sr.145.101.1995

Barron, J.A., Keller, G., Dunn, D.A., 1985a. A multiple microfossil biochronology for the Miocene, in: Kennett, J.P. (Ed.), The Miocene Ocean: Paleoceanography and Biogeography, Memoir 163. The Geological Society of America, Boulder, CO, USA, pp. 21–36.

Barron, J.A., Nigrini, C.A., Pujos, A., Saito, T., Theyer, F., Thomas, E., Weinreich, N., 1985b. Synthesis of Biostratigraphy, Central Equatorial Pacific, Deep Sea Drilling Project Leg 85: Refinement of Oligocene to Quaternary Biochronology, in:

Mayer, L., Theyer, F. (Eds.), Initial Reports of the Deep Sea Drilling Project, Vol. 85. U.S. Government Printing Office, Washington, D.C., USA, pp. 905–934. https://doi.org/10.2973/dsdp.proc.85.130.1985

Berggren, W.A., Kent, D. V., Flynn, J.J., Van Couvering, J.A., 1985. Cenozoic geochronology. Geol. Soc. Am. Bull. 96, 1407–1418. https://doi.org/10.1130/0016-7606(1985)96<1407:CG>2.0.CO;2

Berggren, W.A., Kent, D. V., Swisher, C.C.I., Aubry, M.-P., 1995. A Revised Cenozoic Geochronology and Chronostratigraphy, in: Berggren, W.A., Kent, D.V., Aubry, M.-P., Hardenbol, J. (Eds.), Geochronology, Time Scales, and Global Stratigraphic Correlation, SEPM Special Publication No. 54. SEPM (Society for Sedimentary Geology), Tulsa, OK, USA, pp. 129–212. https://doi.org/10.2110/pec.95.04.0129

Biffi, U., Manum, S.B., 1988. Late Eocene-Early Miocene dinoflagellate cyst stratigraphy from the Marche Region (Central Italy). Boll. della Soc. Paleontol. Ital. 27, 163–212.

Bijl, P.K., Houben, A.J.P., Bruls, A., Pross, J., Sangiorgi, F., 2018. Stratigraphic calibration of Oligocene–Miocene organic-walled dinoflagellate cysts from offshore Wilkes Land, East Antarctica, and a zonation proposal. J. Micropalaeontology 37, 105–138. https://doi.org/10.5194/jm-37-105-2018

Bijl, P.K., Sluijs, A., Brinkhuis, H., 2013. A magneto- and chemostratigraphically calibrated dinoflagellate cyst zonation of the early Palaeogene South Pacific Ocean. Earth-Science Rev. 124, 1–31. https://doi.org/10.1016/j.earscirev.2013.04.010

Bleil, U., 1989. Magnetostratigraphy of Neogene and Quaternary sediment series from the Norwegian Sea: Ocean Drilling Program, Leg 104, in: Eldholm, O., Thiede, J., Taylor, E. (Eds.), Proceedings of the Ocean Drilling Program, Scientific Results, Vol. 104, Proceedings of the Ocean Drilling Program. Ocean Drilling Program, College Station, TX, USA, pp. 829–901. https://doi.org/10.2973/odp.proc.sr.104.1989

Bohaty, S.M., Wise, S.W.J., Duncan, R.A., Moore, C.L., Wallace, P.J., 2003. Neogene Diatom Biostratigraphy, Tephra Stratigraphy, and Chronology of ODP Hole 1138A, Kerguelen Plateau, in: Frey, F.A., Coffin, M.F., Wallace, P.J., Quilty, P.G. (Eds.), Proceedings of the Ocean Drilling Program, Scientific Results, Vol. 183. Ocean Drilling Program, College Station, TX, USA, pp. 1–53. https://doi.org/10.2973/odp.proc.sr.183.016.2003

Brinkhuis, H., 1994. Late Eocene to Early Oligocene dinoflagellate cysts from the Priabonian type-area (Northeast Italy): biostratigraphy and paleoenvironmental interpretation. Palaeogeogr. Palaeoclimatol. Palaeoecol. 107, 121–163. https://doi.org/10.1016/0031-0182(94)90168-6

Brinkhuis, H., Biffi, U., 1993. Dinoflagellate cyst stratigraphy of the Eocene/Oligocene transition in central Italy. Mar. Micropaleontol. 22, 131–183. https://doi.org/10.1016/0377-8398(93)90007-K

Brinkhuis, H., Munsterman, D.K., Sengers, S., Sluijs, A., Warnaar, J., Williams, G.L., 2003. Late Eocene–Quaternary Dinoflagellate Cysts from ODP Site 1168, off Western Tasmania, in: Exon, N.F., Kennett, J.P., Malone, M.J. (Eds.), Proceedings of the Ocean Drilling Program, Scientific Results, Vol. 189. Ocean Drilling Program, College Station, TX, USA, pp. 1–36. https://doi.org/10.2973/odp.proc.sr.189.105.2003

Brown, S., Downie, C., 1984. Dinoflagellate Cyst Biostratigraphy of Late Paleocene and Early Eocene Sediments from Holes 552, 553A, and 555, Leg 81, Deep Sea Drilling Project (Rockall Plateau), in: Roberts, D.G., Schnitker, D. (Eds.), Initial Reports of the Deep Sea Drilling Project, Vol. 81. U.S. Government Printing Office, Washington, D.C., USA, pp. 565–579. https://doi.org/10.2973/dsdp.proc.81.113.1984

Brown, S., Downie, C., 1985. Dinoflagellate Cyst Stratigraphy of Paleocene to Miocene Sediments from the Goban Spur (Sites 548-550, Leg 80), in: de Graciansky, P.C., Poag, C.W. (Eds.), Initial Reports of the Deep Sea Drilling Project, Vol. 80. U.S. Government Printing Office, Washington, D.C., USA, pp. 643–651. https://doi.org/10.2973/dsdp.proc.80.120.1985

Bujak, J.P., Matsuoka, K., 1986. Late Cenozoic dinoflagellate cyst zonation in the Western and Northern Pacific, in: Wrenn, J.H., Duffield, S.L., Stein, J.A. (Eds.), Papers from the First Symposium on Neogene Dinoflagellate Cyst Biostratigraphy, AASP Contributions Series, Vol. 17. American Association of Stratigraphic Palynologists Foundation, Dallas, TX, USA, pp. 7–25.

Burckle, L.H., 1972. Late Cenozoic planktonic diatom zones from the eastern equatorial Pacific, in: Simonsen, R. (Ed.), Proceedings of the First Symposium on Recent and Fossil Marine Diatoms, Bremerhaven, September 21-26, 1970, Beihefte Zur Nova Hedwigia, Vol. 39. pp. 217–246.

Burckle, L.H., 1978. Early Miocene to Pliocene diatom levels for the equatorial Pacific, in: Proceedings of the Second Working Group Meeting on Biostratigraphic Datum-Planes of the Pacific Neogene, IGCP Project 114, Bandung, May 30-June 1, 1977, Special Publications, Vol. 1. Geological Research and Development Centre, Bandung, Republic of Indonesia, pp. 25–44.

Censarek, B., Gersonde, R., 2002. Miocene diatom biostratigraphy at ODP sites 689, 690, 1088, 1092 (Atlantic sector of the Southern Ocean). Mar. Micropaleontol. 45, 309–356. https://doi.org/10.1016/S0377-8398(02)00034-8

Chaisson, W.P., Pearson, P.N., 1997. Planktonic foraminifer biostratigraphy at Site 925: middle Miocene–Pleistocene, in: Shackleton, N.J., Curry, W.B., Richter, C., Bralower, T.J. (Eds.), Proceedings of the Ocean Drilling Program, Scientific Results, Vol. 154. Ocean Drilling Program, College Station, TX, USA, pp. 3–31. https://doi.org/10.2973/odp.proc.sr.154.104.1997

Ciesielski, P.F., Case, S.M., 1989. Neogene Paleoceanography of the Norwegian Sea Based Upon Silicoflagellate Assemblage Changes in ODP Leg 104 Sedimentary Sequences, in: Eldholm, O., Thiede, J., Taylor, E. (Eds.), Proceedings of the Ocean Drilling Program, Scientific Results, Vol. 104. Ocean Drilling Program, College Station, TX, USA, pp. 527–541. https://doi.org/10.2973/odp.proc.sr.104.166.1989

Ciesielski, P.F., 1983. The Neogene and Quaternary Diatom Biostratigraphy of Subantarctic Sediments, Deep Sea Drilling Project Leg 71, in: Ludwig, W.J., Krasheninnikov, V.A. (Eds.), Initial Reports of the Deep Sea Drilling Project, Vol. 71. U.S. Government Printing Office, Washington, D.C., USA, pp. 635–665. https://doi.org/10.2973/dsdp.proc.71.125.1983

Cody, R.D., Levy, R.H., Harwood, D.M., Sadler, P.M., 2008. Thinking outside the zone: High-resolution quantitative diatom biochronology for the Antarctic Neogene. Palaeogeogr. Palaeoclimatol. Palaeoecol. 260, 92–121. https://doi.org/10.1016/j.palaeo.2007.08.020

Costa, L.I., Downie, C., 1979. Cenozoic Dinocyst Stratigraphy of Sites 403 to 406 (Rockall Plateau), IPOD, Leg 48, in: Montadert, L., Roberts, D.G. (Eds.), Initial Reports of the Deep Sea Drilling Project, Vol. 48. U.S. Government Printing Office, Washington, D.C., USA, pp. 513–529. https://doi.org/10.2973/dsdp.proc.48.121.1979

De Schepper, S., Head, M.J., 2009. Pliocene and Pleistocene Dinoflagellate Cyst and Acritarch Zonation of Dsdp Hole 610a, Eastern North Atlantic. Palynology 33, 179–218. https://doi.org/10.2113/gspalynol.33.1.179

de Vernal, A., Londeix, L., Mudie, P.J., Harland, R., Morzadec-Kerfourn, M.T., Turon, J.-L., Wrenn, J.H., 1992. Quaternary organic-walled dinoflagellate cysts of the North Atlantic Ocean and adjacent seas: ecostratigraphy and biostratigraphy, in: Head, M.J., Wrenn, J.H. (Eds.), Neogene and Quaternary Dinoflagellate Cysts and Acritarchs. American Association of Stratigraphic Palynologists Foundation, Dallas, TX, USA, pp. 289–329.

de Vernal, A., Mudie, P.J., 1989. Late Pliocene to Holocene Palynostratigraphy at ODP Site 645, Baffin Bay, in: Srivastava, S.P., Arthur, M., Clement, B. (Eds.), Proceedings of the Ocean Drilling Program, Scientific Results, Vol. 105. Ocean Drilling Program, College Station, TX, USA, pp. 387–399. https://doi.org/10.2973/odp.proc.sr.105.133.1989

de Verteuil, L., Norris, G., 1992. Miocene protoperidiniacean dinoflagellate cysts from the Maryland and Virginia coastal plain, in: Head, M.J., Wrenn, J.H. (Eds.), Neogene and Quaternary Dinoflagellate Cysts and Acritarchs. American Association of Stratigraphic Palynologists Foundation, Dallas, TX, USA, pp. 391–431.

de Verteuil, L., Norris, G., 1996. Miocene Dinoflagellate Stratigraphy and Systematics of Maryland and Virginia. Micropaleontology 42 Suppl., 186. https://doi.org/10.2307/1485926

Duffield, S.L., Stein, J.A., 1986. Peridiniacean-dominated cyst assemblage from the Miocene of the Gulf of Mexico shelf, offshore Louisiana, in: Wrenn, J.H., Duffield, Susan L., Stein, Jeffrey A. (Eds.), Papers from the First Symposium on Neogene Dinoflagellate Cyst Biostratigraphy, AASP Contributions Series, Vol. 17. American Association of Stratigraphic Palynologists Foundation, Dallas, TX, USA, pp. 27–45.

Dybkjær, K., Piasecki, S., 2010. Neogene dinocyst zonation for the eastern North Sea Basin, Denmark. Rev. Palaeobot. Palynol. 161, 1–29. https://doi.org/10.1016/j.revpalbo.2010.02.005

Edwards, L.E., 1984. Miocene Dinocysts from Deep Sea Drilling Project Leg 81, Rockall Plateau, Eastern North Atlantic Ocean, in: Roberts, D.G., Schnitker, D. (Eds.), Initial Reports of the Deep Sea Drilling Project, Vol. 81. U.S. Government Printing Office, Washington, D.C., USA, pp. 581–594. https://doi.org/10.2973/dsdp.proc.81.114.1984

Egger, L.M., Śliwińska, K.K., van Peer, T.E., Liebrand, D., Lippert, P.C., Friedrich, O., Wilson, P.A., Norris, R.D., Pross, J., 2016. Magnetostratigraphically-calibrated dinoflagellate cyst bioevents for the uppermost Eocene to lowermost Miocene of the western North Atlantic (IODP Expedition 342, Paleogene Newfoundland sediment drifts). Rev. Palaeobot. Palynol. 234, 159–185. https://doi.org/10.1016/j.revpalbo.2016.08.002

Eldrett, J.S., Harding, I.C., 2009. Palynological analyses of Eocene to Oligocene sediments from DSDP Site 338, Outer Vøring Plateau. Mar. Micropaleontol. 73, 226–240. https://doi.org/10.1016/j.marmicro.2009.10.004

Eldrett, J.S., Harding, I.C., Firth, J. V., Roberts, A.P., 2004. Magnetostratigraphic calibration of Eocene–Oligocene dinoflagellate cyst biostratigraphy from the Norwegian–Greenland Sea. Mar. Geol. 204, 91–127. https://doi.org/10.1016/S0025-3227(03)00357-8

Fensome, R., Crux, J., Gard, G., MacRae, A., Williams, G., Thomas, F., Fiorini, F., Wach, G., 2008. The last 100 million years on the Scotian Margin, offshore eastern Canada: an event-stratigraphic scheme emphasizing biostratigraphic data. Atl. Geol. 44, 93–126. https://doi.org/10.4138/6506

Firth, J.V., 1996. Upper Middle Eocene to Oligocene Dinoflagellate Biostratigraphy and Assemblage Variations in Hole 913B, Greenland Sea, in: Thiede, J., Myhre, A.M., Firth, J.V., Johnson, G.L., Ruddiman, W.F. (Eds.), Proceedings of the Ocean Drilling Program, Scientific Results, Vol. 151. Ocean Drilling Program, College Station, TX, USA, pp. 203–242. https://doi.org/10.2973/odp.proc.sr.151.105.1996

Gladenkov, A.Y., Barron, J.A., 1995. Oligocene and Early Middle Miocene Diatom Biostratigraphy of Hole 884B, in: Rea, D.K., Basov, I.A., Scholl, D.W., Allan, J.F. (Eds.), Proceedings of the Ocean Drilling Program, Scientific Results, Vol. 145. Ocean Drilling Program, College Station, TX, USA, pp. 21–41. https://doi.org/10.2973/odp.proc.sr.145.105.1995

Goll, R.M., 1989. A Synthesis of Norwegian Sea Biostratigraphies: ODP Leg 104 on the Vøring Plateau, in: Eldholm, O., Thiede, J., Taylor, E. (Eds.), Proceedings of the Ocean Drilling Program, Scientific Results, Vol. 104. Ocean Drilling Program, College Station, TX, USA, pp. 777–826. https://doi.org/10.2973/odp.proc.sr.104.203.1989

Goll, R.M., Bjørklund, K.R., 1989. A New Radiolarian Biostratigraphy for the Neogene of the Norwegian Sea: ODP Leg 104, in: Eldholm, O., Thiede, J., Taylor, E. (Eds.), Proceedings of the Ocean Drilling Program, Scientific Results, Vol. 104. Ocean Drilling Program, College Station, TX, USA, pp. 697–737. https://doi.org/10.2973/odp.proc.sr.104.205.1989

Gradstein, F.M., Kristiansen, I.L., Loemo, L., Kaminski, M.A., 1992. Cenozoic Foraminiferal and Dinoflagellate Cyst Biostratigraphy of the Central North Sea. Micropaleontology 38, 101–137. https://doi.org/10.2307/1485991

Gradstein, F.M., Ogg, J.G., Schmitz, M.D., Ogg, G.M., 2012. The Geologic Time Scale 2012. Elsevier, Amsterdam, The Netherlands. https://doi.org/10.1016/C2011-1-08249-8

Gradstein, F.M., Ogg, J.G., Smith, A.G., 2004. A Geologic Time Scale 2004. Cambridge University Press, Cambridge, UK. https://doi.org/10.1017/CBO9780511536045

Harwood, D.M., Maruyama, T., 1992. Middle Eocene to Pleistocene Diatom Biostratigraphy of Southern Ocean Sediments from the Kerguelen Plateau, Leg 120, in: Wise, S.W.J., Schlich, R. (Eds.), Proceedings of the Ocean Drilling Program, Scientific Results, Vol. 120. Ocean Drilling Program, College Station, TX, USA, pp. 683–733. https://doi.org/10.2973/odp.proc.sr.120.160.1992

Head, M.J., 1993. Dinoflagellates, Sporomorphs, and Other Palynomorphs from the Upper Pliocene St. Erth Beds of Cornwall, Southwestern England. J. Paleontol., The Paleontological Society Memoir 31, 67 Suppl., 1–62. https://doi.org/10.1017/S0022336000061126

Head, M.J., 1994. Morphology and Paleoenvironmental Significance of the Cenozoic Dinoflagellate Genera Tectatodinium and Habibacysta. Micropaleontology 40, 289–321. https://doi.org/10.2307/1485937

Head, M.J., 1998. Marine environmental change in the Pliocene and early Pleistocene of eastern England: the dinoflagellate evidence reviewed, in: van Kolfschoten, T., Gibbard, P.L. (Eds.), The Dawn of the Quaternary, Mededelingen Nederlands Instituut Voor Toegepaste Geowetenschappen TNO, Vol. 60. pp. 199–226.

Head, M.J., Norris, G., 1989. Palynology and Dinocyst Stratigraphy of the Eocene and Oligocene in ODP Leg 105, Hole 647A, Labrador Sea, in: Srivastava, S.P., Arthur, M.A., Clement, B.M. (Eds.), Proceedings of the Ocean Drilling Program, Scientific Results, Vol. 105. Ocean Drilling Program, College Station, TX, USA, pp. 515–550. https://doi.org/10.2973/odp.proc.sr.105.178.1989

Head, M.J., Norris, G., Mudie, P.J., 1989a. Palynology and Dinocyst Stratigraphy of the Upper Miocene and Lowermost Pliocene, ODP Leg 105, Site 646, Labrador Sea, in: Srivastava, S.P., Arthur, M., Clement, B. (Eds.), Proceedings of the Ocean Drilling Program, Scientific Results, Vol. 105. Ocean Drilling Program, College Station, TX, USA, pp. 423–451. https://doi.org/10.2973/odp.proc.sr.105.135.1989

Head, M.J., Norris, G., Mudie, P.J., 1989b. New Species of Dinocysts and a New Species of Acritarch from the Upper Miocene and Lowermost Pliocene, ODP Leg 105, Site 646, Labrador Sea, in: Srivastava, S.P., Arthur, M., Clement, B. (Eds.), Proceedings of the Ocean Drilling Program, Scientific Results, Vol. 105. Ocean Drilling Program, College Station, TX, USA, pp. 453–466. https://doi.org/10.2973/odp.proc.sr.105.136.1989

Head, M.J., Wrenn, J.H., 1992. Neogene and Quaternary Dinoflagellate cysts and Acritarchs. American Association of Stratigraphic Palynologists Foundation, Dallas, TX, USA.

Heilmann-Clausen, C., Costa, L.I., 1989. Dinoflagellate zonation of the uppermost Paleocene? to Lower Miocene in the Wursterheide research well, NW Germany. Geol. Jahrbuch, R. A 111, 431–521.

Hilgen, F.J., Krijgsman, W., Raffi, I., Turco, E., Zachariasse, W.J., 2000. Integrated stratigraphy and astronomical calibration of the Serravallian/Tortonian boundary section at Monte Gibliscemi (Sicily, Italy). Mar. Micropaleontol. 38, 181–211. https://doi.org/10.1016/S0377-8398(00)00008-6

Jan du Chêne, R., 1977. Étude palynologique du Miocene supérieur Andalou (Espagne). Rev. Española Micropaleontol. 9, 97–114.

Köthe, A., 2012. A revised Cenozoic dinoflagellate cyst and calcareous nannoplankton zonation for the German sector of the southeastern North Sea Basin. Newsletters Stratigr. 45, 189–220. https://doi.org/10.1127/0078-0421/2012/0021

Kuhlmann, G., Langereis, C.G., Munsterman, D., van Leeuwen, R.-J., Verreussel, R., Meulenkamp, J.E., Wong, T.E., 2006. Integrated chronostratigraphy of the Pliocene-Pleistocene interval and its relation to the regional stratigraphical stages in the southern North Sea region. Netherlands J. Geosci. - Geol. en Mijnb. 85, 19–35. https://doi.org/10.1017/S0016774600021405

Laskar, J., Joutel, F., Boudin, F., 1993. Orbital, precessional, and insolation quantities for the Earth from -20 Myr to +10 Myr. Astron. Astrophys. 270, 522–533.

Lazarus, D., Barron, J.A., Renaudie, J., Diver, P., Türke, A., 2014. Cenozoic Planktonic Marine Diatom Diversity and Correlation to Climate Change. PLoS One 9, e84857. https://doi.org/10.1371/journal.pone.0084857

Lirer, F., Caruso, A., Foresi, L.M., Sprovieri, M., Bonomo, S., Di Stefano, A., Di Stefano, E., Iaccarino, S.M., Salvatorini, G., Sprovieri, R., Mazzola, S., 2002. Astrochronological calibration of the upper Serravallian/lower Tortonian sedimentary sequence at Tremiti Islands (Adriatic sea, Southern Italy). Riv. Ital. di Paleontol. e Stratigr. 108, 241–256.

Londeix, L., Jan Du Chêne, R., 1998. Burdigalian dinocyst stratigraphyof the stratotypic area (Bordeaux, France). Geobios 30, 283–294. https://doi.org/10.1016/S0016-6995(98)80012-0

Lourens, L.J., Hilgen, F.J., Laskar, J., Shackleton, N.J., Wilson, D., 2004. The Neogene Period, in: Gradstein, F.M., Ogg, J.G., Smith, A.G. (Eds.), A Geologic Time Scale 2004. Cambridge University Press, Cambridge, UK, pp. 409–440.

Louwye, S., Foubert, A., Mertens, K.N., Van Rooij, D., the IODP Expedition 307 scientific party, 2008. Integrated stratigraphy and palaeoecology of the Lower and Middle Miocene of the Porcupine Basin. Geol. Mag. 145, 321–344. https://doi.org/10.1017/S0016756807004244

Manum, S.B., Boulter, M.C., Gunnarsdottir, H., Rangnes, K., Scholze, A., 1989. Eocene to Miocene Palynology of the Norwegian Sea (ODP Leg 104), in: Eldholm, O., Thiede, J., Taylor, E. (Eds.), Proceedings of the Ocean Drilling Program, Scientific Results, Vol. 104. Ocean Drilling Program, College Station, TX, USA, pp. 611–662. https://doi.org/10.2973/odp.proc.sr.104.176.1989

Manum, S.B., 1976. Dinocysts in Tertiary Norwegian-Greenland Sea Sediments (Deep Sea Drilling Project Leg 38), with Observations on Palynomorphs and Palynodebris in Relation to Environment, in: Talwani, M., Udintsev, G. (Eds.), Initial Reports of the Deep Sea Drilling Project, Vol. 38. U.S. Government Printing Office, Washington, D.C., USA, pp. 897–919. https://doi.org/10.2973/dsdp.proc.38.129.1976

McMinn, A., 1992. Neogene Dinoflagellate Distribution in the Eastern Indian Ocean from Leg 123, Site 765, in: Gradstein, F.M., Ludden, J.N. (Eds.), Proceedings of the Ocean Drilling Program, Scientific Results, Vol. 123. Ocean Drilling Program, College Station, TX, USA, pp. 429–441. https://doi.org/10.2973/odp.proc.sr.123.120.1992

McMinn, A., 1993. Neogene Dinoflagellate Cyst Biostratigraphy from Sites 815 and 823, Leg 133, Northeast Australian Margin, in: McKenzie, J.A., Davies, P.J., Palmer-Julson, A. (Eds.), Proceedings of the Ocean Drilling Program, Scientific Results, Vol. 133. Ocean Drilling Program, College Station, TX, USA, pp. 97–105. https://doi.org/10.2973/odp.proc.sr.133.219.1993

Mertens, K.N., Takano, Y., Head, M.J., Matsuoka, K., 2014. Living fossils in the Indo-Pacific warm pool: A refuge for thermophilic dinoflagellates during glaciations. Geology 42, 531–534. https://doi.org/10.1130/G35456.1

Miller, K.G., Aubry, M.-P., Khan, M.J., Melillo, A.J., Kent, D. V., Berggren, W.A., 1985. Oligocene-Miocene biostratigraphy, magnetostratigraphy, and isotopic stratigraphy of the western North Atlantic. Geology 13, 257–261. https://doi.org/10.1130/0091-7613(1985)13<257:OBMAIS>2.0.CO;2

Montanari, A., Bice, D.M., Capo, R., Coccioni, R., Deino, A., DePaolo, D.J., Emmanuel, L., Monechi, S., Renard, M., Zevenboom, D., 1997. Integrated stratigraphy of the Chattian to mid-Burdigalian pelagic sequence of the Contessa valley (Gubbio, Italy), in: Montanari, A., Odin, G.S., Coccioni, Rodolfo (Eds.), Miocene Stratigraphy: An Integrated Approach, Developments in Palaeontology and Stratigraphy, Vol. 15. Elsevier, Amsterdam, The Netherlands, pp. 249–277.

Morgenroth, P., 1966. Mikrofossilien und Konkretionen des nordwesteuropäischen Untereozäns. Palaeontogr. Abteilung B 119, 1–53.

Mudge, D.C., Bujak, J.P., 1996. An integrated stratigraphy for the Paleocene and Eocene of the North Sea, in: Knox, R.W.O., Corfield, R.M., Dunay, R.E. (Eds.), Correlation of the Early Paleogene in Northwest Europe, Special Publications, Vol. 101. Geological Society, London, UK, pp. 91–113. https://doi.org/10.1144/GSL.SP.1996.101.01.06

Mudie, P.J., 1987. Palynology and Dinoflagellate Biostratigraphy of Deep Sea Drilling Project Leg 94, Sites 607 and 611, North Atlantic Ocean, in: Ruddiman, W.F., Kidd, R.B., Thomas, E. (Eds.), Initial Reports of the Deep Sea Drilling Project, Vol. 94. U.S. Government Printing Office, Washington, D.C., USA, pp. 785–812. https://doi.org/10.2973/dsdp.proc.94.118.1987

Mudie, P.J., 1989. Palynology and Dinocyst Biostratigraphy of the Late Miocene to Pleistocene, Norwegian Sea: ODP Leg 104, Sites 642 to 644, in: Eldholm, O., Thiede, J., Taylor, E. (Eds.), Proceedings of the Ocean Drilling Program, Scientific Results, Vol. 104. Ocean Drilling Program, College Station, TX, USA, pp. 587–610. https://doi.org/10.2973/odp.proc.sr.104.174.1989

Nigrini, C., Sanfilippo, A., Moore, T.J.J., 2005. Cenozoic Radiolarian Biostratigraphy: A Magnetobiostratigraphic Chronology of Cenozoic Sequences from ODP Sites 1218, 1219, and 1220, Equatorial Pacific, in: Wilson, P.A., Lyle, M., Firth, J. V. (Eds.), Proceedings of the Ocean Drilling Program, Scientific Results, Vol. 199. Ocean Drilling Program, College Station, TX, USA, pp. 1–76. https://doi.org/10.2973/odp.proc.sr.199.225.2006

Olde, K., Jarvis, I., Pearce, M., Uličný, D., Tocher, B., Trabucho-Alexandre, J., Gröcke, D., 2015. A revised northern European Turonian (Upper Cretaceous) dinoflagellate cyst biostratigraphy: Integrating palynology and carbon isotope events. Rev. Palaeobot. Palynol. 213, 1–16. https://doi.org/10.1016/j.revpalbo.2014.10.006

Pälike, H., Lyle, M., Nishi, H., Raffi, I., Gamage, K., Klaus, A., the Expedition 320/321 Scientists, 2010. Proceedings of the Integrated Ocean Drilling Program, vol. 320/321. Integrated Ocean Drilling Program Management International, Inc., Tokyo, Japan.

Piasecki, S., 1980. Dinoflagellate cyst stratigraphy of the Miocene Hodde and Gram formations, Denmark. Bull. Geol. Soc. Denmark 29, 53–76.

Piasecki, S., 2003. Neogene dinoflagellate cysts from Davis Strait, offshore West Greenland. Mar. Pet. Geol. 20, 1075–1088. https://doi.org/10.1016/S0264-8172(02)00089-2

Powell, A.J., 1986a. Latest Palaeogene and earliest Neogene dinoflagellate cysts from the Lemme section, northwest Italy, in: Wrenn, J.H., Duffield, S.L., Stein, J.A. (Eds.), Papers from the First Symposium on Neogene Dinoflagellate Cyst Biostratigraphy, AASP Contributions Series, Vol. 17. American Association of Stratigraphic Palynologists Foundation, Dallas, TX, USA, pp. 83–104.

Powell, A.J., 1986b. A dinoflagellate cyst biozonation for the late Oligocene to middle Miocene succession of the Langhe region, northwest Italy, in: Wrenn, J.H., Duffield, S.L., Stein, J.A. (Eds.), Papers from the First Symposium on Neogene

Dinoflagellate Cyst Biostratigraphy, AASP Contributions Series, Vol. 17. American Association of Stratigraphic Palynologists Foundation, Dallas, TX, USA, pp. 105–128.

Powell, A.J., 1992. Dinoflagellate cysts of the Tertiary System, in: Powell, A.J. (Ed.), A Stratigraphic Index of Dinoflagellate Cysts, British Micropalaeontological Society Publication Series. Chapman and Hall, London, UK, pp. 155–251.

Prince, I.M., Jarvis, I., Pearce, M.A., Tocher, B.A., 2008. Dinoflagellate cyst biostratigraphy of the Coniacian–Santonian (Upper Cretaceous): New data from the English Chalk. Rev. Palaeobot. Palynol. 150, 59–96. https://doi.org/10.1016/j.revpalbo.2008.01.005

Pross, J., Houben, A.J.P., van Simaeys, S., Williams, G.L., Kotthoff, U., Coccioni, R., Wilpshaar, M., Brinkhuis, H., 2010. Umbria–Marche revisited: A refined magnetostratigraphic calibration of dinoflagellate cyst events for the Oligocene of the Western Tethys. Rev. Palaeobot. Palynol. 158, 213–235. https://doi.org/10.1016/j.revpalbo.2009.09.002

Quaijtaal, W., Donders, T.H., Persico, D., Louwye, S., 2014. Characterising the middle Miocene Mi-events in the Eastern North Atlantic realm: A first high-resolution marine palynological record from the Porcupine Basin. Palaeogeogr. Palaeoclimatol. Palaeoecol. 399, 140–159. https://doi.org/10.1016/j.palaeo.2014.02.017

Quaijtaal, W., Mertens, K.N., Louwye, S., 2015. Some new acritarch species from the lower and middle Miocene of the Porcupine Basin, North Atlantic Ocean: biostratigraphy and palaeoecology. Palynology 39, 37–55. https://doi.org/10.1080/01916122.2014.933749

Schreck, M., Matthiessen, J., 2014. Batiacasphaera bergenensis and Lavradosphaera elongata — New dinoflagellate cyst and acritarch species from the Miocene of the Iceland Sea (ODP Hole 907A). Rev. Palaeobot. Palynol. 211, 97–106. https://doi.org/10.1016/j.revpalbo.2014.07.002

Schreck, M., Matthiessen, J., Head, M.J., 2012. A magnetostratigraphic calibration of Middle Miocene through Pliocene dinoflagellate cyst and acritarch events in the Iceland Sea (Ocean Drilling Program Hole 907A). Rev. Palaeobot. Palynol. 187, 66–94. https://doi.org/10.1016/j.revpalbo.2012.08.006

Shackleton, N.J., Baldauf, J.G., Flores, J.-A., Iwai, M., Moore Jr., T.C., Raffi, I., Vincent, E., 1995. Biostratigraphic Summary for Leg 138, in: Pisias, N.G., Mayer, L.A., Janecek, T.R., Palmer-Julson, A., van Andel, T.H. (Eds.), Proceedings of the Ocean Drilling Program, Scientific Results, Vol. 138. Ocean Drilling Program, College Station, TX, USA, pp. 517–536. https://doi.org/10.2973/odp.proc.sr.138.127.1995

Shipboard Scientific Party, 1987. Site 643: Norwegian Sea, in: Eldholm, O., Thiede, J., Taylor, E. (Eds.), Proceedings of the Ocean Drilling Program, Initial Reports, Vol. 104. Ocean Drilling Program, College Station, TX, USA, pp. 455–615. https://doi.org/10.2973/odp.proc.ir.104.105.1987

Śliwińska, K.K., Abrahamsen, N., Beyer, C., Brünings-Hansen, T., Thomsen, E., Ulleberg, K., Heilmann-Clausen, C., 2012. Bio- and magnetostratigraphy of Rupelian–mid Chattian deposits from the Danish land area. Rev. Palaeobot. Palynol. 172, 48–69. https://doi.org/10.1016/j.revpalbo.2012.01.008

Soliman, A., Ćorić, S., Head, M.J., Piller, W.E., El Beialy, S.Y., 2012. Lower and Middle Miocene biostratigraphy, Gulf of Suez, Egypt based on dinoflagellate cysts and calcareous nannofossils. Palynology 36, 38–79. https://doi.org/10.1080/01916122.2011.633632

Strauss, C., Lund, J.J., 1992. A Middle Miocene dinoflagellate cyst microflora from Papendorf near Hamburg, Germany. Mitteilungen Geol. Inst. der Univ. Hambg. 73, 159–189.

Tocher, B.A., Jarvis, I., 1994. Dinoflagellate cyst distribution and stratigraphy of the lower-middle Cenomanian (Upper Cretaceous) at Fumichon, Normandy, northern France. Rev. Micropaléontologie 37, 223–232.

Tocher, B.A., Jarvis, I., 1996. Dinoflagellate cyst distributions and the Albian–Cenomanian boundary (mid-Cretaceous) at Cordebugle, NW France and Lewes, southern England. J. Micropalaeontology 15, 55–67. https://doi.org/10.1144/jm.15.1.55

van Mourik, C.A., Brinkhuis, H., 2005. The Massignano Eocene-Oligocene golden spike section. Stratigraphy 2, 13–30.

van Mourik, C.A., Brinkhuis, H., Williams, G.L., 2001. Mid- to Late Eocene organic-walled dinoflagellate cysts from ODP Leg 171B, offshore Florida, in: Kroon, D., Norris, R.D., Klaus, A. (Eds.), Western North Atlantic Palaeogene and Cretaceous Palaeoceanography, Special Publications, Vol. 183. Geological Society, London, UK, pp. 225–251. https://doi.org/10.1144/GSL.SP.2001.183.01.11

Van Simaeys, S., De Man, E., Vandenberghe, N., Brinkhuis, H., Steurbaut, E., 2004. Stratigraphic and palaeoenvironmental analysis of the Rupelian-Chattian transition in the type region: Evidence from dinoflagellate cysts, foraminifera and calcareous nannofossils. Palaeogeogr. Palaeoclimatol. Palaeoecol. 208, 31–58. https://doi.org/10.1016/j.palaeo.2004.02.029

Versteegh, G.J.M., Zevenboom, D., 1995. New genera and species of dinoflagellate cysts from the Mediterranean Neogene. Rev. Palaeobot. Palynol. 85, 213–229. https://doi.org/10.1016/0034-6667(94)00127-6

Williams, G.L., Fensome, R.A., MacRae, R.A., 2017. The Lentin and Williams index of fossil dinoflagellates 2017 edition. Am. Assoc. Stratigr. Palynol. Contrib. Ser. 48.

Williams, G.L., Manum, S.B., 1999. Oligocene–early Miocene dinocyst stratigraphy of Hole 985A (Norwegian Sea), in: Raymo, M.E., Jansen, E., Blum, P., Herbert, T.D. (Eds.), Proceedings of the Ocean Drilling Program, Scientific Results, Vol. 162. Ocean Drilling Program, College Station, TX, USA, pp. 99–109. https://doi.org/10.2973/odp.proc.sr.162.030.1999

Williams, G.L., Stover, L.E., Kidson, E.J., 1993. Morphology and stratigraphic ranges of selected Mesozoic-Cenozoic dinoflagellate taxa in the Northern Hemisphere, Paper 92-10. Geological Survey of Canada, Ottawa, Canada.

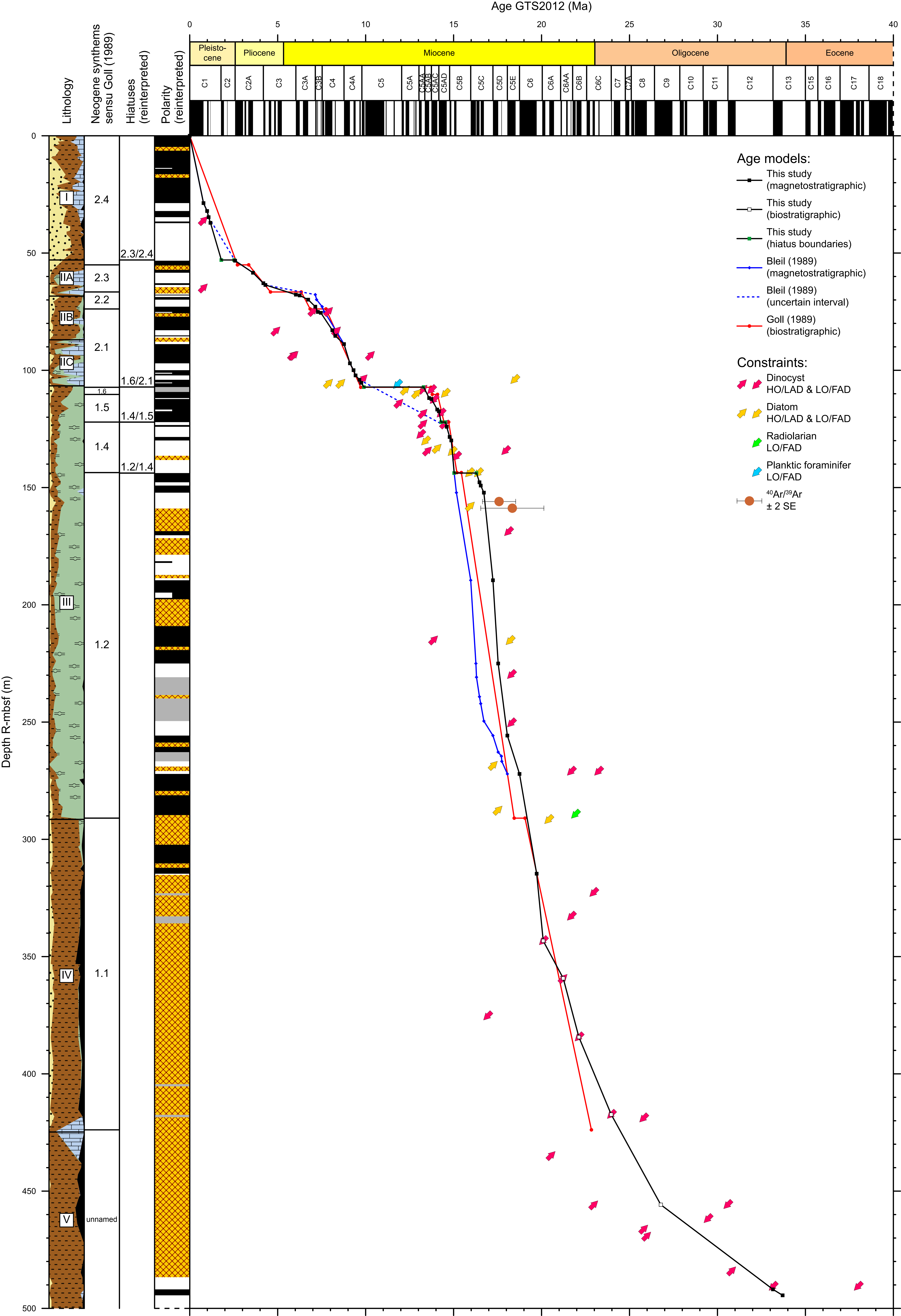
Wilpshaar, M., Santarelli, A., Brinkhuis, H., Visscher, H., 1996. Dinoflagellate cysts and mid-Oligocene chronostratigraphy in the central Mediterranean region. J. Geol. Soc. London. 153, 553–561. https://doi.org/10.1144/gsjgs.153.4.0553

Wrenn, J.H., Kokinos, J.P., 1986. Preliminary comments on Miocene through Pleistocene dinoflagellate cysts from De Soto Canyon, Gulf of Mexico, in: Wrenn, John H., Duffield, S.L., Stein, J.A. (Eds.), Papers from the First Symposium on Neogene Dinoflagellate Cyst Biostratigraphy, AASP Contributions Series, Vol. 17. American Association of Stratigraphic Palynologists Foundation, Dallas, TX, USA, pp. 169–225.

Yanagisawa, Y., Akiba, F., 1998. Refined Neogene diatom biostratigraphy for the northwest Pacific around Japan, with an introduction of code numbers for selected diatom biohorizons. J. Geol. Soc. Japan 104, 395–414. https://doi.org/10.5575/geosoc.104.395

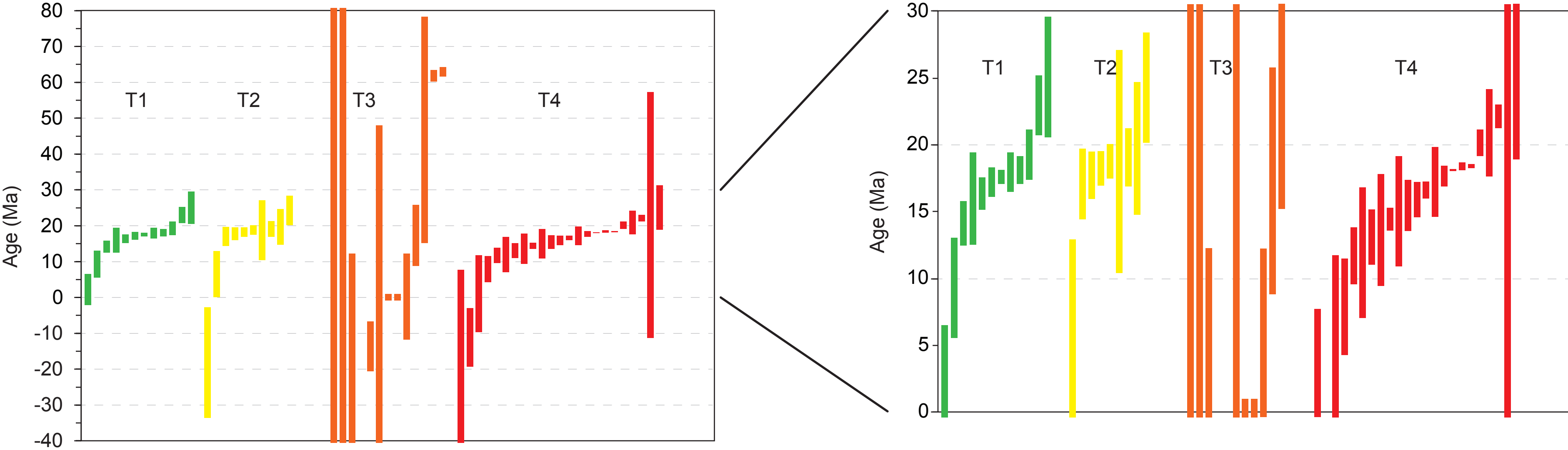
Zegarra, M., Helenes, J., 2011. Changes in Miocene through Pleistocene dinoflagellates from the Eastern Equatorial Pacific (ODP Site 1039), in relation to primary productivity. Mar. Micropaleontol. 81, 107–121. https://doi.org/10.1016/j.marmicro.2011.09.005

Zevenboom, D., 1995. Dinoflagellate cysts from the Mediterranean Late Oligocene and Miocene. Utrecht University.



