ClimActor 2.0: A spatialized database of subnational climate pledges and emissions data

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ClimActor 2.0: A spatialized database of subnational climate pledges and emissions data

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Abstract

ClimActor 2.0 is an open, spatialized database that compiles climate targets, action plans, and self-reported emission inventories from subnational governments, including cities, municipalities, states and regions, worldwide. The dataset provides standardized administrative boundaries for each entity, enabling direct linkage to geospatial data such as population, GDP, land cover, and other globally-gridded datasets. Each record is anchored to a unique identifier that connects decision-making authorities to their corresponding geometries. The database integrates information from 14 major climate disclosure platforms and reporting initiatives, complemented with a few national-level datasets. In total, ClimActor includes over 15,000 entities that participate in a national or transnational climate initiative, of which more than 10,000 of these entities have adopted either a climate mitigation target or plan. In addition to the harmonized spatial boundaries, ClimActor 2.0 provides four harmonized core datasets: aggregated emissions, sectoral emissions, climate targets, and climate plans, in addition to network participation data. Users can utilize the data as a standalone dataset or as an open-source R statistical computing software package, which includes a set of cleaning and matching functions that allow users to easily combine other datasets with ClimActor 2.0 for a wide range of subnational climate action analyses.

Background & Summary

Cities and subnational governments, broadly defined as administrative levels below national governments, remain central actors in addressing climate change. Since the 2015 Paris Agreement officially recognized the importance of engagement of "all levels of government,"[1] the number of city and regional governments participating in transnational climate initiatives or pledging their own mitigation, adaptation or other climate effort has exceeded more than 15,000 recorded on the UN's Non-State Actor Zone for Climate Action (NAZCA) platform as of September 2025. These efforts have been considered critical in supporting implementation of national climate goals, building capacity at local levels, allowing for policy experimentation and innovation, and filling leadership voids in countries where national governments have backslided.[2–5]

In 2020 we developed the first version of the ClimActor dataset,[6] which represented the first systematic effort to compile and harmonize around 10,000 subnational entities pledging climate actions worldwide. It created a foundation for comparative analysis of subnational climate action by introducing a standardized naming convention that enabled cross-identification across datasets. Each record was accompanied by information on population, administrative hierarchy, approximate geographic location

(identified by latitude/longitude), and participation in climate initiatives and reporting platforms, such as CDP (formerly the Carbon Disclosure Project) or the Global Covenant of Mayors for Climate and Energy (GCoM).

Here we present ClimActor 2.0, a major update that expands the original dataset with spatialized boundaries for all covered entities, which includes over 15,000 entities that participate in national or transnational climate initiatives. The spatialization and identification of spatial boundaries allows users to directly link subnational climate pledges and self-reported climate plan and emissions data to globally-gridded datasets on population, GDP, land cover, or observed and projected emissions. By embedding each subnational entity's commitments in geographic space, ClimActor 2.0 enables applications that extend beyond policy analysis and supports integration with earth system modeling, climate risk assessments, and other analyses of climate policy co-benefits such as air quality, biodiversity conservation, or equity impacts, among other questions.

Method

The methodological updates underlying ClimActor 2.0 combine nominal matching, geographical boundary harmonization and climate data integration to ensure that all climate data is linked to both a specific decision-making entity (i.e., municipal, local/city-level, city or regional government) and a specific geographical location (i.e., region, city, district, etc.). A summarized view of the workflow is shown in Figure 1.

