

1 **Data mining by watching old documentary TV programs to learn about the relationships**
2 **between people's lives and the landscape in Sakha in the perestroika era at the end of the**
3 **1980s**

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20 **Abstract**

21 To accurately evaluate the spatiotemporal variability of ecosystem functions and services, as
22 well as biodiversity, under a rapidly changing climate and shifting anthropogenic activities, it
23 is an important but challenging task to retrieve information about past relationships among
24 society, people’s lives, and the landscape. We watched documentary TV programs broadcast
25 by the Japanese public broadcasting station (NHK) about 30 years ago to examine these past
26 relationships in the Republic of Sakha (formerly the Yakut Autonomous Soviet Socialist
27 Republic) in eastern Siberia at the end of the 1980s (the “perestroika era”). We viewed 3
28 episodes of the documentary “NHK Special: The Arctic Circle” and summarized the content
29 of the episodes. The importance of discovering mammoth tusks in this Arctic region to acquire
30 foreign currency was highlighted, as was the relationship between nomadic peoples in Chukchi
31 and managers of their sovkhoz. A trip down the Lena River featured the relationships of
32 economic activities and ethnic minorities in the perestroika era, highlighting the importance of
33 natural resources and the local environment. Despite limitations caused by production choices
34 and historical background and unconscious bias of people at that time, and copyright and
35 privacy issues, we concluded that old TV programs can be useful resources to retrieve
36 information about people’s lives and landscapes in the past.

37

38 Keywords:

39 1980s; data mining; perestroika; TV program archives; Yakutia

40

41 **1. Introduction**

42 To accurately evaluate the spatiotemporal variability of ecosystem functions and services
43 (nature's contributions to people; Díaz et al., 2018), as well as biodiversity, under a rapidly
44 changing climate and shifting anthropogenic activities, we need to deepen our understanding
45 of the long-term relationship between people's lives and the landscape. In the recent past,
46 humans have negatively impacted Earth's ecosystems through deforestation (Hansen et al.,
47 2013; Potapov et al., 2022), excess anthropogenic nutrient inputs to coastal watersheds (Malone
48 et al., 2020), plastics waste input into the oceans (Jambeck et al., 2015), emissions of
49 greenhouse gases and nitrogen deposition (IPCC, 2021), overfishing (FAO, 2020), and
50 overhunting and poaching (Kurland et al., 2017). The negative impacts of these activities in
51 turn threaten the human race (e.g., through climate change and loss of biodiversity; Rockström
52 et al., 2009). These threats occur in various social contexts in which there is increasing demand
53 for food, timber, and mineral resources, as well as increased competition for resource
54 acquisition because of political conflict and market speculation.

55 To retrieve information on past relationships among society, people's lives, and the
56 landscape, sociological research (e.g., interviews; Ichikawa, 2007; Ksenofontov et al., 2017;
57 Onishi, 2018; Lytkin et al., 2021), analysis of social statistics (Bogdanova et al., 2021), and

58 analysis of remote-sensing data are useful (Onishi, 2018). In many cases, relevant documents
59 and data are publicly available on the Internet, and they can be easily accessed. However, they
60 include uncertainties caused by spatiotemporal resolution, accuracy, sample sizes, and bias. It
61 is currently possible to reduce some of these uncertainties by integrating analyses of high-
62 resolution satellite remote-sensing data, real-time *in situ* observational data from multiple
63 points, periodically updated social statistics, and real-time social conditions reported on the
64 Internet and TV broadcasts. However, this approach may be applied only to the past 20 or 30
65 years.

66 The 20th century has been called the century of video (Akahori, 2001). Although the
67 amount of data that can be acquired from videos is much less than that from the Internet in the
68 21st century, there is still a tremendous amount of information available in video form that has
69 been archived as historical documentation since the establishment of broadcast TV stations
70 after the Second World War. Many of the archived videos are considered to be news programs,
71 but they also include many documentary programs about nature or social issues. These
72 documentary TV programs covered domestic issues in many countries, as well international
73 content. They should therefore be useful in retrieving the relationships among society, people's
74 lives, and the landscape in specific past eras and in different regions. In particular, we may be
75 able to obtain invaluable information about areas where accessible information has been quite

76 limited because of the remote nature of some locations and restrictions imposed by local
77 political systems.

78 We tried to retrieve information about the past relationships among society, people's
79 life, and the landscape in the Republic of Sakha (formerly the Yakut Autonomous Soviet
80 Socialist Republic) in Siberia at the end of the 1980s by watching documentary TV programs
81 that were broadcast by the Japanese public broadcast station (NHK) about 30 years ago. In this
82 region, the vulnerability of both the ecosystem and the ethnic minorities to climate change is
83 very high (Ksenofontov et al., 2017; Gladun and Ivanova, 2017), but the amount of accessible
84 information to foreigners was very limited under the communist regime in the 1980s. The aim
85 of this study is to clarify the usability and issues for related to the data mining old TV programs
86 to determine the past relationships among society, people's life, and the landscape. We expect
87 to reveal the truth of societal situation in eastern Siberia before actively conducting
88 ethnographical and natural field works by foreign researchers.

89

90 **2. Material and methods**

91 This study was conducted in the second half of 2021 as part of a trial study of academic use of
92 archived NHK TV and radio programs (hereafter, the "trial study"). The study is entitled
93 "Mining information about people's lives and the landscape in Eastern Siberia in the 1980s by
94 rescuing past videos." People who are accepted as part of the trial study are allowed to watch

95 a limited number of old TV and radio programs that have been cleared of any potential
96 copyright infringement problems, from among about one million archived programs (Miyata
97 and Toriyabe, 2018). Since 2010, the secretariat of the trial study has accepted a total of 244
98 participants as of Aug. 2022 (<https://www.nhk.or.jp/archives/academic/>; in Japanese; accessed
99 4 Aug. 2022).