Age GTS2012 (Ma)
Lithology
Neogene synthems sensu Goll (1989)
Hiatuses (reinterpreted)
Polarity (reinterpreted)
Depth R-mbsf (m)
Pleistocene
Pliocene
Miocene
Oligocene
Eocene
I
IIA
IIB
IIC
III
IV
V
2.4
2.3
2.2
2.1
1.6
1.5
1.4
1.2
1.1
unnamed
2.3/2.4
1.6/2.1
1.4/1.5
1.2/1.4
Age models:
This study (magnetostratigraphic)
This study (biostratigraphic)
This study (hiatus boundaries)
Bleil (1989) (magnetostratigraphic)
Bleil (1989) (uncertain interval)
Goll (1989) (biostratigraphic)
Constraints:
Dinocyst HO/LAD & LO/FAD
Diatom HO/LAD & LO/FAD
Radiolarian LO/FAD
Planktic foraminifer LO/FAD
$^{40}Ar/^{39}Ar$ ± 2 SE

Age calculations where negative intensities are allowed



Age calculations where negative intensities are set to zero

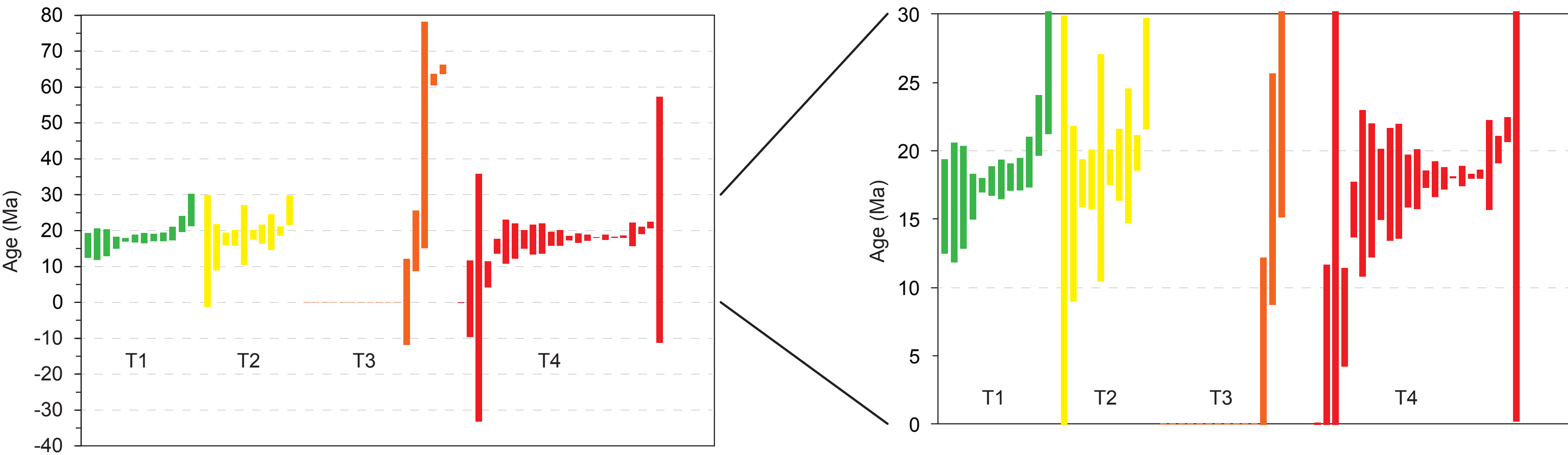


TABLE S1

Top depth (mbsf)	Top depth (R-mbsf)	Core	Section	cm	Dominant/Minor lithology	Texture (%) Sand	Silt	Clay	Composition (%) Quartz	Feldspar	Mica	Clay	Volcanic glass	Calcite/dolomite	Calcite	Dolomite	Accessory minerals:	Glauconite	Zeolites	Pyrite	Pyrite/manganese	Goethite	Opal	Opaque minerals	Foraminifers	Nannofossils	Diatoms	Radiolarians	Sponge spicules	Silicoflagellates	Basalt	Composition grouped (%) Clastics	Clay	Biogenic silica	Biogenic carbonate	Basalt	Other
0,67	0,67	1H	1	67	D	5	40	55	15,00	5,00	0,00	58,00	1,00	20,00	0,00	0,00	1,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	20,00	58,00	0,00	20,00	0,00	2,00
1,81	1,81	1H	2	31	M	15	20	65	13,33	2,67	0,00	80,00	0,00	2,67	0,00	0,00	1,33	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	16,00	80,00	0,00	2,67	0,00	1,33
2,21	2,21	1H	2	71	D	50	20	30	40,00	5,00	0,00	25,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	20,00	10,00	0,00	0,00	0,00	0,00	0,00	45,00	25,00	0,00	30,00	0,00	0,00
2,49	2,49	1H	2	99	D	50	10	40	20,00	5,00	0,00	35,00	0,00	5,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	30,00	5,00	0,00	0,00	0,00	0,00	0,00	25,00	35,00	0,00	40,00	0,00	0,00
3,54	3,54	1H	3	54	D	10	30	60	25,00	5,00	0,00	44,00	0,00	20,00	0,00	0,00	1,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	5,00	0,00	0,00	0,00	0,00	0,00	30,00	44,00	0,00	25,00	0,00	1,00
3,78	3,78	1H	3	78	M	30	30	40	30,00	0,00	0,00	40,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	30,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	30,00	40,00	0,00	0,00	0,00	30,00
4,28	4,28	1H	3	128	D	5	25	70	10,00	2,00	0,00	69,00	0,00	10,00	0,00	0,00	1,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	5,00	3,00	0,00	0,00	0,00	0,00	0,00	12,00	69,00	0,00	18,00	0,00	1,00
5,78	6,28	2H	1	48	D	15	35	50	22,99	5,75	0,00	52,87	0,00	17,24	0,00	0,00	1,15	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	28,74	52,87	0,00	17,24	0,00	1,15
7,98	8,48	2H	2	118	D	5	25	70	15,79	3,16	0,00	73,68	1,05	5,26	0,00	0,00	1,05	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	18,95	73,68	0,00	5,26	0,00	2,11
8,68	9,18	2H	3	38	D	15	15	70	5,00	1,00	0,00	72,00	0,00	2,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	15,00	5,00	0,00	0,00	0,00	0,00	0,00	6,00	72,00	0,00	22,00	0,00	0,00
10,55	11,05	2H	4	75	D	5	20	75	20,00	1,00	0,00	76,00	0,00	2,00	0,00	0,00	1,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	21,00	76,00	0,00	2,00	0,00	1,00
12,44	12,94	2H	5	114	M	25	15	60	3,00	0,00	0,00	62,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	30,00	5,00	0,00	0,00	0,00	0,00	0,00	3,00	62,00	0,00	35,00	0,00	0,00
12,99	13,49	2H	6	19	M		20	80	5,00	0,00	0,00	10,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	15,00	70,00	0,00	0,00	0,00	0,00	0,00	5,00	10,00	0,00	85,00	0,00	0,00
14,82	15,32	2H	7	52	M	5	15	80	2,00	0,00	0,00	17,00	0,00	0,00	0,00	0,00	1,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	10,00	70,00	0,00	0,00	0,00	0,00	0,00	2,00	17,00	0,00	80,00	0,00	1,00
15,25	16,56	3H	1	45	D	40	30	30	45,00	1,00	1,00	30,00	0,00	0,00	20,00	0,00	3,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	47,00	30,00	0,00	20,00	0,00	3,00
16,70	18,01	3H	2	40	D	30	40	30	40,00	0,00	0,00	30,00	0,00	0,00	10,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	20,00	0,00	0,00	0,00	0,00	0,00	0,00	40,00	30,00	0,00	30,00	0,00	0,00
18,29	19,60	3H	3	49	D	30	40	30	60,00	0,00	0,00	30,00	0,00	0,00	5,00	0,00	2,00	0,00	0,00	3,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	60,00	30,00	0,00	5,00	0,00	5,00
19,90	21,21	3H	4	60	D	5	55	40	22,22	0,00	0,00	44,44	0,00	0,00	33,33	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	22,22	44,44	0,00	33,33	0,00	0,00
21,31	22,62	3H	5	51	D	30	40	30	33,33	0,00	0,00	33,33	0,00	0,00	33,33	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	33,33	33,33	0,00	33,33	0,00	0,00
22,02	23,33	3H	5	122	D	20	50	30	60,00	0,00	1,00	30,00	0,00	0,00	5,00	0,00	3,00	0,00	0,00	1,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	61,00	30,00	0,00	5,00	0,00	4,00
23,24	24,55	3H	6	94	D	5	50	45	20,00	0,00	0,00	30,00	0,00	0,00	35,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	15,00	0,00	0,00	0,00	0,00	0,00	20,00	30,00	0,00	50,00	0,00	0,00
25,05	27,19	4H	1	75	D	15	20	65	38,46	0,00	0,00	15,38	0,00	0,00	46,15	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	38,46	15,38	0,00	46,15	0,00	0,00
26,90	29,04	4H	2	110	D	20	30	50	30,00	0,00	0,00	30,00	0,00	0,00	20,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	15,00	5,00	0,00	0,00	0,00	0,00	0,00	30,00	30,00	0,00	40,00	0,00	0,00
29,52	31,66	4H	3	222	D	40	30	30	50,00	5,00	0,00	30,00	0,00	0,00	5,00	0,00	10,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	55,00	30,00	0,00	5,00	0,00	10,00
28,95	31,09	4H	4	15	M	40	50	10	30,00	0,00	0,00	10,00	0,00	0,00	0,00	0,00	2,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	55,00	3,00	0,00	0,00	0,00	0,00	0,00	30,00	10,00	0,00	58,00	0,00	2,00
29,65	31,79	4H	4	85	D	10	40	50	50,00	0,00	0,00	30,00	0,00	0,00	20,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	50,00	30,00	0,00	20,00	0,00	0,00
30,90	33,04	4H	5	60	M	30	50	20	65,00	3,00	1,00	0,00	20,00	0,00	0,00	0,00	10,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	1,00	0,00	0,00	0,00	0,00	0,00	0,00	69,00	0,00	0,00	1,00	0,00	30,00
32,03	34,17	4H	6	23	D	5	35	60	45,00	0,00	0,00	40,00	0,00	0,00	15,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	45,00	40,00	0,00	15,00	0,00	0,00
34,38	37,43	5H	1	58	D	10	40	50	40,00	0,00	0,00	50,00	0,00	0,00	0,00	0,00	10,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	40,00	50,00	0,00	0,00	0,00	10,00
35,53	38,58	5H	2	23	D	30	40	30	60,00	0,00	0,00	30,00	0,00	0,00	0,00	0,00	10,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	60,00	30,00	0,00	0,00	0,00	10,00
37,40	40,45	5H	3	60	D	20	40	40	60,00	0,00	0,00	40,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	60,00	40,00	0,00	0,00	0,00	0,00
37,81	40,86	5H	3	101	D	20	40	40	50,00	0,00	0,00	40,00	0,00	0,00	0,00	0,00	10,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	50,00	40,00	0,00	0,00	0,00	10,00
38,15	41,20	5H	3	135	D	10	50	40	50,00	0,00	0,00	40,00	0,00	5,00	0,00	0,00	5,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	50,00	40,00	0,00	5,00	0,00	5,00
38,90	41,95	5H	4	60	D	10	40	50	50,00	0,00	0,00	50,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	50,00	50,00	0,00	0,00	0,00	0,00
40,55	43,60	5H	5	75	D	30	40	30	60,00	0,00	0,00	30,00	0,00	0,00	0,00	0,00	10,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	60,00	30,00	0,00	0,00	0,00	10,00
43,90	47,45	6H	1	60	D	10	60	30	65,00	0,00	0,00	30,00	0,00	0,00	0,00	0,00	5,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	65,00	30,00	0,00	0,00	0,00	5,00
45,32	48,87	6H	2	52	D	5	35	60	40,00	0,00	0,00	60,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	40,00	60,00	0,00	0,00	0,00	0,00
45,83	49,38	6H	2	103	D	40	30	30	70,00	0,00	0,00	30,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	70,00	30,00	0,00	0,00	0,00	0,00
46,55	50,10	6H	3	25	M	80		20	0,00	0,00	0,00	20,00	80,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	20,00	0,00	0,00	0,00	80,00
47,10	50,65	6H	3	80	D	10	50	40	60,00	0,00	0,00	40,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	60,00	40,00	0,00	0,00	0,00	0,00
48,15	51,70	6H	4	35	D		40	60	50,00	0,00	0,00	50,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	50,00	50,00	0,00	0,00	0,00	0,00
51,48	55,03	6H	6	68	M	20		80	20,00	0,00	0,00	80,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	20,00	80,00	0,00	0,00	0,00	0,00
53,18	57,23	7H	1	38	D		10	90	10,00	0,00	0,00	90,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	10,00	90,00	0,00	0,00	0,00	0,00
55,32	59,37	7H	2	102	D		20	80	4,21	0,00	0,00	15,79	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	73,68	1,05	0,00	5,26	0,00	0,00	4,21	15,79	6,32	73,68	0,00	0,00
56,46	60,51	7H	3	66	M	60		40	10,00	0,00	0,00	35,00	50,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	5,00	0,00	0,00	0,00	0,00	0,00	10,00	35,00	0,00	5,00	0,00	50,00
56,83	60,88	7H	3	103	D		25	75	3,00	0,00	0,00	10,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	65,00	1,00	1,00	20,00	0,00	0,00	3,00	10,00	22,00	65,00	0,00	0,00
59,45	63,50	7H	5	65	D		30	70	5,00	0,00	0,00	20,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	50,00	0,00	0,00	25,00	0,00	0,00	5,00	20,00	25,00	50,00	0,00	0,00
59,72	63,77	7H	5	92	D		40	60	30,00	0,00	0,00	55,00	0,00	0,00	0,00	0,00	4,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	1,00	10,00	0,00	0,00	30,00	55,00	11,00	0,00	0,00	4,00
60,45	64,50	7H	6	15	D		20	80	10,00	0,00	0,00	85,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	5,00	0,00	0,00	10,00	85,00	5,00	0,00	0,00	0,00
62,52	67,07	8H	1	22	D		20	80	5,00	0,00	0,00	15,00	1,00	0,00	0,00	0,00	1,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	1,00	62,00	10,00	0,00	5,00	0,00	0,00	5,00	15,00	15,00	63,00	0,00	2,00
63,26	67,81	8H	1	96	D	5	20	75	15,00	2,00	0,00	70,00	2,00	0,00	0,00	0,00	1,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	10,00	0,00	0,00	17,00	70,00	10,00	0,00	0,00	3,00
64,27	68,82	8H	2	47	D	10	20	70	25,00	5,00	0,00	65,00	2,00	0,00	0,00	0,00	1,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	2,00	0,00	0,00	30,00	65,00	2,00	0,00	0,00	3,00
66,21	70,76	8H	3	91	D	2	18	80	10,00	2,00	0,00	80,00	1,00	0,00	0,00	0,00	1,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	2,00	0,00	4,00	0,00	0,00	12,00	80,00	6,00	0,00	0,00	2,00
67,50	72,05	8H	4	70	D	5	25	70	15,00	1,00	0,00	70,00	1,00	0,00	0,00	0,00	1,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	2,00	0,00	10,00	0,00	0,00	16,00	70,00	12,00	0,00	0,00	2,00
69,00	73,55	8H	5	70	D	5	35	60	15,00	2,00	0,00	60,00	2,00	0,00	0,00	0,00	1,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	10,00	0,00	10,00	0,00	0,00	17,00	60,00	20,00	0,00	0,00	3,00
70,43	74,98	8H	6	63	D	5	15	80	15,00	0,00	0,00	75,00	2,00	0,00	0,00	0,00	1,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	2,00	0,00	5,00	0,00	0,00	15,00	75,00	7,00	0,00	0,00	3,00
72,50	77,55	9H	1	70	D	2	18	80	7,00	0,00	0,00	80,00	2,00	1,00	0,00	0,00	1,00	0,00	0,00	2,00	0,00	0,00	0,00	0,00	0,00	0,00	2,00	0,00	5,00	0,00	0,00	7,00	80,00	7,00	1,00	0,00	5,00
74,21	79,26	9H	2	91	D		20	80	5,00	0,00	0,00	37,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	1,00	50,00	2,00	0,00	5,00	0,00	0,00	5,00	37,00	7,00	51,00	0,00	0,00
75,55	80,60	9H	3	75	D	2	28	70	10,00	1,00	0,00	73,00	1,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	5,00	0,00	10,00	0,00	0,00	11,00	73,00	15,00	0,00	0,00	1,00
77,32	82,37	9H	4	102	D	2	10	88	10,00	1,00	0,00	78,00	3,00	0,00	0,00	0,00	0,00	1,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	2,00	0,00	5,00	0,00	0,00	11,00	78,00	7,00	0,00	0,00	4,00
78,66	83,71	9H	5	86	D	1	19	80	5,00	0,00	0,00	82,00	1,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	2,00	5,00	0,00	5,00	0,00	0,00	5,00	82,00	10,00	2,00	0,00	1,00
79,80	84,85	9H	6	50	D	1	37	62	15,00	0,00	0,00	62,00	2,00	0,00	0,00	0,00	1,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	10,00	0,00	10,00	0,00	0,00	15,00	62,00	20,00	0,00	0,00	3,00
81,09	86,14	9H	7	29	D	1	29	70	5,00	0,00	0,00	72,00	2,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	10,00	1,00	10,00	0,00	0,00	5,00	72,00	21,00	0,00	0,00	2,00
82,13	88,09	10H	1	83	D		30	70	1,00	0,00	0,00	17,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	50,00	25,00	2,00	5,00	0,00	0,00	1,00	17,00	32,00	50,00	0,00	0,00
83,11	89,07	10H	2	31	D		20	80	5,00	0,00	0,00	80,00	1,00	1,00	0,00	0,00	1,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	2,00	0,00	10,00	0,00	0,00	5,00	80,00	12,00	1,00	0,00	2,00
85,20	91,16	10H	3	90	D		20	80	2,00	0,00	0,00	14,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	1,00	65,00	15,00	0,00	3,00	0,00	0,00	2,00	14,00	18,00	66,00	0,00	0,00
87,10	93,06	10H	4	130	D		25	75	5,00	0,00	0,00	14,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	60,00	15,00	1,00	5,00	0,00	0,00	5,00	14,00	21,00	60,00	0,00	0,00
87,80	93,76	10H	5	50	D	1	24	75	15,00	0,00	0,00	74,00	1,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	5,00	0,00	5,00	0,00	0,00	15,00	74,00	10,00	0,00	0,00	1,00
89,30	95,26	10H	6	50	D	3	17	80	10,00	0,00	0,00	79,00	1,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	5,00	0,00	5,00	0,00	0,00	10,00	79,00	10,00	0,00	0,00	1,00
90,52	96,48	10H	7	22	D	2	60	38	10,00	0,00	0,00	34,00	1,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	40,00	5,00	10,00	0,00	0,00	10,00	34,00	55,00	0,00	0,00	1,00
91,56	98,04	11H	1	76	D		25	75	2,00	0,00	0,00	24,00	1,00	2,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	50,00	15,00	1,00	5,00	0,00	0,00	2,00	24,00	21,00	52,00	0,00	1,00
92,60	99,08	11H	2	30	D		25	75	2,00	0,00	0,00	15,00	0,00	2,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	60,00	15,00	1,00	5,00	0,00	0,00	2,00	15,00	21,00	62,00	0,00	0,00
94,95	101,43	11H	3	115	D		40	60	0,00	0,00	0,00	9,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	1,00	55,00	25,00	0,00	10,00	0,00	0,00	0,00	9,00	35,00	56,00	0,00	0,00
96,20	102,68	11H	4	90	D	5	45	50	10,00	0,00	0,00	50,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	30,00	0,00	10,00	0,00	0,00	10,00	50,00	40,00	0,00	0,00	0,00
97,39	103,87	11H	5	59	D		40	60	0,00	0,00	0,00	8,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	50,00	30,00	2,00	10,00	0,00	0,00	0,00	8,00	42,00	50,00	0,00	0,00
98,89	105,37	11H	6	59	D		45	55	0,00	0,00	0,00	11,00	0,00	1,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	1,00	45,00	30,00	2,00	10,00	0,00	0,00	0,00	11,00	42,00	47,00	0,00	0,00
100,31	106,79	11H	CC	10	D	5	35	60	10,00	1,00	0,00	57,00	1,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	20,00	1,00	10,00	0,00	0,00	11,00	57,00	31,00	0,00	0,00	1,00
101,00	108,38	12H	1	70	D	5	40	55	15,00	0,00	0,00	51,00	1,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	20,00	2,00	10,00	1,00	0,00	15,00	51,00	33,00	0,00	0,00	1,00
103,70	111,08	12H	3	40	D		50	50	5,00	0,00	0,00	48,00	1,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	30,00	5,00	10,00	1,00	0,00	5,00	48,00	46,00	0,00	0,00	1,00
106,10	113,48	12H	4	130	D	10	60	30	5,00	0,00	0,00	28,00	1,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	50,00	5,00	10,00	1,00	0,00	5,00	28,00	66,00	0,00	0,00	1,00
107,23	114,61	12H	5	93	D	15	45	40	2,00	0,00	0,00	36,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	40,00	5,00	15,00	2,00	0,00	2,00	36,00	62,00	0,00	0,00	0,00
108,88	116,26	12H	6	108	D	10	50	40	5,00	0,00	0,00	51,00	1,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	30,00	2,00	10,00	1,00	0,00	5,00	51,00	43,00	0,00	0,00	1,00
110,31	118,19	13H	1	51	D	25	45	30	5,00	0,00	0,00	30,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	40,00	5,00	20,00	0,00	0,00	5,00	30,00	65,00	0,00	0,00	0,00
111,00	118,88	13H	1	120	D	30	50	20	10,00	0,00	0,00	20,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	50,00	10,00	10,00	0,00	0,00	10,00	20,00	70,00	0,00	0,00	0,00
113,50	121,38	13H	3	70	D	20	60	20	5,00	0,00	0,00	20,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	55,00	5,00	15,00	0,00	0,00	5,00	20,00	75,00	0,00	0,00	0,00
115,45	123,33	13H	4	115	D	15	55	30	10,00	0,00	0,00	23,00	1,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	50,00	5,00	10,00	1,00	0,00	10,00	23,00	66,00	0,00	0,00	1,00
117,87	125,75	13H	6	57	D	20	60	20	7,00	0,00	0,00	16,00	0,00	0,00	0,00	0,00	1,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	60,00	5,00	10,00	1,00	0,00	7,00	16,00	76,00	0,00	0,00	1,00
118,64	126,52	13H	6	134	D	30	40	30	10,00	0,00	0,00	20,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	50,00	10,00	10,00	0,00	0,00	10,00	20,00	70,00	0,00	0,00	0,00
120,00	128,70	14H	1	70	D	15	60	25	5,00	0,00	0,00	25,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	50,00	5,00	15,00	0,00	0,00	5,00	25,00	70,00	0,00	0,00	0,00
121,53	130,23	14H	2	73	D	30	50	20	5,00	0,00	0,00	8,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	5,00	0,00	0,00	0,00	0,00	0,00	0,00	60,00	5,00	15,00	2,00	0,00	5,00	8,00	82,00	0,00	0,00	5,00
123,12	131,82	14H	3	82	D	15	55	30	4,76	0,00	0,00	19,05	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	52,38	4,76	19,05	0,00	0,00	4,76	19,05	76,19	0,00	0,00	0,00
124,06	132,76	14H	4	26	D	15	65	20	5,00	0,00	0,00	18,00	1,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	50,00	5,00	20,00	1,00	0,00	5,00	18,00	76,00	0,00	0,00	1,00
126,10	134,80	14H	5	80	D	20	60	20	5,00	0,00	0,00	18,00	1,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	60,00	5,00	10,00	1,00	0,00	5,00	18,00	76,00	0,00	0,00	1,00
127,40	136,10	14H	6	60	D	20	60	20	3,00	0,00	0,00	16,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	55,00	5,00	20,00	1,00	0,00	3,00	16,00	81,00	0,00	0,00	0,00
129,64	138,84	15H	1	84	D	15	65	20	5,00	0,00	0,00	13,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	60,00	5,00	15,00	2,00	0,00	5,00	13,00	82,00	0,00	0,00	0,00
131,25	140,45	15H	2	95	D	20	60	20	5,00	0,00	0,00	21,00	1,00	0,00	0,00	0,00	1,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	50,00	5,00	15,00	2,00	0,00	5,00	21,00	72,00	0,00	0,00	2,00
132,20	141,40	15H	3	40	D	20	60	20	5,00	0,00	0,00	13,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	55,00	5,00	20,00	2,00	0,00	5,00	13,00	82,00	0,00	0,00	0,00
134,03	143,23	15H	4	73	D	20	60	20	5,00	0,00	0,00	13,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	55,00	5,00	20,00	2,00	0,00	5,00	13,00	82,00	0,00	0,00	0,00
135,71	144,91	15H	5	91	D	20	60	20	7,00	0,00	0,00	16,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	50,00	5,00	20,00	2,00	0,00	7,00	16,00	77,00	0,00	0,00	0,00
138,10	147,30	15H	CC	30	D	15	55	30	10,00	0,00	0,00	23,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	50,00	5,00	10,00	2,00	0,00	10,00	23,00	67,00	0,00	0,00	0,00
138,80	148,50	16H	1	50	D	15	55	30	10,00	0,00	0,00	23,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	50,00	5,00	10,00	2,00	0,00	10,00	23,00	67,00	0,00	0,00	0,00
140,35	150,05	16H	2	55	D	15	60	25	5,00	0,00	0,00	14,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	60,00	5,00	15,00	1,00	0,00	5,00	14,00	81,00	0,00	0,00	0,00
141,90	151,60	16H	3	60	D	10	45	45	1,02	0,00	0,00	24,49	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	20,41	40,82	2,04	10,20	1,02	0,00	1,02	24,49	54,08	20,41	0,00	0,00
144,00	153,70	16H	4	120	D	20	60	20	5,00	0,00	0,00	19,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	55,00	5,00	15,00	1,00	0,00	5,00	19,00	76,00	0,00	0,00	0,00
146,60	156,30	16H	6	80	D	15	55	30	20,00	0,00	0,00	24,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	40,00	5,00	10,00	1,00	0,00	20,00	24,00	56,00	0,00	0,00	0,00
148,30	158,88	17X	1	50	D	15	55	30	10,00	0,00	0,00	24,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	50,00	5,00	10,00	1,00	0,00	10,00	24,00	66,00	0,00	0,00	0,00
158,16	169,24	18X	1	86	D	20	60	20	5,00	0,00	0,00	19,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	55,00	5,00	15,00	1,00	0,00	5,00	19,00	76,00	0,00	0,00	0,00
159,59	170,67	18X	2	79	D	20	50	30	4,95	0,00	0,00	24,75	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	49,50	4,95	14,85	0,99	0,00	4,95	24,75	70,30	0,00	0,00	0,00
167,61	179,19	19X	1	81	D	15	65	20	5,05	0,00	0,00	12,12	1,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	60,61	5,05	15,15	1,01	0,00	5,05	12,12	81,82	0,00	0,00	1,01
168,77	180,35	19X	2	47	D	15	55	30	4,95	0,00	0,00	22,77	0,99	0,00	0,00	0,00	0,99	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	54,46	4,95	9,90	0,99	0,00	4,95	22,77	70,30	0,00	0,00	1,98
172,22	183,80	19X	4	92	D	15	50	35	5,00	1,00	0,00	21,00	1,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	50,00	5,00	15,00	2,00	0,00	6,00	21,00	72,00	0,00	0,00	1,00
175,02	186,60	19X	6	72	D	20	60	20	5,00	0,00	0,00	18,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	55,00	5,00	15,00	2,00	0,00	5,00	18,00	77,00	0,00	0,00	0,00
177,60	189,68	20X	1	130	D	20	65	15	5,00	1,00	0,00	12,00	1,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	60,00	5,00	15,00	1,00	0,00	6,00	12,00	81,00	0,00	0,00	1,00
178,73	190,81	20X	2	93	D	20	60	20	5,00	0,00	0,00	18,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	50,00	5,00	20,00	2,00	0,00	5,00	18,00	77,00	0,00	0,00	0,00
179,80	191,88	20X	3	50	D	5	80	15	1,00	0,00	0,00	20,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	65,00	1,00	10,00	3,00	0,00	1,00	20,00	79,00	0,00	0,00	0,00
183,30	195,38	20X	5	100	D	5	75	20	0,99	0,00	0,00	9,90	0,99	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	69,31	0,99	14,85	2,97	0,00	0,99	9,90	88,12	0,00	0,00	0,99
184,91	196,99	20X	6	111	D	10	80	10	5,00	0,00	0,00	10,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	50,00	2,00	30,00	3,00	0,00	5,00	10,00	85,00	0,00	0,00	0,00
195,86	209,18	22X	1	56	D	15	70	15	4,00	0,00	0,00	15,00	1,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	45,00	2,00	30,00	3,00	0,00	4,00	15,00	80,00	0,00	0,00	1,00
196,65	209,97	22X	1	135	M	90		10	10,00	0,00	0,00	0,00	90,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	10,00	0,00	0,00	0,00	0,00	90,00
199,40	212,72	22X	3	110	M	5	70	25	0,00	0,00	0,00	20,20	1,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	40,40	1,01	35,35	2,02	0,00	0,00	20,20	78,79	0,00	0,00	1,01

200,44	213,76	22X	4	64	D	5	70	25	3,00	0,00	0,00	25,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	40,00	5,00	25,00	2,00	0,00	3,00	25,00	72,00	0,00	0,00	0,00
203,43	216,75	22X	6	63	D	10	65	25	5,05	0,00	0,00	20,20	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	50,51	1,01	20,20	3,03	0,00	5,05	20,20	74,75	0,00	0,00	0,00
204,48	217,80	22X	7	18	M		80	20	0,00	0,00	0,00	10,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	45,00	1,00	40,00	4,00	0,00	0,00	10,00	90,00	0,00	0,00	0,00
205,40	219,22	23X	1	30	M	5	75	20	3,00	0,00	0,00	15,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	20,00	0,00	0,00	0,00	0,00	0,00	0,00	35,00	1,00	25,00	1,00	0,00	3,00	15,00	62,00	0,00	0,00	20,00
207,60	221,42	23X	2	100	D		80	20	0,00	0,00	0,00	10,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	50,00	8,00	30,00	2,00	0,00	0,00	10,00	90,00	0,00	0,00	0,00
210,12	223,94	23X	4	52	D		70	30	0,00	0,00	0,00	20,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	40,00	5,00	30,00	5,00	0,00	0,00	20,00	80,00	0,00	0,00	0,00
213,38	227,20	23X	6	78	D		80	20	0,00	0,00	0,00	10,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	50,00	5,00	30,00	5,00	0,00	0,00	10,00	90,00	0,00	0,00	0,00
213,48	227,30	23X	6	88	M		80	20	0,00	0,00	0,00	20,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	30,00	2,00	40,00	8,00	0,00	0,00	20,00	80,00	0,00	0,00	0,00
215,70	230,04	24X	1	80	D	5	80	15	0,00	0,00	0,00	10,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	50,00	3,00	35,00	2,00	0,00	0,00	10,00	90,00	0,00	0,00	0,00
218,08	232,42	24X	3	18	M	30	60	10	0,00	0,00	0,00	5,00	60,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	20,00	0,00	15,00	0,00	0,00	0,00	5,00	35,00	0,00	0,00	60,00
220,50	234,84	24X	4	110	D		70	30	0,00	0,00	0,00	20,00	5,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	40,00	3,00	30,00	2,00	0,00	0,00	20,00	75,00	0,00	0,00	5,00
223,13	237,47	24X	6	73	D	10	80	10	0,00	0,00	0,00	11,11	1,11	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	55,56	2,22	27,78	2,22	0,00	0,00	11,11	87,78	0,00	0,00	1,11
224,28	238,62	24X	7	38	D		75	25	0,00	0,00	0,00	20,00	1,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	35,00	1,00	40,00	3,00	0,00	0,00	20,00	79,00	0,00	0,00	1,00
226,70	241,54	25X	2	50	D	15	65	20	0,00	0,00	0,00	15,00	2,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	50,00	5,00	25,00	3,00	0,00	0,00	15,00	83,00	0,00	0,00	2,00
229,65	244,49	25X	4	45	M	5	65	30	0,00	0,00	0,00	25,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	5,00	0,00	0,00	0,00	0,00	0,00	0,00	40,00	1,00	25,00	4,00	0,00	0,00	25,00	70,00	0,00	0,00	5,00
233,20	248,04	25X	6	100	D	20	65	15	0,00	0,00	0,00	10,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	60,00	2,00	25,00	3,00	0,00	0,00	10,00	90,00	0,00	0,00	0,00
233,60	248,44	25X	6	140	D	15	65	20	0,00	0,00	0,00	15,00	1,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	50,00	2,00	30,00	2,00	0,00	0,00	15,00	84,00	0,00	0,00	1,00
234,31	249,15	25X	CC	12	M	60	30	10	0,00	0,00	0,00	5,00	50,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	25,00	0,00	20,00	0,00	0,00	0,00	5,00	45,00	0,00	0,00	50,00
237,68	253,07	26X	3	18	M	95		5	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	5,00	0,00	95,00	0,00	0,00	0,00	0,00	100,00	0,00	0,00	0,00
238,49	253,88	26X	3	99	D	20	60	20	0,00	0,00	0,00	20,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	45,00	1,00	30,00	4,00	0,00	0,00	20,00	80,00	0,00	0,00	0,00
240,19	255,58	26X	4	119	M	50	25	25	0,00	0,00	0,00	25,00	40,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	20,00	0,00	15,00	0,00	0,00	0,00	25,00	35,00	0,00	0,00	40,00
242,35	257,74	26X	6	35	D	5	85	10	0,00	0,00	0,00	10,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	40,00	0,00	45,00	5,00	0,00	0,00	10,00	90,00	0,00	0,00	0,00
243,05	258,44	26X	6	105	D	10	75	15	0,00	0,00	0,00	11,11	3,33	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	44,44	2,22	33,33	5,56	0,00	0,00	11,11	85,56	0,00	0,00	3,33
243,17	258,56	26X	6	117	M	60	35	5	0,00	0,00	0,00	5,00	90,00	0,00	0,00	0,00	0,00	0,00	0,00	5,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	5,00	0,00	0,00	0,00	95,00
244,89	260,80	27X	1	59	D	10	80	10	0,00	0,00	0,00	10,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	55,00	2,00	30,00	3,00	0,00	0,00	10,00	90,00	0,00	0,00	0,00
248,16	264,07	27X	3	86	D		70	30	0,00	0,00	0,00	25,00	1,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	30,00	1,00	40,00	3,00	0,00	0,00	25,00	74,00	0,00	0,00	1,00
252,20	268,11	27X	6	40	D		70	30	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	40,00	4,00	53,33	2,67	0,00	0,00	0,00	100,00	0,00	0,00	0,00
252,78	268,69	27X	6	98	M		80	20	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	50,00	6,25	37,50	6,25	0,00	0,00	0,00	100,00	0,00	0,00	0,00
254,65	271,06	28X	1	55	D	15	65	20	2,00	0,00	0,00	15,00	3,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	60,00	0,00	20,00	0,00	0,00	2,00	15,00	80,00	0,00	0,00	3,00
257,08	273,49	28X	2	148	M				0,00	0,00	0,00	20,00	50,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	10,00	0,00	20,00	0,00	0,00	0,00	20,00	30,00	0,00	0,00	50,00
257,60	274,01	28X	3	50	D	15	55	30	3,00	0,00	0,00	25,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	50,00	0,00	20,00	2,00	0,00	3,00	25,00	72,00	0,00	0,00	0,00
258,06	274,47	28X	3	96	D	20	70	10	9,09	0,00	0,00	9,09	13,64	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	45,45	0,00	22,73	0,00	0,00	9,09	9,09	68,18	0,00	0,00	13,64
260,88	277,29	28X	5	78	D	5	70	25	3,00	0,00	0,00	20,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	40,00	2,00	35,00	0,00	0,00	3,00	20,00	77,00	0,00	0,00	0,00
262,58	278,99	28X	6	98	D	10	60	30	5,00	0,00	0,00	25,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	50,00	5,00	10,00	5,00	0,00	5,00	25,00	70,00	0,00	0,00	0,00
263,29	279,70	28X	7	19	D	15	55	30	7,00	0,00	0,00	21,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	55,00	10,00	5,00	2,00	0,00	7,00	21,00	72,00	0,00	0,00	0,00
264,60	281,51	29X	1	70	D	15	60	25	4,95	0,00	0,00	22,77	0,99	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	59,41	4,95	4,95	1,98	0,00	4,95	22,77	71,29	0,00	0,00	0,99
267,54	284,45	29X	3	64	D	20	60	20	10,10	0,00	0,00	17,17	0,00	0,00	0,00	0,00	1,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	55,56	5,05	10,10	1,01	0,00	10,10	17,17	71,72	0,00	0,00	1,01
268,85	285,76	29X	4	45	M		3	97	0,00	0,00	0,00	97,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	2,00	0,00	1,00	0,00	0,00	0,00	97,00	3,00	0,00	0,00	0,00
269,22	286,13	29X	4	82	D	15	55	30	10,00	0,00	0,00	29,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	50,00	1,00	10,00	0,00	0,00	10,00	29,00	61,00	0,00	0,00	0,00
273,02	289,93	29X	7	12	M		10	90	0,00	0,00	0,00	90,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	5,00	0,00	5,00	0,00	0,00	0,00	90,00	10,00	0,00	0,00	0,00
273,48	290,39	29X	CC	18	D	15	55	30	10,00	0,00	0,00	24,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	50,00	5,00	10,00	1,00	0,00	10,00	24,00	66,00	0,00	0,00	0,00
273,88	291,31	30X	CC	18	D		20	80	5,00	0,00	0,00	79,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	5,00	1,00	10,00	0,00	0,00	5,00	79,00	16,00	0,00	0,00	0,00
284,30	302,23	31X	1	80	D	5	15	80	10,00	0,00	0,00	78,00	1,00	0,00	0,00	0,00	0,00	1,00	0,00	5,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	5,00	0,00	0,00	10,00	78,00	5,00	0,00	0,00	7,00
285,21	303,14	31X	2	21	D	5	20	75	10,00	0,00	0,00	73,00	1,00	0,00	0,00	0,00	0,00	1,00	0,00	5,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	10,00	0,00	0,00	10,00	73,00	10,00	0,00	0,00	7,00
287,23	305,16	31X	3	73	D	5	15	80	10,00	0,00	0,00	79,00	1,00	0,00	0,00	0,00	0,00	0,00	0,00	5,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	5,00	0,00	0,00	10,00	79,00	5,00	0,00	0,00	6,00
292,70	310,63	31X	7	20	D	5	10	85	10,00	0,00	0,00	86,00	1,00	0,00	0,00	0,00	1,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	2,00	0,00	0,00	10,00	86,00	2,00	0,00	0,00	2,00
294,19	312,66	32X	1	89	D	2	17	81	5,15	0,00	0,00	83,51	1,03	0,00	0,00	0,00	0,00	0,00	0,00	10,31	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	5,15	83,51	0,00	0,00	0,00	11,34
295,52	313,99	32X	2	72	D	1	6	93	5,05	0,00	0,00	93,94	1,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	5,05	93,94	0,00	0,00	0,00	1,01
297,56	316,03	32X	3	126	M	5	15	80	0,99	0,00	0,00	80,20	1,98	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	9,90	4,95	1,98	0,00	0,00	0,99	80,20	16,83	0,00	0,00	1,98
297,84	316,31	32X	CC	4	M		3	97	2,00	0,00	0,00	97,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	1,00	0,00	0,00	0,00	2,00	97,00	1,00	0,00	0,00	0,00
303,80	322,77	33X	1	70	D	5	15	80	10,10	0,00	0,00	77,78	1,01	0,00	0,00	0,00	0,00	1,01	0,00	10,10	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	10,10	77,78	0,00	0,00	0,00	12,12
305,23	324,20	33X	2	63	D	1	14	85	5,00	0,00	0,00	84,00	1,00	0,00	0,00	0,00	0,00	0,00	0,00	10,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	5,00	84,00	0,00	0,00	0,00	11,00
316,75	336,22	34X	CC	19	D	5	20	75	15,00	0,00	0,00	73,00	1,00	0,00	0,00	0,00	0,00	0,00	0,00	10,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	1,00	0,00	0,00	15,00	73,00	1,00	0,00	0,00	11,00
324,06	344,03	35X	1	136	D	2	24	74	10,00	0,00	0,00	74,00	1,00	0,00	0,00	0,00	0,00	0,00	0,00	15,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	10,00	74,00	0,00	0,00	0,00	16,00
332,64	353,11	36X	1	14	D		30	70	5,00	0,00	0,00	70,00	5,00	0,00	0,00	0,00	0,00	0,00	0,00	20,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	5,00	70,00	0,00	0,00	0,00	25,00
332,87	353,34	36X	1	37	D	1	20	79	10,00	0,00	0,00	79,00	1,00	0,00	0,00	0,00	0,00	0,00	0,00	10,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	10,00	79,00	0,00	0,00	0,00	11,00
334,66	355,13	36X	2	66	D	2	26	72	10,00	0,00	0,00	72,00	2,00	0,00	0,00	0,00	0,00	0,00	0,00	15,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	1,00	0,00	0,00	10,00	72,00	1,00	0,00	0,00	17,00
337,99	358,46	36X	4	99	D	4	26	70	15,00	0,00	0,00	74,00	1,00	0,00	0,00	0,00	0,00	0,00	0,00	10,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	15,00	74,00	0,00	0,00	0,00	11,00
338,55	359,02	36X	5	5	M	4	1	95	1,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	99,00	0,00	0,00	0,00	0,00	0,00	0,00	1,00	0,00	0,00	99,00	0,00	0,00
342,42	363,39	37X	1	12	M		10	90	1,00	0,00	0,00	40,00	0,00	0,00	56,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	1,00	0,00	2,00	0,00	0,00	1,00	40,00	3,00	56,00	0,00	0,00
342,52	363,49	37X	1	22	D	2	26	72	10,00	0,00	0,00	72,00	2,00	0,00	0,00	0,00	0,00	0,00	0,00	15,00	0,00	0,00	0,00	0,00	0,00	0,00	1,00	0,00	0,00	0,00	0,00	10,00	72,00	1,00	0,00	0,00	17,00
344,63	365,60	37X	2	83	M	5	33	62	10,00	0,00	0,00	62,00	2,00	0,00	0,00	0,00	1,00	0,00	0,00	10,00	0,00	0,00	0,00	0,00	0,00	0,00	15,00	0,00	0,00	0,00	0,00	10,00	62,00	15,00	0,00	0,00	13,00
344,94	365,91	37X	2	114	D	5	27	68	15,00	0,00	0,00	68,00	5,00	0,00	0,00	0,00	0,00	0,00	0,00	10,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	2,00	0,00	0,00	15,00	68,00	2,00	0,00	0,00	15,00
354,10	375,57	38X	2	50	D	5	20	75	10,00	0,00	0,00	74,00	5,00	0,00	0,00	0,00	0,00	1,00	0,00	10,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	10,00	74,00	0,00	0,00	0,00	16,00
362,57	384,54	39X	1	77	D	1	21	78	5,00	0,00	0,00	78,00	2,00	0,00	0,00	0,00	0,00	0,00	0,00	10,00	0,00	0,00	0,00	0,00	0,00	0,00	5,00	0,00	0,00	0,00	0,00	5,00	78,00	5,00	0,00	0,00	12,00
372,24	394,71	40X	CC	19	D		10	90	12,00	0,00	0,00	80,00	1,00	0,00	0,00	0,00	0,00	0,00	0,00	5,00	0,00	0,00	0,00	0,00	0,00	0,00	1,00	0,00	1,00	0,00	0,00	12,00	80,00	2,00	0,00	0,00	6,00
382,06	405,03	41X	1	96	D		20	80	10,00	0,00	0,00	80,00	3,00	0,00	0,00	0,00	1,00	0,00	0,00	0,00	5,00	0,00	0,00	0,00	0,00	0,00	1,00	0,00	0,00	0,00	0,00	10,00	80,00	1,00	0,00	0,00	9,00
382,89	405,86	41X	CC	35	M		5	95	0,00	0,00	0,00	7,00	1,00	0,00	90,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	1,00	0,00	0,00	1,00	0,00	0,00	0,00	7,00	1,00	91,00	0,00	1,00
390,88	414,35	42X	1	18	M		10	90	1,00	0,00	0,00	90,00	3,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	5,00	0,00	0,00	0,00	0,00	0,00	1,00	0,00	0,00	0,00	0,00	1,00	90,00	1,00	0,00	0,00	8,00
391,74	415,21	42X	1	104	D		20	80	3,00	0,00	0,00	80,00	2,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	15,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	3,00	80,00	0,00	0,00	0,00	17,00
392,83	416,30	42X	2	63	M		10	90	1,00	0,00	0,00	30,00	2,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	2,00	0,00	0,00	0,00	0,00	65,00	0,00	0,00	0,00	0,00	0,00	1,00	30,00	0,00	65,00	0,00	4,00
393,99	417,46	42X	3	29	M		10	90	2,00	0,00	5,00	90,00	1,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	2,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	7,00	90,00	0,00	0,00	0,00	3,00
394,69	418,16	42X	3	99	D	10	10	80	15,00	0,00	0,00	80,00	2,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	3,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	15,00	80,00	0,00	0,00	0,00	5,00
395,96	419,43	42X	CC	42	M		5	95	0,00	0,00	0,00	10,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	90,00	0,00	0,00	0,00	0,00	0,00	0,00	10,00	0,00	90,00	0,00	0,00
400,48	424,45	43X	CC	8	D		5	95	0,00	0,00	0,00	20,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	80,00	0,00	0,00	0,00	0,00	0,00	0,00	20,00	0,00	80,00	0,00	0,00
412,24	436,71	44X	2	74	D		10	90	2,00	0,00	0,00	80,00	1,00	0,00	0,00	0,00	0,00	0,00	5,00	0,00	10,00	0,00	0,00	0,00	0,00	0,00	1,00	1,00	0,00	0,00	0,00	2,00	80,00	2,00	0,00	0,00	16,00
413,64	438,11	44X	3	64	D		10	90	2,00	0,00	0,00	90,00	1,00	0,00	0,00	0,00	0,00	0,00	5,00	0,00	2,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	2,00	90,00	0,00	0,00	0,00	8,00
415,57	440,04	44X	4	107	D		10	90	1,00	0,00	0,00	90,00	2,00	0,00	0,00	0,00	0,00	0,00	4,00	0,00	3,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	1,00	90,00	0,00	0,00	0,00	9,00
418,40	442,87	44X	6	90	D		10	90	2,00	0,00	0,00	80,00	2,00	0,00	0,00	0,00	0,00	0,00	15,00	0,00	1,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	2,00	80,00	0,00	0,00	0,00	18,00
420,19	445,28	45X	1	49	D		15	85	2,00	0,00	0,00	78,00	5,00	0,00	0,00	0,00	0,00	0,00	15,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	2,00	78,00	0,00	0,00	0,00	20,00
422,10	447,19	45X	2	90	D		20	80	5,00	0,00	0,00	78,00	2,00	0,00	0,00	0,00	0,00	0,00	15,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	5,00	78,00	0,00	0,00	0,00	17,00
426,65	451,74	45X	5	95	D		10	90	0,00	0,00	0,00	88,00	1,00	1,00	0,00	0,00	0,00	0,00	10,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	88,00	0,00	1,00	0,00	11,00
427,50	452,59	45X	6	30	D		15	85	2,00	0,00	0,00	83,00	5,00	0,00	0,00	0,00	0,00	0,00	10,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	2,00	83,00	0,00	0,00	0,00	15,00
428,60	453,69	45X	CC	32	M		20	80	2,00	0,00	0,00	76,00	1,00	0,00	0,00	0,00	1,00	0,00	5,00	15,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	2,00	76,00	0,00	0,00	0,00	22,00
428,63	453,72	45X	CC	35	M	10	70	20	0,00	0,00	0,00	25,00	0,00	75,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	25,00	0,00	75,00	0,00	0,00
431,70	457,29	46X	2	80	D	5	20	75	2,00	0,00	0,00	73,00	15,00	0,00	0,00	0,00	0,00	0,00	10,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	2,00	73,00	0,00	0,00	0,00	25,00
435,80	461,39	46X	5	40	M		20	80	0,00	0,00	0,00	40,40	0,00	0,00	0,00	0,00	0,00	0,00	5,05	0,00	0,00	0,00	54,55	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	40,40	54,55	0,00	0,00	5,05
438,18	463,77	46X	6	128	M		5	95	0,00	0,00	0,00	95,00	0,00	0,00	0,00	0,00	0,00	0,00	5,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	95,00	0,00	0,00	0,00	5,00
438,30	463,89	46X	6	140	D				1,00	0,00	0,00	79,00	5,00	0,00	0,00	0,00	0,00	0,00	15,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	1,00	79,00	0,00	0,00	0,00	20,00
441,95	468,09	47X	2	135	M		5	95	0,00	0,00	0,00	90,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	10,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	90,00	0,00	0,00	0,00	10,00
440,65	466,79	47X	2	5	M		2	98	1,00	0,00	0,00	98,00	1,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	1,00	98,00	0,00	0,00	0,00	1,00
442,25	468,39	47X	3	15	M		2	98	2,00	0,00	0,00	0,00	0,00	58,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	40,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	2,00	0,00	0,00	58,00	0,00	40,00
442,41	468,55	47X	3	31	M	15	25	60	30,00	0,00	5,00	58,00	0,00	5,00	0,00	0,00	2,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	35,00	58,00	0,00	5,00	0,00	2,00
444,83	470,97	47X	4	123	M		20	80	2,00	0,00	0,00	77,00	1,00	0,00	0,00	0,00	0,00	0,00	0,00	20,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	2,00	77,00	0,00	0,00	0,00	21,00
445,63	471,77	47X	5	53	D		2	98	0,00	0,00	0,00	98,00	1,00	0,00	0,00	0,00	1,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	98,00	0,00	0,00	0,00	2,00
446,89	473,03	47X	6	29	M	50		50	0,00	0,00	0,00	50,00	0,00	50,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	50,00	0,00	50,00	0,00	0,00
450,60	477,44	48X	2	40	D		2	98	2,00	0,00	0,00	98,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	2,00	98,00	0,00	0,00	0,00	0,00
454,09	480,93	48X	4	89	M	40	2	58	2,00	0,00	0,00	58,00	0,00	40,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	2,00	58,00	0,00	40,00	0,00	0,00
455,44	482,28	48X	5	74	M	6	8	86	5,00	2,00	0,00	86,00	5,00	0,00	0,00	0,00	2,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	7,00	86,00	0,00	0,00	0,00	7,00
457,96	484,80	48X	7	26	D	1	10	89	1,00	0,00	0,00	89,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	10,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	1,00	89,00	0,00	0,00	0,00	10,00
459,37	486,83	49X	1	97	D	5	2	93	2,00	0,00	0,00	93,00	5,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	2,00	93,00	0,00	0,00	0,00	5,00
460,34	487,80	49X	2	44	M	20	30	50	20,00	0,00	0,00	50,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	30,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	20,00	50,00	0,00	0,00	0,00	30,00
461,95	489,41	49X	3	55	D		20	80	3,00	0,00	7,00	85,00	1,00	0,00	0,00	0,00	1,00	0,00	2,00	0,00	0,00	0,00	1,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	10,00	85,00	0,00	0,00	0,00	5,00
462,70	490,16	49X	3	130	D		5	95	5,00	0,00	0,00	95,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	5,00	95,00	0,00	0,00	0,00	0,00
464,78	492,24	49X	5	38	D		5	95	3,00	0,00	0,00	95,00	0,00	0,00	0,00	0,00	1,00	0,00	0,00	0,00	0,00	0,00	1,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	3,00	95,00	0,00	0,00	0,00	2,00
466,32	493,78	49X	6	42	D		15	85	1,04	0,00	0,00	88,54	1,04	8,33	0,00	0,00	0,00	0,00	1,04	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	1,04	88,54	0,00	8,33	0,00	2,08
468,13	496,13	50X	1	3	M	100		0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	100,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	100,00	0,00	0,00
468,67	496,67	50X	1	57	D		10	90	2,00	0,00	5,00	88,00	1,00	0,00	0,00	0,00	1,00	0,00	2,00	0,00	0,00	0,00	1,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	7,00	88,00	0,00	0,00	0,00	5,00
480,28	508,78	51X	2	108	M		20	80	1,00	0,00	6,00	80,00	2,00	0,00	0,00	0,00	0,00	0,00	3,00	0,00	8,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	7,00	80,00	0,00	0,00	0,00	13,00
484,16	512,66	51X	5	46	M		10	90	2,00	0,00	6,00	90,00	1,00	1,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	8,00	90,00	0,00	1,00	0,00	1,00
484,77	513,27	51X	5	107	M	98		2	2,00	0,00	1,00	2,00	0,00	95,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	3,00	2,00	0,00	95,00	0,00	0,00
485,41	513,91	51X	6	21	D		10	90	2,00	0,00	5,00	90,00	0,00	2,00	0,00	0,00	0,00	0,00	1,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	7,00	90,00	0,00	2,00	0,00	1,00
486,42	514,92	51X	6	122	M	90	5	5	20,00	0,00	0,00	5,00	0,00	70,00	0,00	0,00	5,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	20,00	5,00	0,00	70,00	0,00	5,00
487,91	517,10	52X	1	61	D		5	95	2,00	0,00	3,00	95,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	5,00	95,00	0,00	0,00	0,00	0,00
492,37	521,56	52X	4	57	M	100		0	0,00	0,00	0,00	0,00	0,00	100,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	100,00	0,00	0,00
492,66	521,85	52X	4	86	D		5	95	1,00	0,00	3,00	95,00	0,00	0,00	0,00	0,00	0,00	0,00	1,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	4,00	95,00	0,00	0,00	0,00	1,00
493,40	522,59	52X	5	10	D		5	95	2,00	0,00	3,00	95,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	5,00	95,00	0,00	0,00	0,00	0,00
494,55	523,74	52X	5	125	M	80	20	0	80,00	15,00	0,00	0,00	0,00	5,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	95,00	0,00	0,00	5,00	0,00	0,00
498,65	528,49	53X	2	15	D		5	95	1,00	0,00	3,00	95,00	0,00	1,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	4,00	95,00	0,00	1,00	0,00	0,00
500,51	530,35	53X	3	51	M		2	98	3,00	0,00	0,00	0,00	0,00	97,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	3,00	0,00	0,00	97,00	0,00	0,00
504,83	534,67	53X	6	33	D		10	90	1,00	0,00	3,00	93,00	0,00	2,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	1,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	4,00	93,00	0,00	2,00	0,00	1,00
509,85	540,19	54X	3	15	D	10	10	80	10,00	0,00	10,00	75,00	0,00	5,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	20,00	75,00	0,00	5,00	0,00	0,00
510,09	540,43	54X	3	39	M	10	20	70	4,00	2,00	0,00	20,00	0,00	54,00	0,00	0,00	0,00	0,00	0,00	20,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	6,00	20,00	0,00	54,00	0,00	20,00
511,92	542,26	54X	4	72	D		5	95	10,00	0,00	5,00	84,00	0,00	0,00	0,00	0,00	0,00	0,00	1,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	15,00	84,00	0,00	0,00	0,00	1,00
515,90	546,24	54X	7	20	M	40	10	50	20,00	10,00	3,00	45,00	2,00	20,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	33,00	45,00	0,00	20,00	0,00	2,00
520,12	551,09	55X	3	72	M	20	11	69	1,00	0,00	0,00	69,00	0,00	30,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	1,00	69,00	0,00	30,00	0,00	0,00
522,60	553,57	55X	5	20	M	50	30	20	2,00	0,00	1,00	10,00	85,00	2,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	3,00	10,00	0,00	2,00	0,00	85,00
523,77	554,74	55X	5	137	M	50	40	10	60,00	0,00	0,00	10,00	30,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	60,00	10,00	0,00	0,00	0,00	30,00
524,38	555,35	55X	6	48	D		2	98	1,01	0,00	0,00	98,99	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	1,01	98,99	0,00	0,00	0,00	0,00
528,02	559,71	56X	2	52	D	1	13	86	2,00	0,00	0,00	86,00	10,00	1,00	0,00	0,00	0,00	1,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	2,00	86,00	0,00	1,00	0,00	11,00
528,83	560,52	56X	2	133	M	1	4	95	1,90	0,00	0,00	90,48	0,00	0,00	0,00	0,00	0,00	0,95	4,76	1,90	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	1,90	90,48	0,00	0,00	0,00	7,62

531,63	563,32	56X	4	113	D	1	8	91	2,11	0,00	0,00	95,79	1,05	0,00	0,00	0,00	1,05	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	2,11	95,79	0,00	0,00	0,00	2,11
532,75	564,44	56X	5	75	D	10	10	80	0,00	0,00	0,00	80,00	0,00	0,00	0,00	0,00	0,00	10,00	10,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	80,00	0,00	0,00	0,00	20,00
534,10	565,79	56X	6	60	M	50	5	45	5,00	0,00	0,00	45,00	0,00	50,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	5,00	45,00	0,00	50,00	0,00	0,00
541,86	574,14	57X	5	26	M	20	17	63	5,00	0,00	0,00	63,00	0,00	0,00	0,00	0,00	2,00	25,00	5,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	5,00	63,00	0,00	0,00	0,00	32,00
555,05	588,37	60X	1	15	D		5	95	2,11	3,16	0,00	94,74	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	5,26	94,74	0,00	0,00	0,00	0,00
557,01	590,33	60X	2	61	D		10	90	3,00	0,00	5,00	90,00	2,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	8,00	90,00	0,00	0,00	0,00	2,00
561,95	595,77	61X	1	75	D	30	10	60	10,00	0,00	2,00	65,00	20,00	1,00	0,00	0,00	2,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	12,00	65,00	0,00	1,00	0,00	22,00

TABLE S2

Core	Core top (mbsf)	Drilled length (m)	Core recovery (m)	Core recovery (%)	Individual offset (m)	Cumulative offset (m)	Core top (R-mbsf)
1H	0,00	5,30	5,25	99,06	0,00	0,00	0,00
2H	5,30	9,50	9,81	103,26	0,50	0,50	5,80
3H	14,80	9,50	9,83	103,47	0,81	1,31	16,11
4H	24,30	9,50	9,91	104,32	0,83	2,14	26,44
5H	33,80	9,50	9,43	99,26	0,91	3,05	36,85
6H	43,30	9,50	8,74	92,00	0,50	3,55	46,85
7H	52,80	9,50	8,15	85,79	0,50	4,05	56,85
8H	62,30	9,50	9,47	99,68	0,50	4,55	66,85
9H	71,80	9,50	9,91	104,32	0,50	5,05	76,85
10H	81,30	9,50	9,52	100,21	0,91	5,96	87,26
11H	90,80	9,50	9,90	104,21	0,52	6,48	97,28
12H	100,30	9,50	9,30	97,89	0,90	7,38	107,68
13H	109,80	9,50	9,82	103,37	0,50	7,88	117,68
14H	119,30	9,50	9,13	96,11	0,82	8,70	128,00
15H	128,80	9,50	9,42	99,16	0,50	9,20	138,00
16H	138,30	9,50	9,88	104,00	0,50	9,70	148,00
17X	147,80	9,50	0,67	7,05	0,88	10,58	158,38
18X	157,30	9,50	3,62	38,11	0,50	11,08	168,38
19X	166,80	9,50	9,49	99,89	0,50	11,58	178,38
20X	176,30	9,50	9,74	102,53	0,50	12,08	188,38
21X	185,80	9,50	5,28	55,58	0,74	12,82	198,62
22X	195,30	9,80	9,75	99,49	0,50	13,32	208,62
23X	205,10	9,80	9,82	100,20	0,50	13,82	218,92
24X	214,90	9,80	9,78	99,80	0,52	14,34	229,24
25X	224,70	9,80	9,85	100,51	0,50	14,84	239,54
26X	234,50	9,80	9,82	100,20	0,55	15,39	249,89
27X	244,30	9,80	9,71	99,08	0,52	15,91	260,21
28X	254,10	9,80	9,77	99,69	0,50	16,41	270,51
29X	263,90	9,80	9,82	100,20	0,50	16,91	280,81
30X	273,70	9,80	0,55	5,61	0,52	17,43	291,13
31X	283,50	9,80	9,84	100,41	0,50	17,93	301,43
32X	293,30	9,80	4,88	49,80	0,54	18,47	311,77
33X	303,10	9,80	4,88	49,80	0,50	18,97	322,07
34X	312,90	9,80	4,02	41,02	0,50	19,47	332,37
35X	322,70	9,80	3,79	38,67	0,50	19,97	342,67
36X	332,50	9,80	8,82	90,00	0,50	20,47	352,97
37X	342,30	9,80	6,17	62,96	0,50	20,97	363,27
38X	352,10	9,70	3,65	37,63	0,50	21,47	373,57
39X	361,80	9,60	3,65	38,02	0,50	21,97	383,77
40X	371,40	9,70	1,07	11,03	0,50	22,47	393,87
41X	381,10	9,60	1,83	19,06	0,50	22,97	404,07
42X	390,70	9,70	5,29	54,54	0,50	23,47	414,17
43X	400,40	9,60	0,41	4,27	0,50	23,97	424,37
44X	410,00	9,70	9,82	101,24	0,50	24,47	434,47
45X	419,70	9,70	8,93	92,06	0,62	25,09	444,79
46X	429,40	9,70	9,75	100,52	0,50	25,59	454,99
47X	439,10	9,60	9,80	102,08	0,55	26,14	465,24
48X	448,70	9,70	9,82	101,24	0,70	26,84	475,54
49X	458,40	9,70	9,74	100,41	0,62	27,46	485,86
50X	468,10	9,60	1,23	12,81	0,54	28,00	496,10
51X	477,70	9,60	9,79	101,98	0,50	28,50	506,20
52X	487,30	9,70	9,85	101,55	0,69	29,19	516,49
53X	497,00	9,70	9,20	94,85	0,65	29,84	526,84
54X	506,70	9,70	9,83	101,34	0,50	30,34	537,04
55X	516,40	9,60	9,82	102,29	0,63	30,97	547,37
56X	526,00	9,60	9,69	100,94	0,72	31,69	557,69
57X	535,60	9,60	9,64	100,42	0,59	32,28	567,88
59X	545,20	9,70	1,45	14,95	0,54	32,82	578,02
60X	554,90	6,30	3,73	59,21	0,50	33,32	588,22
61X	561,20	2,50	1,75	70,00	0,50	33,82	595,02
62X	563,70	1,50	1,71	114,00	0,50	34,32	598,02

TABLE S3

Top depth (mbsf)	Top depth (R-mbsf	Core	Section	Half	Interval (cm)	Sample size (g)
100,920	108,300	12H	1	W	62-64	1,08
103,920	111,300	12H	3	W	62-64	1,11
110,440	118,320	13H	1	W	64-66	1,07
114,920	122,800	13H	4	W	62-64	1,07
119,980	128,680	14H	1	W	68-70	1,04
129,480	138,680	15H	1	W	68-70	1,03
135,480	144,680	15H	5	W	68-70	1,07
138,900	148,600	16H	1	W	60-62	1,08
148,240	158,820	17X	1	W	44-46	1,02
157,780	168,860	18X	1	W	48-50	1,05
167,300	178,880	19X	1	W	50-52	1,06
176,720	188,800	20X	1	W	42-44	1,11
186,340	199,160	21X	1	W	54-56	1,04
195,850	209,170	22X	1	W	55-57	1,10
205,650	219,470	23X	1	W	55-57	1,06
215,450	229,790	24X	1	W	55-57	1,05
225,220	240,060	25X	1	W	52-54	1,05
235,020	250,410	26X	1	W	52-54	0,99
244,890	260,800	27X	1	W	59-61	1,03
254,620	271,030	28X	1	W	52-54	1,06
264,400	281,310	29X	1	W	50-52	1,00
273,800	291,230	30X	CC	W	10-12	1,03
284,050	301,980	31X	1	W	55-57	1,05
293,800	312,270	32X	1	W	50-52	1,11
303,725	322,695	33X	1	W	62.5-64.5	1,05
313,375	332,845	34X	1	W	47.5-49.5	1,13
323,320	343,290	35X	1	W	62-64	1,14
333,090	353,560	36X	1	W	59-61	1,09
342,870	363,840	37X	1	W	57-59	1,07
352,650	374,120	38X	1	W	55-57	1,14
362,350	384,320	39X	1	W	55-57	1,08

TABLE S4

Top depth (mbsf)	Top depth (R-mbsf)	Core	Section	Half	Interval (cm)	Volume (cc)	Selected for Ar/Ar analysis	Macroscopic description
99,890	106,370	11H	7	W	9-10	5		Discrete layer ~1 cm thick
103,910	111,290	12H	3	W	61-62	5		Lens
110,040	117,920	13H	1	W	24-26	5		Lenses
125,070	133,770	14H	4	W	127-129	5		Lens with thickness varying between 4 cm on one side and pinching out on other side.
125,260	133,960	14H	4	W	146-147	5		Not a very distinct layer, but more dispersed in sediment. Secondary gypsum crystals might indicate volcanic material.
134,745	143,945	15H	4	W	144.5-145.5	5		Volcanic ash
139,640	149,340	16H	1	W	134-135	5		Discrete ash layer, 2-7 mm thick. Crystals visible with hand lens.
140,005	149,705	16H	2	W	20.5-21.5	5		Discrete layer ~1 cm thick
146,260	155,960	16H	6	W	46-48	5	X	Thick relatively coarse ash
148,210	158,790	17X	1	W	41-43.5	5	X	Ash interval
160,040	171,120	18X	2	W	124-126	5		Disseminated layer
170,730	182,310	19X	3	W	93-96	5		Discrete layer ~4 cm thick
172,465	184,045	19X	4	W	116.5-117.5	5		
196,655	209,975	22X	1	W	135.5-137.5	5		
199,580	212,900	22X	3	W	128-130	5	X	Dark grey ash ~2 cm thick
218,080	232,420	24X	3	W	18-19	5		Discrete but not continuous layer
237,420	252,810	26X	2	W	142-143	5		Dispersed ash?
257,080	273,490	28X	2	W	148-150	5	X	Discrete ash

TABLE S5

Detector	H2	H1	AX	L1	L2	L3
Amplifier	10^{12} Ω	10^{13} Ω	10^{13} Ω	10^{13} Ω	CDD	CDD
Isotope – >1000fA ^{40}Ar	^{40}Ar	^{39}Ar	^{38}Ar	^{37}Ar	^{36}Ar	
Isotope – <1000fA ^{40}Ar		^{40}Ar	^{39}Ar	^{38}Ar	^{37}Ar	^{36}Ar

TABLE S6

Dinocyst species & spp.