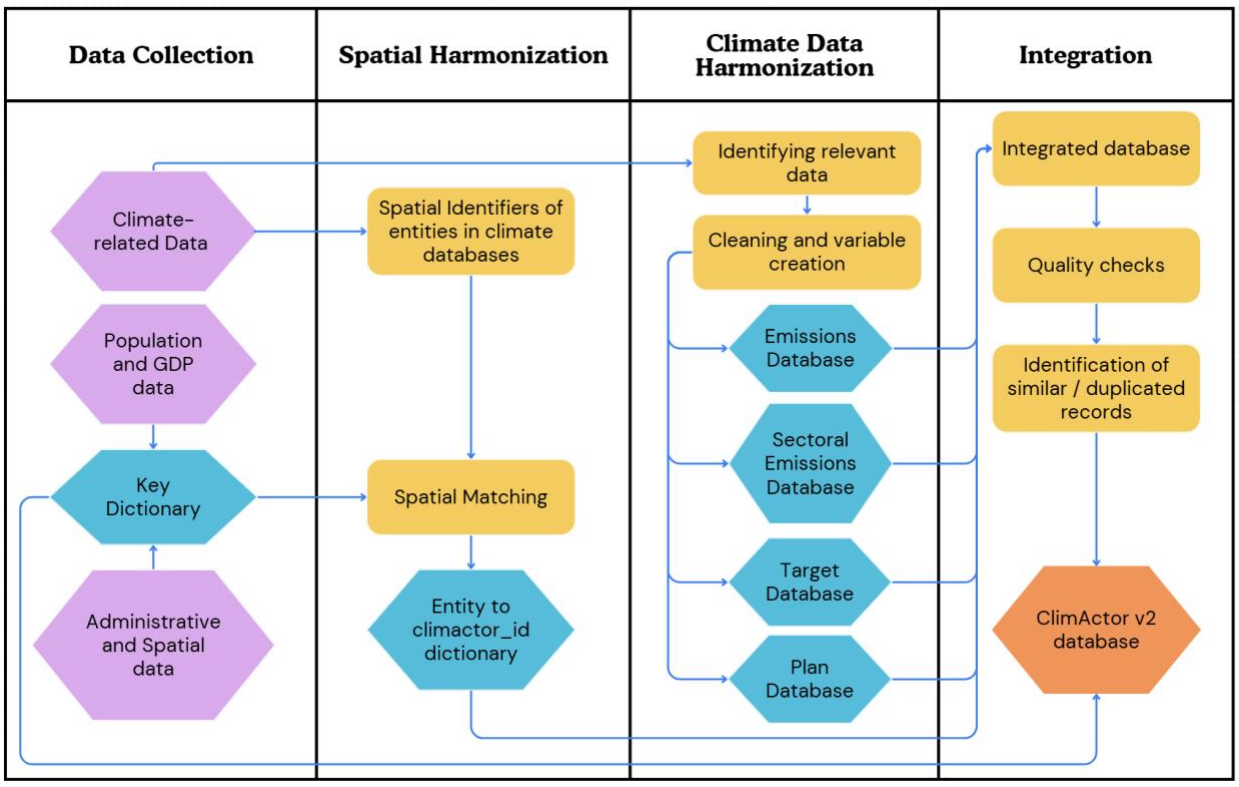

Figure 1. Workflow for development of the ClimActor 2.0 database.

In order to implement our matching and data harmonization process, we constructed a key dictionary for 204 countries and territories that integrates both spatial information (i.e., administrative subdivisions) as

well as descriptive information of the administrative entities, specifically each unit's official name and entity type as defined within its respective national administrative system. We obtained this information from multiple data sources (see Online Table 1), most notably the Global Administrative Database (GDAM v 4.1),[7] as well as from national sources for 36 countries where we found the GDAM administrative boundary data to be outdated or insufficiently detailed. Using this information, we built a key dictionary that includes the complete name of each entity and its entity type in English and national languages, geographical location and structure within its country, population from the EU's Global Human Settlement Layer dataset (GHSL)[8] and and GDP data from Kummu et. al (2025)[9] respectively, and phonetic representations of its name produced by a set of phonetic algorithms[10] for each entity. The resulting key dictionary includes over 214,000 unique administrative entities with specific geometries, and over 1.5 million total records of administrative entities, including name variations based on common errors or language variations from Portuguese, Spanish, French, Italian and others.

Following the construction of the key dictionary, we proceeded to harmonize and match the data for all entities available in previously identified national and transnational initiatives that consolidate information on climate pledges, plans and emissions including dataset from the CDP, the GCoM, C40, China Carbon Neutrality Tracker and others (see Online Table 2). The harmonization process included two complementary workflows, the first one focused on nominal and spatial matching using the key dictionary as the reference, and the second one that harmonized each subnational entity's specific climate information (i.e., participation in transnational climate initiatives, emission reduction targets, self-reported emission data, climate plan information).

The first process involved an automated nominal and geographical matching, which combined two machine-aided approaches: first, matching based on common name variations or language-specific spellings of each entity; and second, a phonetic-based matching using the closest phonetic match of an entity's name compared to a set of ten phonetic representations produced by multiple algorithms (Caverphone, cologne, lein, metaphone, mra_encode, nysiis, onca, phonex, rogerroot, soundex, and statcan) implemented by Howard, II (2020). A significant improvement over the previous version of ClimActor[6] is the use of official names for all entities to prevent mismatches when multiple entities share the same name within a country. For example, Copenhagen (DNK) is considered both a city and a municipality, each with distinct climate commitments, population, GDP and emissions profile. For the automated matching stage, we used GHSL population data as a secondary validation check when self-reported figures were available, with a maximum allowable difference of 20%. If the discrepancy exceeded this threshold, the record was excluded from automatic name-based matching but could still be resolved through phonetic matching or in the subsequent manual review. These population checks not only account for differences in reporting years or demographic shifts but also help distinguish between entities with the same name that correspond to different administrative areas. This geo-matching procedure resulted in a dictionary linking each entity across all databases to its corresponding administrative unit and geometry, identified by a unique key variable, climactor_id. In total, this process produced slightly over 38,000 records of entities participating in one or more of the identified climate initiatives or networks, each matched to a standardized administrative boundary. Figure 2 illustrates the spatial distribution of these entities, with particularly high participation observed in Europe.

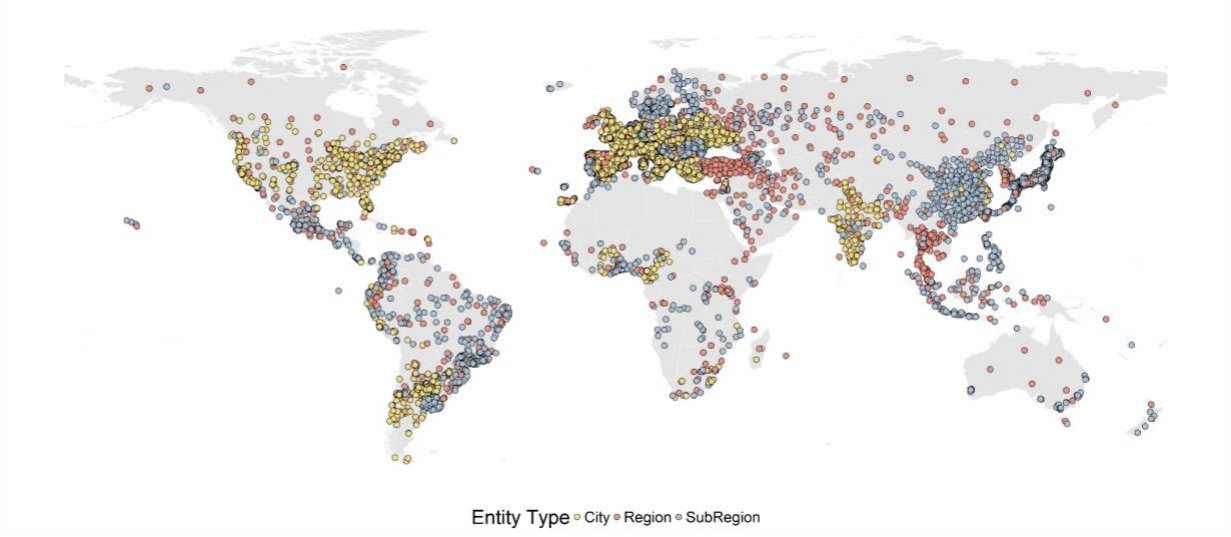

Figure 2. Global spatial coverage of subnational entities included in the ClimActor 2.0 database.