100 In this study, we selected 3 episodes from the 12-part “NHK Special: The Arctic
101 Circle”: the 4th episode, “The permafrost region in Siberia and exploration of the graveyard of
102 mammoths” (originally broadcast on the NHK general channel on 30 July 1989); the 5th
103 episode, “Pursuit of the last 20 genuine Yukaghir—Arctic ethnic policy of the Soviet Union”
104 (originally broadcast on the NHK general channel on 27 August 1989); and the 6th episode,
105 “The main artery in Siberia—traveling downing the Lena River under the midnight sun”
106 (originally broadcast on the NHK general channel on 24 September 1989). Each program was
107 about 1 h long.

108 We watched the target TV programs, which had been recorded on a DVD-R at the
109 NHK broadcasting museum in Tokyo. The first author (NS) watched the target TV programs
110 on 21 October (3 h), 26 October (3 h), 28 October (3 h), and 29 October in 2021 (3 h), for a
111 total of 4 viewings of each episode. In addition, the second author (AK) watched the target TV
112 programs on 24 March (3 h) and 25 March in 2022 (3 h), for a total of 2 viewings of each
113 episode.

114 We were not allowed to take moving images out of the museum. Capturing, recording,
115 and photographing of moving images were also strictly prohibited. However, we were allowed
116 to use about 20 captured still images prepared by the secretariat for the purpose of presentation
117 and publication, and we did in fact obtain 20 captured still images in JPG format from the target
118 TV programs. While watching the target TV programs, we noted important points from the
119 narration and subtitles on paper. In addition, before watching the target TV programs, we read
120 through the publications affiliated with the documentary (Arctic-NHK large documentary
121 [volume 2 and 3], 1989).

122

123 **3. Results**

124 The information retrieved from each target TV program is summarized in the following
125 sections. The focus is on the overall structure, locations, and major information obtained.

126

127 **3.1 Episode 4: “The permafrost region in Siberia and exploration of the graveyard of** 128 **mammoths”**

129 *Episode structure and locations*

130 This issue focused on the competition to find mammoth tusks from the viewpoints of the
131 Ministry of Geology, the Mammoth Committee (a group of scientists), and local people.
132 Mammoth tusks were important natural resources, especially to acquire foreign currencies.

133 This issue featured the news-gathering activities of Dr. N. Vereshchagin (Н. Верещагин), who
134 was a member of the Mammoth Committee. Featured locations included the Lena River,
135 Yakutsk, Berelekh River, Chokurdakh, Leningrad (now Saint Petersburg), Yuribei River
136 (Western Siberia), Khantashin coast, and Khroma River (Fig. 1). The episode timeline,
137 locations, and contents are summarized in Table 1.

138 *Major information*

139 Mammoth tusks, considered to be a substitute for ivory, were important export goods. The
140 price of high-quality good mammoth's tusks was about 300 USD per 1 kg. In the permafrost
141 zone (the river basin for the Indigirka River [река Индигирка] and the Berelekh River), 40
142 million frozen mammoths are estimated to have been preserved over a period of about 10,000
143 years. A preserved 7-year-old male mammoth was discovered in 1977 about 2 m underground
144 at a gold-mining site in the Yakut Autonomous Soviet Socialist Republic. His whole body,
145 including hair and flesh, was completely frozen. He was considered to have lived about 20,000
146 years ago.

147

148 People searching for tusks gathered around the town of Chokurdakh (Fig. 2a, b). The town,
149 where people usually relied on fishing and reindeer grazing to make a living, was alive with
150 activity, similar to a gold rush. The price of tusks at the time reached 9 Soviet rubles (2,000
151 Japanese yen) per 1 kg. Local people could earn more money finding tusks than they could in

152 their main occupations. Mammoth tusks were sometimes dug illegally, such as in the example
153 from the Edoma layer (Fig. 2c).

154

155 To find the mammoth tusks and skeletons of entire bodies, a joint investigation between the
156 Mammoth Committee and the Ministry of Geology, was conducted. Even the Mammoth
157 Committee, which conducted scientific investigations, considered the commercialization of
158 mammoth tusks and body skeletons to acquire foreign currencies. In addition to bodies and
159 tusks of mammoths being found (Fig. 2d), other items are often found nearby, such as a knife
160 from the Paleolithic, which was made of mammoth tusk.

161

162 A 4-month-old female mammoth (body length = 125 cm) was discovered on the Yamal
163 Peninsula (полуостров Ямал). Her whole body, including ear hair and tongue, was preserved.
164 This was the third such discovery in the world at that time. On the Khroma River, about 250
165 km from Chokurdakh, an entire body frame of a 75-year-old male mammoth was discovered—
166 the 19th such discovery in the world. Interestingly, they did not find a tusk. This discovery was
167 supported by local informers, who have received rewards for such information since Czarist
168 Russia.

169

170 Fur farmers and traditional craftsmen working on mammoth tusks to earn a living were
171 interviewed. At the time, however, the government of the Yakut Autonomous Soviet Socialist
172 Republic could not directly export these goods.

173

174 **3.2 Episode 5: “Pursuit of the last 20 genuine Yukaghir—Arctic ethnic policy of the Soviet
175 Union”**

176 *Structure and locations*

177 This issue focused on the relationship between nomadic peoples in Chukchi and managers of
178 their sovkhoz (a state-run farm in the Soviet Union), as well as the conditions encountered by
179 ethnic minorities under the Soviet planned economy and ethnic policies. The episode featured
180 the children of nomadic peoples in Chukchi, as well as Yukaghir hunters. The children went
181 back and forth between a boarding school in the sovkhoz and their homes in the pasture.
182 Featured locations include pastures of Chukchi (Chukotka [Чукотка]; now the Chukotka
183 Autonomous Okrug), Rydkuchi (the sovkhoz in Chukotka), Pevek (a main city of Chukotka),
184 the Yukaghir Uplands, Zyrianka (Зырянка), Nelemnoe Village (the original home of the
185 Yukaghir), and Yakutsk (the Yakutia Academy of Linguistics) (Fig. 1). The episode timeline,
186 locations, and contents are summarized in Table 2.