Species reported by: ->

Sample reference	Top depth (mbsf)	Top depth (R-mbsf)	Core	Section	Half	Interval (cm)	Revised age (Ma)	Comments/Species ->
Mu	3,010	3,010	1H	3	W	1-3	0,08	Reported interval: 1; Assumed top of 2 cm sample.
Mu	5,240	5,240	1H	CC	W	18-20	0,14	Reported interval: 18; Assumed top of 2 cm sample.
Mu	14,920	15,420	2H	CC	W	3-5	0,42	Reported interval: 3; Assumed top of 2 cm sample.
Mu	24,460	25,770	3H	CC	W	3-5	0,70	Reported interval: 3; Assumed top of 2 cm sample.
Mu	24,610	25,920	3H	CC	W	18-20	0,71	Reported interval: 18; Assumed top of 2 cm sample.
Mu	33,980	36,120	4H	CC	W	9-11	1,14	Reported interval: 9; 9-11 according to text Mudie, 1989
Mu	43,050	46,100	5H	CC	W	8-10	1,53	Reported interval: 8; Assumed top of 2 cm sample.
Mu	43,230	46,280	5H	CC	W	26-28	1,54	Reported interval: 26; Assumed top of 2 cm sample.
Mu	51,890	55,440	6H	CC	W	7-9	3,01	Reported interval: 7; Assumed top of 2 cm sample.
Mu	60,760	64,810	7H	CC	W	7-9	4,80	Reported interval: 7; 7-9 according to text Mudie, 1989
Mu	60,940	64,990	7H	CC	W	25-27	4,88	Reported interval: 25; Assumed top of 2 cm sample.
Ma	70,280	74,830	8H	6	W	48-50	7,27	
Mu	71,580	76,130	8H	CC	W	28-30	7,51	Reported interval: 28; 28-30 according to text Mudie, 1989
Ma	78,100	83,150	9H	5	W	30-32	8,12	
Mu	81,430	86,480	9H	CC	W	9-11	8,44	Reported interval: 9; 9-11 according to text Mudie, 1989
Mu	81,640	86,690	9H	CC	W	30-32	8,47	Reported interval: 30; Assumed top of 2 cm sample.
Ma	87,610	93,570	10H	5	W	31-33	8,96	
Mu	90,770	96,730	10H	CC	W	5-7	9,09	Reported interval: 5; 5-7 according to text Mudie, 1989
Ma	97,100	103,580	11H	5	W	30-32	9,59	
Mu	100,630	107,110	11H	CC	W	42-44	9,90	Reported interval: 42; 42-44 according to text Mudie, 1989
Ma	100,610	107,990	12H	1	W	31-33	13,35	
TS	100,920	108,300	12H	1	W	62-64	13,37	
TS	103,920	111,300	12H	3	W	62-64	13,57	
Ma	105,110	112,490	12H	4	W	31-33	13,76	
Ma	106,610	113,990	12H	5	W	31-33	13,87	
TS	110,440	118,320	13H	1	W	64-66	14,19	
TS	114,920	122,800	13H	4	W	62-64	14,56	
Ma	117,610	125,490	13H	6	W	31-33	14,66	
Mu	119,520	127,400	13H	CC	W	20-22	14,74	Reported interval: 20; 20-22 according to text Mudie, 1989, but 17-19 also mentioned?
Mu	119,600	127,480	13H	CC	W	28-30	14,74	Reported interval: 28; Assumed top of 2 cm sample.
TS	119,980	128,680	14H	1	W	68-70	14,79	
Ma	125,620	134,320	14H	5	W	32-34	14,92	
Mu	128,040	136,740	14H	CC	W	12-14	14,95	Reported interval: 12; 12-14 according to text Mudie, 1989, but 10-12 also mentioned?
TS	129,480	138,680	15H	1	W	68-70	14,97	
TS	135,480	144,680	15H	5	W	68-70	16,34	
Ma	136,580	145,780	15H	6	W	28-30	16,39	
Mu	138,140	147,340	15H	CC	W	34-36	16,45	Reported interval: 34; 34-36 according to text Mudie, 1989
Mu	138,170	147,370	15H	CC	W	37-39	16,46	Reported interval: 37; Assumed top of 2 cm sample.
Ma	138,600	148,300	16H	1	W	30-32	16,50	
TS	138,900	148,600	16H	1	W	60-62	16,51	
Mu	148,120	157,820	16H	CC	W	23-25	16,80	Reported interval: 23; 23-25 according to text Mudie, 1989
TS	148,240	158,820	17X	1	W	44-46	16,81	
Ma	157,610	168,690	18X	1	W	31-33	16,95	
TS	157,780	168,860	18X	1	W	48-50	16,95	
TS	167,300	178,880	19X	1	W	50-52	17,09	
Ma	174,600	186,180	19X	6	W	30-32	17,19	
TS	176,720	188,800	20X	1	W	42-44	17,22	
Ma	184,100	196,180	20X	6	W	30-32	17,29	
TS	186,340	199,160	21X	1	W	54-56	17,32	
TS	195,850	209,170	22X	1	W	55-57	17,40	
Ma	201,600	214,920	22X	5	W	30-32	17,45	
TS	205,650	219,470	23X	1	W	55-57	17,49	
Ma	211,400	225,220	23X	5	W	30-32	17,54	
TS	215,450	229,790	24X	1	W	55-57	17,61	
Ma	221,200	235,540	24X	5	W	30-32	17,71	
TS	225,220	240,060	25X	1	W	52-54	17,79	
Ma	226,500	241,340	25X	2	W	30-32	17,81	
Ma	232,500	247,340	25X	6	W	30-32	17,91	
TS	235,020	250,410	26X	1	W	52-54	17,97	
Ma	240,800	256,190	26X	5	W	30-32	18,07	
TS	244,890	260,800	27X	1	W	59-61	18,27	
Ma	250,610	266,520	27X	5	W	31-33	18,51	
TS	254,620	271,030	28X	1	W	52-54	18,70	
Ma	263,400	279,810	28X	7	W	30-32	18,92	
TS	264,400	281,310	29X	1	W	50-52	18,96	
Ma	271,700	288,610	29X	6	W	30-32	19,13	
TS	273,800	291,230	30X	CC	W	10-12	19,19	
TS	284,050	301,980	31X	1	W	55-57	19,43	
Ma	285,300	303,230	31X	2	W	30-32	19,46	
Ma	293,600	312,070	32X	1	W	30-32	19,66	
TS	293,800	312,270	32X	1	W	50-52	19,67	
Ma	303,630	322,600	33X	1	W	53-54	19,83	
TS	303,725	322,695	33X	1	W	62.5-64.5	19,83	
TS	313,375	332,845	34X	1	W	47.5-49.5	19,96	
Ma	314,700	334,170	34X	2	W	30-32	19,98	
TS	323,320	343,290	35X	1	W	62-64	20,10	
TS	333,090	353,560	36X	1	W	59-61	20,83	
Ma	338,800	359,270	36X	5	W	30-32	21,23	
TS	342,870	363,840	37X	1	W	57-59	21,39	
Ma	345,500	366,470	37X	3	W	20-22	21,49	
TS	352,650	374,120	38X	1	W	55-57	21,76	
Ma	353,890	375,360	38X	2	W	29-31	21,80	
Ma	362,100	384,070	39X	1	W	30-32	22,11	
TS	362,350	384,320	39X	1	W	55-57	22,12	
Ma	381,280	404,250	41X	1	W	18-20	23,23	
Ma	390,890	414,360	42X	1	W	19-21	23,80	
Ma	392,390	415,860	42X	2	W	19-21	23,88	
Ma	393,890	417,360	42X	3	W	19-21	23,96	
Ma	395,390	418,860	42X	4	W	19-21	24,07	
Ma	410,300	434,770	44X	1	W	30-32	25,24	
Ma	411,800	436,270	44X	2	W	30-32	25,35	
Ma	413,300	437,770	44X	3	W	30-32	25,46	
Ma	414,800	439,270	44X	4	W	30-32	25,57	
Ma	417,800	442,270	44X	6	W	30-32	25,79	
Ma	421,490	446,580	45X	2	W	29-31	26,10	
Ma	424,490	449,580	45X	4	W	29-31	26,32	
Ma	425,990	451,080	45X	5	W	29-31	26,43	
Ma	430,220	455,810	46X	1	W	82-84	26,78	
Ma	431,720	457,310	46X	2	W	82-84	27,04	
Ma	436,220	461,810	46X	5	W	82-84	27,84	
Ma	440,000	466,140	47X	1	W	90-92	28,60	
Ma	443,000	469,140	47X	3	W	90-92	29,13	
Ma	444,500	470,640	47X	4	W	90-92	29,40	
Ma	446,000	472,140	47X	5	W	90-92	29,66	
Ma	449,600	476,440	48X	1	W	90-92	30,43	
Ma	452,600	479,440	48X	3	W	90-92	30,96	
Ma	454,100	480,940	48X	4	W	90-92	31,22	
Ma	455,600	482,440	48X	5	W	90-92	31,49	
Ma	457,100	483,940	48X	6	W	90-92	31,75	
Ma	458,700	486,160	49X	1	W	30-32	32,14	
Ma	460,200	487,660	49X	2	W	30-32	32,41	
Ma	461,700	489,160	49X	3	W	30-32	32,67	
Ma	463,200	490,660	49X	4	W	30-32	32,94	
Ma	*468,400*	*496,400*	*50X*	*1*	*W*	*30-32*		*and deeper occurrences in Manum et al. (1989) or Eldrett et al. (2004)*

	TS	*Sumatradinium hispidum*
	TS	*Sumatradinium* spp. (pars.)
	TS	*Erymnodinium delectabile*
	TS	*Pyxidinopsis* spp. (pars.)
	TS	*Hystrichostrogylon membraniphorum* (s.s.)
	TS, Ma	*Hystrichostrogylon membraniphorum* (s.l.)
	TS	*Pyxidiella* ? spp.
	TS	*Sumatradinium druggii*
	TS	*Batiacasphaera* ? spp.
	TS	*Cerebrocysta* spp. (pars.)
	TS, Ma, Mu	*Labyrinthodinium truncatum* (s.s.)
	TS, Ma, Mu	*Invertocysta lacrymosa*
	Ma	*Nematosphaeropsis lemniscata*
	Mu	*Achomosphaera crassipellis*
	Mu	*Pyxidiella* ? *simplex*
	TS	*Hystrichostrogylon* spp. (pars.)
	Mu	*Impagidinium multiplexum*
	TS, Ma	*Impagidinium maculatum*
	TS, Mu	*Habibacysta tectata* (s.l.)
	TS, Ma, Mu	*Unipontidinium aquaeductus*
	TS, Ma	*Cerebrocysta poulsenii*
	Mu	*Gramocysta vericula*
	Mu	*Achomosphaera ramulifera*
	Mu	*Operculodinium walli*
	TS, Ma, Mu	*Achomosphaera andalousiensis*
	TS	*Selenopemphix dionaeacysta*
	TS	*Habibacysta tectata* (s.s.)
	TS, Ma	*Cerebrocysta irregularis*
	TS	*Batiacasphaera bergenensis*
	Mu	*Impagidinium sphaericum*
	Mu	*Spiniferites rubinus*
	Mu	*Bitectatodinium tepikiense*
	Mu	*Amiculosphaera umbracula*
	Mu	*Hystrichosphaeropsis pontiana*
	Ma, Mu	*Spiniferites bentorii*
	Mu	*Operculodinium israelianum*
	Ma, Mu	*Spiniferites elongatus*
	Mu	*Brigantedinium simplex*
	Mu	*Islandinium minutum*
	Mu	*Scrippsiella acuminata* cyst
	Mu	*Spiniferites scabratus*
	Mu	*Ataxiodinium choane*
Acritarch species & spp.	TS, Ma	*Cyclopsiella lusatica*
Acritarch species & spp.	TS	*Pusillisphaera solaris*
Acritarch species & spp.	TS	Skolochorate acritarchs
Acritarch species & spp.	TS, Ma	*Platycystidia manumii*
Acritarch species & spp.	TS	Acritarch spp. (pars.)
Acritarch species & spp.	TS, Mu	*Cymatiosphaera* ? *invaginata*
Acritarch species & spp.	TS	*Porcupinea indentata*
Acritarch species & spp.	Mu	*Cyclopsiella elliptica*
Acritarch species & spp.	Mu	*Palaeostomocystis* spp.
Dinocyst open nomenclature	Ma	*Aireiana* sp. 1
Dinocyst open nomenclature	Ma	*Spiniferites* sp. 1 of Manum et al. (1989)
Dinocyst open nomenclature	Ma	*Spiniferites* sp. 2
Dinocyst open nomenclature	Ma	*Gelatia* sp. 1
Dinocyst open nomenclature	Ma	Dinocyst sp. 3 (*Evittosphaerula* ? sp. 1)
Dinocyst open nomenclature	Ma	*Areoligera* sp. 1
Dinocyst open nomenclature	Ma	*Samlandia* sp. 1
Dinocyst open nomenclature	Ma	*Pyxidinopsis* sp. 1
Dinocyst open nomenclature	Ma	*Palaeocystodinium* sp. 1
Dinocyst open nomenclature	Ma	*Systematophora* ? sp. 1
Dinocyst open nomenclature	Ma	*Spiniferites* sp. 3
Dinocyst open nomenclature	Ma	*Palaeocystodinium* sp. 2
Dinocyst open nomenclature	Ma	*Batiacasphaera* sp. 1
Dinocyst open nomenclature	Ma	*Impagidinium* sp. 2
Dinocyst open nomenclature	Ma	*Hystrichokolpoma* ? sp. 2
Dinocyst open nomenclature	TS, Ma	*Bitectatodinium* sp. 1
Dinocyst open nomenclature	Ma	*Invertocysta* ? sp. 1
Dinocyst open nomenclature	Ma	*Palaeocystodinium* sp. 3
Dinocyst open nomenclature	Ma	*Hystrichosphaeridium* sp. 1
Dinocyst open nomenclature	Ma	Dinocyst sp. 4
Dinocyst open nomenclature	Ma	Dinocyst sp. 5
Dinocyst open nomenclature	Ma	*Pyxidiella* sp. 1 of Manum et al. (1989)
Dinocyst open nomenclature	Ma	*Impagidinium* sp. 4
Dinocyst open nomenclature	Ma	*Corrudinium* sp. 1
Dinocyst open nomenclature	Ma	Dinocyst sp. 7
Dinocyst open nomenclature	Ma	*Operculodinium* sp. 2
Dinocyst open nomenclature	Ma	*Dapsilidinium* sp. 1
Dinocyst open nomenclature	Ma	*Lingulodinium* sp. 1
Dinocyst open nomenclature	Ma	*Cleistosphaeridium* sp. 1
Dinocyst open nomenclature	Ma	*Tectatodinium* sp. 3 of Manum et al. (1989)
Dinocyst open nomenclature	Ma	*Hystrichostrogylon* sp. 1
Dinocyst open nomenclature	Mu	*Spiniferites* sp. of Mudie (1989)
Dinocyst open nomenclature	Mu	*Pyxidiella* sp. 1 of Mudie (1989)
Dinocyst open nomenclature	Mu	Dinocyst sp. 1
Dinocyst open nomenclature	Mu	*Brigantedinium* sp. gp. B
Dinocyst open nomenclature	Ma	*Batiacasphaera* sp. 2
Dinocyst open nomenclature	Ma	*Nematosphaeropsis* sp. 2
Dinocyst open nomenclature	Ma	*Operculodinium* sp. 3
Dinocyst open nomenclature	Ma	*Spiniferites* sp. 4
Dinocyst open nomenclature	Mu	*Labyrinthodinium* sp. 1
Dinocyst open nomenclature	Mu	*Tectatodinium* sp. 3 of Mudie (1989)
Dinocyst open nomenclature	Ma	*Achomosphaera* sp. 1
Dinocyst open nomenclature	Mu	*Tectatodinium* sp. 1
Dinocyst open nomenclature	Mu	*Brigantedinium* sp. gp. A
Dinocyst open nomenclature	Mu	*Tectatodinium* sp. 2
Dinocyst cf. species	Ma	*Glaphyrocysta* cf. *vicina*
Dinocyst cf. species	Ma	*Spiniferites* cf. *mirabilis*
Dinocyst cf. species	Ma	*Lejeunecysta* cf. *hyalina*
Dinocyst cf. species	Ma	*Hystrichosphaeridium* cf. *complanata*
Dinocyst cf. species	Ma	*Labyrinthodinium* cf. *truncatum*
Dinocyst cf. species	Ma	*Polysphaeridium* cf. *subtile*
Dinocyst cf. species	Mu	*Thalassiphora* cf. *pansa*
Dinocyst cf. species	TS	*Habibacysta* ? cf. *tectata*
Dinocyst cf. species	Ma	*Hystrichostrogylon* cf. *membraniphorum*
Dinocyst cf. species	Ma	*Amiculosphaera* cf. *umbracula*
Informal species	Ma	*Deflandrea* sp. B of Powell (1986a) sensu Manum et al. (1989)
Informal species	Ma, Mu	*Palaeocystodinium* sp. A of Costa and Downie (1979)
Informal species	Ma	*Cannosphaeropsis* sp. A of Costa and Downie (1979)
Informal species	Ma	*Leptodinium* ? sp. III of Manum (1976)
Informal species	Ma	*Tanyosphaeridium* sp. I of Manum (1976)
Informal species	Ma	Problematicum IV of Manum (1976)
Informal species	Ma	*Sumatradinium* ? sp. C of Powell (1986b)
Informal species	Ma	*Sumatradinium* ? sp. D of Powell (1986b)
Informal species	Ma	*Hystrichostrogylon* sp. of Edwards (1984)
Informal species	Ma	*Cordosphaeridium* sp. I of Manum (1976)
Informal species	Mu	*Hystrichokolpoma* sp. of Edwards (1984)
Informal species	Mu	*Tectatodinium* sp. of Piasecki (1980)
Informal species	TS, Ma	Acritarch sp. 2 (Dinocyst IV of Manum (1976))
Informal species	TS	Acritarch sp. 1 (Dinocyst III of Manum (1976))

TABLE S7

Species reported by:	Category	Species/taxon	Consisting of/synonymized with:	Based on:	Also included in:	Stratigraphic notes
Ma	species	*Achilleodinium biformoides*				
Ma	species	*Thalassiphora pelagica*				
Ma	spp.	*Achomosphaera* spp. (pars.)				
TS, Ma, Mu	spp.	*Palaeocystodinium* spp.	Grouped records of *P. golzowense*, *P.* sp. 1, *P.* sp. 2, *P.* sp. 3, *P.* sp. A of Costa and Downie (1979).	Dinoflaj3 (Williams et al., 2017)		
TS, Ma, Mu	species	*Palaeocystodinium golzowense*			*Palaeocystodinium* spp.	
TS, Ma	spp.	*Operculodinium* spp. (pars.)				
TS, Ma	species	*Spiniferites pseudofurcatus*				
TS, Ma, Mu	spp.	*Impagidinium* spp. (pars.)				
TS, Ma, Mu	spp.	*Spiniferites* spp. (pars.)				
Ma	species	*Deflandrea phosphoritica*				
Ma	spp.	*Glaphyrocysta* spp. (pars.)				
Ma	species	*Licracysta semicirculata*	Ma: *Glaphyrocysta intricata*	Determination corrected by Williams and Manum (1999) as *Areoligera semicirculata*, junior synonym of *Licracysta semicirculata*.		
TS, Ma, Mu	species	*Cleistosphaeridium placacanthum*	Ma, Mu: *Systematophora placacantha*	Dinoflaj3 (Williams et al., 2017)		De Verteuil and Norris (1996) considered the HO at ODP Hole 643A at 83.15 R-mbsf by Manum et al. (1989) to represent reworking, but we consider it in situ (cf. Schreck et al., 2012) based on published LADs.
TS, Ma, Mu	species	*Nematosphaeropsis labyrinthus*				
TS, Ma	species	*Apteodinium australiense*				
TS, Ma, Mu	species	*Lingulodinium machaerophorum*				
Ma	species	*Pentadinium laticinctum laticinctum*				
TS, Ma	species	*Impagidinium velorum*				
TS, Ma	species	*Spiniferites ramosus*				
TS, Ma	species	*Dinopterygium cladoides* sensu Morgenroth (1966)				
TS, Ma	species	*Cordosphaeridium cantharellus*				
Ma	species	*Enneadocysta arcuata*	Ma: *Areosphaeridium arcuatum*	Dinoflaj3 (Williams et al., 2017)		
Ma	species	*Distatodinium "craterum"*			*Distatodinium paradoxum* (s.l.)	
TS, Ma	species	*Distatodinium paradoxum* (s.l.)	Grouped records of *D. paradoxum*, *D. "craterum"*.	Dinoflaj3 (Williams et al., 2017)		
Ma	species	*Chiropteridium lobospinosum*				
TS, Ma	species	*Heteraulacacysta campanula*				
TS, Ma	species	*Spiniferites hyperacanthus*				
TS, Ma, Mu	spp.	*Impletosphaeridium* spp.				
TS, Ma	species	*Batiacasphaera micropapillata*				
TS, Ma, Mu	species	*Reticulatosphaera actinocoronata*	Ma: *Areosphaeridium actinocoronatum*	Dinoflaj3 (Williams et al., 2017)		
Ma	species	*Chiropteridium partispinatum*			*Chiropteridium galea* (s.l.)	
Ma	species	*Chiropteridium galea* (s.l.)	Grouped records of *C. partispinatum*, *C. mespilanum*.	Dinoflaj3 (Williams et al., 2017)		Wider depth range of HO as a result of uncertain determination in sample at 418.86 R-mbsf by Manum et al. (1989).
TS, Ma	species	*Impagidinium aculeatum*				
Ma	species	*Pentadinium laticinctum granulatum*				
TS, Ma	species	*Leptodinium italicum*	Ma: *Impagidinium* sp. 1	Synonymized following Williams and Manum (1999). Schreck et al. (2012) questionably synonymized *I.* sp. 1 of Manum et al. (1989) with *I. elongatum*, which we here reject.		
TS, Ma	species	*Distatodinium paradoxum* (s.s.)			*Distatodinium paradoxum* (s.l.)	
TS, Ma	species	*Homotryblium floripes*				
TS, Ma	species	*Minisphaeridium latirictum*	Ma: *Hystrichosphaeridium latirictum* & Dinocyst II of Manum (1976)	Dinocyst II of Manum (1976) synonymized with *Cordosphaeridium minimum* following Williams and Manum (1999), which is considered a junior synonym of *M. latirictum*.		
TS, Ma, Mu	species	*Hystrichokolpoma rigaudiae*				
TS, Ma	species	*Hystrichokolpoma cinctum*				
TS, Ma, Mu	species	*Apteodinium spiridoides*	Ma, Mu: *Emslandia spiridoides*	Dinoflaj3 (Williams et al., 2017)		
TS, Ma, Mu	species	*Operculodinium centrocarpum*				
Ma	species	*Chiropteridium mespilanum*			*Chiropteridium galea* (s.l.)	
TS, Ma	species	*Caligodinium amiculum*				We interpret the isolated specimen at 281.31 R-mbsf as reworked or misidentified. An LAD of 21.231 Ma (Dybkjær and Piasecki, 2010) at this depth would be inconsistent with other bioevents.
TS, Ma, Mu	species	*Invertocysta tabulata*				
TS, Ma, Mu	species	*Operculodinium janduchenei*	Ma: *Operculodinium* sp. 1; Mu: *Operculodinium* sp. of Jan du Chêne (1977).	Synonymy of *O.* sp. 1 based on photographs by Manum et al. (1989). Synonymy of *O.* sp. of Jan du Chêne (1977) based on species description (Head et al., 1989b). Occurrences in Manum et al. (1989) and Mudie (1989) are confirmed by McMinn (1992). However, the process morphology of *O.* sp. 1 of Manum et al. (1989) is also mentioned in the species description of *O. piaseckii* (Strauss and Lund, 1992), which is here interpreted as an artefact of the rather broad definition of *O. piaseckii*.		
Ma	species	*Dapsilidinium pseudocolligerum*			*Dapsilidinium pastielsii* (s.l.)	
TS, Ma	species	*Impagidinium pallidum*				
TS, Ma, Mu	species	*Dapsilidinium pastielsii* (s.l.)	Grouped records of *D. pastielsii* and *D. pseudocolligerum*.	Grouped following synonymy according to Schreck et al. (2012), Mertens et al. (2014) and references therein.		
TS, Ma	species	*Batiacasphaera baculata* sensu Manum et al. (1989)		Recognized during counting in this study. "*Kallosphaeridium biornatum* group" of Heilmann-Clausen and Costa (1989), according to Williams and Manum (1999).		
TS, Ma	species	*Batiacasphaera hirsuta*				Schreck et al. (2012) suggest a slightly older LAD (8.353 Ma) than our magnetostratigraphic interpretation, but its LAD may be younger if some specimens interpreted as reworked by Schreck et al. (2012) are in fact in situ. Alternatively, specimens observed by Manum et al. (1989) may represent reworking, but we see no other indications for this.
TS	species	*Xandarodinium xanthum*				
TS, Ma	species	*Evittosphaerula paratabulata*				
TS	spp.	*Hystrichosphaeridium* ? spp.				
TS	species	*Cleistosphaeridium ancyreum*		Probably included in *C. placacanthum* by Manum et al. (1989) and Mudie (1989).		
TS	species	*Selenopemphix brevispinosa*				
TS	spp.	*Cleistosphaeridium* spp. (pars.)				
TS	spp.	Dinocyst spp. (pars.)				
TS	spp.	*Spiniferites /Achomosphaera* spp. (pars.)				
TS, Ma	species	*Lejeunecysta fallax*				
TS, Ma, Mu	species	*Batiacasphaera sphaerica*				
TS, Ma, Mu	species	*Tuberculodinium vancampoae*				
TS, Ma, Mu	species	*Dapsilidinium pastielsii* (s.s.)			*Dapsilidinium pastielsii* (s.l.)	
TS, Ma, Mu	species	*Operculodinium piaseckii*	Ma, Mu: *Operculodinium* sp. of Piasecki (1980)	Synonymized following species description (Strauss and Lund, 1992).		An LAD of 7.903 Ma (Piasecki, 2003) would be older than available age models for Hole 643A (This study; Goll, 1989; Bleil, 1989). An FAD of 16.927 Ma (Zevenboom, 1995) is inconsistent with available age models and other bioevents. The reporting of its presence at this depth (Manum et al., 1989; This study) may be explained by its rather broad species definition, which includes morphologies that could also be assigned to *O. janduchenei*, while other studies may have applied a more restricted interpretation of its morphology.
TS	spp.	*Arcticacysta* ? spp.				

TS	spp.	*Lejeunecysta* spp. (pars.)				
TS, Ma	species	*Impagidinium japonicum*				
TS, Ma, Mu	species	*Tectatodinium pellitum* (s.l.)	Grouped records of *T. pellitum (s.s.)* (specimens of Mudie (1989) with question mark) and *T*. sp. of Piasecki (1980) sensu Mudie (1989) (with question mark).	Grouped following questionable synonymy of *T*. sp. of Piasecki (1980) sensu Mudie (1989) according to amended species description (Head, 1994).		
TS, Ma, Mu	species	*Tectatodinium pellitum* (s.s.)	Ma: *Tectatodinium* sp. 2; Mu: *T. pellitum* sensu Mudie (1989) (with question mark). Note that occurrences of *T. pellitum* sensu Mudie (1989) are also included in *Habibacysta tectata* (s.l.) with question marks.	Synonymy of *T*. sp. 2 based on species description of *T. grande* (Williams et al., 1993), which is considered a junior synonym of *T. pellitum* (Head, 1994). *T. pellitum* of Mudie (1989) at ODP Site 642 is not *T. pellitum* , but possibly *Habibacysta tectata* (See Head, 1994). However, *T. pellitum* has been confirmed from the Pliocene of ODP Site 644 in samples of Mudie (1989) by Head (1994). Therefore uncertainty remains about specimens at ODP Site 643.	*Tectatodinium pellitum* (s.l.) / *Habibacysta tectata* (s.l.)	
TS, Ma	species	*Cribroperidinium tenuitabulatum*				
TS, Ma	species	*Apteodinium tectatum*				We interpret the isolated occurrence at 103.58 R-mbsf by Manum et al. (1989) as reworked. An LAD of 11.90 Ma (Powell, 1992) at this depth would be inconsistent with our magnetostratigraphic interpretation and other bioevents.
TS, Ma, Mu	species	*Hystrichosphaeropsis obscura*				
Ma, Mu	species	*Operculodinium longispinigerum*		Includes specimens of *O*.? *eirikianum* (Head and Wrenn, 1992; Head, 1993).		
TS	species	*Distatodinium "cavatum"*				
TS	species	*Spiniferites mirabilis*				
TS, Ma, Mu	species	*Pentadinium imaginatum*	Ma: *P. laticintum imaginatum* ; Mu: *P. laticinctum*	*P. laticinctum* of Mudie (1989) interpreted as *P. laticintum imaginatum* (Now: *P. imaginatum*) based on similar stratigraphic occurrence and photograph by Mudie (1989).		
TS	species	*Lejeunecysta hyalina*				
TS, Mu	species	*Spiniferites pachydermus*				
TS, Mu	species	*Polysphaeridium zoharyi*				
TS	spp.	*Cribroperidinium* spp. (pars.)				
TS	species	*Exochosphaeridium insigne*				
TS, Ma	species	*Impagidinium paradoxum*				
TS, Ma	species	*Impagidinium patulum*				
TS, Ma, Mu	species	*Selenopemphix nephroides*				
Ma	species	*Pterodinium cingulatum cingulatum*				
TS, Ma	species	*Impagidinium elongatum*	Ma: *I*. sp. 3.	Synonymized following species description by Schreck et al. (2012), who also questionably synonymized *I*. sp. 1 of Manum et al. (1989) with *I. elongatum* , which we here reject, following Williams and Manum (1999), who revised their determination of *I*. sp. 1 to *Leptodinium italicum* .		
TS	spp.	*Corrudinium* ? spp.				
TS	species	*Lejeunecysta cinctoria*				
TS	species	*Sumatradinium soucouyantiae*				
TS, Ma, Mu	species	*Melitasphaeridium choanophorum*				
TS, Ma	species	*Cannosphaeropsis utinensis*				
TS, Ma	species	*Lophocysta sulcolimbata*				
TS, Ma	species	*Pyxidinopsis psilata*	Ma: *Tectatodinium psilatum*	Dinoflaj3 (Williams et al., 2017)		
TS	species	*Dalella chathamensis*				
TS, Ma	species	*Nematosphaeropsis downiei*				
TS	species	*Cleistosphaeridium diversispinosum*		Probably included in *C. placacanthum* by Manum et al. (1989) and Mudie (1989).		
TS, Ma	species	*Homotryblium vallum*				
Ma	species	*Spiniferites ramosus brevifurcatus*				
TS, Ma	species	*Cribroperidinium giuseppei*	Ma: *Cribroperidinium giuseppei major*	Dinoflaj3 (Williams et al., 2017)		
TS, Ma	species	*Operculodinium* ? *placitum*				
TS	species	*Pyxidinopsis tuberculata*				
TS, Ma	species	*Cousteaudinium aubryae*	Ma: Dinocyst sp. 6	Dinoflaj3 (Williams et al., 2017); Possibly synonymous with Dinocyst sp. 4 and sp. 5 of Manum et al. (1989), according to species description (de Verteuil and Norris, 1996), which does not affect its stratigraphic range. Dinocyst sp. 4 and sp. 5 are here therefore not synonymized with *C. aubryae* .		
TS, Ma, Mu	species	*Filisphaera filifera*				
TS, Ma, Mu	species	*Labyrinthodinium truncatum* (s.l.)	Grouped records of *L. truncatum* and *L* . cf. *truncatum* .	Grouped following questionable synonymy according to Schreck et al. (2012).		
TS	spp.	*Lingulodinium* spp. (pars.)				
Ma, Mu	species	*Operculodinium crassum*		Dinoflaj3 (Williams et al., 2017): Possibly junior synonym of *O. israelianum* . Here not synonymized.		
TS, Ma, Mu	species	*Trinovantedinium applanatum*	Ma: *T* . cf. *capitatus* ; Mu: *T. capitatum* .	Dinoflaj3 (Williams et al., 2017); Synonymy of *T* . cf. *capitatus* based on photographs by Manum et al. (1989).		
TS	species	*Sumatradinium hispidum*				
TS	spp.	*Sumatradinium* spp. (pars.)				
TS	species	*Erymnodinium delectabile*				
TS	spp.	*Pyxidinopsis* spp. (pars.)				
TS	species	*Hystrichostrogylon membraniphorum* (s.s.)			*Hystrichostrogylon membraniphorum* (s.l.)	
TS, Ma	species	*Hystrichostrogylon membraniphorum* (s.l.)	Grouped records of *H. membraniphorum* and *H.* cf. *membraniphorum* .	Grouped based on photographs by Manum et al. (1989).		
TS	spp.	*Pyxidiella* ? spp.				
TS	species	*Sumatradinium druggii*				
TS	spp.	*Batiacasphaera* ? spp.				
TS	spp.	*Cerebrocysta* spp. (pars.)				
TS, Ma, Mu	species	*Labyrinthodinium truncatum* (s.s.)			*Labyrinthodinium truncatum* (s.l.)	
TS, Ma, Mu	species	*Invertocysta lacrymosa*				
Ma	species	*Nematosphaeropsis lemniscata*		Dinoflaj3 (Williams et al., 2017): Possibly junior synonym of *N. labyrinthus* . Here not synonymized.		
Mu	species	*Achomosphaera crassipellis*				
Mu	species	*Pyxidiella* ? *simplex*	Mu: *Tectatodinium simplex*	Dinoflaj3 (Williams et al., 2017)		
TS	spp.	*Hystrichostrogylon* spp. (pars.)				
Mu	species	*Impagidinium multiplexum*				
TS, Ma	species	*Impagidinium maculatum*				
TS, Mu	species	*Habibacysta tectata* (s.l.)	Grouped records of *H. tectata (s.s.)* , *Tectatodinium pellitum* sensu Mudie (1989) (with question mark), Dinocyst sp. 1 (with question mark), and *Habibacysta* ? cf. *tectata* (with question mark). Note that occurrences of *T. pellitum* sensu Mudie (1989) are also included in *T. pellitum* (s.s.) with question marks.	Grouped following questionable synonymy of *T. pellitum* sensu Mudie (1989) and Dinocyst sp. 1 of Mudie (1989) according to (amended) description by Head (1994). *H.* ? cf. *tectata* (TS) not included in *H. tectata* (s.s.), due to distinct stratigraphic range, but here included (with question mark) in *H. tectata* (s.l.).		
TS, Ma, Mu	species	*Unipontidinium aquaeductus*	Ma, Mu: *Impagidinium aquaeductum*	Dinoflaj3 (Williams et al., 2017)		
TS, Ma	species	*Cerebrocysta poulsenii*	Ma: Gen. et sp. indet. of Piasecki (1980)	Synonymized following species description (de Verteuil and Norris, 1996).		The LAD of 9.867 Ma is based on 67% in NN9 (de Verteuil and Norris, 1996), but the exact position in NN9 is unknown. 100% NN9 is 9.53 Ma (GTS2012), which is consistent with our magnetostratigraphic interpretation.
Mu	species	*Gramocysta verricula*	Mu: *Dinopterygium verriculum*	Dinoflaj3 (Williams et al., 2017)		
Mu	species	*Achomosphaera ramulifera*				
Mu	species	*Operculodinium walli*				

TS, Ma, Mu	species	*Achomosphaera andalousiensis*				The FAD of 13.123 Ma (Dybkjær and Piasecki, 2010) suggests a younger age than our magnetostratigraphic interpretation, but the LO of *A. andalousiensis* at 127.40 R-mbsf occurs in an isolated sample. Its LPO occurs at 111.30 R-mbsf and the FAD of Dybkjær and Piasecki (2010) would be closer to our age model at this depth, although an inconsistency remains.
TS	species	*Selenopemphix dionaeacysta*				
TS	species	*Habibacysta tectata* (s.s.)			*Habibacysta tectata* (s.l.)	
TS, Ma	species	*Cerebrocysta irregularis*	Ma: *Tectatodinium* sp. 4	Synonymized following questionable synonymy in species description (Schreck et al., 2012), overlapping stratigraphic ranges and confirmation of presence of *C. irregularis* in newly analyzed samples.		The LAD of *C. irregularis* (10.283 Ma) has so far only been dated by Schreck et al. (2012) and may have a younger age at ODP Site 643. Following Schreck et al. (2012), we have tentatively synonymised *C. irregularis* with *Tectatodinium* sp. 4 of Manum et al. (1989). The highest confirmed specimen of *C. irregularis* occurs at 108.30 R-mbsf and is consistent with our magnetostratigraphic interpretation.
TS	species	*Batiacasphaera bergenensis*				
Mu	species	*Impagidinium sphaericum*				
Mu	species	*Spiniferites rubinus*				
Mu	species	*Bitectatodinium tepikiense*				
Mu	species	*Amiculosphaera umbracula*				
Mu	species	*Hystrichosphaeropsis pontiana*				
Ma, Mu	species	*Spiniferites bentorii*				
Mu	species	*Operculodinium israelianum*				
Ma, Mu	species	*Spiniferites elongatus*				
Mu	species	*Brigantedinium simplex*				
Mu	species	*Islandinium minutum*	Mu: *Multispinula minuta*	Dinoflaj3 (Williams et al., 2017)		
Mu	species	*Scrippsiella acuminata* cyst	Mu: *Peridinium faeroense* cyst	*Scrippsiella acuminata* (Ehrenberg) Kretschmann, Elbrächter, Zinssmeister, Soehner, Kirsch, Kusber and Gottschling (2015)		
Mu	species	*Spiniferites scabratus*				
Mu	species	*Ataxiodinium choane*				
TS, Ma	acritarch species	*Cyclopsiella lusatica*	Ma: *Ascostomocystis granosa*	Dinoflaj3 (Williams et al., 2017)		
TS	acritarch species	*Pusillisphaera solaris*				
TS	acritarch spp.	Skolochorate acritarchs				
TS, Ma	acritarch species	*Platycystidia manumii*	Ma: *Platycystidia* sp. II of Manum (1976)	Synonymized following species description (Quaijtaal et al., 2015)		
TS	acritarch spp.	Acritarch spp. (pars.)				
TS, Mu	acritarch species	*Cymatiosphaera* ? *invaginata*	Mu: *Cymatiosphaera* sp. 1	Synonymized following species description (Head et al., 1989b)		
TS	acritarch species	*Porcupinea indentata*				
Mu	acritarch species	*Cyclopsiella elliptica*				
Mu	acritarch spp.	*Palaeostomocystis* spp.				
Ma	open	*Aireinana* sp. 1				
Ma	open	*Spiniferites* sp. 1 of Manum et al. (1989)				
Ma	open	*Spiniferites* sp. 2				
Ma	open	*Gelatia* sp. 1				
Ma	open	Dinocyst sp. 3 (*Evittosphaerula* ? sp. 1)				
Ma	open	*Areoligera* sp. 1				
Ma	open	*Samlandia* sp. 1				
Ma	open	*Pyxidinopsis* sp. 1				
Ma	open	*Palaeocystodinium* sp. 1			*Palaeocystodinium* spp.	
Ma	open	*Systematophora* ? sp. 1	Ma: *Systematophora* sp. 1	Genus here considered questionable.		
Ma	open	*Spiniferites* sp. 3				
Ma	open	*Palaeocystodinium* sp. 2			*Palaeocystodinium* spp.	
Ma	open	*Batiacasphaera* sp. 1				
Ma	open	*Impagidinium* sp. 2				
Ma	open	*Hystrichokolpoma* ? sp. 2				
TS, Ma	open	*Bitectatodinium* sp. 1		Recognized during counting in this study.		
Ma	open	*Invertocysta* ? sp. 1				
Ma	open	*Palaeocystodinium* sp. 3			*Palaeocystodinium* spp.	
Ma	open	*Hystrichosphaeridium* sp. 1				
Ma	open	Dinocyst sp. 4				
Ma	open	Dinocyst sp. 5				
Ma	open	*Pyxidiella* sp. 1 of Manum et al. (1989)				
Ma	open	*Impagidinium* sp. 4				
Ma	open	*Corrudinium* sp. 1				
Ma	open	Dinocyst sp. 7				
Ma	open	*Operculodinium* sp. 2				
Ma	open	*Dapsilidinium* sp. 1				
Ma	open	*Lingulodinium* sp. 1				
Ma	open	*Cleistosphaeridium* sp. 1				
Ma	open	*Tectatodinium* sp. 3 of Manum et al. (1989)				
Ma	open	*Hystrichostrogylon* sp. 1				
Mu	open	*Spiniferites* sp. of Mudie (1989)				
Mu	open	*Pyxidiella* sp. 1 of Mudie (1989)				
Mu	open	Dinocyst sp. 1			*Habibacysta tectata* (s.l.)	
Mu	open	*Brigantedinium* sp. gp. B				
Ma	open	*Batiacasphaera* sp. 2				
Ma	open	*Nematosphaeropsis* sp. 2				
Ma	open	*Operculodinium* sp. 3				
Ma	open	*Spiniferites* sp. 4				
Mu	open	*Labyrinthodinium* sp. 1				
Mu	open	*Tectatodinium* sp. 3 of Mudie (1989)				
Ma	open	*Achomosphaera* sp. 1				
Mu	open	*Tectatodinium* sp. 1				
Mu	open	*Brigantedinium* sp. gp. A				
Mu	open	*Tectatodinium* sp. 2				
Ma	cf.	*Glaphyrocysta* cf. *vicina*				
Ma	cf.	*Spiniferites* cf. *mirabilis*				
Ma	cf.	*Lejeunecysta* cf. *hyalina*				
Ma	cf.	*Hystrichosphaeridium* cf. *complanata*				
Ma	cf.	*Labyrinthodinium* cf. *truncatum*			*Labyrinthodinium truncatum* (s.l.)	
Ma	cf.	*Polysphaeridium* cf. *subtile*				
Mu	cf.	*Thallassiphora* cf. *pansa*				
TS	cf.	*Habibacysta* ? cf. *tectata*		Not synonymized with *H. tectata* (s.s.), because of distinct stratigraphic occurrence and taxonomic uncertainty.	*Habibacysta tectata* (s.l.)	
Ma	cf.	*Hystrichostrogylon* cf. *membraniphorum*			*Hystrichostrogylon membraniphorum* (s.l.)	
Ma	cf.	*Amiculosphaera* cf. *umbracula*				
Ma	informal species	*Deflandrea* sp. B of Powell (1986a) sensu Manum et al. (1989)		Not *Deflandrea* sp. B of Powell (1986a), according to Williams and Manum (1999).		
Ma, Mu	informal species	*Palaeocystodinium* sp. A of Costa and Downie (1979)			*Palaeocystodinium* spp.	
Ma	informal species	*Cannosphaeropsis* sp. A of Costa and Downie (1979)				
Ma	informal species	*Leptodinium* ? sp. III of Manum (1976)				
Ma	informal species	*Tanyosphaeridium* sp. I of Manum (1976)				
Ma	informal species	Problematicum IV of Manum (1976)				
Ma	informal species	*Sumatradinium* ? sp. C of Powell (1986b)				
Ma	informal species	*Sumatradinium* ? sp. D of Powell (1986b)				
Ma	informal species	*Hystrichostrogylon* sp. of Edwards (1984)				
Ma	informal species	*Cordosphaeridium* sp. I of Manum (1976)				
Mu	informal species	*Hystrichokolpoma* sp. of Edwards (1984)				
Mu	informal species	*Tectatodinium* sp. of Piasecki (1980)			*Tectatodinium pellitum* (s.l.)	
TS, Ma	informal acritarch species	Acritarch sp. 2 (Dinocyst IV of Manum (1976))		Reinterpreted as acritarch		
TS	informal acritarch species	Acritarch sp. 1 (Dinocyst III of Manum (1976))		Reinterpreted as acritarch		

TABLE S8

Species reported by:	Microfoss	Species	Species name in original study (if different)	Stratigraphic notes
CC	Diatom	*Proboscia barboi* (Brun) Jordan and Priddle 1991	CC: *Rhizosolenia barboi*	
CC	Diatom	*Thalassiosira grunowii* Akiba and Yanagisawa 1985	CC: *Coscinodiscus plicatus*	
CC	Diatom	*Denticulopsis lauta*		
CC	Diatom	*Crucidenticula nicobarica* (Grunow) Akiba and Yanagisawa 1985	CC: *Denticulopsis nicobarica*	
CC	Diatom	*Araniscus lewisianus* (Greville) Komura 1998	CC: *Coscinodiscus lewisianus*	
CC	Diatom	*Crucidenticula punctata* (Schrader) Akiba and Yanagisawa 1985	CC: *Denticulopsis punctata hustedtii*	An FAD of 13.395 Ma (Barron Diatom Catalog in Lazarus et al. (2014)) would be younger than available age models for Hole 643A (Goll (1989), Bleil (1989) and this study) and inconsistent with other bioevents.
CC	Diatom	*Cestodiscus peplum*		
CC	Diatom	*Denticulopsis hyalina*		Barron et al. (1985a) acknowledge an imprecision of 0.1-0.3 Myr for the FAD of *D. hyalina* , which would make the FAD (14.908 Ma) consistent with our magnetostratigraphic interpretation.
SP	Diatom	*Thalassiosira fraga*		The LO of *T. fraga* at 291.65 R-mbsf is close to the diagenetic opal front, so the real LO may be lower.
CC	Diatom	*Actinocyclus ingens*		
CC	Diatom	*Triceratium pileus*		
CC	Diatom	*Thalassiosira spinosa*		
CC	Pl. Foram.	*Neogloboquadrina acostaensis*		
GB	Radiolarian	*Cyrtocapsella tetrapera*		*C. tetrapera* occurs irregularly and its LO at 289.36 R-mbsf is close to the diagenetic opal front, so the real LO may be lower.