Next, after entities were matched with their spatial boundary, the second step focused on detailed cleaning and harmonization of climate information from each source, implemented through custom scripts and targeted string manipulation. Unlike the previous stage, this process relied less on automation and more on expert knowledge of the underlying databases and reporting guidelines of the organizations collecting the climate information. For example, CDP datasets for cities and regions were harmonized by referencing the CDP Questionnaire Guidance for cities and regions,[11] which specifies the relevant questions for emissions, targets and plans. This step resulted in the construction of four core datasets for each data source, covering aggregated emissions, sectoral emissions, climate target-setting, and climate plans, along with auxiliary datasets containing contextual data, actor information, and participation in networks and initiatives.

The final stage involved the integration of all datasets into a combined database for each type of climate data: aggregated emissions, sectoral emissions, mitigation targets, and climate plans. Here we integrated all datasets using the unique key variable (climactor_id) to group all climate information from the same administrative entity. Given the overlap among reporting initiatives such as CDP and GCoM, we identified duplicate records for emissions and targets by comparing coverage, scope and commitment characteristics. For emissions data, we also applied quality controls to flag unlikely or implausible values that may indicate reporting errors, such as per capita emissions below 0.02 tons per person or higher 40 tons per person, as well time-series anomalies (following Hsu et al, 2022)[12]. We also filled some gaps in emissions data based on data similarity using variables such as emissions, scope and sectors, wherever possible. While all records are retained in the database to allow users flexibility in selecting data for their specific analyses, these checks facilitate deduplication and the use of unique values for emissions and targets, even when reported through multiple national or transnational initiatives.

Input Data

The input data used for the construction of ClimActor can be classified as two types: a) administrative and geometry data, and b) climate-related data. Administrative and geometry data were sourced primarily

from GDAM 4.1. For 36 countries, we complemented or replaced these data with officially sourced or crowdsourced data[13] due to missingness or outdated geometries, particularly for lower level administrative entities that have undergone recent administrative boundary changes, such as Italy or Greece. From the full set of available administrative entities, we selected only those corresponding to subnational governments, on the basis that climate pledges and related decisions are made by recognized authorities. Administrative subdivisions without governing authority, such as planning zones or census units, were excluded from the key dictionary.

The climate-plan, mitigation targets, or emissions-related information is sourced directly from a curated list of repositories or national and transnational organizations that collect and disclose climate information from multiple sources and through different means. The list of data sources is not meant to be exhaustive, and future users can easily integrate additional climate data from updated versions of the curated database or entirely new data sources. While ClimActor's primary objective is to compile self-reported information, it also aims to address gaps in coverage, particularly in regions that have been traditionally overlooked outside of Europe and North America. We also incorporated national datasets on subnational climate efforts in Japan and China, which track the actions of their subnational entities through national reporting mechanisms rather than solely relying on voluntary disclosure platforms that are primarily English-based, such as GDP or GCoM. Future ClimActor versions will aim to further identify these types of non-English language datasets to increase geographical coverage.

Detailed records of the sources used for the administrative and geometry data, and climate-related data are available in Online Table 1 and Table 1 respectively.

Data Source	Description
Carbon Disclosure Project 2023 City-wide Emissions (CDP)[14]	Data is self-reported data on city-wide emissions disclosed by cities in 2023, drawn from section 2.1 in Cities 2023 questionnaire (743 entities)
Carbon Disclosure Project 2023 Full Cities Dataset (CDP)[15]	All data is self reported by cities via 2023 Cities Questionnaire. Collected through CDP-ICLEI Track (1019 entities)
EU Covenant of Mayors for Climate & Energy (2024)[16]	Open to all local authorities democratically constituted with/by elected representatives, linked to EU's climate and energy policy framework (7563 entities)
US Climate Mayors (2024)[17]	Network of nearly 350 mayors who demonstrate climate leadership through meaningful actions in their communities. (341 entities)
Global Covenant of Mayors for Climate & Energy (GCoM)[18]	Coalition of cities and local governments committed to reducing greenhouse gas emissions and increasing resilience to climate change (13374 entities)
Global Convent of Mayors Joint Research Centre (GCoM JRC)[19]	Comprehensive and harnessed collection of action plans and monitoring reports from MyCovenant platform in the context of the GCoM initiative after a scrutiny by JRC (1552 entities)
U.S. Climate Alliance (2024)[20]	Coalition of 23 governors securing America's net-zero future by advancing state-led, high-impact climate action (23 entities)

Carbon Disclosure Project 2023 Full States and Regions Dataset (CDP)[11]	2023 data for states and regions. All data included in the dataset is self reported by states and regions through the 2023 States and Regions Questionnaire. (109 entities)
Global Climate Action Portal (GCAP)[21]	Online platform where actors from around the globe - countries, regions, cities, companies, investors and other organizations - can register their commitments to act on climate change (12,019 entities)
Japanese Prefecture Targets, Japan Ministry of Environment (2024)[22]	Ministry of the Environment conducts yearly on the status of implementation of the Act on Promotion of Global Warming Countermeasures in Local Governments. (1793 entities)
China Carbon Neutrality Tracker, Institute for Global Decarbonization Progress (2024)[23]	China Carbon Neutrality Tracker tracks China's up-to-date national and sub-national carbon neutrality actions (322 entities)
Net Zero Tracker (2024)[24]	Dataset tracking net zero targets and actions across all nations and the world's largest regions, cities, and companies (1892 entities)
C40 Cities for Climate Leadership Group (2024)[25]	Database of 98 member cities' efforts towards confronting climate change. (98 entities)

Table 1. Climate databases used for construction of ClimActor 2.0 database.