187

188 *Major information*

189 The Chukchi, with a population of about 16,000, were assigned to a sovkhos in the 1930s
190 during the Stalin era. The sovkhos controlled the grazing of reindeer by Chukchi and contracted
191 for a quota of reindeer meat. It offered incentives to the Chukchi—for example, free provision
192 of boarding school and shuttle services by helicopter between their home in the pasture and the
193 school in the sovkhos. Children of ethnic minorities received an education in Russian. As time
194 passed, Russian and Chukchi groups mixed. As a result, a new generation of half Russian/half
195 Chukchi was formed who lived in cities and not on the tundra. The tundra lifestyle also changed,
196 such as the food preferences of the Chuchi.

197

198 The government of the Soviet Union attempted to control Chukchi cultural activities. For
199 example, it prohibited the rituals of shamanism because they were perceived to be primitive.
200 However, Chukchi often continued to perform traditional ceremonies to protect reindeer from
201 wolves. The government of the Soviet Union also advanced a collectivization policy for ethnic
202 minorities. For instance, more than 10 different ethnic minorities were assembled in Nelemnoe
203 Village, the place of origin of the Yukaghir. Yukaghir inhabitants accounted for half of the
204 inhabitants (227).

205

206 The Soviet government's policy to activate local economics depended on the development of
207 Siberian resources. To do so, it advanced organizations and affirmative actions for ethnic

208 minorities. These included introducing kindergarten, other schools, and medical services (e.g.,
209 flying a doctor to remote regions). At the same time, inhabitants could select their ethnic
210 identification by themselves when they turned 16 years old, at which time they received an
211 ethnicity certificate. The Russian language began to permeate young people's lives as a
212 common language, and minority languages and traditions began to be lost. There were,
213 however, attempts to preserve the Yukaghir language at the Yakutia Academy of Linguistics;
214 these attempts were conducted in the Yukaghir language.

215

216 Increasing reindeer production was a significant issue for the Soviet government. Therefore,
217 the sovkhos increased the production quota every year. At the same time, however, one-third
218 of the inhabitants of the tundra and taiga flowed into cities during a five-years period (about
219 1,000 people per year). Consequently, the population of experts on reindeer grazing rapidly
220 decreased at the same time as the production quota was increasing.

221

222 It presumed that the pure-blooded Yukaghir was about 20 peoples. The Yukaghir hunted large
223 deer with their hunting dogs (Laika dogs) (Fig. 3). They moved from place to place in the taiga,
224 relocating their hunting huts (called Urasa; Ураса) as they moved to follow the deer.

225

226 **3.3 Episode 6: “The main artery in Siberia—traveling down the Lena River under the**
227 **midnight sun”**

228 *Structure and locations*

229 This episode focused on the Soviet appeasement policies regarding economic activities and
230 ethnic minorities in the perestroika era in the Lena River basin, which was the main artery for
231 transporting goods and people in Siberia. It featured a cruise of the freighter *Taishet* (Тайшет)
232 on the Lena River route, as well as the Yakutian people who visited the Osuokhai festival
233 (Lukina, 2018) grounds in Suntar Village, where local cultural practices had been prohibited
234 by the Soviet government for decades. Featured locations included Tiksi Port; Lena Station on
235 the trans-Siberian Railway in Ust’ Kut; Osetrovo Port in Ust’ Kut; the Lena River and Yakutian
236 villages on the river; Mirny; Kirensk, Yakutsk Port; Yakutsk (capital of the Yakut Autonomous
237 Soviet Socialist Republic); and Suntar Village (on the Vilyuy River [река Вилюй]) (Fig. 1).
238 The episode timeline, locations, and contents are summarized in Table 3.

239

240 *Major information*

241 The Lena River route was the main artery of transport for both goods and people. An important
242 upstream point of the Lena River route was Osetrovo Port in Ust’ Kut, which is adjacent to
243 Lena Station on the trans-Siberian Railway (Fig. 4a, b). The downstream (end) point of the
244 Lena River route was Tiksi Port, where the Lena River route connects with the Arctic Ocean

245 route (Fig. 4h). During the period when Tiksi Port operates (from middle June to late
246 September), goods such as daily necessities, building materials for the development of Siberian
247 resources, timber, and cars are transported on the Lena River (about 5000 vessels annually).
248 Any delays caused by bad weather or waterway conditions seriously affect the economics of
249 the entire river basin and the services of the trans-Siberian Railway, and the waterway changes
250 every year depending on the spring snow melt.

251

252 At the time this episode was filmed, the upper reaches of the Lena River were fully covered by
253 taiga (Fig. 4c). The headquarters of the Lena River route was located in Kirensk (in the upper
254 reaches). There are dangerous sections in the middle reaches of the Lena River. An example of
255 such a location, with high bluffs on both banks, is shown in Fig. 4d. Yakutsk Port is located on
256 the middle reaches (Fig. 4e), as is Yakutsk, the capital of the Yakut Autonomous Soviet
257 Socialist Republic and the largest city in the basin (Fig. 4f). The river is wide in the tundra-
258 covered lower reaches (Fig. 4g). Tiksi Port was highlighted as a location where vessels
259 travelling the Arctic route could not directly access the shore. Freight had to be transferred to
260 another vessel to travel the shallow brackish waters. Planning of a port expansion was discussed.