TABLE S9

Event	Species	Age (Ma) Mean	Maximum	Minimum	FAD/LAD	References	Region	Calibration (% from old to young)	Age GTS2012 (Ma)	Used:	Comments
LAD	*Filisphaera filifera*	1,26	1,78	0,78	0,78	Egger et al. (2016)	N Atlantic	C6Cn.1n 50%	*22,66*		Local LAD?
						De Schepper and Head (2009)	N Atlantic	55% between C2n 100% and C1r.1n 0%	1,39	X	
						de Vernal and Mudie (1989)	N Atlantic	NN19 45%	1,26	X	
						Head et al. (1989a)	Labrador Sea	NN12 0%	*5,59*		Local LAD?
						de Vernal et al. (1992)	N Atlantic	NN19 50%	1,19	X	Large error margin
						Kuhlmann et al. (2006)	North Sea	C2n 100%	1,78	X	LAD of acme, so real LAD later.
						Bujak and Matsuoka (1986)	N Pacific	Ionian 0%	**0,78**	Main	Large error margin
						Zegarra and Helenes (2011)	C America	Serravallian 40%	*12,94*		Local LAD?
						Mudie (1987)	N Atlantic	NN19 50%	1,19	X	Large error margin
LAD	*Melitasphaeridium choanophorum*	3,26	5,59	0,78	0,78	Bujak and Matsuoka (1986)	N Pacific	Ionian 0%	**0,78**	Main	Large error margin
						Head et al. (1989a)	Labrador Sea	NN12 0%	5,59	X	
						Head (1998)	N Atlantic	C2n 60%	1,84	X	
						Powell (1992)	North Sea	NN16 0%	3,70	X	Large error margin
						Soliman et al. (2012)	Egypt	NN5 0%	*14,91*		Local LAD?
						McMinn (1993)	Australia	CN11a 33%	4,38	X	
LAD	*Labyrinthodinium truncatum*	7,36	8,35	5,85	5,85	de Verteuil and Norris (1996)	USA offshore (Atl)	NN11a 80%	7,59	X	Large error margin
						Fensome et al. (2008)	Canada offshore (Atl)	NN11d 0%	5,94	X	Dated as 8.05 Ma in Fensome et al. (2008), but not independently.
						Schreck et al. (2012)	N Atlantic	50.2% between C5n.2n 100% - C3Ar 100%	8,35	X	
						Head et al. (1989a)	Labrador Sea	NN10 100%	8,29	X	
						Piasecki (2003)	Greenland	Tortonian 80%	8,12	X	Tortonian truncated by hiatus, so possibly older.
						Powell (1992)	North Sea	NN11d 25%	**5,85**	Main	
						Soliman et al. (2012)	Egypt	NN5 0%	*14,91*		Local LAD?
LAD	*Hystrichosphaeropsis obscura*	8,13	10,58	7,01	7,01	Wrenn and Kokinos (1986)	USA offshore (Atl)	N17 50%	7,59	X	
						Soliman et al. (2012)	Egypt	NN5 0%	*14,91*		Local LAD?
						de Verteuil and Norris (1996)	USA offshore (Atl)	NN11b 80%	**7,01**	Main	Large error margin
						Fensome et al. (2008)	Canada offshore (Atl)	~50% between NN10 0% - NN12 100%	7,33		Error margin too large; Dated as 7.51 Ma in Fensome et al. (2008), but not independently.
						Brown and Downie (1985)	Ireland offshore (Atl)	NN5 50%	*14,22*		Local LAD?
						Schreck et al. (2012)	N Atlantic	C5n.2n 45%	10,58	X	
						Powell (1992)	North Sea	N17 30%	7,99	X	Large error margin
						Dybkjær and Piasecki (2010)	Denmark	NN11 30%	7,48	X	
						Śliwińska et al. (2012)	Denmark	C8n.2n 25%	*25,82*		Local LAD?
						Powell (1986a)	Italy	N4 0%	*23,50*		Local LAD?
						Bujak and Matsuoka (1986)	N Pacific	Langhian 50%	*14,90*		Local LAD?
LAD	*Operculodinium piaseckii*	8,13	8,35	7,90	7,90	Soliman et al. (2012)	Egypt	NN5 10%	*14,77*		Local LAD?
						Zegarra and Helenes (2011)	C America	Serravallian 25%	*13,27*		Local LAD?
						Piasecki (2003)	Greenland	Tortonian 85%	**7,90**	Main	Tortonian truncated by hiatus, so possibly older.
						Schreck et al. (2012)	N Atlantic	50.2% between C5n.2n 100% - C3Ar 100%	8,35	X	
						Bijl et al. (2018)	Antarctica	C5ACn 0%	*14,07*		Local LAD?
LAD	*Cleistosphaeridium placacanthum*	10,87	13,81	4,91	4,91	Bijl et al. (2013)	Australia	C23n.2n 50%	*51,40*		Local LAD?
						Soliman et al. (2012)	Egypt	NN5 100%	13,53	X	
						van Mourik and Brinkhuis (2005)	Italy	C13r 80%	*33,96*		Local LAD?
						McMinn (1992)	Australia	CN4 80%	13,81	X	
						Mudge and Bujak (1996)	N Atlantic	P12 67%	*41,40*		Local LAD?
						Schreck et al. (2012)	N Atlantic	C5n.2n 45%	10,58	X	
						Zevenboom (1995)	Italy	C4n.2n 0%	8,11	X	Possibly younger, because present in upper sample of Mazzapiedi, but absent in lowest sample Perleto. Certainly between C4An 100% (8.771 Ma) and C3An 0% (6.733 Ma) or C3Bn 0% (7.212 Ma).
						Brinkhuis and Biffi (1993)	Italy	P19 0%	*32,10*		Local LAD?
						Powell (1992)	North Sea	N12 90%	11,95	X	Large error margin
						de Verteuil and Norris (1996)	USA offshore (Atl)	NN6 20%	13,20	X	Large error margin
						Wrenn and Kokinos (1986)	USA offshore (Atl)	N18/N19 60%	**4,91**	Main	
						van Mourik et al. (2001)	USA offshore (Atl)	C13r 0%	*35,00*		Local LAD?
						Brown and Downie (1984)	Ireland offshore (Atl)	NP13 75%	*49,46*		Local LAD?
LAD	*Batiacasphaera hirsuta*	8,35	8,35	8,35	8,35	Firth (1996)	N Atlantic	C16n.1r 50%	*35,97*		Local LAD?
						Schreck et al. (2012)	N Atlantic	50.2% between C5n.2n 100% - C3Ar 100%	**8,35**	Main	Reworked (?) fragments and specimens of *B. hirsuta* up to 4.84 Ma. Dated as 8.39 Ma by Schreck et al. (2012).
LAD	*Minisphaeridium latirictum*	8,11	10,28	5,94	5,94	Bijl et al. (2013)	Australia	C18r 10%	*41,05*		Local LAD?
						van Mourik et al. (2001)	USA offshore (Atl)	C13r 0%	*35,00*		Local LAD?
						Soliman et al. (2012)	Egypt	NN5 0%	*14,91*		Local LAD?
						Brown and Downie (1984)	Ireland offshore (Atl)	NP12 100%	*50,50*		Local LAD?
						Fensome et al. (2008)	Canada offshore (Atl)	NN11d 0%	**5,94**	Main	Dated as 8.05 Ma in Fensome et al. (2008), based on occurrence at same depth as HO *L. truncatum* (8.05 Ma, Williams et al. (1999), updated to GTS2004).
						Brinkhuis and Biffi (1993)	Italy	P19 0%	*32,10*		Local LAD?
						Firth (1996)	N Atlantic	C15n 25%	*35,22*		Local LAD?
						Schreck et al. (2012)	N Atlantic	C5n.2n 72%	10,28	X	
LAD	*Cerebrocysta irregularis*	10,28	10,28	10,28	10,28	Schreck et al. (2012)	N Atlantic	C5n.2n 72%	**10,28**	Main	
LAD	*Cerebrocysta poulsenii*	11,54	12,10	9,87	9,87	Zegarra and Helenes (2011)	C America	Langhian 75%	*14,36*		Local LAD?
						de Verteuil and Norris (1996)	USA offshore (Atl)	NN9 67%	**9,87**	Main	Large error margin
						Quaijtaal et al. (2014)	Ireland offshore (Atl)	C5An.1n 60%	12,10	X	
						Zevenboom (1995)	Italy	C5r.3r 0%	12,05	X	
						Piasecki (2003)	N Atlantic	Tortonian 0%	11,63	X	
						Schreck et al. (2012)	N Atlantic	C5An 100%	12,05	X	
LAD	*Hystrichostrogylon membraniphorum*	14,12	14,91	13,27	13,27	Bijl et al. (2013)	Australia	C17n.3n 0%	*38,33*		Local LAD?
						Zegarra and Helenes (2011)	C America	Serravallian 25%	**13,27**	Main	Large error margin; Rare in core.
						Soliman et al. (2012)	Egypt	NN5 >0%	*<14.91*		
						Brown and Downie (1985)	Ireland offshore (Atl)	NN4 100%	14,91	X	Large error margin
						Brown and Downie (1984)	Ireland offshore (Atl)	NP10 90%	*54,34*		Local LAD?
						Powell (1992)	North Sea	N11 100%	13,41	X	Large error margin
						Olde et al. (2015)	North Sea	UC9c 75%	*89,82*		Local LAD?
						Tocher and Jarvis (1994)	France	Acanthoceras rhotomagense 55%	*95,74*		Local LAD?
						Prince et al. (2008)	North Sea	Marsupites testudinarius (stemless crinoid) 50%	*83,75*		Local LAD?
						Bujak and Matsuoka (1986)	N Pacific	Langhian 50%	14,90	X	Large error margin: ~25% Middle Miocene
						Tocher and Jarvis (1996)	France	Mantelliceras mantelli 60%	*99,12*		Local LAD?
FAD	*Batiacasphaera bergenensis*	13,74	13,74	13,74	13,74	Schreck and Matthiessen (2014)	Atlantic	C5ABr 0%	**13,74**	Main	
FAD	*Cerebrocysta irregularis*	13,89	13,89	13,89	13,89	Schreck et al. (2012)	N Atlantic	extrapolated from overlying C5ABr; C5ABr -111%	**13,89**	Main	Calibration uncertain because of uncertain magnetostratigraphy in C5ACn at ODP Site 907. Downward extrapolation yields 13.885 Ma, the same as reported by Schreck et al. (2012).
LAD	*Apteodinium tectatum*	13,09	13,88	11,90	11,90	Powell (1992)	North Sea	NN6 100%	**11,90**	Main	Large error margin
						Louwye et al. (2008)	Ireland offshore (Atl)	C5ABn 50%	13,49	X	
						de Verteuil and Norris (1996)	USA offshore (Atl)	NN5 75%	13,88	X	Large error margin
						Londeix and Jan du Chêne (1998)	France	N6 0%	*17,59*		Local LAD?
LAD	*Apteodinium spiridoides*	13,90	14,57	13,27	13,27	Powell (1992)	North Sea	NN2 67%	*19,78*		Local LAD?
						Köthe (2012)	Germany	NN5 50%	14,22	X	
						Williams et al. (1993)	Northern hemisphere	Serravallian 25%	**13,27**	Main	Large error margin
						Londeix and Jan du Chêne (1998)	France	NN2 50%	*20,55*		Local LAD?
						de Verteuil and Norris (1996)	USA offshore (Atl)	NN5 25%	14,57	X	Large error margin
						Fensome et al. (2008)	USA offshore (Atl)	NN6 0%	13,53	X	Dated as 13.35 in Fensome et al. (2008), based on Williams et al. (1999).
						Soliman et al. (2012)	Egypt	NN4 50%	*16,43*		Local LAD?
FAD	*Habibacysta tectata*	13,88	14,28	13,49	14,28	de Verteuil and Norris (1996)	USA offshore (Atl)	NN5 75%	13,88	X	Large error margin
						Louwye et al. (2008)	Ireland offshore (Atl)	C5ABn 50%	13,49	X	Large error margin
						Köthe (2012)	Germany	40% between NN8 0% - NN10 100%	*9,85*		Local FAD?
						Head et al. (1989a)	Labrador Sea	NN10 <100%	*>8.29*		Local FAD?; Present in lowest sample.
						Schreck et al. (2012)	N Atlantic	extrapolated from overlying C5ABr; C5ABr -413%	**14,28**	Main	Calibration uncertain because of uncertain magnetostratigraphy of C5ACn and lower at ODP Site 907. Downward extrapolation yields 14.28 Ma.
LAD	*Cribroperidinium tenuitabulatum*	13,93	14,90	13,27	13,27	van Mourik et al. (2001)	USA offshore (Atl)	C15n 100%	*35,00*		Local LAD?
						Duffield and Stein (1986)	USA offshore (Atl)	N11 0%	13,77	X	
						Brinkhuis and Biffi (1993)	Italy	C13r 75%	*34,03*		Local LAD?
						Williams et al. (1993)	Northern hemisphere	Serravallian 25%	**13,27**	Main	Large error margin
						Firth (1996)	N Atlantic	C18n.1n 100%	*38,62*		Local LAD?
						Powell (1992)	North Sea	N10 100%	13,77	X	Large error margin
						Bujak and Matsuoka (1986)	N Pacific	Langhian 50%	14,90	X	Large error margin: ~25% Middle Miocene
LAD	*Distatodinium paradoxum*	14,92	15,43	14,50	14,50	Powell (1992)	North Sea	NN5 10%	14,78	X	Large error margin
						Biffi and Manum (1988)	Italy	P22 0%	*26,93*		Local LAD?
						Brinkhuis and Biffi (1993)	Italy	P19 0%	*32,10*		Local LAD?
						Fensome et al. (2008)	Canada offshore (Atl)	~50% between NN5 0% - NN7 0%	*13,41*		Error margin too large; 12.97 Ma according to Fensome et al. (2008), based on Williams et al. (1999).
						de Verteuil and Norris (1996)	USA offshore (Atl)	NN5 25%	14,57	X	Large error margin
						Louwye et al. (2008)	Ireland offshore (Atl)	C5Br 80%	15,32	X	
						Köthe (2012)	Germany	NN5 30%	**14,50**	Main	
						van Mourik et al. (2001)	USA offshore (Atl)	C13r 0%	*35,00*		Local LAD?
						Soliman et al. (2012)	Egypt, Shukheir-1	NN4 83%	15,43	X	
						Bujak and Matsuoka (1986)	N Pacific	Langhian 50%	14,90	X	Large error margin: ~25% Middle Miocene
						Firth (1996)	N Atlantic	C18r 50%	*40,65*		Local LAD?
FAD	*Achomosphaera andalousiensis*	11,81	13,12	10,55	13,12	Zevenboom (1995)	Italy	C5An.1n 100%	12,05	X	
						de Verteuil and Norris (1996)	USA offshore (Atl)	NN8 100%	10,55	X	Large error margin
						Powell (1992)	North Sea	NN8 33%	10,78	X	Large error margin
						Dybkjær and Piasecki (2010)	Denmark	NN6 25%	**13,12**	Main	
						Williams et al. (1993)	Northern hemisphere	Serravallian 50%	12,72	X	Large error margin

						Brown and Downie (1985)	Ireland offshore (Atl)	Serravallian 100%	11,63	X	Large error margin
LAD	*Cribroperidinium*	14,21	14,90	13,53	13,53	Soliman et al. (2012)	Egypt	NN5 100%	**13,53**	Main	Nannofossil stratigraphy missing at relevant depth. Estimate therefore rough estimate. Certainly younger than NN5 25%.
	giuseppei					Brinkhuis and Biffi (1993)	Italy	C13n 75%	*33,29*		Local LAD?
						Firth (1996)	N Atlantic	C11r 25%	*30,44*		Local LAD?
						Brown and Downie (1984)	Ireland offshore (Atl)	NP13 0%	*50,50*		Local LAD?
						Bujak and Matsuoka (1986)	N Pacific	Langhian 50%	14,90	X	Large error margin: ~25% Middle Miocene
FAD	*Cerebrocysta*	17,85	17,95	17,76	17,95	Zegarra and Helenes (2011)	C America	Burdigalian 60%	17,76	X	Large error margin
	poulsenii					de Verteuil and Norris (1996)	USA offshore (Atl)	NN3 100%	**17,95**	Main	Large error margin
FAD	*Unipontidinium*	14,57	15,16	13,99	15,16	Powell (1992)	North Sea	N10 50%	14,01	X	Large error margin
	aquaeductus					Brown and Downie (1985)	Ireland offshore (Atl)	NN5 50%	14,22	X	Large error margin
						de Verteuil and Norris (1996)	USA offshore (Atl)	NN5 33%	14,45	X	Large error margin
						Dybkjær and Piasecki (2010)	Denmark	NN5 10%	14,77	X	
						Louwye et al. (2008)	Ireland offshore (Atl)	C5ACn 25%	13,99	X	
						Zevenboom (1995)	Italy	C5Bn.2n 75%	15,06	X	
						Williams et al. (1993)	Northern hemisphere	Langhian 50%	14,90	X	Large error margin
						Bijl et al. (2018)	Antarctica	C5Bn.2n 0%	**15,16**	Main	
FAD	*Labyrinthodinium*	16,09	18,12	15,16	18,12	de Verteuil and Norris (1996)	USA offshore (Atl)	NN4 75%	15,67	X	Large error margin
	truncatum					Head et al. (1989a)	Labrador Sea	NN10 <100%	*>8.29*		Local FAD?; Present close to lowest sample.
						Powell (1992)	North Sea	NN8 25%	*10,81*		Local FAD?
						Louwye et al. (2008)	Ireland offshore (Atl)	C5Cn.1r 70%	16,28	X	
						Köthe (2012)	Germany	NN4 80%	15,52	X	
						Dybkjær and Piasecki (2010)	Denmark	NN4 70%	15,82	X	
						Zevenboom (1995)	Italy	C5Bn.2n 0%	15,16	X	
						Soliman et al. (2012)	Egypt	NN3 50%	**18,12**	Main	NN3 50% (with large error margin), but suspected caving, so LO could also be at NN4 60% (16.126 Ma).
LAD	*Cordosphaeridium*	17,48	20,70	13,88	13,88	Soliman et al. (2012)	Egypt	NN4 25%	17,19	X	
	cantharellus					Powell (1992)	North Sea	NN4 80%	15,52	X	Large error margin
						Brinkhuis and Biffi (1993)	Italy	P19 0%	*32,10*		Local LAD?
						Williams et al. (1993)	Northern hemisphere	Aquitanian 90%	20,70	X	Large error margin
						Firth (1996)	N Atlantic	C15n 50%	*35,15*		Local LAD?
						Londeix and Jan du Chêne (1998)	France	N5 100%	17,59	X	
						de Verteuil and Norris (1996)	USA offshore (Atl)	NN2 85%	18,96	X	Large error margin
						Dybkjær and Piasecki (2010)	Denmark	NN2 100%	18,28	X	
						Zevenboom (1995)	Italy	C5Dr.1n 100%	17,72	X	
						Fensome et al. (2008)	N Atlantic	NN5 75%	**13,88**	Main	Dated as 14.00 Ma by Fensome et al. (2008).
FAD	*Sumatradinium*	17,74	18,28	17,19	18,28	de Verteuil and Norris (1996)	USA offshore (Atl)	NN3 0%	**18,28**	Main	Large error margin
	druggii					Soliman et al. (2012)	Egypt	NN4 25%	17,19	X	
FAD	*Sumatradinium*	18,28	18,28	18,28	18,28	Soliman et al. (2012)	Egypt	NN2 100%	**18,28**	Main	NN2 <100%, but unclear how much, because lower part of NN2 truncated by hiatus.
	hispidum										
FAD	*Cousteaudinium*	19,74	21,69	17,80	21,69	Zevenboom (1995)	Italy	C5Bn.1n 0%	*14,87*		Local FAD?
	aubryae					de Verteuil and Norris (1996)	USA offshore (Atl)	NN2 25%	**21,69**	Main	Large error margin
						Dybkjær and Piasecki (2010)	Denmark	NN4 5%	17,80	X	
FAD	*Pyxidinopsis*	21,68	23,23	20,13	23,23	De Schepper and Head (2009)	N Atlantic	C2An.1n 38%	*2,86*		Local FAD?
	tuberculata					Versteegh and Zevenboom (1995)	Mediterranean	NN18 0%	*2,39*		Local FAD?
						Montanari et al. (1997)	Italy	C6An.1n 50%	20,13	X	
						Bijl et al. (2018)	Antarctica	C6Cn.3n 100%	**23,23**	Main	
FAD	*Melitasphaeridium*	21,60	22,96	20,10	22,96	Bujak and Matsuoka (1986)	N Pacific	Tortonian 0%	*11,63*		Local FAD?
	choanophorum					Head et al. (1989a)	Labrador Sea	NN10 <100%	*>8.29*		Local FAD?; Present in lowest sample.
						Powell (1992)	North Sea	N4 0%	**22,96**	Main	Large error margin
						Williams et al. (1993)	Northern hemisphere	Aquitanian 50%	21,74	X	Large error margin
						De Schepper and Head (2009)	N Atlantic	NN15 <100%	*>3.70*		Local FAD?; Present in lowest sample.
						Londeix and Jan du Chêne (1998)	France	NN2 60%	20,10	X	
						Soliman et al. (2012)	Egypt	NN2 100%	*18,28*		Local FAD?
						Duffield and Stein (1986)	USA offshore (Atl)	N10 0%	*14,24*		Local FAD?
FAD	*Sumatradinium*	19,89	21,69	18,51	21,69	de Verteuil and Norris (1992)	USA offshore (Atl)	NN2 25%	**21,69**	Main	Large error margin
	soucouyantiae					Montanari et al. (1997)	Italy	C6n 25%	19,48	X	
						Soliman et al. (2012)	Egypt	NN2 95%	18,51	X	
FAD	*Exochosphaeridium*	19,11	20,10	18,28	20,10	de Verteuil and Norris (1996)	USA offshore (Atl)	NN2 60%	**20,10**	Main	Large error margin
	insigne					Dybkjær and Piasecki (2010)	Denmark	NN2 85%	18,96	X	
						Soliman et al. (2012)	Egypt	NN2 100%	18,28	X	
LAD	*Caligodinium*	21,85	22,98	21,23	21,23	Firth (1996)	N Atlantic	C16r 50%	*36,83*		Local LAD?
	amiculum					Biffi and Manum (1988)	Italy	NN1 50%	22,98	X	
						Brinkhuis and Biffi (1993)	Italy	C13n 60%	*33,38*		Local LAD?
						Williams et al. (1993)	Northern hemisphere	Aquitanian 50%	21,74	X	Large error margin
						de Verteuil and Norris (1996)	USA offshore (Atl)	NN2 30%	21,46	X	Large error margin
						Dybkjær and Piasecki (2010)	Denmark	NN2 35%	**21,23**	Main	
FAD	*Operculodinium*	15,29	16,93	14,04	16,93	Soliman et al. (2012)	Egypt	NN5 0%	14,91	X	
	piaseckii					Zegarra and Helenes (2011)	C America	Langhian 90%	14,04	X	
						Zevenboom (1995)	Italy	C5Cr 60%	**16,93**	Main	
FAD	*Batiacasphaera*	18,76	22,12	16,98	22,12	Soliman et al. (2012)	Egypt	NN4 25%	17,19	X	
	sphaerica					Williams et al. (1993)	Northern hemisphere	Aquitanian 35%	**22,12**	Main	Large error margin
						Bijl et al. (2018)	Antarctica	C5Cr 50%	16,98	X	
FAD	*Operculodinium*	23,96	23,96	23,96	23,96	Soliman et al. (2012)	Egypt	NN4 100%	14,91		Occurs in single sample.
	janduchenei					Head et al. (1989a)	Labrador Sea	NN10 100%	8,29		Local FAD?
						Bijl et al. (2018)	Antarctica	C7n.1n 100%	**23,96**	Main	
FAD	*Invertocysta tabulata*	24,71	25,80	23,63	25,80	Powell (1992)	North Sea	P22 33%	**25,80**	Main	Large error margin
						Louwye et al. (2008)	Ireland offshore (Atl)	C5ABr 25%	*13,71*		Local FAD?
						Williams et al. (1993)	Northern hemisphere	Serravallian 75%	*12,17*		Local FAD?
						Zegarra and Helenes (2011)	C America	Serravallian 80%	*12,06*		Local FAD?
						Bijl et al. (2018)	Antarctica	C6Cr 50%	23,63	X	
LAD	*Chiropteridium galea*	24,04	28,23	20,55	20,55	Fensome et al. (2008)	N Atlantic	~50% between NP25 0% - NN2 0%	*24,83*		Error margin too large; Dated as 21.90 Ma by Fensome et al. (2008), based on Williams et al. (2004).
						Dybkjær and Piasecki (2010)	Denmark	NN2 20%	21,91	X	
						Śliwińska et al. (2012)	Denmark	C9r 10%	27,82	X	
						de Verteuil and Norris (1996)	France	NN2 25%	21,69	X	Large error margin
						Head and Norris (1989)	Labrador Sea	NP24 50%	28,23	X	
						Biffi and Manum (1988)	Italy	NN2 50%	**20,55**	Main	
						Brinkhuis and Biffi (1993)	Italy	C13r 75%	*34,03*		Local LAD?
LAD	*Chiropteridium*	25,93	28,23	22,98	22,98	Powell (1992)	North Sea	P22 15%	26,42	X	Large error margin
	lobospinosum					Head and Norris (1989)	Labrador Sea	NP24 50%	28,23	X	
						Köthe (2012)	Germany	NP24 60%	27,95	X	
						Gradstein et al. (1992)	North Sea	NN1 50%	**22,98**	Main	
						Biffi and Manum (1988)	Italy	NP25 75%	24,06	X	
FAD	*Apteodinium*	28,17	30,58	25,56	30,58	Powell (1992)	North Sea	NP24 45%	28,37	X	Large error margin
	spiridoides					Köthe (2012)	Germany	NP23 60%	**30,58**	Main	
						Williams et al. (1993)	Northern hemisphere	Chattian 50%	25,56	X	Large error margin
						Biffi and Manum (1988)	Italy	NN4 50%	*16,43*		Local FAD?
FAD	*Leptodinium italicum*	29,46	29,46	29,46	29,46	Biffi and Manum (1988)	Italy	P20 75%	**29,46**	Main	
LAD	*Licracysta*	27,08	29,62	25,82	25,82	Brinkhuis et al. (2003)	Australia	C9r 50%	27,65	X	
	semicirculata					Powell (1992)	North Sea	P22 15%	26,42	X	Large error margin
						Gradstein et al. (1992)	North Sea	NP24 0%	29,62	X	
						Brinkhuis and Biffi (1993)	Italy	C13n 60%	*33,38*		Local LAD?
						Pross et al. (2010)	Italy	C9n 75%	26,67	X	
						Śliwińska et al. (2012)	Denmark	C8n.2n 25%	**25,82**	Main	
						Egger et al. (2016)	Canada offshore (Atl)	C9n 85%	26,57	X	
						Van Simaeys et al. (2004)	Belgium	NP24 100%	26,84	X	
LAD	*Achilleodinium*	28,12	30,58	25,99	25,99	Powell (1992)	North Sea	NP23 60%	30,58	X	Large error margin
	biformoides					Brown and Downie (1984)	Ireland offshore (Atl)	NP13 75%	*49,46*		Local LAD?
						Williams et al. (1993)	Northern hemisphere	Rupelian 80%	*29,25*		Large error margin
						Firth (1996)	N Atlantic	C17n.1r 75%	*37,78*		Local LAD?
						Van Simaeys et al. (2004)	Belgium	NP24 66%	27,79	X	
						Pross et al. (2010)	Italy	C8r 100%	**25,99**	Main	
						Brinkhuis and Biffi (1993)	Italy	P16/P17 100%	*34,03*		Local LAD?
						Açikalin et al. (2015)	W Turkey	P1b 50%	*64,58*		Local LAD?
LAD	*Enneadocysta*	32,11	33,39	30,82	30,82	Powell (1992)	North Sea	P18 33%	33,39	X	Large error margin
	arcuata					Head and Norris (1989)	Labrador Sea	NP23 50%	**30,82**	Main	
FAD	*Chiropteridium*	31,79	33,16	30,46	33,16	Egger et al. (2016)	N Atlantic	C12r 50%	32,10	X	
	lobospinosum					Eldrett and Harding (2009)	N Atlantic	C13n 100%	**33,16**	Main	
						Firth (1996)	N Atlantic	C12r 25%	32,63	X	
						Powell (1992)	North Sea	NP23 65%	30,46	X	Large error margin
						Head and Norris (1989)	Labrador Sea	NP23 50%	30,82	X	
						Köthe (2012)	Germany	NP22 75%	32,25	X	
						Gradstein et al. (1992)	North Sea	NP23 0%	32,02	X	
						Wilpshaar et al. (1996)	Italy	C12n 33%	30,89	X	
FAD	*Heteraulacacysta*	35,52	37,99	31,54	37,99	Brinkhuis (1994)	Italy	NP18 80%	37,04	X	
	campanula					Brinkhuis and Biffi (1993)	Italy	C17n 25%	**37,99**	Main	
						Powell (1992)	North Sea	NP23 20%	31,54	X	Large error margin

TABLE S10

Event	Microfossil	Species	Age (Ma) Mean	Maximum	Minimum	FAD/LAD	References	Based on:	Region	Calibration type	Published age (Ma)	Original timescale	Age GTS2012 (Ma)	Used:	GTS2012 comments
FAD	Diatom	*Proboscia barboi* (Brun) Jordan and Priddle 1991	13,9	18,47	11,8	18,47	Cody et al. (2008)		Antarctic	Total range CONOP model	18.47 (total range)	Gradstein et al. (2004)	**18,47**	Main	
							Cody et al. (2008)		Antarctic	Average range CONOP model	13-13.37 (average range)	Gradstein et al. (2004)	13,19	X	
							Barron et al. (1985a)		Eastern Tropical Pacific	Biostratigraphic interpolation	11,2	I.e. Berggren et al. (1985), using the suggested anomaly 5-chron 11 correlation.	11,8	X	
							Barron Diatom Catalog in Lazarus et al. (2014)	Barron (2003), based on: Barron (1992); Shackleton et al. (1995); unpublished notes of Barron	North Pacific	Bio- and magnetostratigraphy of Barron (1992); Integrated cyclo-, bio- and magnetostratigraphy of Shackleton et al. (1995)	12,3	Gradstein et al. (2004)	12,4	X	
LAD	Diatom	*Thalassiosira grunowii* Akiba and Yanagisawa 1985	8,0	8,2	7,9	7,9	Barron et al. (1985b)	Barron, unpublished data, Core RC-12-418	Eastern Equatorial Pacific	Magnetostratigraphy	7,3	I.e. Berggren et al. (1985), using the suggested anomaly 5-chron 11 correlation.	8,2	X	
							Barron Diatom Catalog in Lazarus et al. (2014)	Barron (2003), based on: Barron (1992); Shackleton et al. (1995); unpublished notes of Barron	North Pacific	Bio- and magnetostratigraphy of Barron (1992); Integrated cyclo-, bio- and magnetostratigraphy of Shackleton et al. (1995)	7,9	Gradstein et al. (2004)	**7,9**	Main	
LAD	Diatom	*Denticulopsis lauta*	11,1	13,1	8,6	8,6	Cody et al. (2008)		Antarctic	Total range CONOP model	9.74 (total range)	Gradstein et al. (2004)	9,75	X	
							Cody et al. (2008)		Antarctic	Average range CONOP model	12.46–13.73 (average range)	Gradstein et al. (2004)	13,10	X	
							Ciesielski (1983)		Antarctic	Magnetostratigraphy; Ar/Ar dating	8,6	-	**8,6**	Main	Timescale unknown
							Barron Diatom Catalog in Lazarus et al. (2014)	Barron (2003), based on: Barron (1992); Shackleton et al. (1995); unpublished notes of Barron	North Pacific	Bio- and magnetostratigraphy of Barron (1992); Integrated cyclo-, bio- and magnetostratigraphy of Shackleton et al. (1995)	13,1	Gradstein et al. (2004)	13,1	X	
FAD	Planktic foraminifer	*Neogloboquadrina acostaensis*	11,0	11,8	9,83	11,8	Anthonissen and Ogg (2012)	Chaisson and Pearson (1997)	Western Equatorial Atlantic	Cyclostratigraphy	9,83	Gradstein et al. (2012)	9,83	X	
							Anthonissen and Ogg (2012)	Miller et al. (1985)	North Atlantic	Magnetostratigraphy	10,9	Gradstein et al. (2012)	10,9	X	
							Lourens et al. (2004)	Hilgen et al. (2000)	Mediterranean	Cyclostratigraphy	10.57 (First Regular Occurrence)	Gradstein et al. (2004)	10,58	X	
							Lirer et al. (2002)		Mediterranean	Cyclostratigraphy	11,8	Astronomical: Laskar et al. (1993)	**11,8**	Main	Astronomical: Laskar et al. (1993)
							Hilgen et al. (2000)		Mediterranean	Cyclostratigraphy	11,78	Astronomical: Laskar et al. (1993)	11,78	X	Astronomical: Laskar et al. (1993)
LAD	Diatom	*Crucidenticula nicobarica* (Grunow) Akiba and Yanagisawa 1985	12,5	12,9	12,26	12,26	Cody et al. (2008)		Antarctic	Total range CONOP model	12.14–12.26 (total range)	Gradstein et al. (2004)	**12,26**	Main	
							Cody et al. (2008)		Antarctic	Average range CONOP model	12.57–12.67 (average range)	Gradstein et al. (2004)	12,64	X	
							Pälike et al. (2010)	Barron (1983)	Eastern Equatorial Pacific	Confirmation only	12,5	Gradstein et al. (2004)	12,5	X	
							Bohaty et al. (2003)	Baldauf and Barron (1991)	Kerguelen Plateau	Magnetostratigraphy of Baldauf and Barron (1991); confirmation from Ar/Ar dating	12,3	Berggren et al. (1995)	12,4	X	
							Barron et al. (1985a)		Eastern Tropical Pacific	Biostratigraphic interpolation	12,6	I.e. Berggren et al. (1985), using the suggested anomaly 5-chron 11 correlation.	12,9	X	
							Barron Diatom Catalog in Lazarus et al. (2014)	Barron (2003), based on: Barron (1992); Shackleton et al. (1995); unpublished notes of Barron	Equatorial Pacific	Bio- and magnetostratigraphy of Barron (1992); Integrated cyclo-, bio- and magnetostratigraphy of Shackleton et al. (1995)	12,3	Gradstein et al. (2004)	12,4	X	
LAD	Diatom	*Araniscus lewisianus* (Greville) Komura 1998	13,7	14,88	12,9	12,9	Cody et al. (2008)		Antarctic	Total range CONOP model	14.31–14.61 (total range)	Gradstein et al. (2004)	14,47	X	
							Cody et al. (2008)		Antarctic	Average range CONOP model	14.68–15.1 (average range)	Gradstein et al. (2004)	14,88	X	
							Pälike et al. (2010)	Burckle (1972); Barron (1985b)	Eastern Equatorial Pacific	Confirmation only	12,99	Gradstein et al. (2004)	13,01	X	
							Barron et al. (1985a)		Eastern Tropical Pacific	Biostratigraphic interpolation	12,9	I.e. Berggren et al. (1985), using the suggested anomaly 5-chron 11 correlation.	13,1	X	
							Barron Diatom Catalog in Lazarus et al. (2014)	Shackleton et al. (1995)	Eastern Equatorial Pacific	Integrated cyclo-, bio- and magnetostratigraphy	12,9	Gradstein et al. (2004)	**12,9**	Main	
FAD	Diatom	*Thalassiosira grunowii* Akiba and Yanagisawa 1985	14,2	14,5	13,9	14,5	Barron (1985a)		Eastern Equatorial Pacific	Biostratigraphic interpolation	13.8-13.9	I.e. Berggren et al. (1985)	13,9	X	
							Barron Diatom Catalog in Lazarus et al. (2014)	Yanagisawa and Akiba (1998)	North Pacific	Magnetostratigraphy	14,5	Gradstein et al. (2004)	**14,5**	Main	
FAD	Diatom	*Crucidenticula punctata* (Schrader) Akiba and Yanagisawa 1985	13,1	13,4	12,9	13,4	Pälike et al. (2010)		Eastern Equatorial Pacific	Biostratigraphic interpolation	13,18	Gradstein et al. (2004)	13,18	X	
							Barron (2003)	Barron (1992); Shackleton et al. (1995); unpublished notes of Barron	Equatorial Pacific	Bio- and magnetostratigraphy of Barron (1992); Integrated cyclo-, bio- and magnetostratigraphy of Shackleton et al. (1995)	12,8	Berggren et al. (1995)	12,9	X	
							Barron Diatom Catalog in Lazarus et al. (2014)	Barron (1985a)	Eastern Equatorial Pacific	Biostratigraphic interpolation	13,4	Gradstein et al. (2004)	**13,4**	Main	
LAD	Diatom	*Cestodiscus peplum*	14,1	14,16	14,1	14,1	Pälike et al. (2010)	Burckle (1978)	Eastern Equatorial Pacific	Confirmation only	14,19	Gradstein et al. (2004)	14,16	X	
							Barron Diatom Catalog in Lazarus et al. (2014)	Barron (2003), based on: Barron (1992); Shackleton et al. (1995); unpublished notes of Barron	Equatorial Pacific	Bio- and magnetostratigraphy of Barron (1992); Integrated cyclo-, bio- and magnetostratigraphy of Shackleton et al. (1995)	14,1	Gradstein et al. (2004)	**14,1**	Main	
FAD	Diatom	*Denticulopsis hyalina*	14,5	14,9	13,79	14,9	Cody et al. (2008)		Antarctic	Total range CONOP model	14.16-14.56 (total range)	Gradstein et al. (2004)	14,35	X	
							Cody et al. (2008)		Antarctic	Average range CONOP model	13.45-14.13 (average range)	Gradstein et al. (2004)	13,79	X	
							Barron et al. (1985a)		Eastern Tropical Pacific	Biostratigraphic interpolation	15,0	I.e. Berggren et al. (1985)	**14,9**	Main	

							Barron Diatom Catalog in Lazarus et al. (2014)	Barron (2003), based on: Barron (1992); Shackleton et al. (1995); unpublished notes of Barron	North Pacific	Bio- and magnetostratigraphy of Barron (1992); Integrated cyclo-, bio- and magnetostratigraphy of Shackleton et al. (1995)	14,9	Gradstein et al. (2004)	14,9	X
FAD	Diatom	*Denticulopsis lauta*	15,8	15,9	15,57	15,9	Cody et al. (2008)		Antarctic	Total range CONOP model	15.57 (total range)	Gradstein et al. (2004)	15,57	X
							Cody et al. (2008)		Antarctic	Average range CONOP model	15.67–15.7 (average range)	Gradstein et al. (2004)	15,69	X
							Barron et al. (2013)	Yanagisawa and Akiba (1998), based on: Barron and Gladenkov (1995)	New Jersey Shelf	Confirmation only	15,9	Gradstein et al. (2004)	**15,9**	Main
							Barron et al. (1985a)		Eastern Tropical Pacific	Biostratigraphic interpolation	16,1	I.e. Berggren et al. (1985)	15,9	X
							Barron Diatom Catalog in Lazarus et al. (2014)	Barron (2003), based on: Barron (1992); Shackleton et al. (1995); unpublished notes of Barron	North Pacific	Bio- and magnetostratigraphy of Barron (1992); Integrated cyclo-, bio- and magnetostratigraphy of Shackleton et al. (1995)	15,9	Gradstein et al. (2004)	**15,9**	Main
							Barron (1985a)		Eastern Equatorial Pacific	Biostratigraphic interpolation	15,9	I.e. Berggren et al. (1985)	15,7	X
FAD	Diatom	*Cestodiscus peplum*	16,2	16,4	16,15	16,4	Pälike et al. (2010)	Barron (1985a), based on: Barron (1985b)	Eastern Equatorial Pacific	Confirmation only	16,15	Gradstein et al. (2004)	16,15	X
							Barron et al. (1985b)		Eastern Equatorial Pacific	Magnetostratigraphy	16,4	I.e. Berggren et al. (1985)	16,2	X
							Barron Diatom Catalog in Lazarus et al. (2014)	Barron (2003), based on: Barron (1992); Shackleton et al. (1995); unpublished notes of Barron	Equatorial Pacific	Bio- and magnetostratigraphy of Barron (1992); Integrated cyclo-, bio- and magnetostratigraphy of Shackleton et al. (1995)	16,4	Gradstein et al. (2004)	**16,4**	Main
LAD	Diatom	*Thalassiosira fraga*	16,2	16,5	15,96	15,96	Pälike et al. (2010)	Barron (1983)	Eastern Equatorial Pacific	Confirmation only	15,96	Gradstein et al. (2004)	**15,96**	Main
							Barron (2003)	Barron (1992); Shackleton et al. (1995); unpublished notes of Barron	Equatorial Pacific	Bio- and magnetostratigraphy of Barron (1992); Integrated cyclo-, bio- and magnetostratigraphy of Shackleton et al. (1995)	16,5	Berggren et al. (1995)	16,5	X
							Barron Diatom Catalog in Lazarus et al. (2014)	Barron (1985a)	Eastern Equatorial Pacific	Biostratigraphic interpolation	16,3	Gradstein et al. (2004)	16,3	X
							Barron et al. (1985a)		Eastern Tropical Pacific	Biostratigraphic interpolation	16,4	I.e. Berggren et al. (1985)	16,2	X
FAD	Diatom	*Actinocyclus ingens*	16,1	18,2	15,25	18,2	Cody et al. (2008)		Antarctic	Total range CONOP model	15.78 (total range)	Gradstein et al. (2004)	15,78	X
							Cody et al. (2008)		Antarctic	Average range CONOP model	15.84–15.89 (average range)	Gradstein et al. (2004)	15,87	X
							Pälike et al. (2010)	Barron (1983)	Eastern Equatorial Pacific	Confirmation only	15,25	Gradstein et al. (2004)	15,25	X
							Barron et al. (2013)	Barron (1985a)	New Jersey Shelf	Confirmation only	15,5	Gradstein et al. (2004)	15,5	X
							Bohaty et al. (2003)	Baldauf and Barron (1991); Harwood and Maruyama (1992); Censarek and Gersonde (2002)	Kerguelen Plateau	Magnetostratigraphy; Confirmation from Ar/Ar dating	16.2 (First Common Occurrence)	Berggren et al. (1995)	16,2	X
							Barron Diatom Catalog in Lazarus et al. (2014)	Barron (2003), based on: Barron (1992); Shackleton et al. (1995); unpublished notes of Barron	North Pacific	Bio- and magnetostratigraphy of Barron (1992); Integrated cyclo-, bio- and magnetostratigraphy of Shackleton et al. (1995)	18,2	Gradstein et al. (2004)	**18,2**	Main
LAD	Diatom	*Triceratium pileus*	17,4	17,6	17,3	17,3	Pälike et al. (2010)		Eastern Equatorial Pacific	Biostratigraphic interpolation	17,35	Gradstein et al. (2004)	17,35	X
							Barron (1985a)		Eastern Equatorial Pacific	Magnetostratigraphy	17,6	I.e. Berggren et al. (1985)	**17,3**	Main
							Barron Diatom Catalog in Lazarus et al. (2014)	Barron (2005)	Central Tropical Pacific	Magnetostratigraphy	17,6	Gradstein et al. (2004)	17,6	X
LAD	Diatom	*Thalassiosira spinosa*	17,6	17,64	17,5	17,5	Pälike et al. (2010)		Eastern Equatorial Pacific	Biostratigraphic interpolation	17,64	Gradstein et al. (2004)	17,64	X
							Barron (1985a)		Eastern Equatorial Pacific	Magnetostratigraphy	17,9	I.e. Berggren et al. (1985)	**17,5**	Main
FAD	Radiolarian	*Cyrtocapsella tetrapera*	21,84	21,92	21,77	21,92	Nigrini et al. (2005)		Central Equatorial Pacific ODP Site 1218	Magnetostratigraphy	22.52-22.65	Berggren et al. (1995)	21,77	X
							Nigrini et al. (2005)		Central Equatorial Pacific ODP Site 1219	Magnetostratigraphy	22.6-22.86	Berggren et al. (1995)	**21,92**	Main
							Nigrini et al. (2005)		Central Equatorial Pacific ODP Site 1220	Magnetostratigraphy	22.25-23.01	Berggren et al. (1995)	21,85	X
FAD	Diatom	*Thalassiosira fraga*	19,7	20,4	19,21	20,4	Pälike et al. (2010)	Barron (1983)	Eastern Equatorial Pacific	Confirmation only	19,21	Gradstein et al. (2004)	19,21	X
							Barron (2003)	Barron (1992); Shackleton et al. (1995); unpublished notes of Barron	Equatorial Pacific	Bio- and magnetostratigraphy of Barron (1992); Integrated cyclo-, bio- and magnetostratigraphy of Shackleton et al. (1995)	20,3	Berggren et al. (1995)	19,9	X
							Barron (1985a)		Eastern Equatorial Pacific	Biostratigraphic extrapolation	19,9	I.e. Berggren et al. (1985)	19,2	X
							Gladenkov and Barron (1995)		North Pacific	Magnetostratigraphy	20,1	I.e. Berggren et al. (1985)	19,4	X
							Harwood and Maruyama (1992)		Kerguelen Plateau	Magnetostratigraphy	21,2	Berggren et al. (1985)	20,3	X
							Barron Diatom Catalog in Lazarus et al. (2014)	Barron (2005)	Central Tropical Pacific	Magnetostratigraphy	20,4	Gradstein et al. (2004)	**20,4**	Main
							Barron et al. (1985a)		Eastern Tropical Pacific	Biostratigraphic extrapolation	19,9	I.e. Berggren et al. (1985)	19,2	X

TABLE S11

Summary

Sample	Core	Section	Interval (cm)	Half	Depth (mbsf)	Depth (R-m	Material	Negative 37Ar intensities are used in age calculations: Plateau	Full External Error	Total fusion	Full External Error	Normal Isochron	Full External Error	Inverse isochron	Full External Error	Negative 37Ar intensities are set to zero: Plateau	Full External Error	Total fusion	Full External Error	Comments
T1	16H	6	46-48	W	146.26	155,96	Sanidine	17,23	0,47	15,60	0,98	16,55	1,71	17,06	1,46	17,59	0,47	17,76	0,99	
T2	17X	1	41-43.5	W	148.21	158,79	Sanidine	18,21	0,75	14,75	1,96	18,45	0,76	17,94	0,98	18,34	0,90	17,95	1,97	
T3	22X	3	128-130	W	199.58	212,9	Sanidine	59,36	3,86	54,32	1,93	-54,83	33,97	61,61	3,84	-297,11	251,62	57,71	1,41	No reliable results produced
T4	28X	2	148-150	W	257.08	273,49	Sanidine	18,02	0,24	16,74	0,38	18,76	0,33	17,93	0,28	18,07	0,21	18,24	0,39	No diagnostic results produced

Sample T1

Negative 37Ar intensities are used in age calculations

Relative Abundances			36Ar [A]	%1σ	37Ar [A]	%1σ	38Ar [A]	%1σ	39Ar [A]	%1σ	40Ar [A]	%1σ	40(r)/39(k) ± 1σ	Age ± 1σ (Ma)	40Ar(r) (%)	39Ar(k) (%)	K/Ca ± 1σ
329_VU10	0 °C		0,0346608	1,333	89,439426	31,269	0,0557595	10,390	4,189768	0,215	18,4600	0,099	0,24904 ± 0,51983	2,09 ± 4,36	5,73	7,44	0,02 ± 0,01
330_VU10	0 °C		0,0157397	3,042	59,927352	51,620	0,0706097	9,129	5,428493	0,191	15,4251	0,141	1,09670 ± 0,44669	9,19 ± 3,73	38,88	9,57	0,04 ± 0,02
331_VU10	0 °C		0,0494698	1,195	42,827945	65,182	0,1485901	4,931	11,074341	0,136	36,7676	0,053	1,67638 ± 0,19887	14,03 ± 1,66	50,62	19,43	0,11 ± 0,07
334_VU10	0 °C		3,0626126	0,434	44,492607	45,567	0,6781505	0,989	10,577646	0,132	930,9022	0,005	1,89865 ± 0,41527	15,88 ± 3,46	2,15	18,46	0,10 ± 0,05
216_VU10	0 °C	✓	0,0007729	57,540	2,957542	19,048	0,0384949	25,878	0,988848	0,697	2,3816	0,305	1,93943 ± 0,14216	16,22 ± 1,18	80,69	1,73	0,14 ± 0,03
215_VU10	0 °C	✓	0,0034721	15,297	1,219211	42,906	0,0342861	28,776	1,242970	0,367	3,6723	0,227	2,04360 ± 0,13213	17,09 ± 1,10	69,22	2,18	0,44 ± 0,19
213_VU10	0 °C	✓	0,0047688	11,714	1,869484	30,049	0,0360895	31,229	2,836906	0,280	7,1958	0,157	2,08670 ± 0,06127	17,45 ± 0,51	82,23	4,96	0,65 ± 0,20
209_VU10	0 °C		0,0079601	5,910	2,233555	26,318	0,0064232	142,800	0,853682	0,831	4,0211	0,219	2,13557 ± 0,17479	17,86 ± 1,45	45,26	1,49	0,16 ± 0,04
210_VU10	0 °C		0,1299480	0,606	3,226537	21,059	0,0468342	16,797	2,024196	0,332	42,8987	0,032	2,15331 ± 0,12129	18,00 ± 1,01	10,15	3,54	0,27 ± 0,06
335_VU10	0 °C		0,8082951	0,456	51,189898	49,720	0,2653358	2,700	10,277164	0,131	260,7859	0,011	2,25307 ± 0,22477	19,17 ± 1,87	9,01	17,92	0,09 ± 0,04
333_VU10	0 °C		0,0154306	3,323	69,841388	35,458	0,1052782	6,268	7,346751	0,147	19,0475	0,078	2,73196 ± 0,26837	22,81 ± 2,23	104,70	12,77	0,04 ± 0,02
212_VU10	0 °C		0,0126058	3,914	0,329156	187,337	0,0004327	2129,200	0,289132	2,671	4,6543	0,209	2,98757 ± 0,54317	24,93 ± 4,50	18,57	0,51	0,38 ± 0,71
		Σ	4,1457364	0,335	23,847162	271,521	1,4862846	1,930	57,129897	0,060	1346,2122	0,005					