Data limitations

Our database is not without limitations. First, self-reported data carry inherent limitations, as human error in reporting can lead to gaps, inaccuracies, or even internal contradictions within the same source database. While we tried to overcome some of these limitations with quality checks and duplicate identification (See Methods), some errors inevitably still persist (e.g., such as reported emissions data due to an entity's own miscalculation). The second limitation is the geographical imbalance in participation across transnational networks and disclosure initiatives, with a disproportionately high number of entities from Europe. This disparity reflects, in part, the maturity of initiatives that originated in Europe and its strong emphasis on disclosure, such as in the GlobalCovenant of Mayors for Climate and Energy - EU Secretariat (EUCoM) that requires member governments to publish climate action plans and report emission inventories.[26] While we tried to include additional national datasets from other regions to better represent subnational climate action originating in the Global South, our dataset still reflects this imbalance. Finally, language barriers limit our capacity to further incorporate countries and regions where English is not the primary language or when access to information is limited due to regional or national constraints, such as regional blocks or limited access to non-citizens to country-specific data.

Data Records

ClimActor v2.0 includes 7 main datasets: i) a key dictionary for subnational entities; ii) an actor database that includes all entities identified in the selected databases; iii) an emissions database that includes data on aggregated emissions for all sectors, GHGs, and scopes reported; iv) reported data on sector-specific emissions; v) climate action plans that include information about climate plan characteristics; vi) climate target information, including descriptive information on an entity's mitigation target; and vii) climate initiative participation of subnational entities and their focus. The datasets are available on the Data-Driven EnviroLab's Dataverse,[27] as well as on Github (www.github.com/datadrivenenvirolab/ClimActor), alongside the updated functions for their use included

in an R package. An overview of the most relevant indicators is available in Table 1 and more detailed in Online-only Table 2.

Dataset: Key Dictionary	
climactor_id	Unique ClimActor identifier for entities that provide the information
right	Official entity name including name and entity type
entity_type	ClimActor classification for subnational entities including: Regional, Sub-regional and City
ent_type_eng	Country specific subnational classification
lat_long	Centroid of associated geometry of entity.
Dataset: Actor	
name	Name of entity in original dataset
entity_type	Entity type according to original data source
datasource_id	Unique code of data source
orig_id	Unique identifier of original data source
climactor_id	Unique ClimActor identifier for entities that provide the information
Dataset: Aggregated Emissions and Emissions Breakdown	
climactor_id	Unique ClimActor identifier for entities that provide the information
inv_year	Year of emissions (YYYY)
total_emissions	Integer value of emissions in units (recorded in inv_unit)
inv_unit	Unit of total_emissions. Currently supported:'tCO2e': tonnes of CO2 equivalent

inv_scopes	Relevant scope numbers (1, 2, or 3) combined by "+". Ex. "1+2"
inv_sectors	All sectors included in the inventory. Possible options include: AFOLU, Buildings, Energy, IPPU, Transportation, Waste, Other
ghgs_included	Type of unique greenhouse gases included in the emissions data: CO2 only, CO2 + other gases, or a combination of the gases included in the emissions (ex. CO2+CH4)
Dataset: Targets	
climactor_id	Unique ClimActor identifier for entities that provide the information
target_type	The type of target as explicitly stated by the entity: Examples include:"Relative emission reduction", "Absolute emission reduction", "Net zero target" or similar
target_year	Year of completion (YYYY). Targets may have year values in the past for historical targets
target_unit	Unit of the target value. Current units supported are: - 'tCO2e': tonnes of CO2 equivalent - 'percent': percentage reduction
target_value	Value of the target. This is delimited in units by target_unit
target_sectors	All sectors included in the plan. Possible options include: AFOLU, Buildings, Energy, IPPU, Transportation, Waste, Other
Dataset: Plan	
climactor_id	Unique ClimActor identifier for entities that provide the information
plan_type	Thematic coverage of the plan including: 'Mitigation', 'Adaptation', 'Integrated', 'Energy', or 'Other'
plan_adoption_year	Year of plan adoption
Dataset: Initiatives	
climactor_id	Unique ClimActor identifier for entities that provide the information

initiative_name	Name of Initiative
initiative_description	Self-description of Initiative
initiative_clim_focus	Climate Focus of the Initiative

Table 2. Description of selected variables within each of ClimActor 2.0's seven core datasets.

Data Overview

The ClimActor 2.0 dataset provides harmonized, spatially-explicit information on subnational climate action worldwide, covering emission records, climate action plans, mitigation targets, and network/initiative participation for more than 15,000 entities worldwide. By linking each entity to its geospatial administrative boundary and decision-making authority, the dataset enables both global comparisons and integration with other geospatial and socioeconomic or policy-relevant datasets. Figures 3-6 provide an illustration of the overall coverage of the data available in ClimActor 2.0. Figure 3 presents the number of annual emissions records reported per entity. While many entities disclose only a few years of data, others provide time series extending 10 or 15 years or more, which provides opportunities for longitudinal analysis of subnational emission trajectories. Figure 4 maps the global distribution of climate plans by type, distinguishing between mitigation, adaptation, energy and integrated plans. Europe shows the highest density of reporting entities, but there is also subnational coverage across Latin America, East Asia, and the Middle East. Figure 5 presents the evolution of climate target types adopted by subnational entities over time, highlighting the growing prevalence of net-zero targets as long-term goals. Earlier commitments were more likely to emphasize absolute or relative emission reductions, whereas in more recent years net-zero targets have emerged as a dominant long-term goal for subnational governments. Figure 6 highlights variation in the detail of self-reported emissions data across regions. Entities participating in global reporting or networks tend to report comprehensive greenhouse gas inventories, however some gaps in data persists in regions like Eastern Europe and Central Asia or Latin America which provide only carbon dioxide emissions data or insufficient information to distinguish. These disparities reflect both the progress made and the remaining challenges in achieving consistent, high-quality subnational climate reporting worldwide. Similarly, Figure 7 reports GHG scopes covered by subnational governments' self-reported inventories. Coverage varies widely by region, with East Asia and Europe inventories with particularly high proportions of inventories with insufficient scope information , whereas some other regions, including South Asia and North America, report high proportions of Scope 1+2 or 1+2+3 inventories. Finally, Figure 8 shows regional participation of subnational entities in UN-registered climate initiatives in the Global Climate Action Portal, categorized by primary objective (i.e., Mitigation, Adaption or Both). Across regions, subnational entities mainly join mitigation or combined mitigation and adaptation initiatives, while participation in adaptation-only efforts is limited, indicating that mitigation remains the dominant focus of r international networks and potential their resources.