261

262 Russians have been interested in the mineral resources (gold, silver, and diamonds) in this area
263 since the times of the Czars (i.e., for at least 350 years). These resources were also a significant

264 way for the government of the Soviet Union to acquire foreign currencies. A vein of diamonds
265 was first discovered in 1954. An example of a diamond mining vessel in Mirny is shown in
266 Fig. 5c. Other abundant natural resources included timber (Fig. 5a), coal (Fig. 5b), and fur
267 (sable and silver fox; Fig. 5d). Foreign currencies were earned by exporting timber to Japan
268 and Europe (1.5 million trees per year) and fur.

269

270 The fur trade has been important for a long time in this area. After the fort was built by Cossacks
271 in 1632, Czarist Russia conciliated ethnic minorities and acquired the fur of sables, wolves,
272 and foxes. To reduce the amount of fur taxes they had to pay, Yakutian people formally
273 converted to the Russian Orthodox Church. However, many of them still privately believed in
274 shamanism, as can be seen in the remains of burial structures in the river basin.

275

276 In 1988, the Osuokhai festival, which had not been held since the Russian Revolution, was
277 revived after 70 years in Suntar Village (Fig. 6a, b). The festival was revived to celebrate both
278 the Soviet Union and ethnic groups under the new perestroika-era ethnic policies. About 20,000
279 people visited Suntar Village, which had a population of only 8500. Many visitors traveled a
280 great distance (e.g., from Armenia and the Caucasus) with the hopes of making a quick fortune
281 by selling at the event.

282

283 The episode ended with a visit to Suntar Village, the first place known to be inhabited by
284 Yakutian people. Historically, the Russians took notice of Yakutians because they knew where
285 diamonds were located. Since 1954, the Soviet Union had sent more than 100 investigative
286 parties to the Lena River basin and discovered many rich diamond veins.

287

288 **4. Discussion**

289 Our target TV programs reported on the circumstances of people's lives and the landscape in
290 Siberia at the end of the 1980s during the glasnost (ГЛАСНОСТЬ) transition period under the
291 perestroika, when information was becoming more available to foreign countries. Figure 7
292 summarizes these relationships as determined from our viewing of the above-described
293 episodes.

294

295 The primary aim of the production of our target TV programs was to clarify conditions in
296 Siberia at the end of 1980s. It was a period of transition from the planned economy of the Soviet
297 Union, which was hidden behind a veil of strict governmental control during the cold war era,
298 to the challenge of perestroika (i.e., breaking down and transforming the old economic system).
299 News-gathering activities in the Yakut Autonomous Soviet Socialist Republic, which was
300 located far from the central government of the Soviet Union, were particularly challenging and
301 ambitious. The region is extremely cold, and the Republic of Sakha was not very familiar to

302 the Japanese public, although there had been exhibitions of mammoths in museums and
303 international expositions. The numbers of visitors from Japan to the Republic of Sakha are
304 quite limited, even in the 21st century, because there are few sightseeing spots and little
305 business activity. For these reasons, the area remains physically and mentally remote to most
306 Japanese.

307 A primary current concern about Siberia, including the Republic of Sakha, is climate
308 change. Global warming has impacted ecosystems and humans in a variety of ways, such as
309 the thawing of permafrost (Takakura, 2016; Romanovsky et al., 2017; Biskaborn et al., 2019;
310 Takakura et al., 2021), emission of methane (a greenhouse gas) (Schuur et al., 2018), exposure
311 of frozen viruses and bacteria in the permafrost (Miner et al., 2021), risk of extreme floods
312 (Takakura, 2016; Tei et al., 2019), changes in carbon and water budgets due to changing land
313 cover/land use and growing periods (Loranty et al., 2016; Loranty et al., 2018; Schuur and
314 Mack, 2018), and changes in food security (Bogdanova et al., 2021). Russian, European, and
315 Japanese scientists have collaborated in various fields, including hydrology, meteorology,
316 ecology, ethnography, and economy, since the 1990s. In fact, NHK broadcast a program
317 focused on the impact of global warming in Siberia (“On the ice”;
318 <https://www.nhk.jp/p/wdoc/ts/88Z7X45XZY/episode/te/KG7ZL5Z99R/>, in Japanese,
319 accessed 4 Aug. 2022), which was produced by a Germany production company (Altayfilm;
320 <https://www.altay.film/>, accessed 4 Aug. 2022).

321 In our target TV programs, program producers covered some topics but ignored others.
322 For example, they highlighted subsistence topics such as reindeer grazing by the Chukchi and
323 hunting by the Yukaghir. However, they did not focus on other subsistence issues, such as
324 horse grazing (unique to the Yakutian people; Takakura, 2010, 2016; Nakada and Grigorev,
325 2019), fishing (Ksenofontov et al., 2017; Ksenofontov et al., 2018), and forest use (Fujioka et
326 al., 2020; Kotani et al., 2021; Shin et al., 2022). These subsistence topics may not have been
327 suitable or desirable as subjects of a TV program highlighting life in this part of Siberia in the
328 1980s. In addition, historical background and unconscious bias of people at that time and the
329 photography permission of the Soviet government also may be considered to limit the subjects
330 of a TV program. However, to accurately clarify the relationship among society, people's lives,
331 and the landscape at that time, information on these issues is required. In addition, to compare
332 the past with the present, it is preferable to specify the detailed location. These highlight a
333 limitation to data mining by watching old TV programs. There is a gap between the more
334 limited intent of the program producers and the more comprehensive aim of academic users.
335 Viewers of these types of programs must be aware of this type of potential information gap
336 when using the data gained from past programs.