Information on Analysis and Constants Used in Calculations

Sample = 329_VU107-AT1
Material = sanidine
Location = 16H6W: 46.0-48.0
Analyst = Klaudia Kuiper
Project = VU107
Mass Discrimination Law = LIN
Irradiation = VU107
J = 0.00458730 ± 0.00001193
FCs = 28.201 ± 0.023 Ma
IGSN = Undefined
Preferred Age = Undefined
Classification = Undefined
Experiment Type = Undefined
Extraction Method = Undefined
Heating = 45 sec
Isolation = 5.00 min
Instrument = ARGUS
Lithology = Undefined
Lat-Lon = Undefined - Undefined
Feature = Undefined

Age Equations = Min et al. (2000)
Negative Intensities = Allowed
Decay Constant 40K = 5.460 ± 0.053 E-10 1/a
Decay Constant 39Ar = 2.940 ± 0.016 E-07 1/h
Decay Constant 37Ar = 8.230 ± 0.012 E-04 1/h
Decay Constant 36Cl = 2.257 ± 0.015 E-06 1/a
Decay Activity 40K(EC,β+) = 3.310 ± 0.030 1/gs
Decay Activity 40K(β-) = 27.890 ± 0.150 1/gs
Atmospheric Ratio 40/36(a) = 298.56 ± 0.31
Atmospheric Ratio 38/36(a) = 0.1885 ± 0.0003
Production Ratio 39/37(ca) = 0.000673 ± 0.000004
Production Ratio 36/37(ca) = 0.000264 ± 0.000002
Production Ratio 40/39(k) = 0.000860 ± 0.000070
Production Ratio 38/39(k) = 0.012110 ± 0.000030
Production Ratio 36/38(cl) = 262.80 ± 1.71
Scaling Ratio K/Ca = 0.430
Abundance Ratio 40K/K = 1.1700 ± 0.0100 E-04
Atomic Weight K = 39.0983 ± 0.0001 g

Results	40(a)/36(a) ± 1σ	40(r)/39(k) ± 1σ	Age ± 1σ (Ma)	MSWD	39Ar(k) (%,n)	K/Ca ± 1σ
Age Plateau		2,06056 ± 0,05177 ± 2,51%	17,23 ± 0,43 ± 2,51%	0,46 / 63%	8,87 / 3	0,14 ± 0,08
			Full External Error ± 0,47	2,00	1σ Confidence Limit	
			Analytical Error ± 0,43	1,0000	Error Magnification	
Total Fusion Age		1,86443 ± 0,11638 ± 6,24%	15,60 ± 0,97 ± 6,22%		12	1,03 ± 2,80
			Full External Error ± 0,98			
			Analytical Error ± 0,97			
Normal Isochron	333,27 ± 109,01 ± 32,71%	1,97854 ± 0,20487 ± 10,35%	16,55 ± 1,71 ± 10,31%	1,13 / 29%	8,87 / 3	
			Full External Error ± 1,71	2,41	1σ Confidence Limit	
			Analytical Error ± 1,71	1,0647	Error Magnification	
				50	Number of Iterations	
				0,0000185206	Convergence	
Inverse Isochron	310,60 ± 102,37 ± 32,96%	2,03955 ± 0,17459 ± 8,56%	17,06 ± 1,45 ± 8,52%	0,91 / 34%	8,87 / 3	
			Full External Error ± 1,46	2,41	1σ Confidence Limit	
			Analytical Error ± 1,45	1,0000	Error Magnification	
				3	Number of Iterations	
				0,0000212802	Convergence	
				16%	Spreading Factor	

Negative 37Ar intensities are set to zero

Total fusion			36Ar(a) [A]	37Ar(ca) [A]	38Ar(cl) [A]	39Ar(k) [A]	40Ar(r) [A]	Age ± 1σ (Ma)	40Ar(r) (%)	39Ar(k) (%)	K/Ca ± 1σ
334_VU107-A	0 °C		3,0508666	44,49261	0,0000000	10,547702	20,02640	15,88 ± 3,46	2,15	18,50	0,102 ± 0,046
329_VU107-A	0 °C		0,0346608	0,00000	0,0000000	4,189768	8,10808	16,19 ± 4,39	43,92	7,35	0,020 ± 0,006
330_VU107-A	0 °C		0,0157397	0,00000	0,0000000	5,428493	10,72118	16,52 ± 3,75	69,50	9,52	0,039 ± 0,020
331_VU107-A	0 °C		0,0494698	0,00000	0,0000000	11,074341	21,98835	16,61 ± 1,66	59,80	19,42	0,111 ± 0,073
213_VU107-A	0 °C	✓	0,0042753	1,86948	0,0000000	2,835648	5,91698	17,45 ± 0,51	82,23	4,97	0,652 ± 0,196
215_VU107-A	0 °C	✓	0,0034721	0,00000	0,0000000	1,242970	2,63455	17,72 ± 1,10	71,74	2,18	0,439 ± 0,188
209_VU107-A	0 °C		0,0073704	2,23356	0,0000000	0,852178	1,81989	17,86 ± 1,45	45,26	1,49	0,164 ± 0,043
210_VU107-A	0 °C		0,1290962	3,22654	0,0000000	2,022025	4,35404	18,00 ± 1,01	10,15	3,55	0,269 ± 0,057
216_VU107-A	0 °C	✓	0,0007729	0,00000	0,0000000	0,988848	2,15001	18,18 ± 1,19	90,27	1,73	0,144 ± 0,027
335_VU107-A	0 °C		0,7947809	51,18890	0,0000000	10,242713	23,48729	19,17 ± 1,87	9,01	17,97	0,086 ± 0,043
333_VU107-A	0 °C		0,0000001	69,84139	0,0000000	7,299748	19,04123	21,79 ± 2,23	99,97	12,80	0,045 ± 0,016
212_VU107-A	0 °C		0,0126058	0,00000	0,0000000	0,289132	0,89041	25,69 ± 4,51	19,13	0,51	0,378 ± 0,708
		Σ	4,1031107	172,85347	0,0000000	57,013567	121,13842				

Information on Analysis

Sample = 329_VU107-AT1
Material = sanidine
Location = 16H6W: 46.0-48.0
Analyst = Klaudia Kuiper
Project = VU107
Mass Discrimination Law = LIN
Irradiation = VU107
J = 0.00458730 ± 0.00001193
FCs = 28.201 ± 0.023 Ma

Results	40(r)/39(k) ± 1σ	Age ± 1σ (Ma)	MSWD	39Ar(k) (%,n)	K/Ca ± 1σ
Age Plateau (Overestimated Error)	2,10325 ± 0,05179 ± 2,46%	17,59 ± 0,43 ± 2,46%	0,17 / 85%	8,89 / 3	0,135 ± 0,083
		Full External Error ± 0,47	2,00	1σ Confidence Limit	
		Analytical Error ± 0,43	1,0000	Error Magnification	
Total Fusion Age	2,12473 ± 0,11665 ± 5,49%	17,76 ± 0,97 ± 5,47%		12	0,142 ± 0,053
		Full External Error ± 0,99			
		Analytical Error ± 0,97			

Sample T2

Negative 37Ar intensities are used in age calculations

Relative Abundances			36Ar [A]	%1σ	37Ar [A]	%1σ	38Ar [A]	%1σ	39Ar [A]	%1σ	40Ar [A]	%1σ	40(r)/39(k) ± 1σ	Age ± 1σ (Ma)	40Ar(r) (%)	39Ar(k) (%)	K/Ca ± 1σ
024_VU10	0 °C		0,0147413	3,017	60,258474	47,563	0,0140206	38,283	1,206999	0,543	6,46082	0,262	2,15700 ± 1,81445	18,21 ± 15,40	41,65	6,69	0,009 ± 0,004
027_VU10	0 °C		0,0461046	0,787	35,727939	72,569	0,0393433	18,341	2,639823	0,260	18,61273	0,072	0,76182 ± 0,76832	6,39 ± 6,43	10,90	14,29	0,032 ± 0,023
204_VU10	0 °C	✓	0,0005026	105,031	1,529733	32,571	0,0053910	141,976	0,512604	1,301	1,31153	0,801	2,02568 ± 0,31799	16,94 ± 2,65	79,33	2,75	0,144 ± 0,047
206_VU10	0 °C	✓	0,0031342	13,663	2,778417	20,800	0,0257924	31,983	0,652459	1,412	2,08269	0,471	2,10355 ± 0,21130	17,59 ± 1,76	65,71	3,49	0,101 ± 0,021
200_VU10	0 °C	✓	0,0046153	8,583	0,814661	69,197	0,0064231	138,123	0,832600	0,935	3,24815	0,286	2,16681 ± 0,15341	18,11 ± 1,28	55,58	4,47	0,440 ± 0,304
199_VU10	0 °C	✓	0,0564166	1,119	2,159511	21,701	0,0034578	216,439	1,257343	0,542	19,82675	0,131	2,23366 ± 0,15512	18,67 ± 1,29	14,18	6,75	0,251 ± 0,054
026_17B0(	0 °C	✓	0,0105312	2,743	6,707947	422,483	0,0324577	23,573	2,237078	0,329	7,60374	0,173	2,23380 ± 1,00151	18,67 ± 8,33	65,59	11,97	0,143 ± 0,605
025_VU10	0 °C	✓	0,0008273	36,569	16,452030	163,693	0,0985203	7,237	8,148064	0,085	17,40393	0,085	2,26703 ± 0,26117	18,95 ± 2,17	105,99	43,64	0,213 ± 0,348
207_VU10	0 °C		0,0023013	20,276	1,739088	36,769	0,0287619	30,254	0,253271	3,468	1,13611	0,864	2,34236 ± 0,59462	19,57 ± 4,94	51,98	1,35	0,062 ± 0,023
203_VU10	0 °C		0,3864704	0,348	1,874137	29,264	0,0802518	8,383	0,854550	0,965	118,01162	0,012	2,89615 ± 0,49287	24,17 ± 4,09	2,10	4,59	0,196 ± 0,057
		Σ	0,5256449	0,358	74,686973	73,627	0,3215738	7,441	18,594792	0,129	195,69809	0,024					

Information on Analysis and Constants Used in Calculations

Sample = 024_VU107-T2
Material = 17X1W: 41.0-43.5
Location = DSDP
Analyst = Klaudia Kuiper
Project = VU107
Mass Discrimination Law = LIN
Irradiation = VU107
J = 0.00458730 ± 0.00001193
FCs = 28.201 ± 0.023 Ma
IGSN = Undefined
Preferred Age = Undefined
Classification = Undefined
Experiment Type = Undefined
Extraction Method = Undefined
Heating = 45 sec
Isolation = 5.00 min
Instrument = ARGUS
Lithology = Undefined
Lat-Lon = Undefined - Undefined
Feature = Undefined

Age Equations = Min et al. (2000)
Negative Intensities = Allowed
Decay Constant 40K = 5.460 ± 0.053 E-10 1/a
Decay Constant 39Ar = 2.940 ± 0.016 E-07 1/h
Decay Constant 37Ar = 8.230 ± 0.012 E-04 1/h
Decay Constant 36Cl = 2.257 ± 0.015 E-06 1/a
Decay Activity 40K(EC,β+) = 3.310 ± 0.030 1/gs
Decay Activity 40K(β-) = 27.890 ± 0.150 1/gs
Atmospheric Ratio 40/36(a) = 298.56 ± 0.31
Atmospheric Ratio 38/36(a) = 0.1885 ± 0.0003
Production Ratio 39/37(ca) = 0.000673 ± 0.000004
Production Ratio 36/37(ca) = 0.000264 ± 0.000002
Production Ratio 40/39(k) = 0.000860 ± 0.000070
Production Ratio 38/39(k) = 0.012110 ± 0.000030
Production Ratio 36/38(cl) = 262.80 ± 1.71
Scaling Ratio K/Ca = 0.430
Abundance Ratio 40K/K = 1.1700 ± 0.0100 E-04
Atomic Weight K = 39.0983 ± 0.0001 g

Results	40(a)/36(a) ± 1σ	40(r)/39(k) ± 1σ	Age ± 1σ (Ma)	MSWD	39Ar(k) (%,n)	K/Ca ± 1σ
Age Plateau (Overestimated Error)		2,17819 ± 0,08704 ± 4,00%	18,21 ± 0,73 ± 3,98%	0,12 / 99%	73,08 / 6	0,025 ± 0,059
			Full External Error ± 0,75	1,63	1σ Confidence Limit	
			Analytical Error ± 0,72	1,0000	Error Magnification	
Total Fusion Age		1,76279 ± 0,23456 ± 13,31%	14,75 ± 1,96 ± 13,26%		10	0,107 ± 0,079
			Full External Error ± 1,96			
			Analytical Error ± 1,95			
Normal Isochron (No Convergence)	298,79 ± 4,08 ± 1,37%	2,20757 ± 0,08826 ± 4,00%	18,45 ± 0,74 ± 3,99%	0,33 / 86%	73,08 / 6	
			Full External Error ± 0,76	1,71	1σ Confidence Limit	
			Analytical Error ± 0,73	1,0000	Error Magnification	
				100	Number of Iterations	
				0,0000970961	Convergence	
Inverse Isochron (Overestimated Error)	300,46 ± 4,51 ± 1,50%	2,14624 ± 0,11605 ± 5,41%	17,94 ± 0,97 ± 5,39%	0,11 / 98%	73,08 / 6	
			Full External Error ± 0,98	1,71	1σ Confidence Limit	
			Analytical Error ± 0,97	1,0000	Error Magnification	
				3	Number of Iterations	
				0,0000005153	Convergence	
				87%	Spreading Factor	

Negative 37Ar intensities are set to zero

Total fusion			36Ar(a) [A]	37Ar(ca) [A]	38Ar(cl) [A]	39Ar(k) [A]	40Ar(r) [A]	Age ± 1σ (Ma)	40Ar(r) (%)	39Ar(k) (%)	K/Ca ± 1σ
024_VU107-T	0 °C		0,0147413	0,000000	0,0000000	1,206999	2,058622	14,27 ± 15,63	31,86	6,50	0,009 ± 0,004
027_VU107-T	0 °C		0,0461046	0,000000	0,0000000	2,639823	4,845472	15,36 ± 6,46	26,03	14,21	0,032 ± 0,023
206_VU107-T	0 °C	✓	0,0024007	2,778417	0,0000000	0,650590	1,365381	17,55 ± 1,76	65,56	3,50	0,101 ± 0,021
025_VU107-T	0 °C	✓	0,0000001	16,452030	0,0000000	8,136992	17,396892	17,88 ± 2,17	99,96	43,80	0,213 ± 0,348
026_17B006-1	0 °C	✓	0,0087603	6,707947	0,0000000	2,232563	4,986332	18,67 ± 8,33	65,58	12,02	0,143 ± 0,605
200_VU107-T	0 °C	✓	0,0046153	0,000000	0,0000000	0,832600	1,869485	18,77 ± 1,28	57,56	4,48	0,440 ± 0,304
204_VU107-T	0 °C	✓	0,0005026	0,000000	0,0000000	0,512604	1,161030	18,93 ± 2,65	88,52	2,76	0,144 ± 0,047
207_VU107-T	0 °C		0,0018421	1,739088	0,0000000	0,252101	0,585907	19,42 ± 4,94	51,57	1,36	0,062 ± 0,023
199_VU107-T	0 °C		0,0564166	0,000000	0,0000000	1,257343	2,981934	19,82 ± 1,29	15,04	6,77	0,251 ± 0,054
203_VU107-T	0 °C		0,3864704	0,000000	0,0000000	0,854550	2,626278	25,64 ± 4,09	2,23	4,60	0,196 ± 0,057
		Σ	0,5218542	27,677482	0,0000000	18,576165	39,877331				

Information on Analysis

Sample = 024_VU107-T2
Material = 17X1W: 41.0-43.5
Location = DSDP
Analyst = Klaudia Kuiper
Project = VU107
Mass Discrimination Law = LIN
Irradiation = VU107
J = 0.00458730 ± 0.00001193
FCs = 28.201 ± 0.023 Ma

Results	40(r)/39(k) ± 1σ	Age ± 1σ (Ma)	MSWD	39Ar(k) (%,n)	K/Ca ± 1σ
Age Plateau (Overestimated Error)	2,19353 ± 0,10525 ± 4,80%	18,34 ± 0,88 ± 4,78%	0,10 / 98%	66,57 / 5	0,059 ± 0,048
		Full External Error ± 0,90	1,71	1σ Confidence Limit	
		Analytical Error ± 0,88	1,0000	Error Magnification	
Total Fusion Age	2,14669 ± 0,23544 ± 10,97%	17,95 ± 1,96 ± 10,92%		10	0,289 ± 0,573
		Full External Error ± 1,97			
		Analytical Error ± 1,96			

Sample T3

Negative 37Ar intensities are used in age calculations

Relative Abundances	36Ar [A]	%1σ	37Ar [A]	%1σ	38Ar [A]	%1σ	39Ar [A]	%1σ	40Ar [A]	%1σ	40(r)/39(k) ± 1σ	Age ± 1σ (Ma)	40Ar(r) (%)	39Ar(k) (%)	K/Ca ± 1σ

Negative 37Ar intensities are set to zero

Total fusion	36Ar(a) [A]	37Ar(ca) [A]	38Ar(cl) [A]	39Ar(k) [A]	40Ar(r) [A]	Age ± 1σ (Ma)	40Ar(r) (%)	39Ar(k) (%)	K/Ca ± 1σ

028_VU10	0 °C	✓	0,0065203	5,675	62,378759	57,066	0,0044135	135,855	0,067921	12,346	0,9325	1,662	53,96664 ± 28,42942	521,00 ± 317,51	636,06	0,33	0,001 ± 0,000
190_VU10	0 °C	✓	0,0036287	12,676	2,174688	21,524	0,0111169	82,986	0,010747	52,278	0,5980	1,722	33,61974 ± 25,51824	306,80 ± 253,52	52,20	0,03	0,002 ± 0,001
191_VU10	0 °C	✓	0,0166486	2,903	3,737668	12,673	0,0245818	39,030	0,023338	27,585	4,1097	0,256	27,01410 ± 11,02240	242,32 ± 105,72	13,69	0,06	0,002 ± 0,001
031_VU10	0 °C	✓	0,0291560	1,729	20,307227	167,024	0,0096295	77,504	0,065465	10,467	8,3449	0,227	24,77026 ± 34,65173	220,92 ± 328,48	23,49	0,24	0,002 ± 0,003
029_17B00	0 °C	✓	0,0067243	4,212	6,334923	456,272	0,0008537	532,609	0,057595	11,599	1,1414	0,943	22,07641 ± 37,57960	195,56 ± 351,34	119,65	0,19	0,004 ± 0,019
187_VU10	0 °C	✓	0,0162526	3,478	0,717739	71,186	0,0267858	30,017	0,010507	52,439	5,1125	0,192	20,30528 ± 20,63798	179,08 ± 191,22	3,98	0,03	0,006 ± 0,005
185_VU10	0 °C	✓	0,0086745	3,938	1,123703	56,822	0,0161533	60,023	0,043898	18,983	2,0853	0,631	9,64324 ± 3,24405	82,87 ± 28,52	19,95	0,13	0,017 ± 0,010
196_VU10	0 °C	✓	0,0197151	2,271	2,895195	21,791	0,0135765	72,314	0,177027	4,239	5,3721	0,231	1,62557 ± 0,82148	13,71 ± 6,95	5,30	0,53	0,026 ± 0,006
194_VU10	0 °C	✓	0,0043904	10,112	1,007398	54,029	0,0164068	58,650	0,025002	29,133	1,2276	0,810	0,04503 ± 5,74269	0,38 ± 48,26	0,09	0,07	0,010 ± 0,006
030_VU10	0 °C	✓	0,0012897	26,988	41,364075	89,126	0,0038380	169,346	0,026872	29,718	0,0400	36,211	3017,74105 ± 81476,34519	0,00 ± 53262,32	7282,97	0,00	0,000 ± 0,000
188_VU10	0 °C	✓	0,0209335	2,933	2,049947	21,923	0,0086317	85,877	0,001515	527,062	6,5013	0,152	646,91326 ± 38238,04035	0,00 ± 163119,59	1,35	0,00	0,000 ± 0,002
197_VU10	0 °C	✓	0,0009332	47,948	2,602996	23,718	0,0225323	48,091	0,101701	8,270	0,0750	12,748	0,01490 ± 1,42581	0,13 ± 11,98	1,99	0,30	0,017 ± 0,004
034_VU10	0 °C	✓	3,0047725	0,198	63,292618	60,059	0,5826844	1,397	3,595805	0,215	899,4158	0,004	2,05351 ± 1,01461	17,17 ± 8,44	0,81	10,82	0,024 ± 0,014
193_VU10	0 °C	✓	0,0019616	24,453	1,977745	27,335	0,0072334	144,471	0,041116	14,197	0,6534	1,398	5,61906 ± 3,85252	46,61 ± 31,55	34,22	0,12	0,009 ± 0,003
032_17B00	0 °C	✓	0,0157627	1,719	4,575969	580,152	0,1210272	4,571	10,740500	0,072	85,3770	0,018	7,47432 ± 0,19539	61,74 ± 1,59	94,05	32,72	1,010 ± 5,857
033_VU10	0 °C	✓	0,1877277	0,498	55,525630	65,264	0,2250838	2,758	17,832018	0,051	196,3216	0,011	7,60416 ± 0,16104	62,80 ± 1,31	69,21	54,42	0,138 ± 0,090
		Σ	3,2707194	0,191	26,178737	343,319	0,9414628	3,517	32,821028	0,090	1194,0804	0,005					

028_VU107-T	0 °C	✓	0,0065187	0,00000	0,0023622	0,067921	0,00000	0,00 ± 0,00	0,00	0,21	0,001 ± 0,000
029_17B006-1	0 °C	✓	0,0067243	0,00000	0,0000000	0,057595	0,00000	0,00 ± 0,00	0,00	0,18	0,004 ± 0,019
030_VU107-T	0 °C	✓	0,0000000	41,36407	0,0000000	0,026872	0,04003	0,00 ± 0,00	100,00	0,00	0,000 ± 0,000
031_VU107-T	0 °C	✓	0,0291537	0,00000	0,0033412	0,065465	0,00000	0,00 ± 0,00	0,00	0,20	0,002 ± 0,003
185_VU107-T	0 °C	✓	0,0083779	1,12370	0,0000000	0,043142	0,00000	0,00 ± 0,00	0,00	0,13	0,017 ± 0,010
187_VU107-T	0 °C	✓	0,0000000	0,71774	0,0000000	0,010024	0,00000	0,00 ± 0,00	0,00	0,03	0,006 ± 0,005
188_VU107-T	0 °C	✓	0,0000000	2,04995	0,0000000	0,000135	0,00000	0,00 ± 0,00	0,00	0,00	0,000 ± 0,002
190_VU107-T	0 °C	✓	0,0030482	2,17469	0,0104299	0,009284	0,00000	0,00 ± 0,00	0,00	0,03	0,002 ± 0,001
191_VU107-T	0 °C	✓	0,0156490	3,73767	0,0213798	0,020823	0,00000	0,00 ± 0,00	0,00	0,06	0,002 ± 0,001
194_VU107-T	0 °C	✓	0,0041152	1,00740	0,0153365	0,024324	0,00000	0,00 ± 0,00	0,00	0,07	0,010 ± 0,006
196_VU107-T	0 °C	✓	0,0189460	2,89519	0,0078850	0,175079	0,00000	0,00 ± 0,00	0,00	0,53	0,026 ± 0,006
197_VU107-T	0 °C	✓	0,0002460	2,60300	0,0000000	0,099950	0,00149	0,13 ± 11,98	1,99	0,31	0,017 ± 0,004
034_VU107-T	0 °C	✓	2,9880633	63,29262	0,0000000	3,553209	7,29657	17,17 ± 8,44	0,81	10,85	0,024 ± 0,014
193_VU107-T	0 °C	✓	0,0014395	1,97774	0,0000000	0,039785	0,22355	46,61 ± 31,55	34,22	0,12	0,009 ± 0,003
032_17B006-1	0 °C	✓	0,0157627	0,00000	0,0000000	10,740500	80,66167	62,03 ± 1,59	94,48	32,81	1,010 ± 5,857
033_VU107-T	0 °C	✓	0,1877277	0,00000	0,0000000	17,832018	140,25823	64,92 ± 1,31	71,44	54,47	0,138 ± 0,090
		Σ	3,2857723	122,94377	0,0607345	32,739253	228,48155				

Information on Analysis and Constants Used in Calculations

Sample = 028_VU107-T3
Material = sanidine
Location = 22X3W: 128.0-130.0
Analyst = Klaudia Kuiper
Project = VU107
Mass Discrimination Law = LIN
Irradiation = VU107
J = 0.00458730 ± 0.00001193
FCs = 28.201 ± 0.023 Ma
IGSN = Undefined
Preferred Age = Undefined
Classification = Undefined
Experiment Type = Undefined
Extraction Method = Undefined
Heating = 45 sec
Isolation = 5.00 min
Instrument = ARGUS
Lithology = Undefined
Lat-Lon = Undefined - Undefined
Feature = Undefined

Age Equations = Min et al. (2000)
Negative Intensities = Allowed
Decay Constant 40K = 5.460 ± 0.053 E-10 1/a
Decay Constant 39Ar = 2.940 ± 0.016 E-07 1/h
Decay Constant 37Ar = 8.230 ± 0.012 E-04 1/h
Decay Constant 36Cl = 2.257 ± 0.015 E-06 1/a
Decay Activity 40K(EC,β⁺) = 3.310 ± 0.030 1/gs
Decay Activity 40K(β⁻) = 27.890 ± 0.150 1/gs
Atmospheric Ratio 40/36(a) = 298.56 ± 0.31
Atmospheric Ratio 38/36(a) = 0.1885 ± 0.0003
Production Ratio 39/37(ca) = 0.000673 ± 0.000004
Production Ratio 36/37(ca) = 0.000264 ± 0.000002
Production Ratio 40/39(k) = 0.000860 ± 0.000070
Production Ratio 38/39(k) = 0.012110 ± 0.000030
Production Ratio 36/38(cl) = 262.80 ± 1.71
Scaling Ratio K/Ca = 0.430
Abundance Ratio 40K/K = 1.1700 ± 0.0100 E-04
Atomic Weight K = 39.0983 ± 0.0001 g

Results	40(a)/36(a) ± 1σ	40(r)/39(k) ± 1σ	Age ± 1σ (Ma)	MSWD	39Ar(k) (%,n)	K/Ca ± 1σ
Age Plateau Error Mean		7,18085 ± 0,46849 ± 6,52%	59,36 ± 3,81 ± 6,42%	14,90 0%	100,00 16	0,000 ± 0,000
			Full External Error ± 3,86	1,37	1σ Confidence Limit	
			Analytical Error ± 3,81	3,8606	Error Magnification	
Total Fusion Age		6,56225 ± 0,22528 ± 3,43%	54,32 ± 1,84 ± 3,39%		16	0,539 ± 1,852
			Full External Error ± 1,93			
			Analytical Error ± 1,84			
Normal Isochron Error Chron	308,29 ± 8,94 ± 2,90%	6,42947 ± 3,92315 ± 61,02%	54,83 ± 33,96 ± 61,94%	36,05 0%	99,97 13	
			Full External Error ± 33,97	1,43	1σ Confidence Limit	
			Analytical Error ± 33,96	6,0040	Error Magnification	
				9	Number of Iterations	
				0,0000411467	Convergence	
Inverse Isochron Error Chron	290,25 ± 4,44 ± 1,53%	7,45798 ± 0,46581 ± 6,25%	61,61 ± 3,79 ± 6,15%	15,31 0%	99,97 13	
			Full External Error ± 3,84	1,43	1σ Confidence Limit	
			Analytical Error ± 3,78	3,9124	Error Magnification	
				4	Number of Iterations	
				0,0000979989	Convergence	
				992%	Spreading Factor	

Information on Analysis

Sample = 028_VU107-T3
Material = sanidine
Location = 22X3W: 128.0-130.0
Analyst = Klaudia Kuiper
Project = VU107
Mass Discrimination Law = LIN
Irradiation = VU107
J = 0.00458730 ± 0.00001193
FCs = 28.201 ± 0.023 Ma

Results	40(r)/39(k) ± 1σ	Age ± 1σ (Ma)	MSWD	39Ar(k) (%,n)	K/Ca ± 1σ
Age Plateau Error Mean	32,64223 ± 25,45858 ± 77,99%	297,11 ± 251,59 ± 84,68%	49972,80 0%	100,00 16	0,002 ± 0,298
		Full External Error ± 251,62	1,37	1σ Confidence Limit	
		Analytical Error ± 251,59	223,5460	Error Magnification	
Total Fusion Age	6,97883 ± 0,15530 ± 2,23%	57,71 ± 1,27 ± 2,21%		16	0,115 ± 0,084
		Full External Error ± 1,41			
		Analytical Error ± 1,26			

Sample T4

Negative 37Ar intensities are used in age calculations

Relative Abundances			36Ar [A]	%1σ	37Ar [A]	%1σ	38Ar [A]	%1σ	39Ar [A]	%1σ	40Ar [A]	%1σ	40(r)/39(k) ± 1σ	Age ± 1σ (Ma)	40Ar(r) (%)	39Ar(k) (%)	K/Ca ± 1σ
180_VU10	0 °C		0,0095441	5,472	1,71140	36,095	0,0000000	97098821933,691	0,03984	13,746	2,8554	0,317	3,14798 ± 4,01439	26,64 ± 34,22	4,52	0,02	0,010 ± 0,004
174_VU10	0 °C		0,0091276	5,038	1,78053	35,324	0,0000000	80478303358,800	0,15291	4,599	2,3823	0,356	1,33536 ± 0,96597	11,25 ± 8,17	8,50	0,07	0,037 ± 0,013
181_VU10	0 °C		0,0516856	1,191	0,48843	123,162	0,0000000	88053302780,596	0,15035	4,770	15,4101	0,064	0,11486 ± 1,27107	0,96 ± 10,67	0,11	0,07	0,132 ± 0,163
184_VU10	0 °C		0,0053945	7,129	1,92091	32,649	0,0000000	80731158586,062	0,29239	2,696	1,7306	0,524	0,93144 ± 0,43136	7,81 ± 3,61	15,67	0,13	0,065 ± 0,021
039_VU10	0 °C	✓	0,0063918	3,887	78,06905	35,031	0,0823699	9,886	8,29514	0,096	19,6571	0,069	1,38819 ± 0,25845	11,63 ± 2,16	58,95	3,85	0,046 ± 0,016
045_VU10	0 °C	✓	0,0020819	17,541	34,67101	94,264	0,0364459	16,520	4,36705	0,171	9,5506	0,174	1,41048 ± 0,58734	11,81 ± 4,90	64,84	2,02	0,054 ± 0,051
036_VU10	0 °C		1,6559194	0,187	42,62369	72,770	0,3930327	1,561	10,80481	0,075	514,6019	0,006	1,55460 ± 0,24603	13,01 ± 2,05	3,27	4,99	0,109 ± 0,080
047_17B00	0 °C	✓	0,0004885	44,824	33,09927	100,638	0,0422519	15,201	5,20748	0,129	11,1783	0,090	1,60984 ± 0,50226	13,48 ± 4,19	75,32	2,41	0,068 ± 0,068
046_VU10	0 °C	✓	0,0679819	0,722	131,87449	22,541	0,2741907	2,464	23,92955	0,050	71,8082	0,034	1,71105 ± 0,09781	14,32 ± 0,82	57,23	11,07	0,078 ± 0,018
044_17B00	0 °C	✓	0,0081651	3,071	18,30516	159,414	0,0354318	14,258	4,66238	0,139	12,2008	0,114	1,77898 ± 0,49236	14,89 ± 4,10	68,16	2,16	0,110 ± 0,175
042_VU10	0 °C	✓	0,0277420	1,528	40,82711	81,435	0,1112589	5,728	11,38164	0,088	32,4523	0,053	1,83553 ± 0,23001	15,36 ± 1,92	64,53	5,26	0,120 ± 0,098
038_17B00	0 °C	✓	0,0038284	7,686	42,30554	62,397	0,1338801	3,977	13,14422	0,067	29,2903	0,050	1,88280 ± 0,15813	15,75 ± 1,32	84,67	6,07	0,134 ± 0,084
043_VU10	0 °C	✓	0,0237326	1,881	65,79652	47,567	0,3354776	1,800	31,82733	0,040	75,2371	0,025	1,97474 ± 0,07754	16,52 ± 0,65	83,65	14,69	0,208 ± 0,099
040_VU10	0 °C	✓	0,0149216	3,197	4,38673	642,311	0,0580763	12,388	7,12315	0,102	19,3622	0,074	2,04253 ± 0,31235	17,08 ± 2,60	75,17	3,29	0,699 ± 4,487
049_VU10	0 °C	✓	0,0138691	2,644	23,35658	138,414	0,3162081	1,775	28,17476	0,046	65,0835	0,026	2,09565 ± 0,09050	17,52 ± 0,75	90,77	13,00	0,519 ± 0,718
175_VU10	0 °C	✓	0,0058494	6,012	0,54544	113,410	0,1331940	6,211	13,15859	0,076	30,1242	0,037	2,15242 ± 0,00899	18,00 ± 0,07	94,02	6,07	10,374 ± 11,765
171_VU10	0 °C	✓	0,0030471	21,242	0,95635	47,308	0,0353484	26,141	5,11500	0,203	12,0007	0,098	2,18248 ± 0,03875	18,25 ± 0,32	93,01	2,36	2,300 ± 1,088
178_VU10	0 °C	✓	0,0000593	798,364	1,82178	35,400	0,0664025	13,074	7,45106	0,102	16,1629	0,089	2,19035 ± 0,02037	18,31 ± 0,17	100,96	3,43	1,758 ± 0,622
037_VU10	0 °C	✓	0,1475600	0,502	24,80687	115,086	0,2314304	2,735	18,81194	0,053	87,1346	0,023	2,39519 ± 0,12036	20,01 ± 1,00	51,67	8,66	0,326 ± 0,375
048_VU10	0 °C	✓	0,0028640	12,386	26,54637	106,392	0,0365944	16,604	5,65462	0,146	12,7901	0,136	2,48770 ± 0,39550	20,78 ± 3,29	109,64	2,60	0,091 ± 0,097
041_17B00	0 °C	✓	0,0111820	3,140	54,10651	42,452	0,1712044	3,809	16,64842	0,051	42,8306	0,024	2,63319 ± 0,10922	21,99 ± 0,91	102,13	7,66	0,132 ± 0,056
172_VU10	0 °C		0,0077413	7,595	3,25047	15,995	0,0000000	101002845623697,000	0,04604	11,878	2,1754	0,383	2,74436 ± 4,12962	22,91 ± 34,26	5,53	0,02	0,006 ± 0,001
177_VU10	0 °C		0,0004583	107,883	0,87300	58,763	0,0000000	82583701221540,600	0,21072	4,300	0,4237	2,476	2,99426 ± 0,74141	24,99 ± 6,14	148,49	0,10	0,104 ± 0,061
		Σ	2,0786003	0,181	401,02078	27,753	2,4927980	1,432	216,64939	0,020	1086,4430	0,007					

Negative 37Ar intensities are set to zero

Total fusion			36Ar(a) [A]	37Ar(ca) [A]	38Ar(cl) [A]	39Ar(k) [A]	40Ar(r) [A]	Age ± 1σ (Ma)	40Ar(r) (%)	39Ar(k) (%)	K/Ca ± 1σ
174_VU107-T	0 °C		0,0086576	1,78053	0,0000000	0,15171	0,00000	0,00 ± 0,00	0,00	0,07	0,04 ± 0,01
181_VU107-T	0 °C		0,0515566	0,48843	0,0000000	0,15002	0,01723	0,96 ± 10,67	0,11	0,07	0,13 ± 0,16
180_VU107-T	0 °C		0,0095441	0,00000	0,0000000	0,03984	0,00586	1,24 ± 34,49	0,21	0,02	0,01 ± 0,00
184_VU107-T	0 °C		0,0048874	1,92091	0,0000000	0,29110	0,27114	7,81 ± 3,61	15,67	0,13	0,07 ± 0,02
036_VU107-T	0 °C		1,6559194	0,00000	0,0000000	10,80481	20,20133	15,64 ± 2,05	3,93	4,99	0,11 ± 0,08
177_VU107-T	0 °C	✓	0,0000001	0,87300	0,0000000	0,21014	0,42353	16,86 ± 6,12	99,95	0,10	0,10 ± 0,06
045_VU107-T	0 °C	✓	0,0020819	0,00000	0,0000000	4,36705	8,92531	17,09 ± 4,92	93,45	2,02	0,05 ± 0,05
040_VU107-T	0 °C	✓	0,0149216	0,00000	0,0000000	7,12315	14,90108	17,49 ± 2,60	76,96	3,29	0,70 ± 4,49
044_17B006-1	0 °C	✓	0,0081651	0,00000	0,0000000	4,66238	9,75902	17,50 ± 4,11	79,99	2,15	0,11 ± 0,18
047_17B006-1	0 °C	✓	0,0004885	0,00000	0,0000000	5,20748	11,02795	17,71 ± 4,20	98,66	2,40	0,07 ± 0,07
042_VU107-T	0 °C	✓	0,0277420	0,00000	0,0000000	11,38164	24,15984	17,75 ± 1,92	74,45	5,26	0,12 ± 0,10
039_VU107-T	0 °C	✓	0,0063918	0,00000	0,0000000	8,29514	17,74163	17,88 ± 2,16	90,26	3,83	0,05 ± 0,02
043_VU107-T	0 °C	✓	0,0237326	0,00000	0,0000000	31,82733	68,12413	17,90 ± 0,65	90,55	14,70	0,21 ± 0,10
038_17B006-1	0 °C	✓	0,0038284	0,00000	0,0000000	13,14422	28,13602	17,90 ± 1,32	96,06	6,07	0,13 ± 0,08
046_VU107-T	0 °C	✓	0,0679819	0,00000	0,0000000	23,92955	51,49100	17,99 ± 0,82	71,71	11,05	0,08 ± 0,02
175_VU107-T	0 °C	✓	0,0058494	0,00000	0,0000000	13,15859	28,36653	18,02 ± 0,07	94,17	6,08	10,37 ± 11,76
049_VU107-T	0 °C	✓	0,0138691	0,00000	0,0000000	28,17476	60,91848	18,08 ± 0,75	93,60	13,01	0,52 ± 0,72
178_VU107-T	0 °C	✓	0,0000001	1,82178	0,0000000	7,44983	16,15645	18,13 ± 0,17	99,96	3,44	1,76 ± 0,62
171_VU107-T	0 °C	✓	0,0027946	0,95635	0,0000000	5,11436	11,16196	18,25 ± 0,32	93,01	2,36	2,30 ± 1,09
048_VU107-T	0 °C	✓	0,0000001	26,54637	0,0000000	5,63675	12,78520	18,96 ± 3,29	99,96	2,60	0,09 ± 0,10
037_VU107-T	0 °C	✓	0,1410110	24,80687	0,0000000	18,79525	45,01819	20,01 ± 1,00	51,67	8,68	0,33 ± 0,37
041_17B006-1	0 °C	✓	0,0000001	54,10651	0,0000000	16,61200	42,81630	21,53 ± 0,91	99,97	7,67	0,13 ± 0,06
172_VU107-T	0 °C		0,0068832	3,25047	0,0000000	0,04385	0,12035	22,91 ± 34,26	5,53	0,02	0,01 ± 0,00
		Σ	2,0563064	116,55124	0,0000000	216,57095	472,52851				

Information on Analysis and Constants Used in Calculations

Sample = 180_VU107-T4
Material = sanidine
Location = 28X2W: 148.0-150.0
Analyst = Klaudia Kuiper
Project = VU107
Mass Discrimination Law = LIN
Irradiation = VU107
J = 0.00458730 ± 0.00001193
FCs = 28.201 ± 0.023 Ma
IGSN = Undefined
Preferred Age = Undefined
Classification = Undefined
Experiment Type = Undefined
Extraction Method = Undefined
Heating = 45 sec
Isolation = 5.00 min
Instrument = ARGUS
Lithology = Undefined
Lat-Lon = Undefined - Undefined
Feature = Undefined

Age Equations = Min et al. (2000)
Negative Intensities = Allowed
Decay Constant 40K = 5.460 ± 0.053 E-10 1/a
Decay Constant 39Ar = 2.940 ± 0.016 E-07 1/h
Decay Constant 37Ar = 8.230 ± 0.012 E-04 1/h
Decay Constant 36Cl = 2.257 ± 0.015 E-06 1/a
Decay Activity 40K(EC,β⁺) = 3.310 ± 0.030 1/gs
Decay Activity 40K(β⁻) = 27.890 ± 0.150 1/gs
Atmospheric Ratio 40/36(a) = 298.56 ± 0.31
Atmospheric Ratio 38/36(a) = 0.1885 ± 0.0003
Production Ratio 39/37(ca) = 0.000673 ± 0.000004
Production Ratio 36/37(ca) = 0.000264 ± 0.000002
Production Ratio 40/39(k) = 0.000860 ± 0.000070
Production Ratio 38/39(k) = 0.012110 ± 0.000030
Production Ratio 36/38(cl) = 262.80 ± 1.71
Scaling Ratio K/Ca = 0.430
Abundance Ratio 40K/K = 1.1700 ± 0.0100 E-04
Atomic Weight K = 39.0983 ± 0.0001 g

Results	40(a)/36(a) ± 1σ	40(r)/39(k) ± 1σ	Age ± 1σ (Ma)	MSWD	39Ar(k) (%,n)	K/Ca ± 1σ
Age Plateau Error Mean		2,15570 ± 0,01716 ± 0,80%	18,02 ± 0,15 ± 0,83%	4,74 0%	94,60 16	0,054 ± 0,017
			Full External Error ± 0,24	1,37	1σ Confidence Limit	
			Analytical Error ± 0,14	2,1769	Error Magnification	
Total Fusion Age		2,00103 ± 0,04085 ± 2,04%	16,74 ± 0,34 ± 2,05%		23	0,233 ± 0,065
			Full External Error ± 0,38			
			Analytical Error ± 0,34			
Normal Isochron No Convergence	77,80 ± 42,09 ± 54,10%	2,24452 ± 0,03172 ± 1,41%	18,76 ± 0,27 ± 1,43%	38,99 0%	80,91 13	
			Full External Error ± 0,33	1,43	1σ Confidence Limit	
			Analytical Error ± 0,26	6,2441	Error Magnification	
				100	Number of Iterations	
				0,0000795715	Convergence	
Inverse Isochron Error Chron	301,25 ± 30,13 ± 10,00%	2,14499 ± 0,02363 ± 1,10%	17,93 ± 0,20 ± 1,13%	4,29 0%	80,91 13	
			Full External Error ± 0,28	1,43	1σ Confidence Limit	
			Analytical Error ± 0,20	2,0708	Error Magnification	
				3	Number of Iterations	
				0,0000513246	Convergence	
				54%	Spreading Factor	

Information on Analysis

Sample = 174_VU107-T4
Material = sanidine
Location = 28X2W: 148.0-150.0
Analyst = Klaudia Kuiper
Project = VU107
Mass Discrimination Law = LIN
Irradiation = VU107
J = 0.00458730 ± 0.00001193
FCs = 28.201 ± 0.023 Ma

Results	40(r)/39(k) ± 1σ	Age ± 1σ (Ma)	MSWD	39Ar(k) (%,n)	K/Ca ± 1σ
Age Plateau	2,16173 ± 0,00869 ± 0,40%	18,07 ± 0,09 ± 0,48%	1,22 25%	94,70 17	0,05 ± 0,02
		Full External Error ± 0,21	1,35	1σ Confidence Limit	
		Analytical Error ± 0,07	1,1030	Error Magnification	
Total Fusion Age	2,18186 ± 0,04091 ± 1,87%	18,24 ± 0,34 ± 1,88%		23	0,80 ± 0,76
		Full External Error ± 0,39			
		Analytical Error ± 0,34			