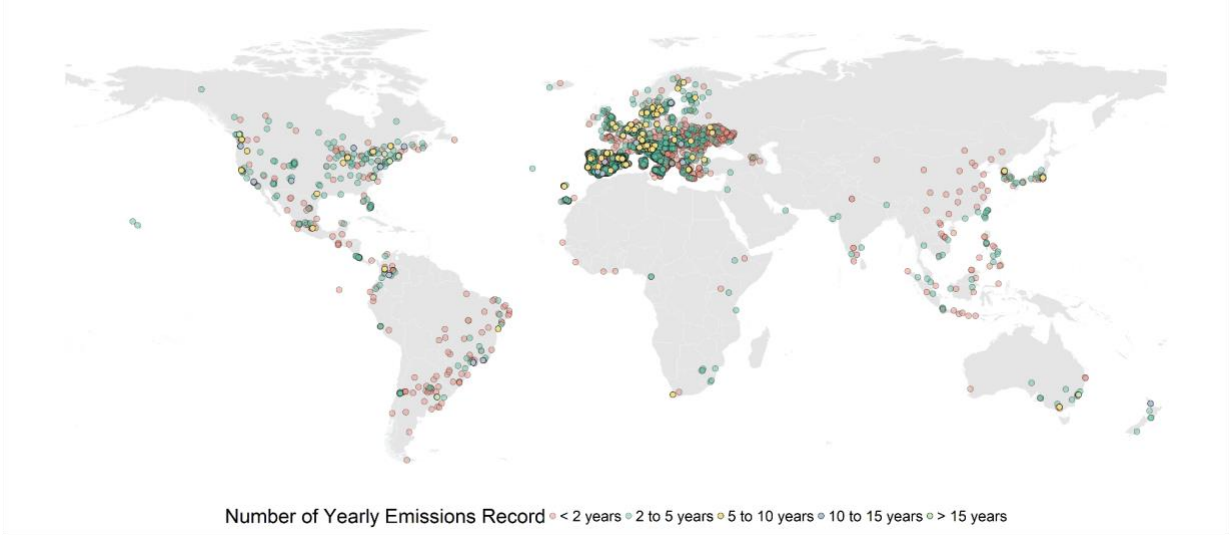

Figure 3. Number of annual emissions records per entity in the ClimActor dataset.

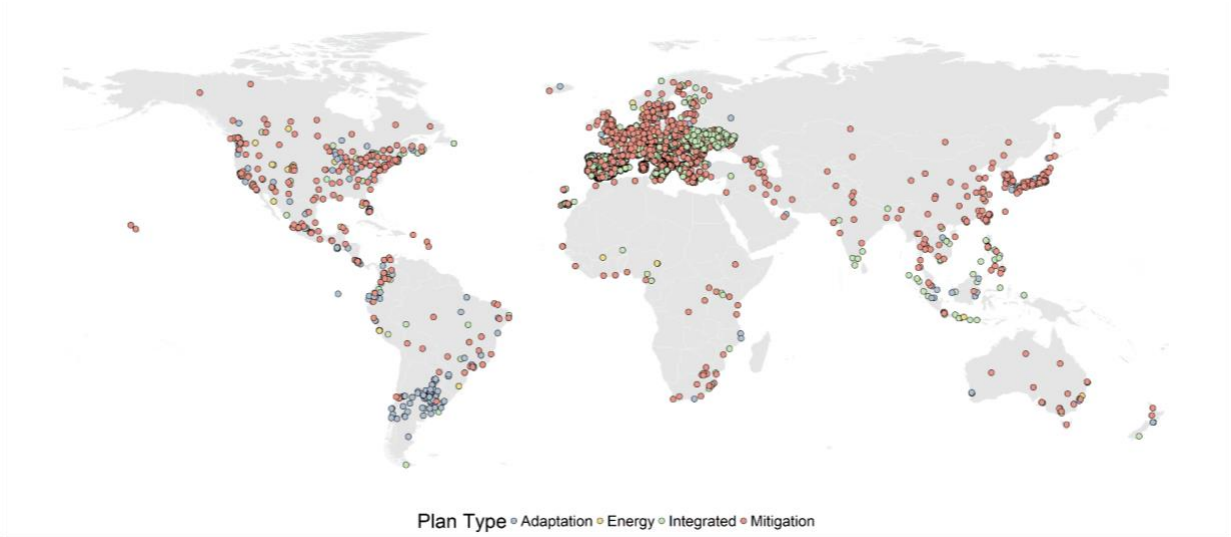

Figure 4. Global distribution of climate plans by type: adaptation, energy, mitigation, or an integrated plan that includes a combination of aims.