337 In this study, we overcame limitations related to copying video by writing notes about
338 important information from the target videos. Although we had no problem with data mining
339 by watching and taking notes from the target videos, the total length of our target programs

340 was only 3 h, and the programs had been pre-selected to avoid any issues with copyright. If we
341 were to try to efficiently and automatically retrieve useful information from the huge amounts
342 of available videos archived at various broadcast stations, many difficulties would arise,
343 including copyright issues. As media and technology have progressed, the Japanese
344 government has revised its copyright law ([https://elaws.e-](https://elaws.e-gov.go.jp/document?lawid=345AC0000000048)
345 [gov.go.jp/document?lawid=345AC0000000048](https://elaws.e-gov.go.jp/document?lawid=345AC0000000048), in Japanese, accessed 4 Aug. 2022), but
346 difficulties remain and sometimes must be judged on a case-by-case basis. At the same time,
347 data-mining technologies (e.g., machine learning) are expected to continue to grow
348 exponentially in the future, and there will be considerable difficulties in adhering to copyright
349 and privacy laws as we attempt to use previously broadcast TV programs to gather data.
350 Recently, filmed images of the landscape of Yakutsk (e.g., “Old Yakutsk” on YouTube;
351 https://www.youtube.com/channel/UCjvpc_q6ynA6NPbDD1JOuKQ, accessed 4 Aug. 2022)
352 have been published on the Internet. The free availability of these moving images may allow
353 us to extract useful information, but privacy and copyright issues are still a concern.

354

355 **5. Conclusions**

356 By watching 3 episodes of a documentary TV series archived by NHK, we were able to retrieve
357 information on the relationship between the people’s lives and the landscape in the Yakut
358 Autonomous Soviet Socialist Republic in Eastern Siberia at the end of the 1980s, with a

359 particular focus on economic and ethnic policies. The use of this type of information can be
360 limited by the intent of the programs' producers, as well as by copyright and privacy issues,
361 and historical background and unconscious bias of people at that time. We need to further
362 develop techniques for mining useful information from the tremendous volume of previously
363 broadcast TV programs.

364

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370

371 **Competing interests**

372 The authors declare that no competing interests exist.

373

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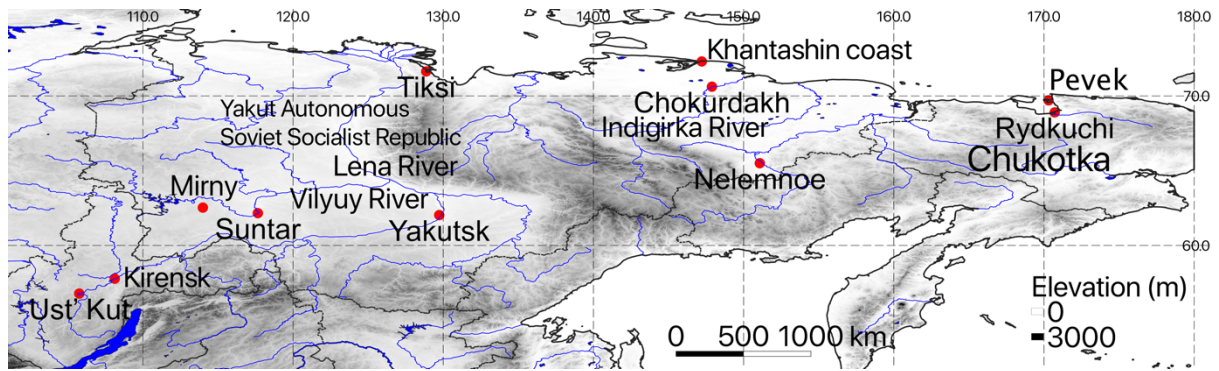
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496

497 **Figure caption**



498

499 Fig. 1 Major locations in the Yakut Autonomous Soviet Socialist Republic (now the Republic

500 of Sakha) and Chukotka (now the Chukotka Autonomous Okrug) that appeared on the 3 TV

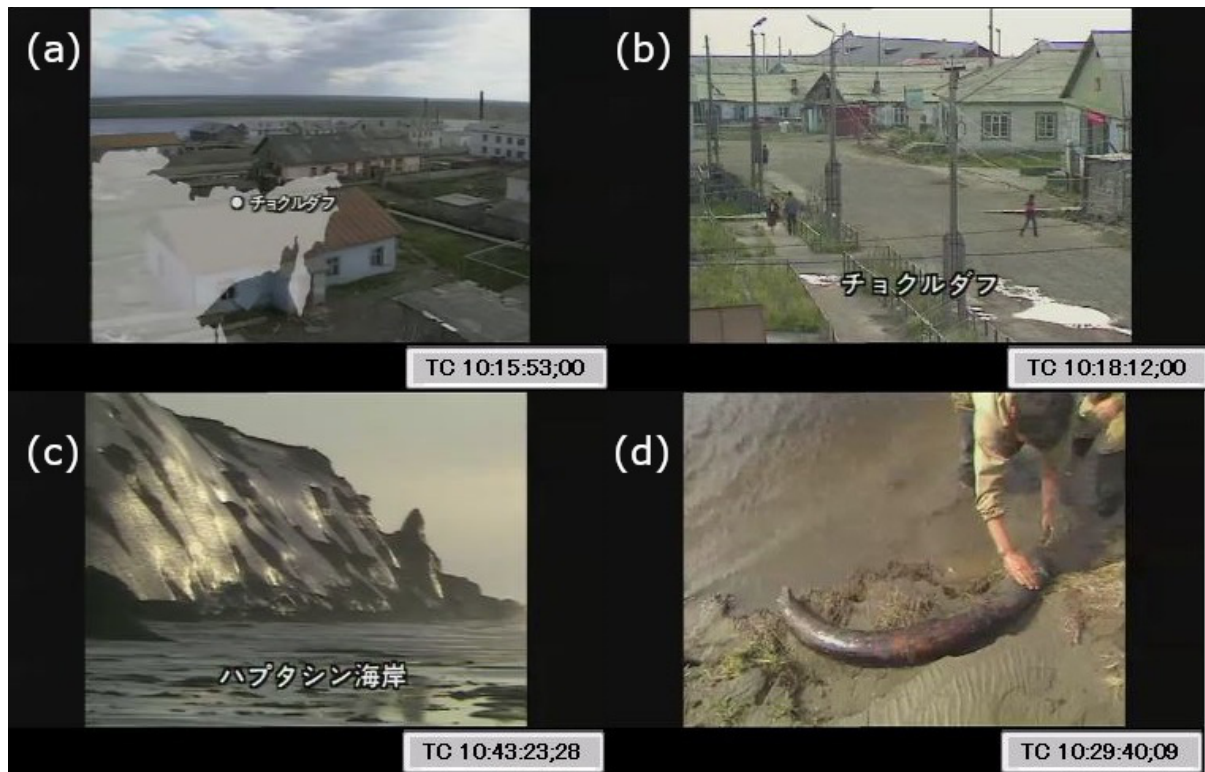
501 episodes that were viewed. The red dots represent locations discussed in the programs.