TABLE S12

	Bleil (1989)								Calculation of mean declination and assigning outliers									This study: Calculation of mean declination without outliers and applying correction factor											Resulting data and polarity interpretation						
Sample label	Midpoint depth (mbsf)	Intensity NRM (mA m-1)	Inclination NRM (degrees)	Declination NRM (degrees)	Inclination AF (degrees)	Declination AF (degrees)	Polarity Bleil, 1989	Median destructive field NRM (mT)	Declination (If incl. negative -> decl. +180)	Declination (radians)	Cosine Decl.	Sine Decl.	Mean cosine Decl.	Mean sine Decl.	Std. dev cosine Decl.	Std. dev. sine Decl.	Decl. (radians) minus outliers (>1 std. dev.)	Cosine Decl. minus outliers	Sine Decl. minus outliers	Mean cosine Decl. minus outliers	Mean sine Decl. minus outliers	Arctangent Decl. minus outliers	Corerotation (degrees) [mean declination minus outliers]	Correction factor (degrees)	Correcting declination (degrees)	Subtracting 360 degrees [1]	Subtracting 360 degrees [2, if necessary]	Adding 360 degrees for plotting purposes [if decl. <90]	Midpoint depth (R-mbsf)	Azimuthally corrected declination AF (degrees)	Inclination AF Bleil, 1989 (degrees)	Polarity This study	Sample distance (m)	Sampling gaps >1.4 m	Revised age (Ma)
104-643A-1H-2,16-18	1,67	1,77	69,2	134,4	73,5	136,9	N	28,3	136,9	2,39	-0,73	0,68													412,7	52,7	52,7	412,7	1,67	412,7	73,5	N	0,44		0,05
104-643A-1H-2,60-62	2,11	23,94	69,4	77,1	73,7	79,2	N	22,7	79,2	1,38	0,19	0,98					1,38	0,19	0,98						355,0	355,0	355,0	355,0	2,11	355,0	73,7	N	0,36		0,06
104-643A-1H-2,96-98	2,47	76,53	85,6	113,1	85,8	93,2	N	25	93,2	1,63	-0,06	1,00					1,63	-0,06	1,00						369,0	9,0	9,0	369,0	2,47	369,0	85,8	N	0,34		0,07
104-643A-1H-2,130-132	2,81	38,65	76,9	77,2	77,1	72,1	N	29,9	72,1	1,26	0,31	0,95					1,26	0,31	0,95						347,9	347,9	347,9	347,9	2,81	347,9	77,1	N	0,45		0,08
104-643A-1H-3,25-27	3,26	9,86	63,1	179,4	69,0	72,9	N	17,7	72,9	1,27	0,29	0,96					1,27	0,29	0,96						348,7	348,7	348,7	348,7	3,26	348,7	69,0	N	0,35		0,09
104-643A-1H-3,60-62	3,61	5,24	77,7	129,7	75,9	79,2	N	27,4	79,2	1,38	0,19	0,98					1,38	0,19	0,98						355,0	355,0	355,0	355,0	3,61	355,0	75,9	N	0,36		0,10
104-643A-1H-3,96-98	3,97	26,80	77,4	104,1	81,2	94,1	N	27,7	94,1	1,64	-0,07	1,00					1,64	-0,07	1,00						369,9	9,9	9,9	369,9	3,97	369,9	81,2	N	0,39		0,11
104-643A-1H-3,135-137	4,36	9,02	88,2	61,6	84,3	96,0	N	27,9	96,0	1,68	-0,10	0,99					1,68	-0,10	0,99						371,8	11,8	11,8	371,8	4,36	371,8	84,3	N	0,40		0,12
104-643A-1H-4,25-27	4,76	2,77	86,8	118,2	70,8	86,8	N	14,1	86,8	1,51	0,06	1,00	0,01	0,95	0,32	0,10	1,51	0,06	1,00	0,10	0,98	1,47	84,2	275,8	362,6	2,6	2,6	362,6	4,76	362,6	70,8	N	1,60	gap below	0,13
104-643A-2H-1,55-57	5,86	19,99	74,9	231,4	72,4	240,2	N	23,9	240,2	4,19	-0,50	-0,87													684,5	324,5	324,5	324,5	6,36	324,5	72,4	N	0,40		0,17
104-643A-2H-1,95-97	6,26	1,27	57,3	265,3	68,8	263,9	N	15,6	263,9	4,61	-0,11	-0,99					4,61	-0,11	-0,99						708,2	348,2	348,2	348,2	6,76	348,2	68,8	N	0,40		0,18
104-643A-2H-1,135-137	6,66	21,86	83,9	335,5	79,5	280,2	N	14,5	280,2	4,89	0,18	-0,98					4,89	0,18	-0,98						724,5	364,5	4,5	364,5	7,16	364,5	79,5	N	0,39		0,19
104-643A-2H-2,24-26	7,05	66,12	89,2	233,5	88,6	228,1	N	24,8	228,1	3,98	-0,67	-0,74													672,4	312,4	312,4	312,4	7,55	312,4	88,6	N	0,31		0,21
104-643A-2H-2,55-57	7,36	16,98	79,6	292,7	73,4	271,2	N	14,8	271,2	4,73	0,02	-1,00					4,73	0,02	-1,00						715,5	355,5	355,5	355,5	7,86	355,5	73,4	N	0,40		0,21
104-643A-2H-2,95-97	7,76	80,69	80,6	236,0	80,3	247,3	N	27,8	247,3	4,32	-0,39	-0,92													691,6	331,6	331,6	331,6	8,26	331,6	80,3	N	0,40		0,22
104-643A-2H-2,135-137	8,16	34,03	86,4	251,4	84,4	265,9	N	29	265,9	4,64	-0,07	-1,00					4,64	-0,07	-1,00						710,2	350,2	350,2	350,2	8,66	350,2	84,4	N	0,39		0,24
104-643A-2H-3,24-26	8,55	29,19	77,5	311,1	75,6	259,4	N	15,8	259,4	4,53	-0,18	-0,98					4,53	-0,18	-0,98						703,7	343,7	343,7	343,7	9,05	343,7	75,6	N	0,31		0,25
104-643A-2H-3,55-57	8,86	23,14	85,6	145,1	78,9	249,1	N	20,2	249,1	4,35	-0,36	-0,93													693,4	333,4	333,4	333,4	9,36	333,4	78,9	N	0,40		0,25
104-643A-2H-3,95-97	9,26	9,68	61,2	252,7	79,9	265,5	N	28,5	265,5	4,63	-0,08	-1,00					4,63	-0,08	-1,00						709,8	349,8	349,8	349,8	9,76	349,8	79,9	N	0,40		0,27
104-643A-2H-3,135-137	9,66	50,43	86,6	16,8	83,2	248,0	N	21,8	248,0	4,33	-0,37	-0,93													692,3	332,3	332,3	332,3	10,16	332,3	83,2	N	0,39		0,28
104-643A-2H-4,24-26	10,05	107,81	84,8	294,8	84,0	272,7	N	27,6	272,7	4,76	0,05	-1,00					4,76	0,05	-1,00						717,0	357,0	357,0	357,0	10,55	357,0	84,0	N	0,31		0,29
104-643A-2H-4,55-57	10,36	149,42	77,5	294,7	78,5	294,6	N	27,4	294,6	5,14	0,42	-0,91													738,9	378,9	18,9	378,9	10,86	378,9	78,5	N	0,40		0,30
104-643A-2H-4,95-97	10,76	1,04	63,6	200,0	76,0	287,4	N	27,6	287,4	5,02	0,30	-0,95					5,02	0,30	-0,95						731,7	371,7	11,7	371,7	11,26	371,7	76,0	N	0,40		0,31
104-643A-2H-4,135-137	11,16	29,16	75,6	287,2	74,4	291,2	N	28,4	291,2	5,08	0,36	-0,93					5,08	0,36	-0,93						735,5	375,5	15,5	375,5	11,66	375,5	74,4	N	0,39		0,32
104-643A-2H-5,24-26	11,55	37,97	82,1	278,6	79,8	285,9	N	26,7	285,9	4,99	0,27	-0,96					4,99	0,27	-0,96						730,2	370,2	10,2	370,2	12,05	370,2	79,8	N	0,31		0,33
104-643A-2H-5,55-57	11,86	10,07	75,1	179,5	72,3	287,1	N	16,4	287,1	5,01	0,29	-0,96					5,01	0,29	-0,96						731,4	371,4	11,4	371,4	12,36	371,4	72,3	N	0,40		0,34
104-643A-2H-5,95-97	12,26	41,14	70,8	284,7	68,1	280,2	N	21,7	280,2	4,89	0,18	-0,98					4,89	0,18	-0,98						724,5	364,5	4,5	364,5	12,76	364,5	68,1	N	0,40		0,35
104-643A-2H-5,135-137	12,66	42,38	81,8	296,8	83,6	291,7	N	21,3	291,7	5,09	0,37	-0,93					5,09	0,37	-0,93						736,0	376,0	16,0	376,0	13,16	376,0	83,6	N	0,39		0,36
104-643A-2H-6,24-26	13,05	59,01	86,5	255,7	84,0	270,8	N	26,6	270,8	4,73	0,01	-1,00					4,73	0,01	-1,00						715,1	355,1	355,1	355,1	13,55	355,1	84,0	N	0,31		0,37
104-643A-2H-6,55-57	13,36	11,76	62,2	169,0	**-61,1**	172,1		9,2	352,1	6,15	0,99	-0,14													616,4	256,4	256,4	256,4	13,86	256,4	**-61,1**	R (excursion)	0,40		0,38
104-643A-2H-6,95-97	13,76	5,95	81,0	203,8	81,2	267,6	N	17,6	267,6	4,67	-0,04	-1,00					4,67	-0,04	-1,00						711,9	351,9	351,9	351,9	14,26	351,9	81,2	N	0,40		0,39
104-643A-2H-6,135-137	14,16	0,68	84,8	351,8	73,6	275,2	N	9,7	275,2	4,80	0,09	-1,00					4,80	0,09	-1,00						719,5	359,5	359,5	359,5	14,66	359,5	73,6	N	0,39		0,40
104-643A-2H-7,24-26	14,55	10,33	81,9	258,3	80,8	271,8	N	23,8	271,8	4,74	0,03	-1,00	0,03	-0,92	0,35	0,18	4,74	0,03	-1,00	0,10	-0,98	-1,47	-84,3	444,3	716,1	356,1	356,1	356,1	15,05	356,1	80,8	N	1,36		0,41
104-643A-3H-1,29-31	15,10	17,17	47,3	189,5	48,1	203,7	N	23,9	203,7	3,56	-0,92	-0,40													418,1	58,1	58,1	418,1	16,41	418,1	48,1	N	1,46	gap below	0,45
104-643A-3H-2,25-27	16,56	14,89	60,6	165,2	62,1	162,7	N	21,5	162,7	2,84	-0,95	0,30													377,1	17,1	17,1	377,1	17,87	377,1	62,1	N	0,30		0,49
104-643A-3H-2,55-57	16,86	19,12	78,1	139,3	64,6	158,4	N	23,9	158,4	2,76	-0,93	0,37													372,8	12,8	12,8	372,8	18,17	372,8	64,6	N	0,40		0,49
104-643A-3H-2,95-97	17,26	10,97	79,6	66,6	68,9	151,9	N	20	151,9	2,65	-0,88	0,47					2,65	-0,88	0,47						366,3	6,3	6,3	366,3	18,57	366,3	68,9	N	0,40		0,51
104-643A-3H-2,135-137	17,66	0,68	55,5	179,2	76,1	152,1	N	38,8	152,1	2,65	-0,88	0,47					2,65	-0,88	0,47						366,5	6,5	6,5	366,5	18,97	366,5	76,1	N	0,40		0,52
104-643A-3H-3,25-27	18,06	5,40	67,0	97,3	66,5	163,1	N	32,8	163,1	2,85	-0,96	0,29													377,5	17,5	17,5	377,5	19,37	377,5	66,5	N	0,30		0,53
104-643A-3H-3,55-57	18,36	1,45	69,4	203,6	75,7	157,8	N	49,3	157,8	2,75	-0,93	0,38													372,2	12,2	12,2	372,2	19,67	372,2	75,7	N	0,40		0,54
104-643A-3H-3,95-97	18,76	8,23	50,0	124,5	68,4	153,2	N	23	153,2	2,67	-0,89	0,45					2,67	-0,89	0,45						367,6	7,6	7,6	367,6	20,07	367,6	68,4	N	0,80		0,55
104-643A-3H-4,25-27	19,56	3,26	-3,2	194,9	81,5	143,6	N	3	143,6	2,51	-0,80	0,59					2,51	-0,80	0,59						358,0	358,0	358,0	358,0	20,87	358,0	81,5	N	0,30		0,57
104-643A-3H-4,55-57	19,86	3,65	31,5	186,7	59,9	141,4	N	26,2	141,4	2,47	-0,78	0,62					2,47	-0,78	0,62						355,8	355,8	355,8	355,8	21,17	355,8	59,9	N	0,40		0,58
104-643A-3H-4,95-97	20,26	6,79	38,4	30,4	64,5	142,0	N	3,6	142,0	2,48	-0,79	0,62					2,48	-0,79	0,62						356,4	356,4	356,4	356,4	21,57	356,4	64,5	N	0,40		0,59
104-643A-3H-4,135-137	20,66	10,01	70,7	136,8	63,4	147,1	N	7,1	147,1	2,57	-0,84	0,54					2,57	-0,84	0,54						361,5	1,5	1,5	361,5	21,97	361,5	63,4	N	0,40		0,60
104-643A-3H-5,25-27	21,06	3,67	50,0	118,9	65,5	144,7	N	35,3	144,7	2,53	-0,82	0,58					2,53	-0,82	0,58						359,1	359,1	359,1	359,1	22,37	359,1	65,5	N	0,30		0,61
104-643A-3H-5,55-57	21,36	34,66	82,3	116,4	80,8	135,0	N	5,1	135,0	2,36	-0,71	0,71													349,4	349,4	349,4	349,4	22,67	349,4	80,8	N	0,40		0,62
104-643A-3H-5,95-97	21,76	16,20	60,4	146,0	61,3	146,2	N	23,7	146,2	2,55	-0,83	0,56					2,55	-0,83	0,56						360,6	0,6	0,6	360,6	23,07	360,6	61,3	N	0,40		0,63
104-643A-3H-5,135-137	22,16	15,90	50,8	164,3	67,6	137,8	N	19	137,8	2,41	-0,74	0,67					2,41	-0,74	0,67						352,2	352,2	352,2	352,2	23,47	352,2	67,6	N	0,40		0,64
104-643A-3H-6,25-27	22,56	8,37	69,1	143,6	83,8	134,0	N	4,9	134,0	2,34	-0,69	0,72													348,4	348,4	348,4	348,4	23,87	348,4	83,8	N	0,30		0,65
104-643A-3H-6,55-57	22,86	49,08	63,3	82,7	59,3	135,7	N	4,4	135,7	2,37	-0,72	0,70													350,1	350,1	350,1	350,1	24,17	350,1	59,3	N	0,40		0,66
104-643A-3H-6,95-97	23,26	1,28	2,1	168,3	70,1	141,5	N	32,9	141,5	2,47	-0,78	0,62					2,47	-0,78	0,62						355,9	355,9	355,9	355,9	24,57	355,9	70,1	N	0,40		0,67
104-643A-3H-6,135-137	23,66	14,18	86,8	153,7	69,3	132,1	N	3	132,1	2,31	-0,67	0,74													346,5	346,5	346,5	346,5	24,97	346,5	69,3	N	0,40		0,68
104-643A-3H-7,25-27	24,06	33,87	66,6	107,1	65,6	135,7	N	14,2	135,7	2,37	-0,72	0,70													350,1	350,1	350,1	350,1	25,37	350,1	65,6	N	0,29		0,69
104-643A-3H-7,54-56	24,35	29,85	27,5	152,7	84,9	145,4	N	38,9	145,4	2,54	-0,82	0,57	-0,82	0,51	0,09	0,24	2,54	-0,82	0,57	-0,82	0,56	2,54	145,6	214,4	359,8	359,8	359,8	359,8	25,66	359,8	84,9	N	1,04		0,70
104-643A-4H-1,25-27	24,56	19,08	72,3	199,4	74,6	206,1	N	28,9	206,1	3,60	-0,90	-0,44					3,60	-0,90	-0,44						737,1	377,1	17,1	377,1	26,70	377,1	74,6	N	0,30		0,73
104-643A-4H-1,55-57	24,86	12,48	49,2	189,6	62,7	187,4	N	5,7	187,4	3,27	-0,99	-0,13					3,27	-0,99	-0,13						718,4	358,4	358,4	358,4	27,00	358,4	62,7	N	0,40		0,73
104-643A-4H-1,95-97	25,26	6,44	75,0	194,5	84,3	184,5	N	33,1	184,5	3,22	-1,00	-0,08					3,22	-1,00	-0,08						715,5	355,5	355,5	355,5	27,40	355,5	84,3	N	0,40		0,75
104-643A-4H-1,135-137	25,66	6,06	80,9	47,9	70,7	206,0	N	32,1	206,0	3,60	-0,90	-0,44					3,60	-0,90	-0,44						737,0	377,0	17,0	377,0	27,80	377,0	70,7	N	0,40		0,76
104-643A-4H-2,25-27	26,06	3,46	36,5	193,3	80,0	182,5	N	44,6	182,5	3,19	-1,00	-0,04					3,19	-1,00	-0,04						713,5	353,5	353,5	353,5	28,20	353,5	80,0	N	0,30		0,77
104-643A-4H-2,55-57	26,36	6,95	52,7	126,5	70,8	139,3	N	39,9	139,3	2,43	-0,76	0,65													670,3	310,3	310,3	310,3	28,50	310,3	70,8	N	0,40		0,78
104-643A-4H-2,95-97	26,76	39,91	-79,9	353,8	**-79,2**	355,4	R	30,7	535,4	9,34	-1,00	0,08					9,34	-1,00	0,08						886,4	526,4	166,4	166,4	28,90	166,4	**-79,2**	R	0,40		0,79
104-643A-4H-2,135-137	27,16	57,08	-83,3	351,9	**-81,9**	351,1	R	30,5	531,1	9,27	-0,99	0,15					9,27	-0,99	0,15						882,1	522,1	162,1	162,1	29,30	162,1	**-81,9**	R	0,40		0,82
104-643A-4H-3,25-27	27,56	26,49	-68,5	30,1	**-70,2**	22,5	R	30,2	202,5	3,53	-0,92	-0,38					3,53	-0,92	-0,38						553,5	193,5	193,5	193,5	29,70	193,5	**-70,2**	R	0,30		0,84
104-643A-4H-3,55-57	27,86	31,89	-82,6	39,5	**-83,9**	18,9	R	27,5	198,9	3,47	-0,95	-0,32					3,47	-0,95	-0,32						549,9	189,9	189,9	189,9	30,00	189,9	**-83,9**	R	0,40		0,86
104-643A-4H-3,95-97	28,26	6,46	-75,5	267,3	**-80,5**	1,8	R	39,5	181,8	3,17	-1,00	-0,03					3,17	-1,00	-0,03						532,8	172,8	172,8	172,8	30,40	172,8	**-80,5**	R	0,40		0,89
104-643A-4H-3,135-137	28,66	20,73	-81,6	41,3	**-79,7**	9,0	R	28,8	189,0	3,30	-0,99	-0,16					3,30	-0,99	-0,16						540,0	180,0	180,0	180,0	30,80	180,0	**-79,7**	R	0,40		0,91
104-643A-4H-4,25-27	29,06	50,60	-78,6	20,4	**-77,8**	0,6	R	28,9	180,6	3,15	-1,00	-0,01					3,15	-1,00	-0,01						531,6	171,6	171,6	171,6	31,20	171,6	**-77,8**	R	0,30		0,93
104-643A-4H-4,55-57	29,36	42,55	-61,9	308,7	**-78,9**	355,7	R	26,2	535,7	9,35	-1,00	0,07					9,35	-1,00	0,07						886,7	526,7	166,7	166,7	31,50	166,7	**-78,9**	R	0,40		0,95
104-643A-4H-4,95-97	29,76	36,70	-75,0	59,9	**-78,8**	47,4	R	30,6	227,4	3,97	-0,68	-0,74													578,4	218,4	218,4	218,4	31,90	218,4	**-78,8**	R	0,36		0,98
104-643A-4H-4,131-133	30,12	27,48	84,0	211,8	85,3	186,1	N	28,1	186,1	3,25	-0,99	-0,11					3,25	-0,99	-0,11						717,1	357,1	357,1	357,1	32,26	357,1	85,3	N	0,44		0,99
104-643A-4H-5,25-27	30,56	10,15	71,0	7,4	82,8	196,1	N	18,4	196,1	3,42	-0,96	-0,28					3,42	-0,96	-0,28						727,1	367,1	7,1	367,1	32,70	367,1	82,8	N	0,30		1,01
104-643A-4H-5,55-57	30,86	0,85	76,0	218,8	71,4	206,7	N	10,1	206,7	3,61	-0,89	-0,45					3,61	-0,89	-0,45						737,7	377,7	17,7	377,7	33,00	377,7	71,4	N	0,40		1,02
104-643A-4H-5,95-97	31,26	55,14	87,8	183,4	85,6	189,7	N	23,4	189,7	3,31	-0,99	-0,17					3,31	-0,99	-0,17						720,7	360,7	0,7	360,7	33,40	360,7	85,6	N	0,30		1,03
104-643A-4H-5,135-137	31,56	22,39	78,7	190,9	83,2	185,2	N	33,6	185,2	3,23	-1,00	-0,09					3,23	-1,00	-0,09						716,2	356,2	356,2	356,2	33,70	356,2	83,2	N	0,50		1,04
104-643A-4H-6,25-27	32,06	2,38	-53,3	228,6	75,1	185,9	N	16	185,9	3,24	-0,99	-0,10					3,24	-0,99	-0,10						716,9	356,9	356,9	356,9	34,20	356,9	75,1	N	0,30		1,06
104-643A-4H-6,55-57	32,36	0,32	64,0	144,9	80,3	144,5	N	13,2	144,5	2,52	-0,81	0,58													675,5	315,5	315,5	315,5	34,50	315,5	80,3	N	0,40		1,07
104-643A-4H-6,95-97	32,76	11,77	-58,3	129,6	**-67,8**	112,1	R	24,8	292,1	5,10	0,38	-0,93													643,1	283,1	283,1	283,1	34,90	283,1	**-67,8**	R	0,40		1,08
104-643A-4H-6,135-137	33,16	30,67	-70,2	57,4	**-77,2**	32,8	R	35,3	212,8	3,71	-0,84	-0,54													563,8	203,8	203,8	203,8	35,30	203,8	**-77,2**	R	0,40		1,10
104-643A-4H-7,25-27	33,56	6,17	70,5	102,9	**-63,6**	21,3	R	8,8	201,3	3,51	-0,93	-0,36					3,51	-0,93	-0,36						552,3	192,3	192,3	192,3	35,70	192,3	**-63,6**	R	0,30		1,12
104-643A-4H-7,55-57	33,86	1,68	65,2	254,3	**-69,5**	357,8	R	4,1	537,8	9,39	-1,00	0,04	-0,89	-0,16	0,27	0,34	9,39	-1,00	0,04	-0,97	-0,15	-2,98	-171,0	531,0	888,8	528,8	168,8	168,8	36,00	168,8	**-69,5**	R	1,11		1,13
104-643A-5H-1,25-27	34,06	6,43	56,5	95,2	65,6	320,3		12,7	320,3	5,59	0,77	-0,64													745,6	385,6	25,6	385,6	37,11	385,6	65,6	N	0,30		1,18
104-643A-5H-1,55-57	34,36	16,52	-66,3	140,2	**-76,3**	153,6	R	36,4	333,6	5,82	0,90	-0,44													578,9	218,9	218,9	218,9	37,41	218,9	**-76,3**	R	0,40		1,19
104-643A-5H-1,95-97	34,76	10,44	-58,6	137,1	**-68,4**	140,3	R	23	320,3	5,59	0,77	-0,64													565,6	205,6	205,6	205,6	37,81	205,6	**-68,4**	R	0,40		1,21
104-643A-5H-1,135-137	35,16	0,82	-45,5	102,3	**-64,0**	116,9	R		296,9	5,18	0,45	-0,89					5,18	0,45	-0,89						542,2	182,2	182,2	182,2	38,21	182,2	**-64,0**	R	0,40		1,22
104-643A-5H-2,25-27	35,56	41,90	-71,7	116,4	**-74,8**	118,5	R	28,5	298,5	5,21	0,48	-0,88					5,21	0,48	-0,88						543,8	183,8	183,8	183,8	38,61	183,8	**-74,8**	R	0,30		1,24
104-643A-5H-2,55-57	35,86	8,14	-80,7	116,7	**-81,8**	121,0	R	30,3	301,0	5,25	0,52	-0,86					5,25	0,52	-0,86						546,3	186,3	186,3	186,3	38,91	186,3	**-81,8**	R	0,40		1,25
104-643A-5H-2,95-97	36,26	21,97	-79,4	98,2	**-80,6**	114,5	R	28,5	294,5	5,14	0,41	-0,91					5,14	0,41	-0,91						539,8	179,8	179,8	179,8	39,31	179,8	**-80,6**	R	0,40		1,26
104-643A-5H-2,135-137	36,66	9,57	-76,6	100,8	**-79,8**	103,6	R	30,9	283,6	4,95	0,24	-0,97													528,9	168,9	168,9	168,9	39,71	168,9	**-79,8**	R	0,40		1,28
104-643A-5H-3,25-27	37,06	43,88	-72,6	94,9	**-78,2**	102,2	R	33	282,2	4,93	0,21	-0,98													527,5	167,5	167,5	167,5	40,11	167,5	**-78,2**	R	0,30		1,30
104-643A-5H-3,55-57	37,36	31,49	-76,4	99,1	**-79,2**	114,4	R	31	294,4	5,14	0,41	-0,91					5,14	0,41	-0,91						539,7	179,7	179,7	179,7	40,41	179,7	**-79,2**	R	0,40		1,31
104-643A-5H-3,95-97	37,76	1,68	-55,0	109,9	**-64,4**	121,6	R	28,1	301,6	5,26	0,52	-0,85					5,26	0,52	-0,85						546,9	186,9	186,9	186,9	40,81	186,9	**-64,4**	R	0,40		1,32
104-643A-5H-3,135-137	38,16	14,20	-87,5	205,6	**-82,7**	109,2	R	22,9	289,2	5,05	0,33	-0,94					5,05	0,33	-0,94						534,5	174,5	174,5	174,5	41,21	174,5	**-82,7**	R	0,40		1,34
104-643A-5H-4,25-27	38,56	10,45	-57,4	110,6	**-68,8**	106,6	R	18	286,6	5,00	0,29	-0,96					5,00	0,29	-0,96						531,9	171,9	171,9	171,9	41,61	171,9	**-68,8**	R	0,30		1,35
104-643A-5H-4,55-57	38,86	41,39	-72,0	103,7	**-74,2**	106,7	R	31,3	286,7	5,00	0,29	-0,96					5,00	0,29	-0,96						532,0	172,0	172,0	172,0	41,91	172,0	**-74,2**	R	0,40		1,37
104-643A-5H-4,95-97	39,26	22,20	-78,7	99,0	**-78,8**	103,1	R	30,4	283,1	4,94	0,23	-0,97													528,4	168,4	168,4	168,4	42,31	168,4	**-78,8**	R	0,40		1,38
104-643A-5H-4,135-137	39,66	0,19	-36,8	84,8	**-66,0**	108,1	R		288,1	5,03	0,31	-0,95					5,03	0,31	-0,95						533,4	173,4	173,4	173,4	42,71	173,4	**-66,0**	R	0,39		1,40
104-643A-5H-5,24-26	40,05	36,30	-78,8	112,2	**-81,9**	113,6	R	26	293,6	5,12	0,40	-0,92					5,12	0,40	-0,92						538,9	178,9	178,9	178,9	43,10	178,9	**-81,9**	R	0,30		1,41
104-643A-5H-5,54-56	40,35	8,65	-80,4	91,3	**-80,4**	110,1	R	32,7	290,1	5,06	0,34	-0,94					5,06	0,34	-0,94						535,4	175,4	175,4	175,4	43,40	175,4	**-80,4**	R	0,40		1,42
104-643A-5H-5,94-96	40,75	12,22	-78,6	224,6	**-69,9**	115,7	R	22,5	295,7	5,16	0,43	-0,90					5,16	0,43	-0,90						541,0	181,0	181,0	181,0	43,80	181,0	**-69,9**	R	0,40		1,44
104-643A-5H-5,134-136	41,15	31,01	-84,4	119,5	**-83,2**	124,2	R	28,5	304,2	5,31	0,56	-0,83					5,31	0,56	-0,83						549,5	189,5	189,5	189,5	44,20	189,5	**-83,2**	R	0,41		1,46
104-643A-5H-6,25-27	41,56	17,24	-85,9	127,6	**-83,5**	125,7	R	25,8	305,7	5,34	0,58	-0,81					5,34	0,58	-0,81						551,0	191,0	191,0	191,0	44,61	191,0	**-83,5**	R	0,30		1,47
104-643A-5H-6,55-57	41,86	17,63	-86,0	159,0	**-82,7**	118,4	R	32,4	298,4	5,21	0,48	-0,88					5,21	0,48	-0,88						543,7	183,7	183,7	183,7	44,91	183,7	**-82,7**	R	0,40		1,48
104-643A-5H-6,95-97	42,26	14,81	-82,7	156,4	**-74,9**	114,7	R	29,6	294,7	5,14	0,42	-0,91					5,14	0,42	-0,91						540,0	180,0	180,0	180,0	45,31	180,0	**-74,9**	R	0,40		1,50
104-643A-5H-6,135-137	42,66	0,09	-86,3	54,8	**-84,0**	111,8	R	23,5	291,8	5,09	0,37	-0,93					5,09	0,37	-0,93						537,1	177,1	177,1	177,1	45,71	177,1	**-84,0**	R	0,22		1,51
104-643A-5H-7,7-9	42,88	3,57	-84,6	190,6	**-80,7**	108,3	R	34,5	288,3	5,03	0,31	-0,95	0,44	-0,87	0,17	0,13	5,03	0,31	-0,95	0,42	-0,90	-1,14	-65,3	425,3	533,6	173,6	173,6	173,6	45,93	173,6	**-80,7**	R	1,18		1,52
104-643A-6H-1,25-27	43,56	0,14	25,5	124,4	**-64,0**	72,6	R		252,6	4,41	-0,30	-0,95					4,41	-0,30	-0,95						528,0	168,0	168,0	168,0	47,11	168,0	**-64,0**	R	0,29		1,57
104-643A-6H-1,54-56	43,85	0,73	-30,0	133,6	**-74,4**	77,2	R		257,2	4,49	-0,22	-0,98					4,49	-0,22	-0,98						532,6	172,6	172,6	172,6	47,40	172,6	**-74,4**	R	0,40		1,58
104-643A-6H-1,94-96	44,25	23,90	-63,8	106,3	**-68,1**	81,1	R	37,7	261,1	4,56	-0,15	-0,99					4,56	-0,15	-0,99						536,5	176,5	176,5	176,5	47,80	176,5	**-68,1**	R	0,40		1,60
104-643A-6H-1,134-136	44,65	17,91	-56,3	94,6	**-67,7**	97,7	R	36,7	277,7	4,85	0,13	-0,99					4,85	0,13	-0,99						553,1	193,1	193,1	193,1	48,20	193,1	**-67,7**	R	0,41		1,61
104-643A-6H-2,25-27	45,06	15,13	-74,4	37,7	**-76,8**	70,0	R	31,9	250,0	4,36	-0,34	-0,94					4,36	-0,34	-0,94						525,4	165,4	165,4	165,4	48,61	165,4	**-76,8**	R	0,30		1,63
104-643A-6H-2,55-57	45,36	17,10	-89,2	305,3	**-82,4**	70,6	R	35,1	250,6	4,37	-0,33	-0,94					4,37	-0,33	-0,94						526,0	166,0	166,0	166,0	48,91	166,0	**-82,4**	R	0,40		1,64
104-643A-6H-2,95-97	45,76	1,66	-20,6	13,7	**-65,2**	99,4	R		279,4	4,88	0,16	-0,99					4,88	0,16	-0,99						554,8	194,8	194,8	194,8	49,31	194,8	**-65,2**	R	0,40		1,65
104-643A-6H-2,135-137	46,16	0,11	-24,9	94,8	**-82,5**	93,5	R		273,5	4,77	0,06	-1,00					4,77	0,06	-1,00						548,9	188,9	188,9	188,9	49,71	188,9	**-82,5**	R	0,40		1,67
104-643A-6H-3,25-27	46,56	13,39	-68,6	99,1	**-75,3**	99,9	R	32,3	279,9	4,89	0,17	-0,99					4,89	0,17	-0,99						555,3	195,3	195,3	195,3	50,11	195,3	**-75,3**	R	0,30		1,69
104-643A-6H-3,55-57	46,86	48,05	-83,2	118,3	**-85,5**	94,5	R	28,6	274,5	4,79	0,08	-1,00					4,79	0,08	-1,00						549,9	189,9	189,9	189,9	50,41	189,9	**-85,5**	R	0,40		1,70
104-643A-6H-3,95-97	47,26	11,04	-80,3	19,2	**-84,9**	105,0	R	29,1	285,0	4,97	0,26	-0,97													560,4	200,4	200,4	200,4	50,81	200,4	**-84,9**	R	0,40		1,71
104-643A-6H-3,135-137	47,66	44,50	-60,0	113,6	**-69,5**	104,2	R	29,5	284,2	4,96	0,25	-0,97													559,6	199,6	199,6	199,6	51,21	199,6	**-69,5**	R	0,40		1,73
104-643A-6H-4,25-27	48,06	37,85	-63,4	114,6	**-75,8**	109,6	R	24,3	289,6	5,05	0,34	-0,94													565,0	205,0	205,0	205,0	51,61	205,0	**-75,8**	R	0,30		1,74
104-643A-6H-4,55-57	48,36	33,22	-53,8	89,4	**-73,3**	85,6	R	36,1	265,6	4,64	-0,08	-1,00					4,64	-0,08	-1,00						541,0	181,0	181,0	181,0	51,91	181,0	**-73,3**	R	0,40		1,76
104-643A-6H-4,95-97	48,76	3,11	-61,8	89,5	**-72,9**	87,4	R	14,7	267,4	4,67	-0,05	-1,00					4,67	-0,05	-1,00						542,8	182,8	182,8	182,8	52,31	182,8	**-72,9**	R	0,18		1,77
104-643A-6H-4,113-115	48,94	5,50	-44,2	89,4	**-61,4**	75,4	R	16,3	255,4	4,46	-0,25	-0,97					4,46	-0,25	-0,97						530,8	170,8	170,8	170,8	52,49	170,8	**-61,4**	R	0,62		1,78
104-643A-6H-5,25-27	49,56	36,38	-58,5	79,3	**-63,8**	80,1	R	24,5	260,1	4,54	-0,17	-0,99					4,54	-0,17	-0,99						535,5	175,5	175,5	175,5	53,11	175,5	**-63,8**	R	0,30		2,55
104-643A-6H-5,55-57	49,86	13,37	58,8	110,8	81,3	211,3	N	39,7	211,3	3,69	-0,85	-0,52													666,7	306,7	306,7	306,7	53,41	306,7	81,3	N	0,40		2,61
104-643A-6H-5,95-97	50,26	4,79	-9,7	126,1	74,8	209,6	N	47,1	209,6	3,66	-0,87	-0,49													665,0	305,0	305,0	305,0	53,81	305,0	74,8	N	0,40		2,69
104-643A-6H-5,135-137	50,66	4,53	17,8	85,6	85,5	211,2	N	33,9	211,2	3,69	-0,86	-0,52													666,6	306,6	306,6	306,6	54,21	306,6	85,5	N	0,40		2,77
104-643A-6H-6,25-27	51,06	10,56	40,8	147,1	86,1	214,2	N	48,3	214,2	3,74	-0,83	-0,56													669,6	309,6	309,6	309,6	54,61	309,6	86,1	N	0,30		2,85
104-643A-6H-6,55-57	51,36	47,71	81,3	120,8	78,5	201,6	N	23,2	201,6	3,52	-0,93	-0,37													657,0	297,0	297,0	297,0	54,91	297,0	78,5	N	0,40		2,91
104-643A-6H-6,95-97	51,76	24,67	87,5	129,4	84,8	229,3	N	35,8	229,3	4,00	-0,65	-0,76	-0,24	-0,86	0,41	0,21				-0,09	-0,98	-1,66	-95,4	455,4	684,7	324,7	324,7	324,7	55,31	324,7	84,8	N	1,85	gap below	2,99
104-643A-7H-1,30-32	53,11	41,98	77,1	62,0	73,1	79,8	N	22,7	79,8	1,39	0,18	0,98					1,39	0,18	0,98						351,6	351,6	351,6	351,6	57,16	351,6	73,1	N	0,42		3,35
104-643A-7H-1,72-74	53,53	45,39	78,3	95,7	78,0	91,0	N	30,5	91,0	1,59	-0,02	1,00					1,59	-0,02	1,00						362,8	2,8	2,8	362,8	57,58	362,8	78,0	N	0,29		3,44
104-643A-7H-1,101-103	53,82	31,65	71,7	78,2	71,8	76,5	N	24,8	76,5	1,34	0,23	0,97					1,34	0,23	0,97						348,3	348,3	348,3	348,3	57,87	348,3	71,8	N	0,32		3,49
104-643A-7H-1,133-135	54,14	3,15	44,1	97,8	65,9	78,3	N	46,2	78,3	1,37	0,20	0,98					1,37	0,20	0,98						350,1	350,1	350,1	350,1	58,19	350,1	65,9	N	0,40		3,56
104-643A-7H-2,23-25	54,54	7,39	-87,7	281,4	**-78,1**	245,2	R	25,9	425,2	7,42	0,42	0,91					7,42	0,42	0,91						517,0	157,0	157,0	157,0	58,59	157,0	**-78,1**	R	0,36		3,62
104-643A-7H-2,59-61	54,90	1,29	-56,1	176,7	**-73,4**	221,4	R		401,4	7,01	0,75	0,66													493,2	133,2	133,2	133,2	58,95	133,2	**-73,4**	R	0,41		3,67
104-643A-7H-2,100-102	55,31	13,20	-87,3	161,5	**-83,1**	239,5	R	34,1	419,5	7,32	0,51	0,86					7,32	0,51	0,86						511,3	151,3	151,3	151,3	59,36	151,3	**-83,1**	R	0,32		3,72
104-643A-7H-2,132-134	55,63	7,96	-69,5	128,5	**-78,4**	178,1	R	9,9	358,1	6,25	1,00	-0,03													449,9	89,9	89,9	449,9	59,68	449,9	**-78,4**	R	0,43		3,77
104-643A-7H-3,25-27	56,06	2,06	-17,6	133,3	**-62,7**	249,5	R		429,5	7,50	0,35	0,94					7,50	0,35	0,94						521,3	161,3	161,3	161,3	60,11	161,3	**-62,7**	R	0,32		3,82
104-643A-7H-3,57-59	56,38	32,95	-74,1	249,1	**-71,8**	267,6	R	33,2	447,6	7,81	0,04	1,00					7,81	0,04	1,00						539,4	179,4	179,4	179,4	60,43	179,4	**-71,8**	R	0,42		3,87
104-643A-7H-3,99-101	56,80	17,96	-73,7	257,5	**-70,3**	289,3	R	46,4	469,3	8,19	-0,33	0,94					8,19	-0,33	0,94						561,1	201,1	201,1	201,1	60,85	201,1	**-70,3**	R	0,33		3,92
104-643A-7H-3,132-134	57,13	24,36	-80,4	334,4	**-75,2**	299,1	R	35,8	479,1	8,36	-0,49	0,87					8,36	-0,49	0,87						570,9	210,9	210,9	210,9	61,18	210,9	**-75,2**	R	0,41		3,96
104-643A-7H-4,23-25	57,54	24,81	-63,0	307,6	**-72,1**	328,7	R	40,4	508,7	8,88	-0,85	0,52													600,5	240,5	240,5	240,5	61,59	240,5	**-72,1**	R	0,35		4,02
104-643A-7H-4,58-60	57,89	30,39	-71,7	344,9	**-66,6**	341,5	R	34,5	521,5	9,10	-0,95	0,32													613,3	253,3	253,3	253,3	61,94	253,3	**-66,6**	R	0,36		4,06
104-643A-7H-4,94-96	58,25	26,13	-61,8	22,8	**-65,9**	15,9	R	26,7	195,9	3,42	-0,96	-0,27													287,7	287,7	287,7	287,7	62,30	287,7	**-65,9**	R	0,34		4,11
104-643A-7H-4,128-130	58,59	6,24	13,8	159,5	**-65,5**	220,7	R	23,6	400,7	6,99	0,76	0,65													492,5	132,5	132,5	132,5	62,64	132,5	**-65,5**	R	0,46		4,16
104-643A-7H-5,24-26	59,05	27,43	53,5	108,2	56,8	117,0	N	27	117,0	2,04	-0,45	0,89					2,04	-0,45	0,89						388,8	28,8	28,8	388,8	63,10	388,8	56,8	N	0,32		4,22
104-643A-7H-5,56-58	59,37	25,35	0,3	163,5	**-1,3**	169,4		36,9	349,4	6,10	0,98	-0,18													441,2	81,2	81,2	441,2	63,42	441,2	**-1,3**	N	0,38		4,27
104-643A-7H-5,94-96	59,75	4,65	-55,4	191,1	**-65,6**	224,0	R		404,0	7,05	0,72	0,69													495,8	135,8	135,8	135,8	63,80	135,8	**-65,6**	R	0,32		4,38
104-643A-7H-5,126-128	60,07	3,01	-36,1	94,4	**-68,4**	275,5	R		455,5	7,95	-0,10	1,00					7,95	-0,10	1,00						547,3	187,3	187,3	187,3	64,12	187,3	**-68,4**	R	0,43		4,51
104-643A-7H-6,19-21	60,50	1,94	3,4	88,4	**-82,2**	279,4	R	38,5	459,4	8,02	-0,16	0,99	0,09	0,70	0,60	0,41	8,02	-0,16	0,99	0,03	0,95	1,54	88,2	271,8	551,2	191,2	191,2	191,2	64,55	191,2	**-82,2**	R	2,71	gap below	4,69
104-643A-8H-1,40-42	62,71	2,11	-6,2	61,6	**-65,6**	352,7	R		532,7	9,30	-0,99	0,13					9,30	-0,99	0,13						866,7	506,7	146,7	146,7	67,26	146,7	**-65,6**	R	0,31		5,83
104-643A-8H-1,71-73	63,02	2,04	-44,3	105,3	**-65,9**	120,0	R	21,7	300,0	5,24	0,50	-0,87													634,0	274,0	274,0	274,0	67,57	274,0	**-65,9**	R	0,35		5,96
104-643A-8H-1,106-108	63,37	7,99	71,0	159,6	73,6	165,0	N	22,6	165,0	2,88	-0,97	0,26					2,88	-0,97	0,26						679,0	319,0	319,0	319,0	67,92	319,0	73,6	N	0,31		6,15
104-643A-8H-1,137-139	63,68	1,11	71,5	193,7	**-54,2**	215,1	R	17,1	395,1	6,90	0,82	0,58													729,1	369,1	9,1	369,1	68,23	369,1	**-54,2**	R	0,37		6,29
104-643A-8H-2,24-26	64,05	2,88	61,1	250,4	**-73,1**	269,1	R	8,8	449,1	7,84	0,02	1,00													783,1	423,1	63,1	423,1	68,60	423,1	**-73,1**	R	0,31		6,39
104-643A-8H-2,55-57	64,36	5,18	68,2	193,4	72,7	193,7	N	33,7	193,7	3,38	-0,97	-0,24					3,38	-0,97	-0,24						707,7	347,7	347,7	347,7	68,91	347,7	72,7	N	0,34		6,47
104-643A-8H-2,89-91	64,70	0,45	65,3	310,9	73,6	214,3	N		214,3	3,74	-0,83	-0,56					3,74	-0,83	-0,56						728,3	368,3	8,3	368,3	69,25	368,3	73,6	N	0,41		6,57
104-643A-8H-2,130-132	65,11	2,55	70,7	44,5	71,5	352,4	N	16,7	352,4	6,15	0,99	-0,13													866,4	506,4	146,4	146,4	69,66	146,4	71,5	N	0,35		6,67