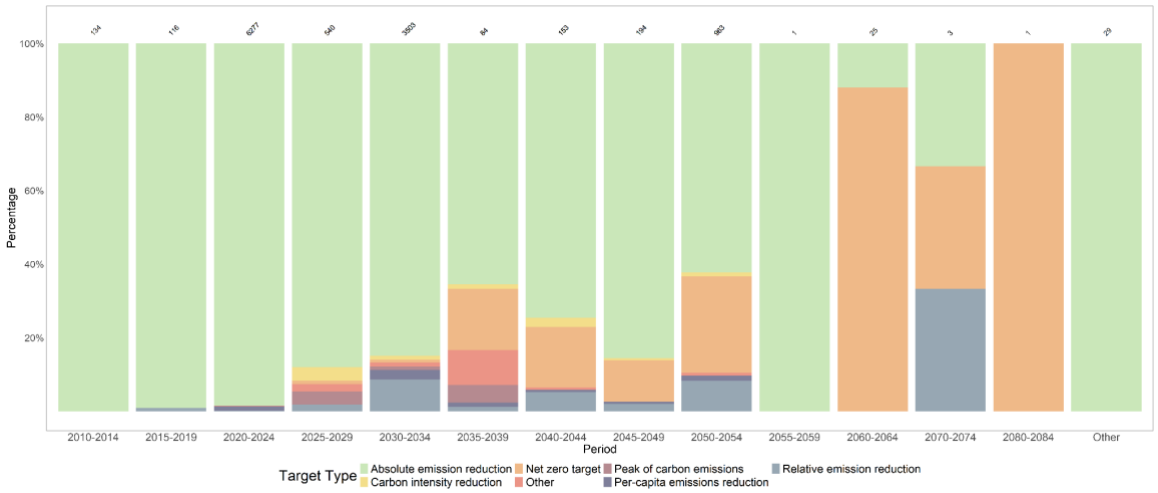

Figure 5. Types of mitigation targets and their approximate timeframe from subnational entities' climate action plans and reported data.

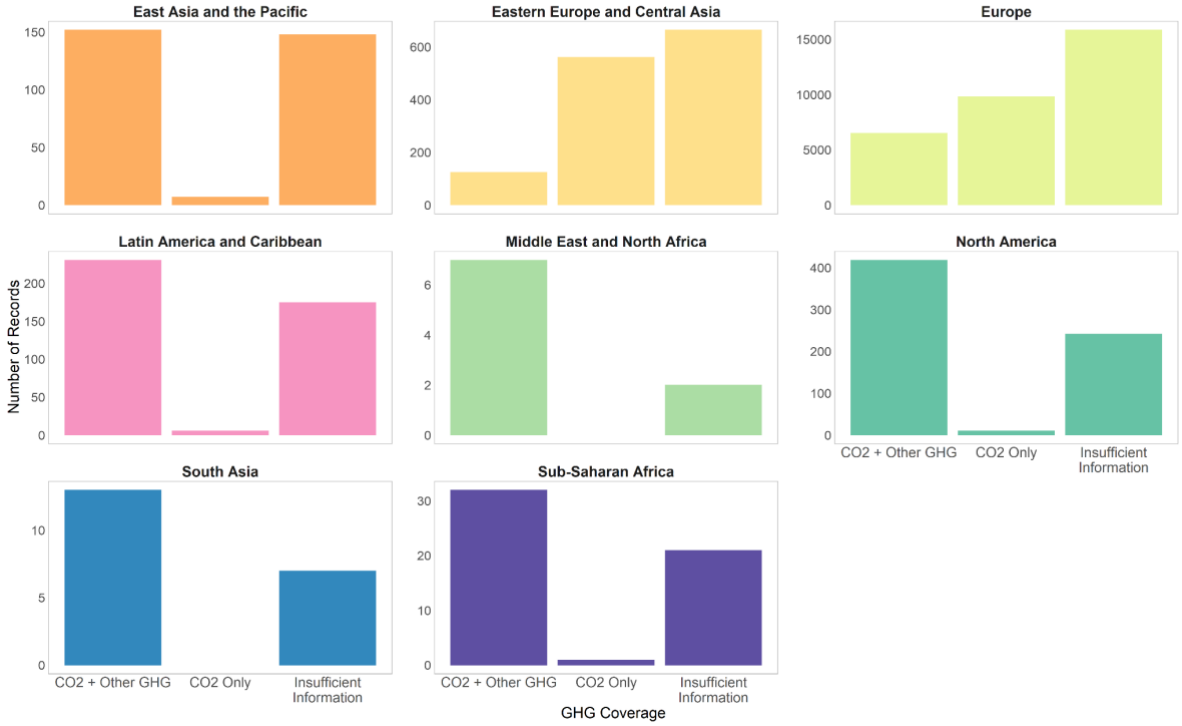

Figure 6. Greenhouse gas emissions coverage information for entities by geographic region.