502 Boundary, river, and lake data come from the “1:10 m cultural vectors” published by Natural

503 Earth (Natural Earth, 2022). Elevations come from the GTOPO30 digital elevation model

504 (USGS, 2018). Latitude and longitude values for each location come from the “Google Maps”.

505



506

507

508 Fig. 2 Settings related to competition for the excavation of mammoth tusks. (a, b) The

509 Chokurdakh area; (c) the Khantashin coast on the Arctic Ocean, showing the Edoma layer

510 outcrop; (d) discovery of a tusk.

511

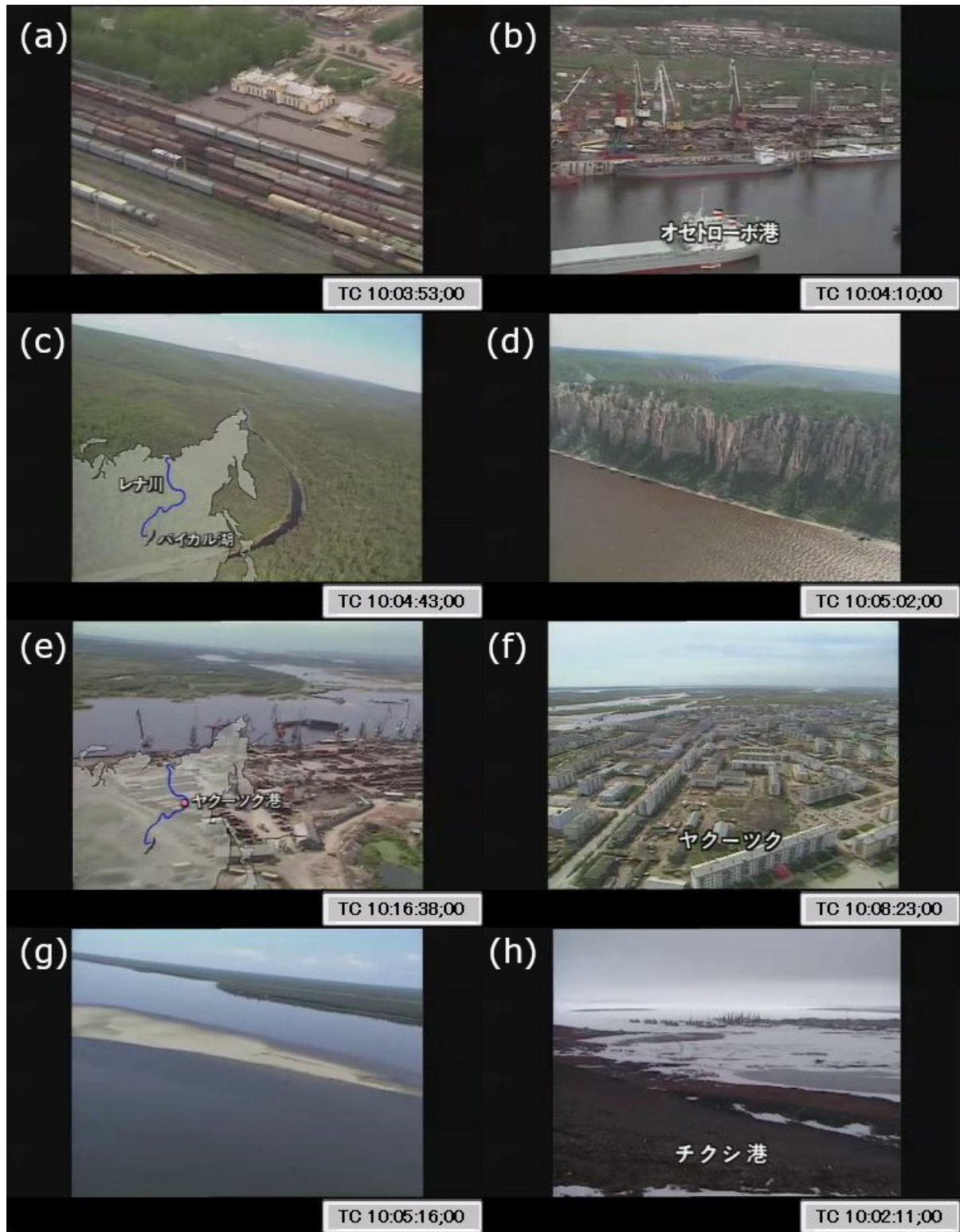


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514 Fig. 3 Big deer hunting by Yukaghir hunters with their hunting dogs.