104-643A-8H-3,24-26	65,55	6,46	-72,7	75,8	**-76,7**	67,3	R	24,6	247,3	4,32	-0,39	-0,92													581,3	221,3	221,3	221,3	70,10	221,3	**-76,7**	R	0,33		6,76
104-643A-8H-3,57-59	65,88	0,47	-31,0	77,7	**-67,3**	42,2	R	60,9	222,2	3,88	-0,74	-0,67					3,88	-0,74	-0,67						556,2	196,2	196,2	196,2	70,43	196,2	**-67,3**	R	0,37		6,81
104-643A-8H-3,94-96	66,25	17,45	-44,7	61,9	**-63,1**	48,0	R	28,5	228,0	3,98	-0,67	-0,74					3,98	-0,67	-0,74						562,0	202,0	202,0	202,0	70,80	202,0	**-63,1**	R	0,37		6,86
104-643A-8H-3,131-133	66,62	14,02	-63,0	52,6	**-68,0**	35,2	R	24,3	215,2	3,76	-0,82	-0,58					3,76	-0,82	-0,58						549,2	189,2	189,2	189,2	71,17	189,2	**-68,0**	R	0,43		6,91
104-643A-8H-4,24-26	67,05	0,90	-48,9	78,5	**-64,8**	45,8	R	66,8	225,8	3,94	-0,70	-0,72					3,94	-0,70	-0,72						559,8	199,8	199,8	199,8	71,60	199,8	**-64,8**	R	0,33		6,97
104-643A-8H-4,57-59	67,38	6,17	-26,8	83,0	**-68,3**	55,9	R	12,1	235,9	4,12	-0,56	-0,83					4,12	-0,56	-0,83						569,9	209,9	209,9	209,9	71,93	209,9	**-68,3**	R	0,36		7,01
104-643A-8H-4,93-95	67,74	0,30	-58,4	95,9	**-70,3**	50,4	R		230,4	4,02	-0,64	-0,77					4,02	-0,64	-0,77						564,4	204,4	204,4	204,4	72,29	204,4	**-70,3**	R	0,38		7,06
104-643A-8H-4,131-133	68,12	0,09	-47,2	93,9	**-79,4**	38,0	R	14,2	218,0	3,80	-0,79	-0,62					3,80	-0,79	-0,62						552,0	192,0	192,0	192,0	72,67	192,0	**-79,4**	R	0,43		7,11
104-643A-8H-5,24-26	68,55	0,17	65,6	70,2	64,6	62,6	N	47,8	62,6	1,09	0,46	0,89													576,6	216,6	216,6	216,6	73,10	216,6	64,6	N	0,34		7,15
104-643A-8H-5,58-60	68,89	0,26	70,4	115,2	65,3	181,8	N	12,8	181,8	3,17	-1,00	-0,03					3,17	-1,00	-0,03						695,8	335,8	335,8	335,8	73,44	335,8	65,3	N	0,35		7,18
104-643A-8H-5,93-95	69,24	0,09	-1,9	111,7	58,2	175,2	N	32,8	175,2	3,06	-1,00	0,08					3,06	-1,00	0,08						689,2	329,2	329,2	329,2	73,79	329,2	58,2	N	0,38		7,20
104-643A-8H-5,131-133	69,62	0,08	32,4	120,2	57,6	189,1	N	25,4	189,1	3,30	-0,99	-0,16					3,30	-0,99	-0,16						703,1	343,1	343,1	343,1	74,17	343,1	57,6	N	0,43		7,22
104-643A-8H-6,24-26	70,05	22,56	76,0	197,6	76,8	205,1	N	38,6	205,1	3,58	-0,91	-0,42					3,58	-0,91	-0,42						719,1	359,1	359,1	359,1	74,60	359,1	76,8	N	0,33		7,25
104-643A-8H-6,57-59	70,38	2,26	7,4	118,4	62,1	155,2	N	36,4	155,2	2,71	-0,91	0,42													669,2	309,2	309,2	309,2	74,93	309,2	62,1	N	0,35		7,27
104-643A-8H-6,92-94	70,73	10,65	-63,9	111,9	**-65,9**	108,8		34,9	288,8	5,04	0,32	-0,95													622,8	262,8	262,8	262,8	75,28	262,8	**-65,9**	R (excursion)	0,40		7,36
104-643A-8H-6,132-134	71,13	28,03	73,7	215,8	71,7	220,0	N	30,7	220,0	3,84	-0,77	-0,64	-0,48	-0,27	0,63	0,58	3,84	-0,77	-0,64	-0,83	-0,41	-2,69	-154,0	514,0	734,0	374,0	14,0	374,0	75,68	374,0	71,7	N	1,43	gap below	7,47
104-643A-9H-1,25-27	72,06	15,00	77,0	119,3	74,6	104,7	N	29	104,7	1,83	-0,25	0,97													392,8	32,8	32,8	392,8	77,11	392,8	74,6	N	0,30		7,60
104-643A-9H-1,55-57	72,36	13,23	66,1	108,7	71,0	99,2	N	40,7	99,2	1,73	-0,16	0,99													387,3	27,3	27,3	387,3	77,41	387,3	71,0	N	0,40		7,62
104-643A-9H-1,95-97	72,76	23,50	82,3	99,4	74,3	98,2	N	36,6	98,2	1,71	-0,14	0,99													386,3	26,3	26,3	386,3	77,81	386,3	74,3	N	0,40		7,66
104-643A-9H-1,135-137	73,16	12,88	73,3	82,8	73,0	83,7	N	36	83,7	1,46	0,11	0,99					1,46	0,11	0,99						371,8	11,8	11,8	371,8	78,21	371,8	73,0	N	0,35		7,69
104-643A-9H-2,20-22	73,51	20,02	36,7	85,7	36,4	85,3	N	39,1	85,3	1,49	0,08	1,00					1,49	0,08	1,00						373,4	13,4	13,4	373,4	78,56	373,4	36,4	N	0,35		7,73
104-643A-9H-2,55-57	73,86	19,95	75,9	133,0	75,2	96,8	N	34,3	96,8	1,69	-0,12	0,99													384,9	24,9	24,9	384,9	78,91	384,9	75,2	N	0,40		7,76
104-643A-9H-2,95-97	74,26	13,27	73,4	110,9	73,9	110,1	N	36,6	110,1	1,92	-0,34	0,94													398,2	38,2	38,2	398,2	79,31	398,2	73,9	N	0,40		7,79
104-643A-9H-2,135-137	74,66	17,03	70,4	115,2	67,4	114,2	N	44,8	114,2	1,99	-0,41	0,91													402,3	42,3	42,3	402,3	79,71	402,3	67,4	N	0,40		7,83
104-643A-9H-3,25-27	75,06	16,46	70,5	60,0	66,6	69,0	N	34,5	69,0	1,20	0,36	0,93					1,20	0,36	0,93						357,1	357,1	357,1	357,1	80,11	357,1	66,6	N	0,30		7,86
104-643A-9H-3,55-57	75,36	20,75	65,7	72,5	67,0	67,8	N	27,7	67,8	1,18	0,38	0,93					1,18	0,38	0,93						355,9	355,9	355,9	355,9	80,41	355,9	67,0	N	0,40		7,89
104-643A-9H-3,95-97	75,76	12,11	58,2	72,7	64,9	70,9	N	35	70,9	1,24	0,33	0,94					1,24	0,33	0,94						359,0	359,0	359,0	359,0	80,81	359,0	64,9	N	0,40		7,92
104-643A-9H-3,135-137	76,16	20,59	70,9	61,2	70,6	62,6	N	30,3	62,6	1,09	0,46	0,89					1,09	0,46	0,89						350,7	350,7	350,7	350,7	81,21	350,7	70,6	N	0,40		7,96
104-643A-9H-4,25-27	76,56	17,30	71,0	86,4	69,5	86,0	N	33	86,0	1,50	0,07	1,00					1,50	0,07	1,00						374,1	14,1	14,1	374,1	81,61	374,1	69,5	N	0,30		7,99
104-643A-9H-4,55-57	76,86	12,26	74,2	10,8	71,7	67,3	N	28,3	67,3	1,17	0,39	0,92					1,17	0,39	0,92						355,4	355,4	355,4	355,4	81,91	355,4	71,7	N	0,40		8,02
104-643A-9H-4,95-97	77,26	15,26	76,5	58,5	74,0	63,8	N	31,6	63,8	1,11	0,44	0,90					1,11	0,44	0,90						351,9	351,9	351,9	351,9	82,31	351,9	74,0	N	0,40		8,06
104-643A-9H-4,135-137	77,66	8,80	74,1	84,8	72,5	69,5	N	30,1	69,5	1,21	0,35	0,94					1,21	0,35	0,94						357,6	357,6	357,6	357,6	82,71	357,6	72,5	N	0,40		8,09
104-643A-9H-5,25-27	78,06	1,52	33,4	25,3	**-73,8**	229,0	N	3,4	409,0	7,14	0,66	0,75													517,1	157,1	157,1	157,1	83,11	157,1	**-73,8**	R	0,30		8,12
104-643A-9H-5,55-57	78,36	10,39	-75,4	252,4	**-73,3**	249,6	R	36	429,6	7,50	0,35	0,94					7,50	0,35	0,94						537,7	177,7	177,7	177,7	83,41	177,7	**-73,3**	R	0,40		8,14
104-643A-9H-5,95-97	78,76	1,96	-73,6	168,5	**-69,3**	247,5	R		427,5	7,46	0,38	0,92					7,46	0,38	0,92						535,6	175,6	175,6	175,6	83,81	175,6	**-69,3**	R	0,80		8,17
104-643A-9H-6,25-27	79,56	3,03	62,8	100,1	**-63,6**	222,7	R	8,8	402,7	7,03	0,73	0,68													510,8	150,8	150,8	150,8	84,61	150,8	**-63,6**	R	0,32		8,23
104-643A-9H-6,57-59	79,88	0,76	-14,3	109,3	**-80,2**	147,0	R	4,4	327,0	5,71	0,84	-0,54													435,1	75,1	75,1	435,1	84,93	435,1	**-80,2**	R	0,38		8,25
104-643A-9H-6,95-97	80,26	5,61	56,9	5,4	63,4	26,3		31,2	26,3	0,46	0,90	0,44													314,4	314,4	314,4	314,4	85,31	314,4	63,4	N	0,40		8,28
104-643A-9H-6,135-137	80,66	1,52	37,2	97,6	**-66,9**	110,7	R	5,3	290,7	5,07	0,35	-0,94													398,8	38,8	38,8	398,8	85,71	398,8	**-66,9**	R	0,40		8,33
104-643A-9H-7,25-27	81,06	2,92	62,4	162,5	**-72,6**	143,2	R	7,3	323,2	5,64	0,80	-0,60	0,27	0,70	0,37	0,56				0,31	0,94	1,25	71,9	288,1	431,3	71,3	71,3	431,3	86,11	431,3	**-72,6**	R	1,71	gap below	8,39
104-643A-10H-1,55-57	81,86	2,59	-56,6	188,2	**-69,2**	201,4	R	47,2	381,4	6,66	0,93	0,36					6,66	0,93	0,36						540,5	180,5	180,5	180,5	87,82	180,5	**-69,2**	R	0,40		8,63
104-643A-10H-1,95-97	82,26	4,22	-73,7	166,8	**-78,3**	192,1	R	38,3	372,1	6,49	0,98	0,21					6,49	0,98	0,21						531,2	171,2	171,2	171,2	88,22	171,2	**-78,3**	R	0,40		8,69
104-643A-10H-1,135-137	82,66	9,33	-64,8	202,0	**-68,9**	198,0	R	36,5	378,0	6,60	0,95	0,31					6,60	0,95	0,31						537,1	177,1	177,1	177,1	88,62	177,1	**-68,9**	R	0,40		8,74
104-643A-10H-2,25-27	83,06	0,56	73,9	74,5	67,8	22,6	N	7,5	22,6	0,39	0,92	0,38					0,39	0,92	0,38						361,7	1,7	1,7	361,7	89,02	361,7	67,8	N	0,30		8,78
104-643A-10H-2,55-57	83,36	1,30	87,6	15,8	73,4	26,2	N	9,7	26,2	0,46	0,90	0,44					0,46	0,90	0,44						365,3	5,3	5,3	365,3	89,32	365,3	73,4	N	0,40		8,79
104-643A-10H-2,95-97	83,76	3,77	70,1	49,0	67,4	22,4	N	25,2	22,4	0,39	0,92	0,38					0,39	0,92	0,38						361,5	1,5	1,5	361,5	89,72	361,5	67,4	N	0,40		8,81
104-643A-10H-2,135-137	84,16	4,75	75,4	86,0	73,6	27,9	N	22,2	27,9	0,49	0,88	0,47					0,49	0,88	0,47						367,0	7,0	7,0	367,0	90,12	367,0	73,6	N	0,40		8,82
104-643A-10H-3,25-27	84,56	12,19	67,6	12,9	67,4	10,1	N	32,5	10,1	0,18	0,98	0,18					0,18	0,98	0,18						349,2	349,2	349,2	349,2	90,52	349,2	67,4	N	0,70		8,84
104-643A-10H-3,95-97	85,26	4,79	77,9	52,3	70,6	35,8	N	28,5	35,8	0,62	0,81	0,58													374,9	14,9	14,9	374,9	91,22	374,9	70,6	N	0,40		8,87
104-643A-10H-3,135-137	85,66	2,35	7,5	228,5	**-21,4**	231,9		34,3	411,9	7,19	0,62	0,79													571,0	211,0	211,0	211,0	91,62	211,0	**-21,4**	N	0,40		8,88
104-643A-10H-4,25-27	86,06	1,35	70,3	333,7	66,2	0,4	N	8,2	0,4	0,01	1,00	0,01													339,5	339,5	339,5	339,5	92,02	339,5	66,2	N	0,30		8,90
104-643A-10H-4,55-57	86,36	1,06	67,6	330,2	73,7	328,5	N	47,5	328,5	5,73	0,85	-0,52													667,6	307,6	307,6	307,6	92,32	307,6	73,7	N	0,40		8,91
104-643A-10H-4,95-97	86,76	0,38	69,8	335,7	74,0	344,3	N	8,6	344,3	6,01	0,96	-0,27													683,4	323,4	323,4	323,4	92,72	323,4	74,0	N	0,40		8,93
104-643A-10H-4,135-137	87,16	3,34	22,9	345,8	77,1	358,9	N	38,9	358,9	6,26	1,00	-0,02													698,0	338,0	338,0	338,0	93,12	338,0	77,1	N	0,40		8,95
104-643A-10H-5,25-27	87,56	0,12	42,8	109,8	70,6	29,4	N	11,3	29,4	0,51	0,87	0,49					0,51	0,87	0,49						368,5	8,5	8,5	368,5	93,52	368,5	70,6	N	0,30		8,96
104-643A-10H-5,55-57	87,86	0,11	70,3	30,6	73,7	11,0	N	8,1	11,0	0,19	0,98	0,19					0,19	0,98	0,19						350,1	350,1	350,1	350,1	93,82	350,1	73,7	N	0,40		8,97
104-643A-10H-5,95-97	88,26	0,08	65,7	29,2	65,7	34,0	N		34,0	0,59	0,83	0,56					0,59	0,83	0,56						373,1	13,1	13,1	373,1	94,22	373,1	65,7	N	0,80		8,99
104-643A-10H-6,25-27	89,06	0,04	63,4	36,1	73,0	25,0	N		25,0	0,44	0,91	0,42					0,44	0,91	0,42						364,1	4,1	4,1	364,1	95,02	364,1	73,0	N	0,30		9,02
104-643A-10H-6,55-57	89,36	0,12	75,8	6,8	74,3	20,9	N	5,8	20,9	0,36	0,93	0,36					0,36	0,93	0,36						360,0	360,0	360,0	360,0	95,32	360,0	74,3	N	0,40		9,04
104-643A-10H-6,95-97	89,76	0,15	65,3	13,0	63,8	20,7	N	25,3	20,7	0,36	0,94	0,35					0,36	0,94	0,35						359,8	359,8	359,8	359,8	95,72	359,8	63,8	N	0,40		9,05
104-643A-10H-6,135-137	90,16	0,19	69,9	83,6	74,4	10,1	N	27,4	10,1	0,18	0,98	0,18					0,18	0,98	0,18						349,2	349,2	349,2	349,2	96,12	349,2	74,4	N	0,40		9,07
104-643A-10H-7,25-27	90,56	0,27	74,6	73,1	66,5	22,9	N	32,4	22,9	0,40	0,92	0,39	0,91	0,28	0,08	0,29	0,40	0,92	0,39	0,93	0,35	0,37	20,9	339,1	362,0	2,0	2,0	362,0	96,52	362,0	66,5	N	1,02		9,08
104-643A-11H-1,25-27	91,06	0,29	60,6	97,0	**-65,6**	204,8	R	4,8	384,8	6,72	0,91	0,42													716,7	356,7	356,7	356,7	97,54	356,7	**-65,6**	R	0,30		9,14
104-643A-11H-1,55-57	91,36	0,09	68,1	175,4	**-62,2**	190,5	R	8,2	370,5	6,47	0,98	0,18													702,4	342,4	342,4	342,4	97,84	342,4	**-62,2**	R	0,40		9,16
104-643A-11H-1,95-97	91,76	0,20	-66,7	203,9	**-64,8**	206,2	R	13,1	386,2	6,74	0,90	0,44													718,1	358,1	358,1	358,1	98,24	358,1	**-64,8**	R	0,40		9,19
104-643A-11H-1,135-137	92,16	0,35	-63,9	222,6	**-68,5**	208,2	R	30,4	388,2	6,78	0,88	0,47													720,1	360,1	0,1	360,1	98,64	360,1	**-68,5**	R	0,40		9,22
104-643A-11H-2,25-27	92,56	0,37	60,9	334,2	**-69,4**	268,7	R	3,9	448,7	7,83	0,02	1,00													780,6	420,6	60,6	420,6	99,04	420,6	**-69,4**	R	0,30		9,25
104-643A-11H-2,55-57	92,86	0,30	76,0	304,9	**-68,6**	275,6	R	6,4	455,6	7,95	-0,10	1,00													787,5	427,5	67,5	427,5	99,34	427,5	**-68,6**	R	0,40		9,27
104-643A-11H-2,95-97	93,26	0,16	-14,3	14,3	**-71,5**	338,4	R	4,6	518,4	9,05	-0,93	0,37					9,05	-0,93	0,37						850,3	490,3	130,3	130,3	99,74	130,3	**-71,5**	R	0,40		9,30
104-643A-11H-2,135-137	93,66	0,64	80,6	280,5	74,5	221,0	N	14	221,0	3,86	-0,75	-0,66					3,86	-0,75	-0,66						732,9	372,9	12,9	372,9	100,14	372,9	74,5	N	0,40		9,32
104-643A-11H-3,25-27	94,06	0,93	36,9	245,1	72,5	223,0	N	15	223,0	3,89	-0,73	-0,68					3,89	-0,73	-0,68						734,9	374,9	14,9	374,9	100,54	374,9	72,5	N	0,30		9,34
104-643A-11H-3,55-57	94,36	0,18	57,5	228,5	62,3	231,7	N	8	231,7	4,04	-0,62	-0,78													743,6	383,6	23,6	383,6	100,84	383,6	62,3	N	0,40		9,36
104-643A-11H-3,95-97	94,76	0,24	-39,9	151,7	**-74,7**	122,5	R	29,8	302,5	5,28	0,54	-0,84													634,4	274,4	274,4	274,4	101,24	274,4	**-74,7**	R (excursion)	0,40		9,38
104-643A-11H-3,135-137	95,16	0,08	67,7	318,8	81,6	231,1	N	9,8	231,1	4,03	-0,63	-0,78													743,0	383,0	23,0	383,0	101,64	383,0	81,6	N	0,40		9,40
104-643A-11H-4,25-27	95,56	0,18	71,4	252,4	59,2	250,0	N	23,5	250,0	4,36	-0,34	-0,94													761,9	401,9	41,9	401,9	102,04	401,9	59,2	N	0,30		9,42
104-643A-11H-4,55-57	95,86	0,97	-46,6	113,3	**-75,4**	21,1	R		201,1	3,51	-0,93	-0,36					3,51	-0,93	-0,36						533,0	173,0	173,0	173,0	102,34	173,0	**-75,4**	R	0,40		9,44
104-643A-11H-4,95-97	96,26	0,42	-41,1	104,9	**-81,8**	42,5	R	13,9	222,5	3,88	-0,74	-0,68					3,88	-0,74	-0,68						554,4	194,4	194,4	194,4	102,74	194,4	**-81,8**	R	0,40		9,49
104-643A-11H-4,135-137	96,66	0,19	36,9	26,9	**-63,5**	34,4	R		214,4	3,74	-0,83	-0,56					3,74	-0,83	-0,56						546,3	186,3	186,3	186,3	103,14	186,3	**-63,5**	R	0,40		9,54
104-643A-11H-5,25-27	97,06	0,83	-51,7	36,2	**-68,0**	55,9	R	7,7	235,9	4,12	-0,56	-0,83													567,8	207,8	207,8	207,8	103,54	207,8	**-68,0**	R	0,30		9,59
104-643A-11H-5,55-57	97,36	0,45	-25,9	79,5	**-63,1**	30,6	R	14,2	210,6	3,68	-0,86	-0,51					3,68	-0,86	-0,51						542,5	182,5	182,5	182,5	103,84	182,5	**-63,1**	R	0,40		9,62
104-643A-11H-5,95-97	97,76	0,10	66,8	166,8	65,1	193,2	N	14,6	193,2	3,37	-0,97	-0,23													705,1	345,1	345,1	345,1	104,24	345,1	65,1	N	0,40		9,66
104-643A-11H-5,135-137	98,16	0,15	61,0	99,1	69,6	191,1	N	24,7	191,1	3,34	-0,98	-0,19													703,0	343,0	343,0	343,0	104,64	343,0	69,6	N	0,40		9,70
104-643A-11H-6,25-27	98,56	0,16	84,6	80,8	79,2	174,1	N	4,6	174,1	3,04	-0,99	0,10													686,0	326,0	326,0	326,0	105,04	326,0	79,2	N	0,30		9,73
104-643A-11H-6,55-57	98,86	0,11	-38,3	233,8	**-63,7**	148,7	R	7,7	328,7	5,74	0,85	-0,52													660,6	300,6	300,6	300,6	105,34	300,6	**-63,7**	R (excursion)	0,40		9,75
104-643A-11H-6,95-97	99,26	0,10	56,4	127,2	59,3	116,8	N	12	116,8	2,04	-0,45	0,89													628,7	268,7	268,7	268,7	105,74	268,7	59,3	N	0,40		9,79
104-643A-11H-6,135-137	99,66	0,32	54,5	129,3	66,8	98,5	N	12,2	98,5	1,72	-0,15	0,99													610,4	250,4	250,4	250,4	106,14	250,4	66,8	N	0,40		9,82
104-643A-11H-7,25-27	100,06	0,81	27,6	98,2	61,4	83,0	N	36,1	83,0	1,45	0,12	0,99	-0,25	-0,07	0,71	0,69				-0,82	-0,44	-2,65	-151,9	511,9	594,9	234,9	234,9	234,9	106,54	234,9	61,4	N	1,40		9,85
104-643A-12H-1,25-27	100,56	0,38	60,8	71,7	68,1	151,3	N	9,2	151,3	2,64	-0,88	0,48													451,4	91,4	91,4	91,4	107,94	91,4	68,1	?	0,30		13,35
104-643A-12H-1,55-57	100,86	0,20	-57,7	46,2	**-61,4**	348,9			528,9	9,23	-0,98	0,19													649,0	289,0	289,0	289,0	108,24	289,0	**-61,4**	?	0,40		13,37
104-643A-12H-1,95-97	101,26	0,14	72,2	91,8	80,8	126,9	N		126,9	2,21	-0,60	0,80													427,0	67,0	67,0	427,0	108,64	427,0	80,8	?	0,40		13,40
104-643A-12H-1,135-137	101,66	0,16	-37,2	63,2	**-67,2**	45,2		19,7	225,2	3,93	-0,70	0,71													345,3	345,3	345,3	345,3	109,04	345,3	**-67,2**	?	0,40		13,42
104-643A-12H-2,25-27	102,06	0,18	62,5	87,7	61,2	86,7	N		86,7	1,51	0,06	1,00					1,51	0,06	1,00						386,8	26,8	26,8	386,8	109,44	386,8	61,2	N	0,30		13,45
104-643A-12H-2,55-57	102,36	0,45	67,7	58,1	67,1	54,1	N	29,8	54,1	0,94	0,59	0,81					0,94	0,59	0,81						354,2	354,2	354,2	354,2	109,74	354,2	67,1	N	0,40		13,47
104-643A-12H-2,95-97	102,76	0,26	48,4	75,8	67,1	49,4	N	22,6	49,4	0,86	0,65	0,76					0,86	0,65	0,76						349,5	349,5	349,5	349,5	110,14	349,5	67,1	N	0,40		13,50
104-643A-12H-2,135-137	103,16	0,50	68,1	80,7	68,4	58,9	N	19,1	58,9	1,03	0,52	0,86					1,03	0,52	0,86						359,0	359,0	359,0	359,0	110,54	359,0	68,4	N	0,40		13,52
104-643A-12H-3,25-27	103,56	0,25	67,8	71,7	63,4	68,7	N		68,7	1,20	0,36	0,93					1,20	0,36	0,93						368,8	8,8	8,8	368,8	110,94	368,8	63,4	N	0,30		13,55
104-643A-12H-3,55-57	103,86	0,14	53,3	49,6	67,9	62,0	N	38,2	62,0	1,08	0,47	0,88					1,08	0,47	0,88						362,1	2,1	2,1	362,1	111,24	362,1	67,9	N	0,40		13,57
104-643A-12H-3,95-97	104,26	0,25	70,5	56,9	65,9	66,8	N		66,8	1,17	0,39	0,92					1,17	0,39	0,92						366,9	6,9	6,9	366,9	111,64	366,9	65,9	N	0,40		13,59
104-643A-12H-3,135-137	104,66	0,12	-65,8	102,6	**-67,7**	176,8			356,8	6,23	1,00	-0,06													476,9	116,9	116,9	116,9	112,04	116,9	**-67,7**	R	0,40		13,67
104-643A-12H-4,25-27	105,06	0,28	63,6	47,1	65,4	46,7	N		46,7	0,82	0,69	0,73					0,82	0,69	0,73						346,8	346,8	346,8	346,8	112,44	346,8	65,4	N	0,30		13,75
104-643A-12H-4,55-57	105,36	0,10	83,4	97,4	75,2	63,1	N	6,9	63,1	1,10	0,45	0,89					1,10	0,45	0,89						363,2	3,2	3,2	363,2	112,74	363,2	75,2	N	0,40		13,78
104-643A-12H-4,95-97	105,76	0,54	68,3	100,9	71,5	63,0	N	14,6	63,0	1,10	0,45	0,89					1,10	0,45	0,89						363,1	3,1	3,1	363,1	113,14	363,1	71,5	N	0,40		13,81
104-643A-12H-4,135-137	106,16	0,17	64,5	65,7	70,4	55,8	N	34,9	55,8	0,97	0,56	0,83					0,97	0,56	0,83						355,9	355,9	355,9	355,9	113,54	355,9	70,4	N	0,40		13,83
104-643A-12H-5,25-27	106,56	0,29	61,6	73,0	60,8	58,0	N	40,8	58,0	1,01	0,53	0,85					1,01	0,53	0,85						358,1	358,1	358,1	358,1	113,94	358,1	60,8	N	0,30		13,86
104-643A-12H-5,55-57	106,86	0,19	66,1	64,4	67,9	54,3	N	61,2	54,3	0,95	0,58	0,81					0,95	0,58	0,81						354,4	354,4	354,4	354,4	114,24	354,4	67,9	N	0,40		13,89
104-643A-12H-5,95-97	107,26	0,27	72,9	64,1	70,1	62,6	N	30,1	62,6	1,09	0,46	0,89					1,09	0,46	0,89						362,7	2,7	2,7	362,7	114,64	362,7	70,1	N	0,80		13,92
104-643A-12H-6,25-27	108,06	0,32	64,7	70,0	63,2	65,6	N	37,4	65,6	1,14	0,41	0,91					1,14	0,41	0,91						365,7	5,7	5,7	365,7	115,44	365,7	63,2	N	0,30		13,97
104-643A-12H-6,55-57	108,36	0,14	54,1	63,2	63,4	50,9	N	30,7	50,9	0,89	0,63	0,78					0,89	0,63	0,78						351,0	351,0	351,0	351,0	115,74	351,0	63,4	N	0,40		14,00
104-643A-12H-6,95-97	108,76	0,24	71,3	99,0	71,9	59,1	N	28,8	59,1	1,03	0,51	0,86					1,03	0,51	0,86						359,2	359,2	359,2	359,2	116,14	359,2	71,9	N	0,40		14,03
104-643A-12H-6,135-137	109,16	0,41	70,9	37,3	67,4	53,8	N	8,5	53,8	0,94	0,59	0,81					0,94	0,59	0,81						353,9	353,9	353,9	353,9	116,54	353,9	67,4	N	0,41		14,05
104-643A-12H-7,26-28	109,57	0,07	-39,4	82,9	**-67,6**	103,7		23,8	283,7	4,95	0,24	-0,97	0,29	0,63	0,53	0,51				0,50	0,86	1,05	59,9	300,1	403,8	43,8	43,8	403,8	116,95	403,8	**-67,6**	R (excursion)	0,99		14,10
104-643A-13H-1,25-27	110,06	0,23	26,5	44,0	64,5	20,3	N	32,8	20,3	0,35	0,94	0,35					0,35	0,94	0,35						348,2	348,2	348,2	348,2	117,94	348,2	64,5	N	0,30		14,18
104-643A-13H-1,55-57	110,36	0,25	81,0	74,2	72,0	46,0	N	65,6	46,0	0,80	0,69	0,72					0,80	0,69	0,72						373,9	13,9	13,9	373,9	118,24	373,9	72,0	N	0,40		14,18
104-643A-13H-1,95-97	110,76	0,28	54,6	60,4	66,1	43,6	N	17,8	43,6	0,76	0,72	0,69					0,76	0,72	0,69						371,5	11,5	11,5	371,5	118,64	371,5	66,1	N	0,40		14,19
104-643A-13H-1,135-137	111,16	0,23	48,8	37,0	59,1	25,4	N	8,3	25,4	0,44	0,90	0,43					0,44	0,90	0,43						353,3	353,3	353,3	353,3	119,04	353,3	59,1	N	0,40		14,21
104-643A-13H-2,25-27	111,56	0,15	36,9	109,8	85,3	39,6	N		39,6	0,69	0,77	0,64					0,69	0,77	0,64						367,5	7,5	7,5	367,5	119,44	367,5	85,3	N	0,29		14,22
104-643A-13H-2,54-56	111,85	0,08	46,6	58,0	68,2	44,1	N	31,2	44,1	0,77	0,72	0,70					0,77	0,72	0,70						372,0	12,0	12,0	372,0	119,73	372,0	68,2	N	0,41		14,22
104-643A-13H-2,95-97	112,26	0,26	57,8	129,5	76,6	64,6	N	3,9	64,6	1,13	0,43	0,90													392,5	32,5	32,5	392,5	120,14	392,5	76,6	N	0,40		14,23
104-643A-13H-2,135-137	112,66	0,24	-24,0	353,8	59,4	50,8	N	20,2	50,8	0,89	0,63	0,77													378,7	18,7	18,7	378,7	120,54	378,7	59,4	N	0,40		14,24
104-643A-13H-3,25-27	113,06	0,31	43,9	83,1	63,2	55,9	N	3,8	55,9	0,98	0,56	0,83													383,8	23,8	23,8	383,8	120,94	383,8	63,2	N	0,30		14,26
104-643A-13H-3,55-57	113,36	0,49	46,7	71,8	60,3	49,9	N	4,1	49,9	0,87	0,64	0,76					0,87	0,64	0,76						377,8	17,8	17,8	377,8	121,24	377,8	60,3	N	0,40		14,26
104-643A-13H-3,95-97	113,76	1,18	59,9	1,7	76,4	26,3	N	22	26,3	0,46	0,90	0,44					0,46	0,90	0,44						354,2	354,2	354,2	354,2	121,64	354,2	76,4	N	0,40		14,27
104-643A-13H-3,135-137	114,16	0,29	77,1	46,0	70,1	33,7	N	21,2	33,7	0,59	0,83	0,55					0,59	0,83	0,55						361,6	1,6	1,6	361,6	122,04	361,6	70,1	N	0,40		14,28
104-643A-13H-4,25-27	114,56	0,09	8,2	59,7	**-21,4**	344,6	R	11,9	524,6	9,16	-0,96	0,27													672,5	312,5	312,5	312,5	122,44	312,5	**-21,4**	R	0,30		14,55
104-643A-13H-4,55-57	114,86	0,05	-70,3	183,4	**-60,4**	170,9	R	3	350,9	6,12	0,99	-0,16													498,8	138,8	138,8	138,8	122,74	138,8	**-60,4**	R	0,40		14,56
104-643A-13H-4,95-97	115,26	0,07	-61,9	233,8	**-61,5**	224,0	R		404,0	7,05	0,72	0,69					7,05	0,72	0,69						551,9	191,9	191,9	191,9	123,14	191,9	**-61,5**	R	0,40		14,57
104-643A-13H-4,135-137	115,66	0,13	61,7	164,3	66,6	38,0	N	28,1	38,0	0,66	0,79	0,62					0,66	0,79	0,62						365,9	5,9	5,9	365,9	123,54	365,9	66,6	N	0,40		14,59
104-643A-13H-5,25-27	116,06	0,06	-1,6	118,2	62,7	24,0	N		24,0	0,42	0,91	0,41					0,42	0,91	0,41						351,9	351,9	351,9	351,9	123,94	351,9	62,7	N	0,30		14,60
104-643A-13H-5,55-57	116,36	0,12	-84,1	113,4	**-72,6**	192,4	R		372,4	6,50	0,98	0,21					6,50	0,98	0,21						520,3	160,3	160,3	160,3	124,24	160,3	**-72,6**	R	0,40		14,61
104-643A-13H-5,95-97	116,76	0,22	23,3	101,4	**-66,5**	195,6	R	19,1	375,6	6,56	0,96	0,27					6,56	0,96	0,27						523,5	163,5	163,5	163,5	124,64	163,5	**-66,5**	R	0,80		14,63
104-643A-13H-6,25-27	117,56	0,10	36,2	93,6	**-73,0**	210,8	R	9,9	390,8	6,82	0,86	0,51					6,82	0,86	0,51						538,7	178,7	178,7	178,7	125,44	178,7	**-73,0**	R	0,30		14,66
104-643A-13H-6,55-57	117,86	0,06	-49,5	174,2	**-68,6**	187,2	R	7,8	367,2	6,41	0,99	0,13													515,1	155,1	155,1	155,1	125,74	155,1	**-68,6**	R	0,40		14,67
104-643A-13H-6,95-97	118,26	0,09	-73,8	230,2	**-66,7**	186,4	R		366,4	6,39	0,99	0,11													514,3	154,3	154,3	154,3	126,14	154,3	**-66,7**	R	0,40		14,69
104-643A-13H-6,135-137	118,66	0,08	13,1	89,4	**-61,0**	158,3	R		338,3	5,90	0,93	-0,37													486,2	126,2	126,2	126,2	126,54	126,2	**-61,0**	R	0,40		14,70
104-643A-13H-7,25-27	119,06	0,06	-74,3	223,6	**-74,4**	200,1	R		380,1	6,63	0,94	0,34	0,74	0,45	0,39	0,32	6,63	0,94	0,34	0,83	0,52	0,56	32,1	327,9	528,0	168,0	168,0	168,0	126,94	168,0	**-74,4**	R	1,32		14,72
104-643A-14H-1,25-27	119,56	0,06	-7,2	55,0	**-51,2**	66,3	R	9,7	246,3	4,30	-0,40	-0,92													605,9	245,9	245,9	245,9	128,26	245,9	**-51,2**	R	0,32		14,77
104-643A-14H-1,57-59	119,88	0,21	30,6	42,7	59,3	53,0	N	41,7	53,0	0,93	0,60	0,80													592,6	232,6	232,6	232,6	128,58	232,6	59,3	N	0,26		14,79
104-643A-14H-1,83-85	120,14	0,12	9,0	84,6	77,4	93,2	N		93,2	1,63	-0,06	1,00													632,8	272,8	272,8	272,8	128,84	272,8	77,4	N	0,52		14,80
104-643A-14H-1,135-137	120,66	0,10	42,5	67,8	75,1	74,1	N	9,9	74,1	1,29	0,27	0,96													613,7	253,7	253,7	253,7	129,36	253,7	75,1	N	0,40		14,83
104-643A-14H-2,25-27	121,06	0,51	75,2	32,6	77,7	127,1	N	8,5	127,1	2,22	-0,60	0,80													666,7	306,7	306,7	306,7	129,76	306,7	77,7	N	0,30		14,86
104-643A-14H-2,55-57	121,36	0,12	-74,1	346,4	**-74,8**	349,9	R		529,9	9,25	-0,98	0,18					9,25	-0,98	0,18						889,5	529,5	169,5	169,5	130,06	169,5	**-74,8**	R	0,40		14,87
104-643A-14H-2,95-97	121,76	0,02	-25,0	66,2	**-78,3**	333,1	R		513,1	8,96	-0,89	0,45					8,96	-0,89	0,45						872,7	512,7	152,7	152,7	130,46	152,7	**-78,3**	R	0,40		14,88
104-643A-14H-2,135-137	122,16	0,09	-14,1	332,1	**-66,4**	342,0	R		522,0	9,11	-0,95	0,31					9,11	-0,95	0,31						881,6	521,6	161,6	161,6	130,86	161,6	**-66,4**	R	0,40		14,88
104-643A-14H-3,25-27	122,56	0,05	-61,4	303,7	**-76,8**	334,4	R		514,4	8,98	-0,90	0,43					8,98	-0,90	0,43						874,0	514,0	154,0	154,0	131,26	154,0	**-76,8**	R	0,30		14,89
104-643A-14H-3,55-57	122,86	0,29	-71,3	306,2	**-70,3**	304,2	R	69,4	484,2	8,45	-0,56	0,83													843,8	483,8	123,8	123,8	131,56	123,8	**-70,3**	R	0,40		14,89
104-643A-14H-3,95-97	123,26	0,10	-30,0	283,6	**-63,4**	316,7	R		496,7	8,67	-0,73	0,69					8,67	-0,73	0,69						856,3	496,3	136,3	136,3	131,96	136,3	**-63,4**	R	0,40		14,89
104-643A-14H-3,135-137	123,66	0,04	-25,9	350,8	**-77,1**	315,0	R		495,0	8,64	-0,71	0,71													854,6	494,6	134,6	134,6	132,36	134,6	**-77,1**	R	0,40		14,90
104-643A-14H-4,25-27	124,06	0,13	73,3	67,7	**-65,6**	20,8	R	5,8	200,8	3,50	-0,93	-0,36					3,50	-0,93	-0,36						560,4	200,4	200,4	200,4	132,76	200,4	**-65,6**	R	0,30		14,90
104-643A-14H-4,55-57	124,36	0,07	-52,6	98,9	**-79,0**	27,9	R		207,9	3,63	-0,88	-0,47					3,63	-0,88	-0,47						567,5	207,5	207,5	207,5	133,06	207,5	**-79,0**	R	0,40		14,91
104-643A-14H-4,95-97	124,76	0,11	-46,9	70,1	**-66,5**	53,6	R		233,6	4,08	-0,59	-0,80													593,2	233,2	233,2	233,2	133,46	233,2	**-66,5**	R	0,40		14,91
104-643A-14H-4,135-137	125,16	0,19	-73,1	31,3	**-71,6**	21,3	R	46,4	201,3	3,51	-0,93	-0,36					3,51	-0,93	-0,36						560,9	200,9	200,9	200,9	133,86	200,9	**-71,6**	R	0,40		14,92
104-643A-14H-5,25-27	125,56	0,05	-7,5	60,5	**-70,0**	12,7	R		192,7	3,36	-0,98	-0,22					3,36	-0,98	-0,22						552,3	192,3	192,3	192,3	134,26	192,3	**-70,0**	R	0,30		14,92
104-643A-14H-5,55-57	125,86	0,12	-50,3	59,4	**-61,2**	44,4	R	45	224,4	3,92	-0,71	-0,70													584,0	224,0	224,0	224,0	134,56	224,0	**-61,2**	R	0,40		14,93
104-643A-14H-5,95-97	126,26	0,11	1,1	32,6	**-66,7**	7,3	R		187,3	3,27	-0,99	-0,13					3,27	-0,99	-0,13						546,9	186,9	186,9	186,9	134,96	186,9	**-66,7**	R	0,40		14,93
104-643A-14H-5,135-137	126,66	0,16	-61,9	96,6	**-71,4**	16,4	R	17,9	196,4	3,43	-0,96	-0,28					3,43	-0,96	-0,28						556,0	196,0	196,0	196,0	135,36	196,0	**-71,4**	R	0,40		14,94
104-643A-14H-6,25-27	127,06	0,16	42,3	98,2	**-71,2**	13,5	R	12,8	193,5	3,38	-0,97	-0,23					3,38	-0,97	-0,23						553,1	193,1	193,1	193,1	135,76	193,1	**-71,2**	R	0,30		14,94
104-643A-14H-6,55-57	127,36	0,18	-69,0	327,8	**-67,5**	4,9	R	48,8	184,9	3,23	-1,00	-0,09					3,23	-1,00	-0,09						544,5	184,5	184,5	184,5	136,06	184,5	**-67,5**	R	0,40		14,94
104-643A-14H-6,95-97	127,76	0,09	12,0	101,8	**-74,9**	39,3	R	14,7	219,3	3,83	-0,77	-0,63	-0,68	0,09	0,42	0,61				-0,93	-0,01	-3,14	-179,6	539,6	578,9	218,9	218,9	218,9	136,46	218,9	**-74,9**	R	1,80	gap below	14,95
104-643A-15H-1,25-27	129,06	0,02	-28,9	176,8	**-75,4**	263,2	R		443,2	7,74	0,12	0,99					7,74	0,12	0,99						551,3	191,3	191,3	191,3	138,26	191,3	**-75,4**	R	0,30		14,97
104-643A-15H-1,55-57	129,36	0,07	-78,8	251,8	**-80,6**	261,8	R		441,8	7,71	0,14	0,99					7,71	0,14	0,99						549,9	189,9	189,9	189,9	138,56	189,9	**-80,6**	R	0,40		14,97
104-643A-15H-1,95-97	129,76	0,01	15,4	177,2	**-62,3**	254,8	R		434,8	7,59	0,26	0,97					7,59	0,26	0,97						542,9	182,9	182,9	182,9	138,96	182,9	**-62,3**	R	0,40		14,98
104-643A-15H-1,135-137	130,16	0,09	-21,5	120,4	**-83,1**	259,6	R		439,6	7,67	0,18	0,98					7,67	0,18	0,98						547,7	187,7	187,7	187,7	139,36	187,7	**-83,1**	R	0,40		14,98
104-643A-15H-2,25-27	130,56	0,05	53,4	225,1	**-79,1**	239,5	R	9,7	419,5	7,32	0,51	0,86					7,32	0,51	0,86						527,6	167,6	167,6	167,6	139,76	167,6	**-79,1**	R	0,30		14,99
104-643A-15H-2,55-57	130,86	0,02	23,5	98,5	**-54,2**	250,1	R		430,1	7,51	0,34	0,94					7,51	0,34	0,94						538,2	178,2	178,2	178,2	140,06	178,2	**-54,2**	R	0,40		14,99
104-643A-15H-2,95-97	131,26	0,02	-60,9	252,5	**-66,1**	251,1	R		431,1	7,52	0,32	0,95					7,52	0,32	0,95						539,2	179,2	179,2	179,2	140,46	179,2	**-66,1**	R	0,40		15,00
104-643A-15H-2,135-137	131,66	0,08	-62,1	218,7	**-64,9**	236,8	R	3,3	416,8	7,27	0,55	0,84					7,27	0,55	0,84						524,9	164,9	164,9	164,9	140,86	164,9	**-64,9**	R	0,40		15,00
104-643A-15H-3,25-27	132,06	0,20	-77,3	227,7	**-74,4**	216,1	R	9,4	396,1	6,91	0,81	0,59													504,2	144,2	144,2	144,2	141,26	144,2	**-74,4**	R	0,30		15,01
104-643A-15H-3,55-57	132,36	0,08	-31,4	209,5	**-59,9**	218,1	R	18	398,1	6,95	0,79	0,62													506,2	146,2	146,2	146,2	141,56	146,2	**-59,9**	R	0,40		15,01
104-643A-15H-3,95-97	132,76	0,09	26,8	123,0	**-75,4**	234,7	R	33	414,7	7,24	0,58	0,82					7,24	0,58	0,82						522,8	162,8	162,8	162,8	141,96	162,8	**-75,4**	R	0,40		15,01