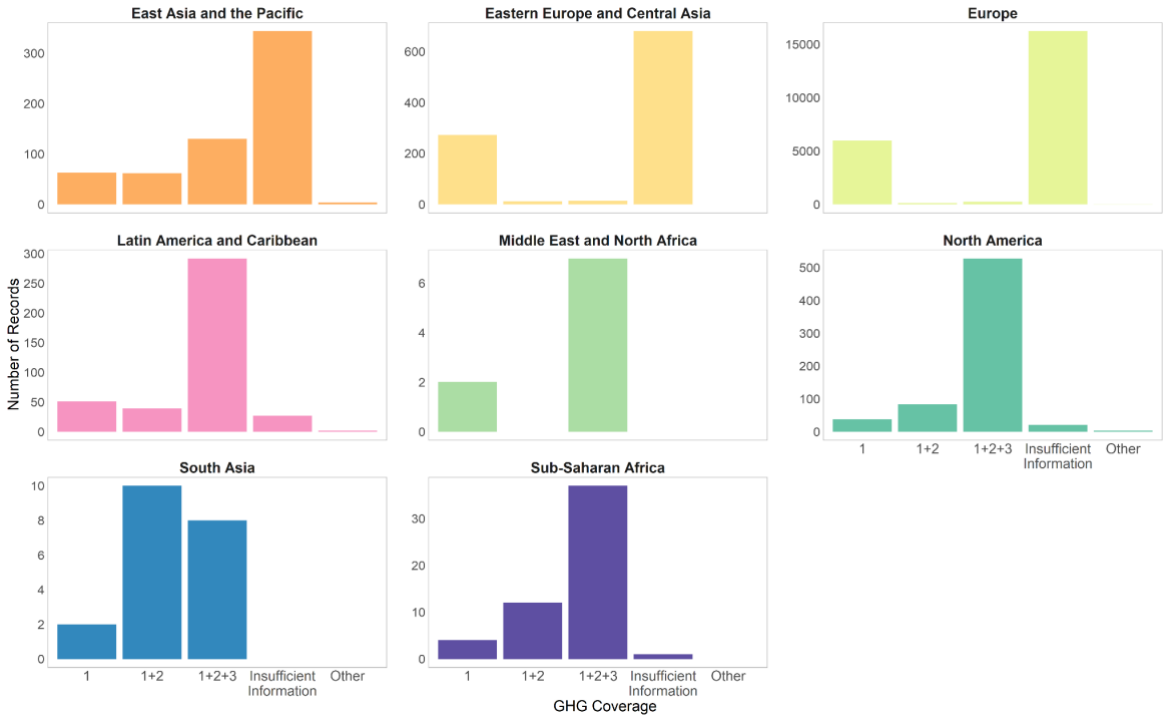

Figure 7. Self-reported emission scopes for subnational GHG inventories by geographic region

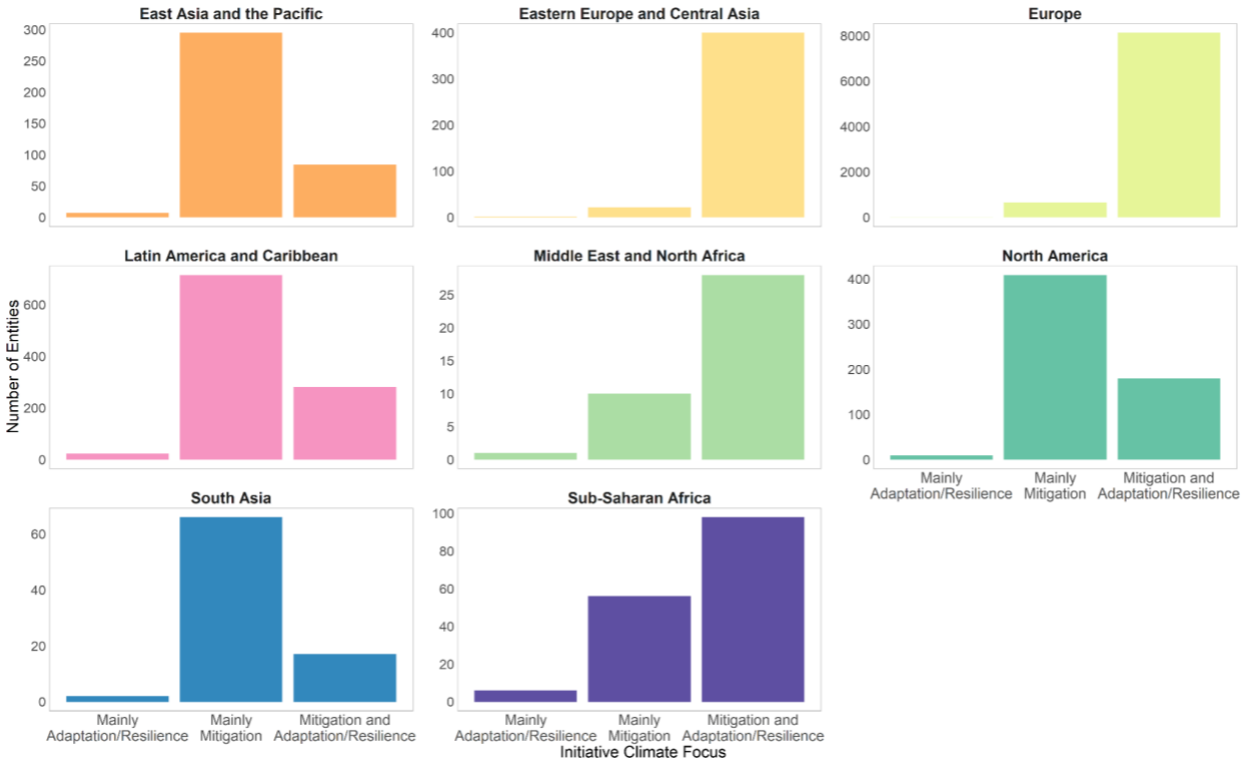

Figure 8. Number of subnational entities that participate in climate initiatives by focus and region.

Technical Validation

Because ClimActor harmonizes information reported by other climate initiatives, direct external validation of the underlying climate data is not feasible. Instead, our validation efforts focused on assessing the accuracy of the entity matching process, which links climate commitments to the correct administrative authority and spatial geometry (Figure 8). Across the 12 datasets integrated, we achieved a matching success rate of over 85%, with particularly high accuracy for national-level datasets such as those from China and Japan.

Unmatched entities occur primarily in datasets such as GCoM and EUCoM, where municipal boundary reforms have altered or eliminated certain jurisdictions after their initial participation. For example, in Greece, municipal reorganizations in 2011 and 2019 merged several previously independent entities, creating discrepancies between historical membership lists and current administrative structures. These challenges reflect genuine changes in administrative geography rather than failures of the matching procedure.