515



516

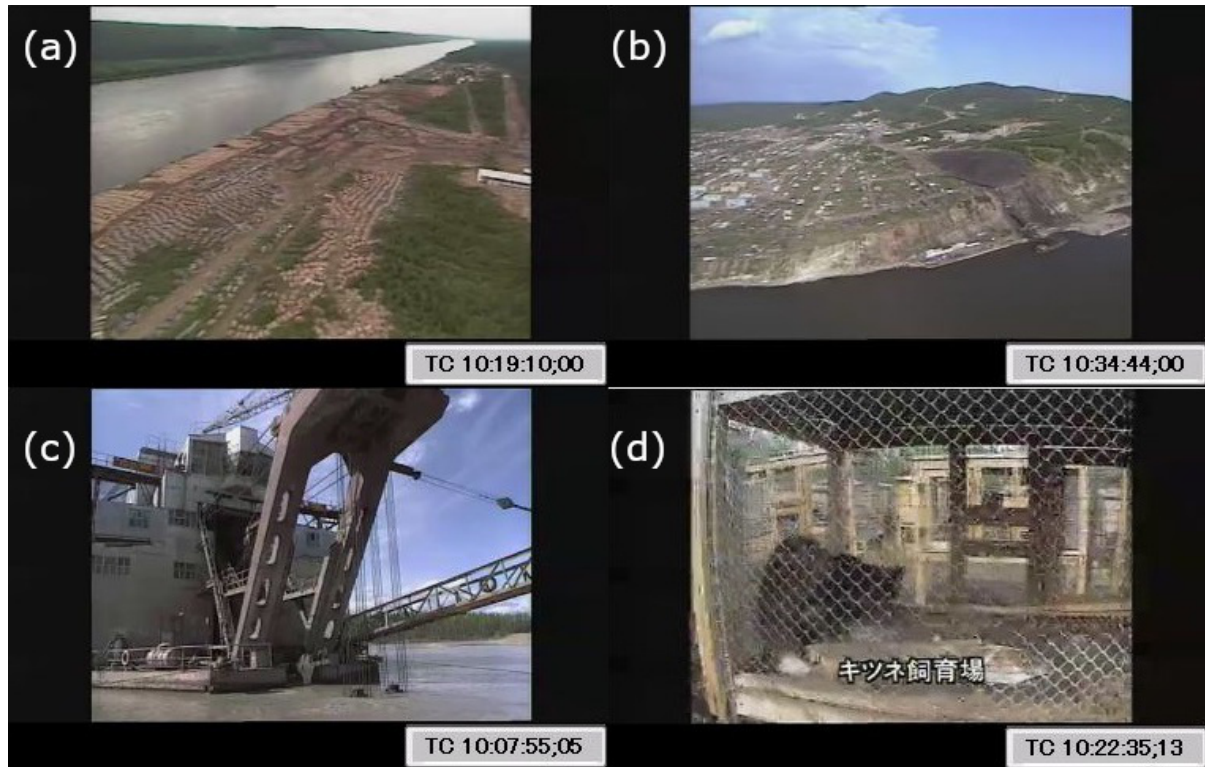
517

518 Fig. 4 Landscape of the Lena River from the upper reaches to lower reaches. (a) Lena Station

519 on the Siberian Railway in Ust' Kut; (b) Osetrovo Port in Ust' Kut; (c) the upper reaches of the

520 river (taiga forest); (d) a dangerous location in the middle reaches of the Lena River route
521 (surrounded by high bluffs); (e) Yakutsk Port, the distribution base in the middle reaches of the
522 Lena River; (f) Yakutsk, the capital of the Autonomous Republic of Yakutia; (g) lower reaches
523 of the river (note the river width has increased); (h) Tiksi Port, a junction between the Arctic
524 and Lena River routes. The numerical values at the lower right of each image indicate the
525 elapsed time on the video.

526



527

528

529 Fig. 5 Relationship between the acquisition of natural resources and the landscape on the

530 middle reaches of the Lena River. (a) Central location for collection of timbers; (b) shipping

531 point of coal from open-cast coal mines; (c) diamond mining vessel; (d) a fox on a farm in