104-643A-15H-3,135-137	133,16	0,09	13,9	231,5	**-65,8**	223,2	R	4,7	403,2	7,04	0,73	0,68					7,04	0,73	0,68						511,3	151,3	151,3	151,3	142,36	151,3	**-65,8**	R	0,40	15,02
104-643A-15H-4,25-27	133,56	0,07	-37,6	206,8	**-71,2**	218,7	R	38,3	398,7	6,96	0,78	0,63													506,8	146,8	146,8	146,8	142,76	146,8	**-71,2**	R	0,30	15,02
104-643A-15H-4,55-57	133,86	0,05	56,2	244,1	**-66,2**	227,5	R	9	407,5	7,11	0,68	0,74					7,11	0,68	0,74						515,6	155,6	155,6	155,6	143,06	155,6	**-66,2**	R	0,40	15,03
104-643A-15H-4,95-97	134,26	0,07	-8,5	181,6	**-63,4**	184,4	R		364,4	6,36	1,00	0,08													472,5	112,5	112,5	112,5	143,46	112,5	**-63,4**	R	0,40	15,03
104-643A-15H-4,135-137	134,66	0,10	80,7	123,3	72,5	121,3	N	13,8	121,3	2,12	-0,52	0,85													409,4	49,4	49,4	409,4	143,86	409,4	72,5	N	0,40	16,30
104-643A-15H-5,25-27	135,06	0,30	20,3	136,6	64,7	126,9	N	32,6	126,9	2,21	-0,60	0,80													415,0	55,0	55,0	415,0	144,26	415,0	64,7	N	0,30	16,32
104-643A-15H-5,55-57	135,36	0,40	52,7	107,7	67,6	106,8	N		106,8	1,86	-0,29	0,96					1,86	-0,29	0,96						394,9	34,9	34,9	394,9	144,56	394,9	67,6	N	0,40	16,33
104-643A-15H-5,95-97	135,76	0,84	86,8	272,0	70,3	129,5	N	38,7	129,5	2,26	-0,64	0,77													417,6	57,6	57,6	417,6	144,96	417,6	70,3	N	0,80	16,35
104-643A-15H-6,25-26	136,56	0,50	63,7	114,6	65,0	114,4	N	25,3	114,4	2,00	-0,41	0,91													402,5	42,5	42,5	402,5	145,76	402,5	65,0	N	0,30	16,39
104-643A-15H-6,55-57	136,86	0,18	79,4	245,5	75,6	119,0	N	14,4	119,0	2,08	-0,48	0,87													407,1	47,1	47,1	407,1	146,06	407,1	75,6	N	0,40	16,40
104-643A-15H-6,95-97	137,26	0,12	61,9	321,2	70,2	125,7	N		125,7	2,19	-0,58	0,81													413,8	53,8	53,8	413,8	146,46	413,8	70,2	N	0,40	16,42
104-643A-15H-6,135-137	137,66	0,28	79,2	113,0	73,9	107,5	N	31,7	107,5	1,88	-0,30	0,95					1,88	-0,30	0,95						395,6	35,6	35,6	395,6	146,86	395,6	73,9	N	0,40	16,43
104-643A-15H-7,25-27	138,06	0,46	44,9	315,4	69,8	322,8	R	36	322,8	5,63	0,80	-0,60	0,20	0,75	0,54	0,35				0,29	0,90	1,25	71,9	288,1	610,9	250,9	250,9	250,9	147,26	250,9	69,8	N	1,00	16,45
104-643A-16H-1,25-27	138,56	0,16	40,9	169,3	**-59,0**	168,3	R		348,3	6,08	0,98	-0,20					6,08	0,98	-0,20						505,9	145,9	145,9	145,9	148,26	145,9	**-59,0**	R	0,30	16,50
104-643A-16H-1,55-57	138,86	0,21	81,0	192,8	**-75,5**	121,9	R	12,7	301,9	5,27	0,53	-0,85													459,5	99,5	99,5	99,5	148,56	99,5	**-75,5**	R	0,40	16,51
104-643A-16H-1,95-97	139,26	0,08	34,1	174,6	**-36,6**	131,2	R		311,2	5,43	0,66	-0,75													468,8	108,8	108,8	108,8	148,96	108,8	**-36,6**	R	0,40	16,53
104-643A-16H-1,135-137	139,66	0,19	47,2	356,9	48,5	40,9	N	5,2	40,9	0,71	0,76	0,65					0,71	0,76	0,65						378,5	18,5	18,5	378,5	149,36	378,5	48,5	N	0,40	16,55
104-643A-16H-2,25-27	140,06	0,17	69,4	317,6	68,2	28,6	N	4,7	28,6	0,50	0,88	0,48					0,50	0,88	0,48						366,2	6,2	6,2	366,2	149,76	366,2	68,2	N	0,26	16,58
104-643A-16H-2,51-53	140,32	0,35	73,2	322,5	75,3	20,4	N	34,2	20,4	0,36	0,94	0,35					0,36	0,94	0,35						358,0	358,0	358,0	358,0	150,02	358,0	75,3	N	0,44	16,59
104-643A-16H-2,95-97	140,76	0,31	76,3	55,1	73,9	24,7	N	24	24,7	0,43	0,91	0,42					0,43	0,91	0,42						362,3	2,3	2,3	362,3	150,46	362,3	73,9	N	0,44	16,62
104-643A-16H-2,135-137	141,16	0,25	74,4	324,1	68,6	5,2	N	19,4	5,2	0,09	1,00	0,09					0,09	1,00	0,09						342,8	342,8	342,8	342,8	150,86	342,8	68,6	N	0,40	16,64
104-643A-16H-3,25-27	141,56	0,13	53,2	95,0	63,1	37,3	N	19,9	37,3	0,65	0,80	0,61					0,65	0,80	0,61						374,9	14,9	14,9	374,9	151,26	374,9	63,1	N	0,26	16,67
104-643A-16H-3,51-53	141,82	0,09	71,6	64,8	71,4	27,6	N	12,1	27,6	0,48	0,89	0,46					0,48	0,89	0,46						365,2	5,2	5,2	365,2	151,52	365,2	71,4	N	0,44	16,68
104-643A-16H-3,95-97	142,26	0,13	67,9	83,0	74,7	41,9	N	22	41,9	0,73	0,74	0,67					0,73	0,74	0,67						379,5	19,5	19,5	379,5	151,96	379,5	74,7	N	0,40	16,71
104-643A-16H-3,135-137	142,66	0,15	-15,8	73,1	**-51,9**	66,2	R	15,4	246,2	4,30	-0,40	-0,91													403,8	43,8	43,8	403,8	152,36	403,8	**-51,9**	R	0,40	16,72
104-643A-16H-4,25-27	143,06	0,19	-43,5	97,9	**-79,9**	198,6	R	14,5	378,6	6,61	0,95	0,32					6,61	0,95	0,32						536,2	176,2	176,2	176,2	152,76	176,2	**-79,9**	R	0,26	16,73
104-643A-16H-4,51-53	143,32	0,03	-38,0	113,5	**-75,9**	213,3	R		393,3	6,86	0,84	0,55					6,86	0,84	0,55						550,9	190,9	190,9	190,9	153,02	190,9	**-75,9**	R	0,44	16,73
104-643A-16H-4,95-97	143,76	0,02	17,3	73,6	**-84,2**	210,2	R		390,2	6,81	0,86	0,50					6,81	0,86	0,50						547,8	187,8	187,8	187,8	153,46	187,8	**-84,2**	R	0,40	16,74
104-643A-16H-4,135-137	144,16	0,26	-50,4	89,2	**-76,5**	141,0	R	13,1	321,0	5,60	0,78	-0,63													478,6	118,6	118,6	118,6	153,86	118,6	**-76,5**	R	0,40	16,74
104-643A-16H-5,25-27	144,56	0,11	61,3	99,4	**-71,0**	160,8	R	5,8	340,8	5,95	0,94	-0,33					5,95	0,94	-0,33						498,4	138,4	138,4	138,4	154,26	138,4	**-71,0**	R	0,26	16,75
104-643A-16H-5,51-53	144,82	0,03	42,8	13,5	**-63,9**	164,3	R	24	344,3	6,01	0,96	-0,27					6,01	0,96	-0,27						501,9	141,9	141,9	141,9	154,52	141,9	**-63,9**	R	0,44	16,75
104-643A-16H-5,95-97	145,26	0,06	44,9	94,0	**-50,0**	189,7	R	5,5	369,7	6,45	0,99	0,17					6,45	0,99	0,17						527,3	167,3	167,3	167,3	154,96	167,3	**-50,0**	R	0,30	16,76
104-643A-16H-5,125-127	145,56	0,27	-36,7	257,3	**-72,8**	197,5	R	18,7	377,5	6,59	0,95	0,30					6,59	0,95	0,30						535,1	175,1	175,1	175,1	155,26	175,1	**-72,8**	R	0,50	16,76
104-643A-16H-6,25-27	146,06	0,16	-51,2	256,1	**-80,1**	216,4	R		396,4	6,92	0,80	0,59					6,92	0,80	0,59						554,0	194,0	194,0	194,0	155,76	194,0	**-80,1**	R	0,26	16,77
104-643A-16H-6,51-53	146,32	0,12	-76,0	98,6	**-84,8**	228,3	R		408,3	7,13	0,67	0,75					7,13	0,67	0,75						565,9	205,9	205,9	205,9	156,02	205,9	**-84,8**	R	0,44	16,77
104-643A-16H-6,95,97	146,76	0,09	17,5	281,6	**-60,3**	226,1	R	6,6	406,1	7,09	0,69	0,72					7,09	0,69	0,72						563,7	203,7	203,7	203,7	156,46	203,7	**-60,3**	R	0,40	16,78
104-643A-16H-6,135-137	147,16	0,81	-55,1	252,9	**-80,1**	239,8	R	20,1	419,8	7,33	0,50	0,86													577,4	217,4	217,4	217,4	156,86	217,4	**-80,1**	R	0,40	16,79
104-643A-16H-7,25-27	147,56	1,33	-47,3	264,1	**-72,1**	259,9	R	17,6	439,9	7,68	0,18	0,98	0,75	0,22	0,31	0,56				0,87	0,36	0,39	22,4	337,6	597,5	237,5	237,5	237,5	157,26	237,5	**-72,1**	R	1,38	16,79
104-643A-17X-1,25-27	148,06	1,55	35,0	98,7	**-41,4**	98,0	R	25,8	278,0	4,85	0,14	-0,99					4,85	0,14	-0,99						540,2	180,2	180,2	180,2	158,64	180,2	**-41,4**	R	0,30	16,81
104-643A-17X-1,55-57	148,36	0,66	-32,2	116,2	**-65,7**	97,7	R	14,7	277,7	4,85	0,13	-0,99	0,14	-0,99	0,00	0,00	4,85	0,13	-0,99	0,14	-0,99	-1,43	-82,2	442,2	539,9	179,9	179,9	179,9	158,94	179,9	**-65,7**	R	9,65 gap below	16,81
104-643A-18X-1,20-22	157,51	7,10	69,8	246,0	68,4	302,0	N	14,7	302,0	5,27	0,53	-0,85					5,27	0,53	-0,85						735,0	375,0	15,0	375,0	168,59	375,0	68,4	N	0,47	16,95
104-643A-18X-1,67-69	157,98	0,21	20,5	297,4	62,7	273,1	N	13,7	273,1	4,77	0,05	-1,00					4,77	0,05	-1,00						706,1	346,1	346,1	346,1	169,06	346,1	62,7	N	0,58	16,95
104-643A-18X-1,125-127	158,56	0,11	82,7	336,1	75,7	308,9	N	29,4	308,9	5,39	0,63	-0,78													741,9	381,9	21,9	381,9	169,64	381,9	75,7	N	0,45	16,96
104-643A-18X-2,20-22	159,01	0,10	79,5	287,8	72,0	312,2	N		312,2	5,45	0,67	-0,74													745,2	385,2	25,2	385,2	170,09	385,2	72,0	N	0,47	16,97
104-643A-18X-2,67-69	159,48	0,10	-20,9	132,8	**-50,0**	90,0	R	9,5	270,0	4,71	0,00	-1,00													523,0	163,0	163,0	163,0	170,56	163,0	**-50,0**	R	0,58	16,97
104-643A-18X-2,125-127	160,06	1,22	-43,7	113,2	**-60,8**	105,9	R	12,1	285,9	4,99	0,27	-0,96					4,99	0,27	-0,96						538,9	178,9	178,9	178,9	171,14	178,9	**-60,8**	R	0,45	16,98
104-643A-18X-3,20-22	160,51	1,01	-61,6	92,8	**-68,2**	89,7	R	10,7	269,7	4,71	-0,01	-1,00	0,31	-0,90	0,30	0,11				0,29	-0,94	-1,27	-73,0	433,0	522,7	162,7	162,7	162,7	171,59	162,7	**-68,2**	R	7,05 gap below	16,99
104-643A-19X-1,25-27	167,06	0,86	-36,9	231,9	**-51,1**	36,4	R	11,1	216,4	3,78	-0,80	-0,59					3,78	-0,80	-0,59						544,4	184,4	184,4	184,4	178,64	184,4	**-51,1**	R	0,30	17,09
104-643A-19X-1,55-57	167,36	0,19	-34,3	78,0	**-72,7**	57,8	R	22,8	237,8	4,15	-0,53	-0,85					4,15	-0,53	-0,85						565,8	205,8	205,8	205,8	178,94	205,8	**-72,7**	R	0,42	17,09
104-643A-19X-1,97-99	167,78	0,08	-63,2	19,0	**-67,1**	51,1	R	19,7	231,1	4,03	-0,63	-0,78					4,03	-0,63	-0,78						559,1	199,1	199,1	199,1	179,36	199,1	**-67,1**	R	0,38	17,10
104-643A-19X-1,135-137	168,16	0,09	-42,2	72,0	**-77,2**	56,9	R		236,9	4,13	-0,55	-0,84					4,13	-0,55	-0,84						564,9	204,9	204,9	204,9	179,74	204,9	**-77,2**	R	0,40	17,10
104-643A-19X-2,25-27	168,56	0,07	-37,0	90,9	**-70,7**	51,8	R	6,4	231,8	4,05	-0,62	-0,79					4,05	-0,62	-0,79						559,8	199,8	199,8	199,8	180,14	199,8	**-70,7**	R	0,30	17,11
104-643A-19X-2,55-57	168,86	0,03	-1,5	46,7	**-58,4**	357,0	R		537,0	9,37	-1,00	0,05													865,0	505,0	145,0	145,0	180,44	145,0	**-58,4**	R	0,42	17,11
104-643A-19X-2,97-99	169,28	0,20	-79,2	357,9	**-65,7**	8,8	R	9,8	188,8	3,30	-0,99	-0,15					3,30	-0,99	-0,15						516,8	156,8	156,8	156,8	180,86	156,8	**-65,7**	R	0,38	17,12
104-643A-19X-2,135-137	169,66	0,34	-81,7	69,7	**-74,4**	75,1	R	9,4	255,1	4,45	-0,26	-0,97													583,1	223,1	223,1	223,1	181,24	223,1	**-74,4**	R	0,40	17,12
104-643A-19X-3,25-27	170,06	0,16	34,5	304,6	47,9	184,3	N	22,6	184,3	3,22	-1,00	-0,07					3,22	-1,00	-0,07						692,3	332,3	332,3	332,3	181,64	332,3	47,9	N (excursion)	0,30	17,13
104-643A-19X-3,55-57	170,36	0,14	34,4	333,3	69,0	171,8	N	32,8	171,8	3,00	-0,99	0,14													679,8	319,8	319,8	319,8	181,94	319,8	69,0	N (excursion)	0,42	17,13
104-643A-19X-3,97-99	170,78	0,30	-84,6	336,4	**-72,6**	57,8	R	1,3	237,8	4,15	-0,53	-0,85					4,15	-0,53	-0,85						565,8	205,8	205,8	205,8	182,36	205,8	**-72,6**	R	0,38	17,14
104-643A-19X-3,135-137	171,16	0,09	63,5	128,7	**-70,1**	83,7	R	7,4	263,7	4,60	-0,11	-0,99													591,7	231,7	231,7	231,7	182,74	231,7	**-70,1**	R	0,40	17,14
104-643A-19X-4,25-27	171,56	0,23	77,0	120,1	**-66,8**	89,4	R	22,5	269,4	4,70	-0,01	-1,00													597,4	237,4	237,4	237,4	183,14	237,4	**-66,8**	R	0,30	17,15
104-643A-19X-4,55-57	171,86	0,19	-21,0	18,1	**-73,2**	85,7	R	3,3	265,7	4,64	-0,07	-1,00													593,7	233,7	233,7	233,7	183,44	233,7	**-73,2**	R	0,42	17,15
104-643A-19X-4,97-99	172,28	0,14	-26,3	45,5	**-73,5**	82,9	R	11,6	262,9	4,59	-0,12	-0,99													590,9	230,9	230,9	230,9	183,86	230,9	**-73,5**	R	0,38	17,16
104-643A-19X-4,135-137	172,66	0,30	-31,7	273,4	**-63,4**	75,5	R	2,7	255,5	4,46	-0,25	-0,97													583,5	223,5	223,5	223,5	184,24	223,5	**-63,4**	R	0,40	17,16
104-643A-19X-5,25-27	173,06	0,68	41,3	274,7	**-70,0**	76,0	R	2,9	256,0	4,47	-0,24	-0,97													584,0	224,0	224,0	224,0	184,64	224,0	**-70,0**	R	0,30	17,17
104-643A-19X-5,55-57	173,36	0,18	-56,2	13,8	**-69,0**	14,5	R	4,2	194,5	3,39	-0,97	-0,25					3,39	-0,97	-0,25						522,5	162,5	162,5	162,5	184,94	162,5	**-69,0**	R	0,42	17,17
104-643A-19X-5,97-99	173,78	0,10	-56,5	351,3	**-65,5**	8,3	R		188,3	3,29	-0,99	-0,14					3,29	-0,99	-0,14						516,3	156,3	156,3	156,3	185,36	156,3	**-65,5**	R	0,78	17,18
104-643A-19X-6,25-27	174,56	0,05	52,5	32,9	**-72,9**	3,8	R	49,1	183,8	3,21	-1,00	-0,07					3,21	-1,00	-0,07						511,8	151,8	151,8	151,8	186,14	151,8	**-72,9**	R	0,30	17,19
104-643A-19X-6,55-57	174,86	0,05	63,2	287,8	65,9	180,4	R	9,6	180,4	3,15	-1,00	-0,01													688,4	328,4	328,4	328,4	186,44	328,4	65,9	R	0,42	17,19
104-643A-19X-6,97-99	175,28	0,03	-51,2	305,8	**-85,8**	342,4	R		522,4	9,12	-0,95	0,30													850,4	490,4	130,4	130,4	186,86	130,4	**-85,8**	R	0,38	17,20
104-643A-19X-6,135-137	175,66	0,43	-83,1	188,6	**-84,0**	349,9	R	12,7	529,9	9,25	-0,98	0,18	-0,63	-0,50	0,37	0,47				-0,78	-0,49	-2,58	-148,0	508,0	857,9	497,9	137,9	137,9	187,24	137,9	**-84,0**	R	1,40 gap below	17,20
104-643A-20X-1,25-27	176,56	0,30	66,9	325,5	**-54,9**	341,8	R	12,5	521,8	9,11	-0,95	0,31					9,11	-0,95	0,31						563,4	203,4	203,4	203,4	188,64	203,4	**-54,9**	R	0,30	17,22
104-643A-20X-1,55-57	176,86	0,03	10,3	323,4	**-66,1**	341,6	R		521,6	9,10	-0,95	0,32					9,10	-0,95	0,32						563,2	203,2	203,2	203,2	188,94	203,2	**-66,1**	R	0,40	17,23
104-643A-20X-1,95-97	177,26	0,28	-86,5	207,1	**-79,5**	345,8	R	25,1	525,8	9,18	-0,97	0,25					9,18	-0,97	0,25						567,4	207,4	207,4	207,4	189,34	207,4	**-79,5**	R	0,40	17,23
104-643A-20X-1,135-137	177,66	0,22	72,7	70,2	73,3	64,0	N	23	64,0	1,12	0,44	0,90													285,6	285,6	285,6	285,6	189,74	285,6	73,3	N	0,40	17,24
104-643A-20X-2,25-27	178,06	0,07	14,4	293,5	85,9	129,0	N	41,4	129,0	2,25	-0,63	0,78					2,25	-0,63	0,78						350,6	350,6	350,6	350,6	190,14	350,6	85,9	N	0,30	17,24
104-643A-20X-2,55-57	178,36	0,09	79,7	166,2	72,9	141,1	N	8,7	141,1	2,46	-0,78	0,63					2,46	-0,78	0,63						362,7	2,7	2,7	362,7	190,44	362,7	72,9	N	0,40	17,24
104-643A-20X-2,95-97	178,76	0,15	76,6	358,4	81,7	105,4	N	8,6	105,4	1,84	-0,27	0,96					1,84	-0,27	0,96						327,0	327,0	327,0	327,0	190,84	327,0	81,7	N	0,40	17,25
104-643A-20X-2,135-137	179,16	0,62	70,7	126,0	62,7	124,5	N	9,3	124,5	2,17	-0,57	0,82					2,17	-0,57	0,82						346,1	346,1	346,1	346,1	191,24	346,1	62,7	N	0,40	17,25
104-643A-20X-3,25-27	179,56	0,18	69,5	313,6	67,5	158,6	N	20,8	158,6	2,77	-0,93	0,36					2,77	-0,93	0,36						380,2	20,2	20,2	380,2	191,64	380,2	67,5	N	0,30	17,25
104-643A-20X-3,55-57	179,86	0,16	75,6	142,1	78,5	125,8	N	15,5	125,8	2,20	-0,58	0,81					2,20	-0,58	0,81						347,4	347,4	347,4	347,4	191,94	347,4	78,5	N	0,40	17,26
104-643A-20X-3,95-97	180,26	0,05	77,8	70,5	73,3	144,6	N	17,5	144,6	2,52	-0,82	0,58					2,52	-0,82	0,58						366,2	6,2	6,2	366,2	192,34	366,2	73,3	N	0,40	17,26
104-643A-20X-3,135-137	180,66	0,04	69,9	174,0	65,7	132,5	N	21	132,5	2,31	-0,68	0,74					2,31	-0,68	0,74						354,1	354,1	354,1	354,1	192,74	354,1	65,7	N	0,40	17,26
104-643A-20X-4,25-27	181,06	0,16	72,4	101,4	66,7	153,8	N	3,9	153,8	2,68	-0,90	0,44					2,68	-0,90	0,44						375,4	15,4	15,4	375,4	193,14	375,4	66,7	N	0,30	17,27
104-643A-20X-4,55-57	181,36	0,22	58,6	116,0	62,5	142,1	N	14,7	142,1	2,48	-0,79	0,61					2,48	-0,79	0,61						363,7	3,7	3,7	363,7	193,44	363,7	62,5	N	0,40	17,27
104-643A-20X-4,95-97	181,76	0,05	75,5	117,4	61,2	133,3	N	12,5	133,3	2,33	-0,69	0,73					2,33	-0,69	0,73						354,9	354,9	354,9	354,9	193,84	354,9	61,2	N	0,80	17,27
104-643A-20X-5,25-27	182,56	0,18	80,5	40,4	72,9	151,5	N	12,9	151,5	2,64	-0,88	0,48					2,64	-0,88	0,48						373,1	13,1	13,1	373,1	194,64	373,1	72,9	N	0,30	17,28
104-643A-20X-5,55-57	182,86	0,07	-8,9	13,5	**-63,8**	347,6	R		527,6	9,21	-0,98	0,21													569,2	209,2	209,2	209,2	194,94	209,2	**-63,8**	R (excursion)	0,40	17,28
104-643A-20X-5,95-97	183,26	0,21	-82,2	61,9	**-78,8**	306,5	R	19,7	486,5	8,49	-0,59	0,80					8,49	-0,59	0,80						528,1	168,1	168,1	168,1	195,34	168,1	**-78,8**	R (excursion)	0,40	17,28
104-643A-20X-5,135-137	183,66	0,07	46,5	12,0	**-88,6**	270,0	R		450,0	7,85	0,00	1,00													491,6	131,6	131,6	131,6	195,74	131,6	**-88,6**	R (excursion)	0,40	17,29
104-643A-20X-6,25-27	184,06	0,06	65,2	206,9	**-64,0**	294,3	R	3,6	474,3	8,28	-0,41	0,91					8,28	-0,41	0,91						515,9	155,9	155,9	155,9	196,14	155,9	**-64,0**	R (excursion)	0,30	17,29
104-643A-20X-6,55-57	184,36	0,24	-73,7	245,2	**-74,7**	314,8	R	9,3	494,8	8,64	-0,70	0,71					8,64	-0,70	0,71						536,4	176,4	176,4	176,4	196,44	176,4	**-74,7**	R (excursion)	0,40	17,29
104-643A-20X-6,95-97	184,76	0,02	31,2	90,2	**-71,2**	303,0	R		483,0	8,43	-0,54	0,84					8,43	-0,54	0,84						524,6	164,6	164,6	164,6	196,84	164,6	**-71,2**	R (excursion)	0,40	17,30
104-643A-20X-6,135-137	185,16	0,19	63,5	316,0	74,4	220,9	N	49,8	220,9	3,86	-0,76	-0,65													442,5	82,5	82,5	442,5	197,24	442,5	74,4	N	0,40	17,30
104-643A-20X-7,25-27	185,56	0,05	68,2	8,7	79,1	72,9	N	35,7	72,9	1,27	0,29	0,96	-0,61	0,60	0,38	0,36				-0,72	0,64	2,42	138,4	221,6	294,5	294,5	294,5	294,5	197,64	294,5	79,1	N	11,42 gap below	17,30
104-643A-22X-1,43-45	195,74	0,13	72,2	358,0	67,1	338,4	N	31,7	338,4	5,91	0,93	-0,37													733,8	373,8	13,8	373,8	209,06	373,8	67,1	N	0,50	17,40
104-643A-22X-1,93-95	196,24	0,27	79,1	68,4	78,0	318,2	N	30	318,2	5,55	0,75	-0,67					5,55	0,75	-0,67						713,6	353,6	353,6	353,6	209,56	353,6	78,0	N	0,51	17,40
104-643A-22X-1,144-146	196,75	0,14	41,9	317,5	65,6	329,8	N	37	329,8	5,76	0,86	-0,50					5,76	0,86	-0,50						725,2	365,2	5,2	365,2	210,07	365,2	65,6	N	0,49	17,41
104-643A-22X-2,43-45	197,24	0,15	71,2	32,4	71,2	323,5	N	19,8	323,5	5,65	0,80	-0,59					5,65	0,80	-0,59						718,9	358,9	358,9	358,9	210,56	358,9	71,2	N	0,50	17,41
104-643A-22X-2,93-95	197,74	0,17	74,5	220,1	76,7	335,0	N	24,5	335,0	5,85	0,91	-0,42					5,85	0,91	-0,42						730,4	370,4	10,4	370,4	211,06	370,4	76,7	N	0,51	17,42
104-643A-22X-2,144-146	198,25	0,60	-21,9	331,0	67,7	318,7	N	3,2	318,7	5,56	0,75	-0,66					5,56	0,75	-0,66						714,1	354,1	354,1	354,1	211,57	354,1	67,7	N	0,49	17,42
104-643A-22X-3,43-45	198,74	0,15	50,1	311,0	70,2	312,0	N	29,8	312,0	5,45	0,67	-0,74													707,4	347,4	347,4	347,4	212,06	347,4	70,2	N	0,50	17,42
104-643A-22X-3,93-95	199,24	0,39	74,6	326,7	69,3	315,6	N	32,4	315,6	5,51	0,71	-0,70					5,51	0,71	-0,70						711,0	351,0	351,0	351,0	212,56	351,0	69,3	N	0,51	17,43
104-643A-22X-3,144-146	199,75	0,14	78,7	227,0	73,4	324,3	N	39,3	324,3	5,66	0,81	-0,58					5,66	0,81	-0,58						719,7	359,7	359,7	359,7	213,07	359,7	73,4	N	0,49	17,43
104-643A-22X-4,43-45	200,24	0,11	74,3	299,3	68,9	318,7	N	4,2	318,7	5,56	0,75	-0,66					5,56	0,75	-0,66						714,1	354,1	354,1	354,1	213,56	354,1	68,9	N	0,50	17,44
104-643A-22X-4,93-95	200,74	0,16	78,9	70,0	66,7	326,2	N	3,1	326,2	5,69	0,83	-0,56					5,69	0,83	-0,56						721,6	361,6	1,6	361,6	214,06	361,6	66,7	N	0,38	17,44
104-643A-22X-4,131-133	201,12	0,14	63,2	97,1	64,4	332,8	N	99,9	332,8	5,81	0,89	-0,46					5,81	0,89	-0,46						728,2	368,2	8,2	368,2	214,44	368,2	64,4	N	0,62	17,44
104-643A-22X-5,43-45	201,74				58,9	282,2	N	8,9	282,2	4,93	0,21	-0,98													677,6	317,6	317,6	317,6	215,06	317,6	58,9	N	0,50	17,45
104-643A-22X-5,93-95	202,24	0,07	83,6	347,0	72,8	341,8	N	4	341,8	5,97	0,95	-0,31													737,2	377,2	17,2	377,2	215,56	377,2	72,8	N	0,51	17,45
104-643A-22X-5,144-146	202,75	0,19	62,3	291,9	70,3	324,2	N	7,4	324,2	5,66	0,81	-0,58					5,66	0,81	-0,58						719,6	359,6	359,6	359,6	216,07	359,6	70,3	N	0,49	17,46
104-643A-22X-6,43-45	203,24	0,08	86,2	164,1	63,8	340,3	N	3,8	340,3	5,94	0,94	-0,34													735,7	375,7	15,7	375,7	216,56	375,7	63,8	N	0,50	17,46
104-643A-22X-6,93-95	203,74	0,21	52,7	79,1	62,1	328,6	N	3,3	328,6	5,74	0,85	-0,52					5,74	0,85	-0,52						724,0	364,0	4,0	364,0	217,06	364,0	62,1	N	0,51	17,47
104-643A-22X-6,144-146	204,25	0,22	45,0	38,1	67,2	327,0	N	7	327,0	5,71	0,84	-0,54					5,71	0,84	-0,54						722,4	362,4	2,4	362,4	217,57	362,4	67,2	N	0,30	17,47
104-643A-22X-7,24-26	204,55	0,16	67,6	321,4	69,6	322,1	N	2,9	322,1	5,62	0,79	-0,61	0,79	-0,57	0,16	0,16	5,62	0,79	-0,61	0,81	-0,58	-0,62	-35,4	395,4	717,5	357,5	357,5	357,5	217,87	357,5	69,6	N	1,41 gap below	17,47
104-643A-23X-1,35-37	205,46	0,13	50,8	271,3	64,7	266,4	N	6,9	266,4	4,65	-0,06	-1,00													696,6	336,6	336,6	336,6	219,28	336,6	64,7	N	0,50	17,48
104-643A-23X-1,85-87	205,96	0,05	21,2	223,8	62,3	257,1	N	15	257,1	4,49	-0,22	-0,97													687,3	327,3	327,3	327,3	219,78	327,3	62,3	N	0,50	17,49
104-643A-23X-1,135-137	206,46	0,05	49,5	245,0	56,2	260,8	N	3,1	260,8	4,55	-0,16	-0,99													691,0	331,0	331,0	331,0	220,28	331,0	56,2	N	0,50	17,49
104-643A-23X-2,35-37	206,96	0,22	47,7	173,2	76,3	283,0	N	9,6	283,0	4,94	0,22	-0,97					4,94	0,22	-0,97						713,2	353,2	353,2	353,2	220,78	353,2	76,3	N	0,50	17,50
104-643A-23X-2,85-87	207,46	0,09	65,4	269,5	68,3	287,0	N	3,4	287,0	5,01	0,29	-0,96					5,01	0,29	-0,96						717,2	357,2	357,2	357,2	221,28	357,2	68,3	N	0,50	17,50
104-643A-23X-2,135-137	207,96	0,45	30,0	251,8	62,4	284,0	N	3,1	284,0	4,96	0,24	-0,97					4,96	0,24	-0,97						714,2	354,2	354,2	354,2	221,78	354,2	62,4	N	0,50	17,51
104-643A-23X-3,35-37	208,46	0,17	16,4	86,0	77,5	330,3	N	8,9	330,3	5,76	0,87	-0,50													760,5	400,5	40,5	400,5	222,28	400,5	77,5	N	0,50	17,51
104-643A-23X-3,85-87	208,96	0,05	59,4	230,4	72,5	258,6	N	13,1	258,6	4,51	-0,20	-0,98													688,8	328,8	328,8	328,8	222,78	328,8	72,5	N	0,50	17,51
104-643A-23X-3,135-137	209,46	0,11	73,7	184,8	82,3	286,6	N	12,3	286,6	5,00	0,29	-0,96					5,00	0,29	-0,96						716,8	356,8	356,8	356,8	223,28	356,8	82,3	N	0,50	17,52
104-643A-23X-4,35-37	209,96	0,04	7,6	295,9	68,9	280,6	N		280,6	4,90	0,18	-0,98					4,90	0,18	-0,98						710,8	350,8	350,8	350,8	223,78	350,8	68,9	N	0,50	17,52
104-643A-23X-4,85-87	210,46	0,02	60,0	26,7	70,1	283,8	N	9,7	283,8	4,95	0,24	-0,97					4,95	0,24	-0,97						714,0	354,0	354,0	354,0	224,28	354,0	70,1	N	0,50	17,53
104-643A-23X-4,135-137	210,96	0,06	61,3	318,3	70,6	292,8	N		292,8	5,11	0,39	-0,92					5,11	0,39	-0,92						723,0	363,0	3,0	363,0	224,78	363,0	70,6	N	0,50	17,53
104-643A-23X-5,35-37	211,46	0,04	56,2	329,6	**-68,7**	120,5	R		300,5	5,24	0,51	-0,86					5,24	0,51	-0,86						550,7	190,7	190,7	190,7	225,28	190,7	**-68,7**	R	0,50	17,54
104-643A-23X-5,85-87	211,96	0,05	51,0	38,6	**-61,9**	115,6	R		295,6	5,16	0,43	-0,90					5,16	0,43	-0,90						545,8	185,8	185,8	185,8	225,78	185,8	**-61,9**	R	1,00	17,55
104-643A-23X-6,35-37	212,96	0,06	-56,4	149,9	**-54,1**	146,9	R	2,5	326,9	5,71	0,84	-0,55													577,1	217,1	217,1	217,1	226,78	217,1	**-54,1**	R	0,50	17,56
104-643A-23X-6,85-87	213,46	0,02	46,7	321,4	71,1	286,8		4,1	286,8	5,01	0,29	-0,96					5,01	0,29	-0,96						717,0	357,0	357,0	357,0	227,28	357,0	71,1	R	0,50	17,57
104-643A-23X-6,135-137	213,96	0,07	-57,2	251,5	**-76,5**	124,2	R	13,3	304,2	5,31	0,56	-0,83					5,31	0,56	-0,83						554,4	194,4	194,4	194,4	227,78	194,4	**-76,5**	R	0,50	17,58
104-643A-23X-7,35-37	214,46	0,13	-62,1	92,5	**-77,6**	113,4	R	12	293,4	5,12	0,40	-0,92	0,28	-0,90	0,31	0,15	5,12	0,40	-0,92	0,34	-0,93	-1,22	-70,2	430,2	543,6	183,6	183,6	183,6	228,28	183,6	**-77,6**	R	1,32	17,59
104-643A-24X-1,35-37	215,26	0,04	84,7	204,2	**-75,9**	299,0	R	4,2	479,0	8,36	-0,48	0,87					8,36	-0,48	0,87						531,1	171,1	171,1	171,1	229,60	171,1	**-75,9**	R	0,50	17,61
104-643A-24X-1,85-87	215,76	0,04	65,6	277,2	**-72,3**	303,7	R	9	483,7	8,44	-0,55	0,83					8,44	-0,55	0,83						535,8	175,8	175,8	175,8	230,10	175,8	**-72,3**	R	0,50	17,62
104-643A-24X-1,135-137	216,26	0,14	37,0	125,5	**-49,3**	319,4	R	3	499,4	8,72	-0,76	0,65					8,72	-0,76	0,65						551,5	191,5	191,5	191,5	230,60	191,5	**-49,3**	R	0,50	17,63
104-643A-24X-21,35-37	216,76	0,07	65,8	169,5	71,6	167,0	N	4,5	167,0	2,91	-0,97	0,22													399,1	39,1	39,1	399,1	231,10	399,1	71,6	?	0,50	17,64
104-643A-24X-2,85-87	217,26	0,05	76,5	356,8	69,2	113,8	N	8,9	113,8	1,99	-0,40	0,91					1,99	-0,40	0,91						345,9	345,9	345,9	345,9	231,60	345,9	69,2	?	0,50	17,64
104-643A-24X-2,135-137	217,76				65,8	124,3	N	5,6	124,3	2,17	-0,56	0,83					2,17	-0,56	0,83						356,4	356,4	356,4	356,4	232,10	356,4	65,8	?	0,50	17,65
104-643A-24X-3,35-37	218,26	0,11	68,7	128,0	67,1	117,4	N	13,6	117,4	2,05	-0,46	0,89					2,05	-0,46	0,89						349,5	349,5	349,5	349,5	232,60	349,5	67,1	?	0,50	17,66
104-643A-24X-3,85-87	218,76	0,05	87,9	121,7	74,2	111,4	N	12,7	111,4	1,94	-0,36	0,93					1,94	-0,36	0,93						343,5	343,5	343,5	343,5	233,10	343,5	74,2	?	0,50	17,67
104-643A-24X-3,135-137	219,26	0,04	60,6	131,1	64,4	123,7	N	5,3	123,7	2,16	-0,55	0,83					2,16	-0,55	0,83						355,8	355,8	355,8	355,8	233,60	355,8	64,4	?	0,50	17,68
104-643A-24X-4,35-37	219,76	0,22	83,8	161,3	66,8	121,5	N	5,4	121,5	2,12	-0,52	0,85					2,12	-0,52	0,85						353,6	353,6	353,6	353,6	234,10	353,6	66,8	?	0,50	17,69
104-643A-24X-4,85-87	220,26	0,06	33,8	319,5	**-62,8**	334,0	R	25,9	514,0	8,97	-0,90	0,44													566,1	206,1	206,1	206,1	234,60	206,1	**-62,8**	?	0,50	17,70
104-643A-24X-4,135-137	220,76	0,04	-58,6	320,9	**-60,0**	323,9	R		503,9	8,79	-0,81	0,59					8,79	-0,81	0,59						556,0	196,0	196,0	196,0	235,10	196,0	**-60,0**	?	0,50	17,70
104-643A-24X-5,35-37	221,26	0,07	30,9	229,9	**-17,6**	323,0	R	11	503,0	8,78	-0,80	0,60					8,78	-0,80	0,60						555,1	195,1	195,1	195,1	235,60	195,1	**-17,6**	?	0,50	17,71
104-643A-24X-5,85-87	221,76	0,07	70,6	85,3	66,5	78,7	N		78,7	1,37	0,20	0,98													310,8	310,8	310,8	310,8	236,10	310,8	66,5	?	0,50	17,72
104-643A-24X-5,135-137	222,26	0,07	57,2	2,8	62,3	138,5	N	9,4	138,5	2,42	-0,75	0,66					2,42	-0,75	0,66						370,6	10,6	10,6	370,6	236,60	370,6	62,3	?	0,50	17,73
104-643A-24X-6,35-37	222,76	0,07	61,7	237,8	80,7	146,2	N	6,6	146,2	2,55	-0,83	0,56					2,55	-0,83	0,56						378,3	18,3	18,3	378,3	237,10	378,3	80,7	?	0,50	17,74
104-643A-24X-6,85-87	223,26	0,07	76,3	196,3	66,0	132,6	N	8	132,6	2,31	-0,68	0,74					2,31	-0,68	0,74						364,7	4,7	4,7	364,7	237,60	364,7	66,0	?	0,50	17,75
104-643A-24X-6,135-137	223,76	0,04	17,1	73,6	55,6	104,6	N	14,6	104,6	1,83	-0,25	0,97													336,7	336,7	336,7	336,7	238,10	336,7	55,6	?	0,37	17,76
104-643A-24X-7,22-24	224,13	0,06	63,0	94,2	67,8	121,0	N	2	121,0	2,11	-0,52	0,86	-0,58	0,75	0,27	0,20	2,11	-0,52	0,86	-0,60	0,77	2,23	127,9	232,1	353,1	353,1	353,1	353,1	238,47	353,1	67,8	?	1,43 gap below	17,76
104-643A-25X-1,35-37	225,06	0,04	16,6	22,9	**-49,9**	126,2	R		306,2	5,34	0,59	-0,81													510,5	150,5	150,5	150,5	239,90	150,5	**-49,9**	?	0,50	17,79
104-643A-25X-1,85-87	225,56	0,02	-1,4	144,8	**-54,7**	177,4	R	12,2	357,4	6,24	1,00	-0,05													561,7	201,7	201,7	201,7	240,40	201,7	**-54,7**	?	0,50	17,79
104-643A-25X-1,135-137	226,06	0,03	67,5	316,3	60,0	324,6		7,2	324,6	5,67	0,82	-0,58					5,67	0,82	-0,58						708,9	348,9	348,9	348,9	240,90	348,9	60,0	?	0,50	17,80
104-643A-25X-2,35-37	226,56	0,02	36,2	325,4	**-65,6**	72,7	R	12,9	252,7	4,41	-0,30	-0,95													457,0	97,0	97,0	97,0	241,40	97,0	**-65,6**	?	0,50	17,81
104-643A-25X-2,85-87	227,06	0,03	-5,9	303,5	**-80,3**	113,4	R	8,8	293,4	5,12	0,40	-0,92													497,7	137,7	137,7	137,7	241,90	137,7	**-80,3**	?	0,50	17,82
104-643A-25X-2,135-137	227,56	0,05	70,1	325,5	63,0	332,1	N		332,1	5,80	0,88	-0,47					5,80	0,88	-0,47						716,4	356,4	356,4	356,4	242,40	356,4	63,0	?	0,50	17,83
104-643A-25X-3,35-37	228,06	0,02	-67,6	309,1	65,8	357,9	N	2,8	357,9	6,25	1,00	-0,04													742,2	382,2	22,2	382,2	242,90	382,2	65,8	?	0,50	17,84
104-643A-25X-3,85-87	228,56	0,05	70,1	330,0	62,4	341,9	N	13,6	341,9	5,97	0,95	-0,31					5,97	0,95	-0,31						726,2	366,2	6,2	366,2	243,40	366,2	62,4	?	0,50	17,85
104-643A-25X-3,135-137	229,06	0,07	69,9	32,9	66,9	6,4	N	14,2	6,4	0,11	0,99	0,11													390,7	30,7	30,7	390,7	243,90	390,7	66,9	?	0,50	17,85
104-643A-25X-4,35-37	229,56	0,03	77,1	325,7	74,6	342,0	N		342,0	5,97	0,95	-0,31					5,97	0,95	-0,31						726,3	366,3	6,3	366,3	244,40	366,3	74,6	?	0,50	17,86
104-643A-25X-4,85-87	230,06	0,06	63,6	343,4	60,5	355,3	N	7,9	355,3	6,20	1,00	-0,08													739,6	379,6	19,6	379,6	244,90	379,6	60,5	?	0,50	17,87
104-643A-25X-4,135-137	230,56	0,07	2,4	290,8	81,7	337,5	N	4,1	337,5	5,89	0,92	-0,38					5,89	0,92	-0,38						721,8	361,8	1,8	361,8	245,40	361,8	81,7	?	0,50	17,88
104-643A-25X-5,35-37	231,06	0,08	3,1	284,5	77,5	338,1	N	4,8	338,1	5,90	0,93	-0,37					5,90	0,93	-0,37						722,4	362,4	2,4	362,4	245,90	362,4	77,5	?	0,50	17,89
104-643A-25X-5,85-87	231,56	0,02	64,6	336,7	64,6	328,1	N		328,1	5,73	0,85	-0,53					5,73	0,85	-0,53						712,4	352,4	352,4	352,4	246,40	352,4	64,6	?	0,50	17,90
104-643A-25X-5,135-137	232,06	0,05	64,4	319,6	60,6	326,8	N	13,3	326,8	5,70	0,84	-0,55					5,70	0,84	-0,55						711,1	351,1	351,1	351,1	246,90	351,1	60,6	?	0,50	17,91
104-643A-25X-6,35-37	232,56	0,08	67,5	344,1	68,6	344,9	N	5,9	344,9	6,02	0,97	-0,26					6,02	0,97	-0,26						729,2	369,2	9,2	369,2	247,40	369,2	68,6	?	0,50	17,91
104-643A-25X-6,85-87	233,06	0,06	76,0	302,5	59,8	333,7	N	4,4	333,7	5,82	0,90	-0,44					5,82	0,90	-0,44						718,0	358,0	358,0	358,0	247,90	358,0	59,8	?	1,00	17,92
104-643A-25X-7,35-37	234,06	0,02	74,2	328,2	65,7	343,3	N	8,6	343,3	5,99	0,96	-0,29	0,81	-0,40	0,32	0,30	5,99	0,96	-0,29	0,91	-0,41	-0,42	-24,3	384,3	727,6	367,6	7,6	367,6	248,90	367,6	65,7	?	1,35	17,94
104-643A-26X-1,35-37	234,86	0,30	-10,9	270,6	**-76,4**	218,2	R	3,3	398,2	6,95	0,79	0,62					6,95	0,79	0,62						562,0	202,0	202,0	202,0	250,25	202,0	**-76,4**	R	0,50	17,96

104-643A-26X-1,85-87	235,36	0,04	49,3	34,6	**-59,2**	151,5	R		331,5	5,79	0,88	-0,48													495,3	135,3	135,3	135,3	250,75	135,3	**-59,2**	R	0,50		17,97
104-643A-26X-1,135-137	235,86	0,02	44,6	71,8	**-41,6**	152,0	R	18,2	332,0	5,79	0,88	-0,47													495,8	135,8	135,8	135,8	251,25	135,8	**-41,6**	R	0,50		17,98
104-643A-26X-2,35-37	236,36	0,04	67,4	25,9	**-56,5**	201,5	R	14,4	381,5	6,66	0,93	0,37					6,66	0,93	0,37						545,3	185,3	185,3	185,3	251,75	185,3	**-56,5**	R	0,50		17,99
104-643A-26X-2,85-87	236,86	0,07	77,7	22,4	**-82,1**	141,3	R	3,6	321,3	5,61	0,78	-0,63													485,1	125,1	125,1	125,1	252,25	125,1	**-82,1**	R	0,50		18,00
104-643A-26X-2,135-137	237,36	0,04	36,0	312,3	**-78,5**	203,1	R	7,6	383,1	6,69	0,92	0,39					6,69	0,92	0,39						546,9	186,9	186,9	186,9	252,75	186,9	**-78,5**	R	0,50		18,00
104-643A-26X-3,35-37	237,86	0,05	37,0	290,7	**-64,3**	243,2	R	3,4	423,2	7,39	0,45	0,89													587,0	227,0	227,0	227,0	253,25	227,0	**-64,3**	R	0,50		18,01
104-643A-26X-3,85-87	238,36	0,03	-68,6	208,8	**-66,0**	236,6	R	4,4	416,6	7,27	0,55	0,83													580,4	220,4	220,4	220,4	253,75	220,4	**-66,0**	R	0,50		18,02
104-643A-26X-3,135-137	238,86	0,06	63,9	188,7	**-85,6**	209,9	R	3,1	389,9	6,81	0,87	0,50					6,81	0,87	0,50						553,7	193,7	193,7	193,7	254,25	193,7	**-85,6**	R	0,50		18,03
104-643A-26X-4,35-37	239,36	0,08	-77,4	193,6	**-85,6**	208,5	R	19,3	388,5	6,78	0,88	0,48					6,78	0,88	0,48						552,3	192,3	192,3	192,3	254,75	192,3	**-85,6**	R	0,50		18,04
104-643A-26X-4,85-87	239,86	0,04	39,6	110,8	**-53,4**	52,3	R		232,3	4,05	-0,61	-0,79													396,1	36,1	36,1	396,1	255,25	396,1	**-53,4**	R	1,00		18,05
104-643A-26X-5,35-37	240,86	0,04	82,3	349,8	71,8	326,2	N	9	326,2	5,69	0,83	-0,56													670,0	310,0	310,0	310,0	256,25	310,0	71,8	N	0,50		18,08
104-643A-26X-5,85-87	241,36	0,04	77,3	343,6	79,3	353,0	N	4,3	353,0	6,16	0,99	-0,12					6,16	0,99	-0,12						696,8	336,8	336,8	336,8	256,75	336,8	79,3	N	0,50		18,10
104-643A-26X-5,135-137	241,86	0,04	75,7	357,7	69,1	12,0	N		12,0	0,21	0,98	0,21					0,21	0,98	0,21						355,8	355,8	355,8	355,8	257,25	355,8	69,1	N	0,50		18,12
104-643A-26X-6,35-37	242,36	0,04	85,8	76,5	60,4	345,9	N	14,4	345,9	6,04	0,97	-0,24					6,04	0,97	-0,24						689,7	329,7	329,7	329,7	257,75	329,7	60,4	N	0,50		18,14
104-643A-26X-6,85-87	242,86	0,11	77,3	43,6	76,7	354,5	N	3,3	354,5	6,19	1,00	-0,10					6,19	1,00	-0,10						698,3	338,3	338,3	338,3	258,25	338,3	76,7	N	0,50		18,16
104-643A-26X-6,135-137	243,36	0,04	51,1	303,1	67,4	34,0	N	4,9	34,0	0,59	0,83	0,56	0,76	0,09	0,38	0,54	0,59	0,83	0,56	0,91	0,27	0,28	16,2	343,8	377,8	17,8	17,8	377,8	258,75	377,8	67,4	N	1,82	gap below	18,18
104-643A-27X-1,35-37	244,66	0,02	84,8	35,4	61,5	68,5	N		68,5	1,20	0,37	0,93													551,2	191,2	191,2	191,2	260,57	191,2	61,5	N	0,50		18,26
104-643A-27X-1,85-87	245,16	0,03	30,7	130,4	75,5	54,7	N	29,7	54,7	0,95	0,58	0,82													537,4	177,4	177,4	177,4	261,07	177,4	75,5	N	0,50		18,28
104-643A-27X-1,135-137	245,66	0,06	-33,9	190,5	41,4	75,4	N	18,3	75,4	1,32	0,25	0,97													558,1	198,1	198,1	198,1	261,57	198,1	41,4	N	0,50		18,30
104-643A-27X-2,35-37	246,16	0,02	73,2	324,3	57,6	331,6	N		331,6	5,79	0,88	-0,48													814,3	454,3	94,3	94,3	262,07	94,3	57,6	N	0,50		18,32
104-643A-27X-2,85-87	246,66	0,04	39,5	157,2	70,0	58,4	N	10,3	58,4	1,02	0,52	0,85													541,1	181,1	181,1	181,1	262,57	181,1	70,0	N	0,50		18,34
104-643A-27X-2,135-137	247,16	0,02	4,9	298,6	**-80,0**	329,7	R		509,7	8,90	-0,86	0,50													812,4	452,4	92,4	92,4	263,07	92,4	**-80,0**	?	0,50		18,37
104-643A-27X-3,35-37	247,66	0,02	9,0	269,9	**-56,4**	128,2	R		308,2	5,38	0,62	-0,79													610,9	250,9	250,9	250,9	263,57	250,9	**-56,4**	?	0,50		18,39
104-643A-27X-3,85-87	248,16	0,02	-48,5	140,9	**-50,5**	87,4	R	3,4	267,4	4,67	-0,05	-1,00													570,1	210,1	210,1	210,1	264,07	210,1	**-50,5**	?	0,50		18,41
104-643A-27X-3,135-137	248,66	0,09	16,5	180,0	2,3	184,6		3,1	184,6	3,22	-1,00	-0,08													667,3	307,3	307,3	307,3	264,57	307,3	2,3	?	0,44		18,43
104-643A-27X-4,29-31	249,10	0,04	75,7	34,0	55,8	217,1	N	9,7	217,1	3,79	-0,80	-0,60					3,79	-0,80	-0,60						699,8	339,8	339,8	339,8	265,01	339,8	55,8	?	0,56		18,45
104-643A-27X-4,85-87	249,66	0,03	76,7	110,0	56,4	161,7	N		161,7	2,82	-0,95	0,31													644,4	284,4	284,4	284,4	265,57	284,4	56,4	?	0,50		18,47
104-643A-27X-4,135-137	250,16	0,14	72,3	51,4	73,6	154,2	N	8,2	154,2	2,69	-0,90	0,44													636,9	276,9	276,9	276,9	266,07	276,9	73,6	?	0,50		18,49
104-643A-27X-5,35-37	250,66	0,07	34,6	120,1	52,4	167,1	N	4,1	167,1	2,92	-0,97	0,22													649,8	289,8	289,8	289,8	266,57	289,8	52,4	?	0,37		18,51
104-643A-27X-5,72-74	251,03	0,08	-61,9	77,9	**-68,9**	64,3	R	14,4	244,3	4,26	-0,43	-0,90					4,26	-0,43	-0,90						547,0	187,0	187,0	187,0	266,94	187,0	**-68,9**	R	0,53		18,53
104-643A-27X-5,125-127	251,56	0,12	-56,3	73,2	**-64,6**	64,3	R	18,7	244,3	4,26	-0,43	-0,90					4,26	-0,43	-0,90						547,0	187,0	187,0	187,0	267,47	187,0	**-64,6**	R	0,59		18,55
104-643A-27X-6,34-36	252,15	0,07	45,2	123,3	**-68,4**	64,4	R	4,7	244,4	4,27	-0,43	-0,90													547,1	187,1	187,1	187,1	268,06	187,1	**-68,4**	R	0,39		18,58
104-643A-27X-6,73-75	252,54	0,12	-50,7	79,2	**-55,9**	89,2	R	4,6	269,2	4,70	-0,01	-1,00													571,9	211,9	211,9	211,9	268,45	211,9	**-55,9**	R	0,52		18,59
104-643A-27X-6,125-127	253,06	0,07	75,8	134,8	**-47,6**	63,1	R	14,6	243,1	4,24	-0,45	-0,89	-0,23	-0,14	0,63	0,76	4,24	-0,45	-0,89	-0,53	-0,82	-2,14	-122,7	482,7	545,8	185,8	185,8	185,8	268,97	185,8	**-47,6**	R	1,90	gap below	18,61
104-643A-28X-1,35-37	254,46	0,08	29,4	351,6	**-12,5**	336,8	R	4,6	516,8	9,02	-0,92	0,39													740,8	380,8	20,8	380,8	270,87	380,8	**-12,5**	R	0,50		18,70
104-643A-28X-1,85-87	254,96	0,15	-14,6	349,5	**-51,4**	46,9	R	47,5	226,9	3,96	-0,68	-0,73													450,9	90,9	90,9	90,9	271,37	90,9	**-51,4**	R	0,50		18,72
104-643A-28X-1,135-137	255,46	0,06	43,6	32,2	**-15,2**	54,6	R		234,6	4,09	-0,58	-0,82													458,6	98,6	98,6	98,6	271,87	98,6	**-15,2**	R	0,50		18,74
104-643A-28X-2,35-37	255,96	0,08	50,0	31,5	49,0	28,5	N	27,9	28,5	0,50	0,88	0,48													432,5	72,5	72,5	432,5	272,37	432,5	49,0	N	0,50		18,75
104-643A-28X-2,85-87	256,46	0,05	14,8	95,2	52,5	96,8	N		96,8	1,69	-0,12	0,99													500,8	140,8	140,8	140,8	272,87	140,8	52,5	N	0,50		18,77
104-643A-28X-2,135-137	256,96	0,10	77,8	100,0	**-63,2**	127,0		7,7	307,0	5,36	0,60	-0,80					5,36	0,60	-0,80						531,0	171,0	171,0	171,0	273,37	171,0	**-63,2**	N	0,50		18,78
104-643A-28X-3,35-37	257,46	0,08	62,6	84,1	67,0	352,3	N	13,5	352,3	6,15	0,99	-0,13					6,15	0,99	-0,13						756,3	396,3	36,3	396,3	273,87	396,3	67,0	N	0,50		18,79
104-643A-28X-3,85-87	257,96	0,06	50,0	283,4	66,1	276,1	N	7,5	276,1	4,82	0,11	-0,99					4,82	0,11	-0,99						680,1	320,1	320,1	320,1	274,37	320,1	66,1	N	0,50		18,80
104-643A-28X-3,135-137	258,46	0,10	81,9	352,0	64,9	310,1	N	20,8	310,1	5,41	0,64	-0,76					5,41	0,64	-0,76						714,1	354,1	354,1	354,1	274,87	354,1	64,9	N	0,50		18,81
104-643A-28X-4,35-37	258,96	0,05	76,1	18,1	80,5	299,8	N	7	299,8	5,23	0,50	-0,87					5,23	0,50	-0,87						703,8	343,8	343,8	343,8	275,37	343,8	80,5	N	0,50		18,82
104-643A-28X-4,85-87	259,46	0,03	73,0	313,9	69,5	306,6	N	9,1	306,6	5,35	0,60	-0,80					5,35	0,60	-0,80						710,6	350,6	350,6	350,6	275,87	350,6	69,5	N	0,50		18,83
104-643A-28X-4,135-137	259,96	0,05	62,2	110,0	68,6	320,6	N	8,8	320,6	5,60	0,77	-0,63					5,60	0,77	-0,63						724,6	364,6	4,6	364,6	276,37	364,6	68,6	N	0,50		18,85
104-643A-28X-5,35-37	260,46	0,07	49,0	39,1	56,7	331,5	N	26,1	331,5	5,79	0,88	-0,48					5,79	0,88	-0,48						735,5	375,5	15,5	375,5	276,87	375,5	56,7	N	0,50		18,86
104-643A-28X-5,85-87	260,96	0,06	79,6	66,5	82,1	329,7	N	26,4	329,7	5,75	0,86	-0,50					5,75	0,86	-0,50						733,7	373,7	13,7	373,7	277,37	373,7	82,1	N	1,00		18,87
104-643A-28X-6,35-37	261,96	0,08	40,5	292,0	61,0	336,1	N	14,4	336,1	5,87	0,91	-0,41					5,87	0,91	-0,41						740,1	380,1	20,1	380,1	278,37	380,1	61,0	N	0,50		18,89
104-643A-28X-6,85-87	262,46	0,05	57,7	300,9	68,1	306,5	N	14,9	306,5	5,35	0,59	-0,80					5,35	0,59	-0,80						710,5	350,5	350,5	350,5	278,87	350,5	68,1	N	0,50		18,90
104-643A-28X-6,135-137	262,96	0,05	70,7	278,8	70,7	315,5	N	13,7	315,5	5,51	0,71	-0,70	0,40	-0,45	0,61	0,56	5,51	0,71	-0,70	0,68	-0,66	-0,77	-44,0	404,0	719,5	359,5	359,5	359,5	279,37	359,5	70,7	N	1,80	gap below	18,91
104-643A-29X-1,35-37	264,26	0,05	49,3	97,0	51,2	82,5	N		82,5	1,44	0,13	0,99													382,1	22,1	22,1	382,1	281,17	382,1	51,2	N	0,50		18,96
104-643A-29X-1,85-87	264,76	0,05	60,6	62,7	66,3	66,2	N		66,2	1,16	0,40	0,91					1,16	0,40	0,91						365,8	5,8	5,8	365,8	281,67	365,8	66,3	N	0,50		18,97
104-643A-29X-1,135-137	265,26	0,08	76,0	328,2	75,5	70,9	N	4,5	70,9	1,24	0,33	0,94					1,24	0,33	0,94						370,5	10,5	10,5	370,5	282,17	370,5	75,5	N	0,50		18,98
104-643A-29X-2,35-37	265,76	0,06	58,8	53,4	70,3	52,6	N	19,5	52,6	0,92	0,61	0,79					0,92	0,61	0,79						352,2	352,2	352,2	352,2	282,67	352,2	70,3	N	0,50		18,99
104-643A-29X-2,85-87	266,26	0,11	67,8	24,9	76,1	58,3	N	8,7	58,3	1,02	0,53	0,85					1,02	0,53	0,85						357,9	357,9	357,9	357,9	283,17	357,9	76,1	N	0,50		19,00
104-643A-29X-2,135-137	266,76	0,17	39,8	65,9	61,0	69,6	N	4	69,6	1,21	0,35	0,94					1,21	0,35	0,94						369,2	9,2	9,2	369,2	283,67	369,2	61,0	N	0,50		19,01
104-643A-29X-3,35-37	267,26	0,14	47,6	52,2	67,3	47,7	N	14,9	47,7	0,83	0,67	0,74					0,83	0,67	0,74						347,3	347,3	347,3	347,3	284,17	347,3	67,3	N	0,50		19,02
104-643A-29X-3,85-87	267,76	0,09	82,0	196,2	69,0	79,8	N	19,8	79,8	1,39	0,18	0,98													379,4	19,4	19,4	379,4	284,67	379,4	69,0	N	0,50		19,04
104-643A-29X-3,135-137	268,26	0,04	63,5	15,4	69,5	46,4	N		46,4	0,81	0,69	0,72													346,0	346,0	346,0	346,0	285,17	346,0	69,5	N	0,50		19,05
104-643A-29X-4,35-37	268,76	0,11	22,9	329,4	64,5	40,2	N	21,6	40,2	0,70	0,76	0,65													339,8	339,8	339,8	339,8	285,67	339,8	64,5	N	0,50		19,06
104-643A-29X-4,85-87	269,26	0,07	58,9	22,0	70,0	45,0	N	11,5	45,0	0,79	0,71	0,71													344,6	344,6	344,6	344,6	286,17	344,6	70,0	N	0,50		19,07
104-643A-29X-4,135-137	269,76	0,08	17,5	294,8	67,2	66,8	N	19,6	66,8	1,17	0,39	0,92					1,17	0,39	0,92						366,4	6,4	6,4	366,4	286,67	366,4	67,2	N	0,50		19,08
104-643A-29X-5,35-37	270,26	0,04	53,0	239,7	71,2	68,4	N		68,4	1,19	0,37	0,93					1,19	0,37	0,93						368,0	8,0	8,0	368,0	287,17	368,0	71,2	N	0,50		19,09
104-643A-29X-5,85-87	270,76	0,19	80,8	63,0	75,9	69,7	N	11	69,7	1,22	0,35	0,94					1,22	0,35	0,94						369,3	9,3	9,3	369,3	287,67	369,3	75,9	N	1,00		19,10
104-643A-29X-6,35-37	271,76	0,09	70,0	51,0	67,0	49,1	N	3,6	49,1	0,86	0,65	0,76					0,86	0,65	0,76						348,7	348,7	348,7	348,7	288,67	348,7	67,0	N	0,50		19,13
104-643A-29X-6,85-87	272,26	0,08	55,9	35,1	72,5	48,4	N	4	48,4	0,84	0,66	0,75					0,84	0,66	0,75						348,0	348,0	348,0	348,0	289,17	348,0	72,5	N	0,50		19,14
104-643A-29X-6,135-137	272,76	0,10	71,9	36,4	74,6	57,3	N	13,2	57,3	1,00	0,54	0,84	0,49	0,85	0,19	0,11	1,00	0,54	0,84	0,49	0,86	1,05	60,4	299,6	356,9	356,9	356,9	356,9	289,67	356,9	74,6	N	12,62	gap below	19,15
104-643A-31X-1,85-87	284,36	0,48	-26,2	121,3	85,5	130,6	N	3,2	130,6	2,28	-0,65	0,76					2,28	-0,65	0,76						358,2	358,2	358,2	358,2	302,29	358,2	85,5	N	0,50		19,44
104-643A-31X-1,135-137	284,86	0,37	80,7	141,4	75,1	127,0	N	4,5	127,0	2,22	-0,60	0,80					2,22	-0,60	0,80						354,6	354,6	354,6	354,6	302,79	354,6	75,1	N	0,50		19,45
104-643A-31X-2,35-37	285,36	0,25	76,8	76,8	86,4	100,7	N	6,8	100,7	1,76	-0,19	0,98													328,3	328,3	328,3	328,3	303,29	328,3	86,4	N	0,50		19,46
104-643A-31X-2,85-87	285,86	0,22	74,8	310,4	75,9	126,9	N	7,9	126,9	2,21	-0,60	0,80					2,21	-0,60	0,80						354,5	354,5	354,5	354,5	303,79	354,5	75,9	N	0,50		19,47
104-643A-31X-2,135-137	286,36	0,27	86,3	327,9	77,3	135,1	N	9,2	135,1	2,36	-0,71	0,71					2,36	-0,71	0,71						362,7	2,7	2,7	362,7	304,29	362,7	77,3	N	0,50		19,48
104-643A-31X-3,35-37	286,86	0,17	88,1	125,1	71,0	137,1	N	5,6	137,1	2,39	-0,73	0,68					2,39	-0,73	0,68						364,7	4,7	4,7	364,7	304,79	364,7	71,0	N	0,50		19,50
104-643A-31X-3,85-87	287,36	0,17	71,3	148,3	71,7	133,3	N	10,9	133,3	2,33	-0,69	0,73					2,33	-0,69	0,73						360,9	0,9	0,9	360,9	305,29	360,9	71,7	N	0,50		19,51
104-643A-31X-3,135-137	287,86	0,39	75,5	343,0	68,3	131,5	N	12,9	131,5	2,30	-0,66	0,75					2,30	-0,66	0,75						359,1	359,1	359,1	359,1	305,79	359,1	68,3	N	0,50		19,52
104-643A-31X-4,35-37	288,36	0,31	45,5	63,4	67,5	127,4	N	5,5	127,4	2,22	-0,61	0,79					2,22	-0,61	0,79						355,0	355,0	355,0	355,0	306,29	355,0	67,5	N	0,50		19,53
104-643A-31X-4,85-87	288,86	0,24	82,8	131,7	76,9	118,9	N	20	118,9	2,08	-0,48	0,88													346,5	346,5	346,5	346,5	306,79	346,5	76,9	N	0,50		19,54
104-643A-31X-4,135-137	289,36	0,22	75,1	141,6	76,3	138,5	N	13,6	138,5	2,42	-0,75	0,66					2,42	-0,75	0,66						366,1	6,1	6,1	366,1	307,29	366,1	76,3	N	0,43		19,55
104-643A-31X-5,28-30	289,79	0,39	26,3	124,5	60,1	141,0	N	3	141,0	2,46	-0,78	0,63													368,6	8,6	8,6	368,6	307,72	368,6	60,1	N	1,02		19,56
104-643A-31X-5,130-132	290,81	0,13	74,6	122,8	74,7	136,2	N	14,3	136,2	2,38	-0,72	0,69					2,38	-0,72	0,69						363,8	3,8	3,8	363,8	308,74	363,8	74,7	N	0,55		19,59
104-643A-31X-6,35-37	291,36	0,12	62,3	105,4	65,8	139,4	N	9,5	139,4	2,43	-0,76	0,65													367,0	7,0	7,0	367,0	309,29	367,0	65,8	N	1,00		19,60
104-643A-31X-6,135-137	292,36	0,13	73,1	97,6	64,9	118,3	N	9,4	118,3	2,06	-0,47	0,88	-0,63	0,76	0,15	0,10				-0,67	0,74	2,31	132,4	227,6	345,9	345,9	345,9	345,9	310,29	345,9	64,9	N	1,84	gap below	19,62
104-643A-32X-1,35-37	293,66	0,24	81,0	358,5	75,5	133,0	N	3,5	133,0	2,32	-0,68	0,73													367,0	7,0	7,0	367,0	312,13	367,0	75,5	N	0,50		19,66
104-643A-32X-1,85-87	294,16	0,15	76,2	71,9	82,0	131,5	N	4,6	131,5	2,30	-0,66	0,75					2,30	-0,66	0,75						365,5	5,5	5,5	365,5	312,63	365,5	82,0	N	0,50		19,68
104-643A-32X-1,135-137	294,66	0,23	84,1	167,0	68,3	122,4	N	4,1	122,4	2,14	-0,54	0,84					2,14	-0,54	0,84						356,4	356,4	356,4	356,4	313,13	356,4	68,3	N	0,50		19,69
104-643A-32X-2,35-37	295,16	0,11	75,7	305,2	61,1	127,2	N	7,4	127,2	2,22	-0,60	0,80					2,22	-0,60	0,80						361,2	1,2	1,2	361,2	313,63	361,2	61,1	N	0,50		19,70
104-643A-32X-2,85-87	295,66	0,20	85,5	84,7	85,1	118,9	N	4,4	118,9	2,08	-0,48	0,88													352,9	352,9	352,9	352,9	314,13	352,9	85,1	N	1,03		19,71
104-643A-32X-3,38-40	296,69	0,31	-84,7	334,1	**-85,7**	302,8	R	3,2	482,8	8,43	-0,54	0,84	-0,59	0,81	0,08	0,06	8,43	-0,54	0,84	-0,59	0,81	2,20	126,0	234,0	536,8	176,8	176,8	176,8	315,16	176,8	**-85,7**	R	7,77	gap below	19,73
104-643A-33X-1,85-87	303,96	0,10	76,0	306,5	72,2	352,2	N	9,8	352,2	6,15	0,99	-0,14													670,7	310,7	310,7	310,7	322,93	310,7	72,2	?	0,50		19,83
104-643A-33X-1,135-137	304,46	0,03	10,7	223,6	**-76,2**	221,5	R		401,5	7,01	0,75	0,66					7,01	0,75	0,66						540,0	180,0	180,0	180,0	323,43	180,0	**-76,2**	?	0,50		19,84
104-643A-33X-2,35-37	304,96	0,06	74,1	101,4	74,4	82,1	N	12,1	82,1	1,43	0,14	0,99	0,63	0,51	0,44	0,58				0,75	0,66	0,72	41,5	318,5	400,6	40,6	40,6	400,6	323,93	400,6	74,4	?	8,89	gap below	19,84
104-643A-34X-1,44-46	313,35	0,11	68,4	53,2	70,7	38,1	N	8,2	38,1	0,66	0,79	0,62					0,66	0,79	0,62						364,7	4,7	4,7	364,7	332,82	364,7	70,7	?	0,76		19,96
104-643A-34X-1,120-122	314,11	0,05	70,0	358,3	69,5	33,8	N	5,8	33,8	0,59	0,83	0,56					0,59	0,83	0,56						360,4	0,4	0,4	360,4	333,58	360,4	69,5	?	0,74		19,97
104-643A-34X-2,44-46	314,85	0,10	67,4	66,3	67,5	45,9	N	9,5	45,9	0,80	0,70	0,72													372,5	12,5	12,5	372,5	334,32	372,5	67,5	?	0,76		19,98
104-643A-34X-2,120-122	315,61	0,06	61,1	351,6	59,5	15,9	N	15,4	15,9	0,28	0,96	0,27													342,5	342,5	342,5	342,5	335,08	342,5	59,5	?	0,74		19,99
104-643A-34X-3,44-46	316,35	0,03	72,5	109,8	69,1	28,4	N		28,4	0,50	0,88	0,48	0,83	0,53	0,10	0,17	0,50	0,88	0,48	0,83	0,55	0,58	33,4	326,6	355,0	355,0	355,0	355,0	335,82	355,0	69,1	?	7,40	gap below	20,00
104-643A-35X-1,54-56	323,25	0,05	82,8	213,9	76,0	95,7	N		95,7	1,67	-0,10	1,00	-0,10	1,00	#DIV/0!	#DIV/0!	1,67	-0,10	1,00	-0,10	1,00	1,67	95,7	264,3	360,0	360,0	360,0	360,0	343,22	360,0	76,0	?	61,14	gap below	20,10
104-643A-41X-1,28-30	381,39	0,33	60,7	97,7	81,9	351,9	N	7,3	351,9	6,14	0,99	-0,14					6,14	0,99	-0,14						714,4	354,4	354,4	354,4	404,36	354,4	81,9	?	0,50		23,24
104-643A-41X-1,78-80	381,89	0,21	66,7	46,0	71,7	3,2	N	16,1	3,2	0,06	1,00	0,06					0,06	1,00	0,06						365,7	5,6	5,6	365,7	404,86	365,7	71,7	?	0,51		23,27
104-643A-41X-1,129-131	382,40	0,26	74,6	46,3	67,5	22,2	N	3,8	22,2	0,39	0,93	0,38	0,97	0,10	0,04	0,26				0,99	-0,04	-0,04	-2,5	362,5	384,7	24,7	24,7	384,7	405,37	384,7	67,5	?	12,09	gap below	23,29
104-643A-42X-3,28-30	393,99	0,04	50,5	109,4	**-63,3**	121,0	R		301,0	5,25	0,52	-0,86													522,0	162,0	162,0	162,0	417,46	162,0	**-63,3**	?	0,50		23,97
104-643A-42X-3,78-80	394,49	0,20	-25,9	183,2	**-68,8**	143,2	R		323,2	5,64	0,80	-0,60					5,64	0,80	-0,60						544,2	184,2	184,2	184,2	417,96	184,2	**-68,8**	?	0,51		24,01
104-643A-42X-3,129-131	395,00	0,46	17,6	99,1	**-64,1**	134,8	R	3	314,8	5,49	0,70	-0,71	0,67	-0,72	0,15	0,13	5,49	0,70	-0,71	0,75	-0,65	-0,72	-41,0	401,0	535,8	175,8	175,8	175,8	418,47	175,8	**-64,1**	?			24,04