532 Yakutsk.

533



534

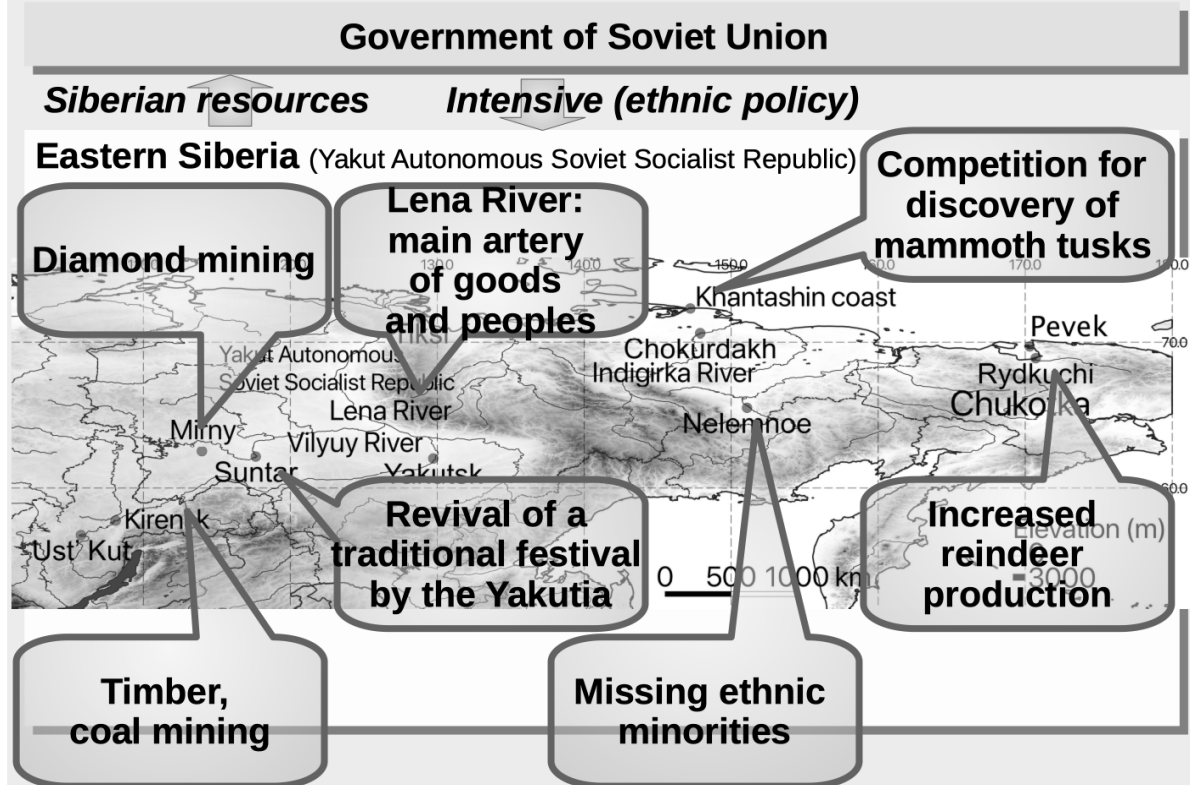
535

536 Fig. 6 The origin of Yakutian people and the revival of a traditional festival. (a) Suntar Village

537 on the Vilyuy River; (b) people participating in an ethnic dance at the Osuokhai festival.

538

Perestroika (at the end of 1980s) : A rapidly changing social system Soviet government



539

540

541 Fig. 7 Summary of the relationship among society, people's lives, and the landscape in the

542 Yakut Autonomous Soviet Socialist Republic at the end of the 1980s.

543

544

545 **Table**

546 Table 1. Summary of the timeline and content of episode 4, “The permafrost region in Siberia
 547 and exploration of the graveyard of mammoths.”

Elapsed time	Location	Content
00:00	–	Prologue
00:02	Ministry of Geology	Interviews about the discovery of mammoth tusks
00:09	Reaches of the Berelekh River (река Бёрёлёх)	A typical area to discover mammoth tusks
00:15	Chokurdakh (Чокурдах)	Base camp of discovery of mammoth tusks
00:19	Leningrad (Ленинград; now Saint Petersburg [Санкт-Петербург])	Recruitment of workers for discovery of mammoth tusks by Ministry of Geology
00:26	Riverside of Indigirka	Cooperative survey by Mammoth committee and Ministry of Geology
00:32	Yuribei River (река Юрибей)	Discovery of a young frozen mammoth
00:37	Yakutsk (Якутск)	Fur factory and facility for manufacturing items from tusks
00:43	Khantashin coast ¹ (морской берег Ханташинский) and Khroma River (река Хрома)	Discovery of mammoth tusks and the whole-body skeleton of an old mammoth
00:56	–	Epilogue

548 ¹ Subtitles in the documentary TV program showed Khaptashin coast. However, we used the
 549 notation referred to a Russian map (Якутское аэрогеодезическое предприятие, 1998).

550

551 Table 2. Summary of the timeline and content of episode 5, “Pursuit of the last 20 genuine
 552 Yukaghir—Arctic ethnic policy of the Soviet Union.”

Elapsed time	Location	Content
00:00	–	Prologue
00:02	A tundra in Chukotka (Чукотска)	Reindeer grazing in Chukotka
00:07	Rydkuchi (Рыдкучи)	Children who went to boarding school and returned to their homes located on pastureland
00:16	Pevek (Певек)	The new generation of Chukchi who were half Russian/half Chukchi and grew up in towns, not on pastureland
00:29	Yukaghir (Юкагир) Uplands, Zyryanka (Зырянка), Nelemnoe Village (село Нелемное)	Landscape around Yukaghir Village; policy for assimilation of Arctic ethnic minorities by the Soviet Union; flying doctor
00:40	Yukaghir Uplands	Hunting by genuine Yukaghir
00:50	Yakutia Academy of Linguistics	Conservation of the Yukaghir language
00:52	Rydkuchi	Plan to increase production of reindeer and movement of ethnic minorities under perestroika
00:56	–	Epilogue

553

554 Table 3. Summary of the timeline and content of Episode 6, “The main artery in Siberia—
 555 traveling down the Lena River under the midnight sun.”

Elapsed time	Location	Content
00:00	—	Prologue
00:02	Tiksi Port (порт Тикси)	Junction between the Arctic and Lena River routes; area around Tiksi Port
00:03	Lena Station in Ust’ Kut (усть Кут)	A concentrated point for goods; area around Lena Station
00:04	Osetrovo Port (порт Осетрово) in Ust’ Kut	Upstream point of the Lena River route; landscape around Osetrovo Port
00:04	Lena River	Landscape from the upper reaches to lower reaches
00:07	Diamond mining vessel	Diamond mining
00:11	Mirny (Мирный)	Site of open-cast diamond mines; selection of diamonds
00:12	Middle reaches of the Lena River, Kirensk (Киренск)	A dangerous spot for travel on the river
00:16	Yakutsk Port, Lena Station	Goods pile up owing to travel delays on the Lena River route
00:19	Central timber collection location on the middle reaches of the Lena River	Timber for export along the Lena River route
00:22	Fox farm in Yakutsk	Acquisition of foreign currencies through the farming of animals for fur
00:27	Villages on the Lena River	Village landscape
00:29	Suntar Village (село Сунтар)	People visiting Suntar for the Osuokhai (осуохай) festival
00:34	Shipping point of coal from open-cast coal mines on the middle reaches of the Lena River	Open-cast coal mines
00:41	Osuokhai venue of Suntar Village	Osuokhai festival
00:48	Mouth of Lena River, Tiksi Port	Underdeveloped port facility (difficult navigation by river ice)
00:56	—	Epilogue

556