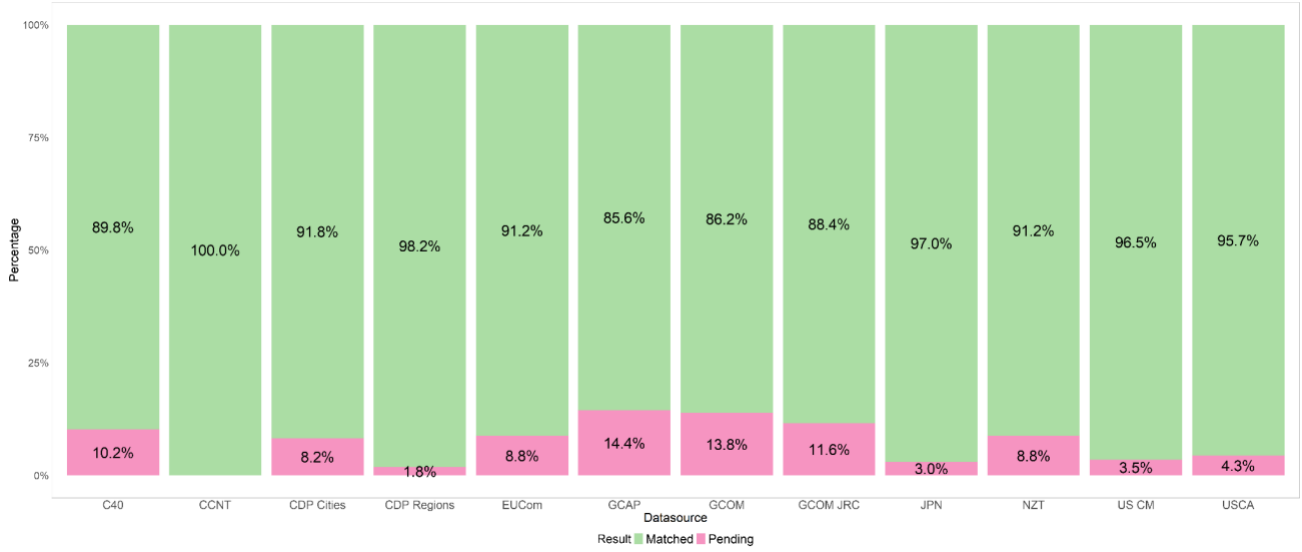

Figure 9. Entity matching results percentage for each climate-related dataset.

Usage Notes

We updated the existing ClimActor R package with new functions and databases to assist researchers in utilizing our database alongside other datasets. Key improvements include enhanced naming conventions for administrative entities, which reduce ambiguity by specifying, for example, 'State of New York' or 'City of Lima' instead of just 'New York' or 'Lima', which could refer to multiple administrative levels. In addition we have expanded machine-aided matching functions and refined the phonetic matching tools to operate effectively with the updated entity names.

Code Availability

Data and code for the ClimActor R package functions are publicly available on GitHub: https://github.com/ datadrivenenvirolab/ClimActor.

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Author Contributions
D.M, and K.B organized the data collection process and established the methods. D.M., K.B., E.B. and A.M. collected data and executed the method. D.M., K.B., E.B., A.M. and A.H. contributed to the manuscript. A.H. conceptualized and supervised the study. All coauthors reviewed, edited, and approved the manuscript.

Competing Interests
The authors declare no competing interests.

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Supplementary Information

ClimActor 2.0: A spatialized database of subnational climate pledges and emissions data

Country	Datasource
Argentina	National Geographic Institute (ARG) (2019)[1]
Belarus	OSM (2025), National Cadastral Agency (BLR) (2025) [2]
Cameroon	Ministry of Forestry and Fauna (CMR)(2023a, 2023b, 2023c)[3–5]
Canada	Statistics Canada(2023)[6]
China	Cheng (2025)[7]
Czech Republic	Czech National Institute for Geosciences(2025)[8]
Finland	National Land Survey of Finland (2024)[9]
France	National Institute of Geographic Information and Forestry (FRA) (2025)[10]
Ghana	Ghana Statistical Service (2025)[11]
Greece	Michael Bauer Research (2025)[12]
Hungary	European Commission (2025) [13]
India	OSM (2025)[14]
Indonesia	Alf-Anas (Github) (2023)[15]
Iran	UNHCR (2023a)[16]
Iraq	UNHCR (2019)[17]
Italy	National Institute of Statistics (ITA) (2024)[18]
Japan	ESRI Japan (2022)[19]
Kazakhstan	UNHCR (2025a)[20]
Latvia	Envirotech (2021)[21]
Lithuania	Construction Sector Development Agency (LTU)(2025) [22]
Malaysia	UNHCR (2022a)[23]
Moldova	OSM (2025), Agency of Geodesy, Cartography, and Cadastre (MDA)(2022)[14,24]
Morocco	UNHCR (2022b)[25]
Mozambique	UNHCR (2023b)[26]
Myanmar	Myanmar Information Management Unit (2023a, 2023b, 2023c, 2023d)[27–30]
Romania	National Agency for Cadastre and Land Registration (ROU) (2025)[31]
Russia	Petrov, O. (2023)[32]
Spain	National Geographic Institute (ESP)(2025) [33]
Sweden	National Land Survey of Sweden (2024)[34]
Togo	Digital Agency of Togo (2024)[35]
Turkey	General Directorate of Mapping (TUR)(2022)[36]
Ukraine	UNHCR (2025b)[37]
United	Office for National Statistics (GBR) (2024a, 2024b, 2024c),

Kingdom	Crone, J. & Dörrbecker, M. (2017)[38–41]
United States	United States Census Bureau (2024)[42]
Venezuela	OCHA(2024) [43]

Online Table 1. *Sources of Administrative and Spatial data*

Variable	Description
Database 1: Key Dictionary	
right	Official denomination of subnational entity (i.e City of New York)
wrong	Alternative denominations of subnational entity (i.e New York City)
iso	ISO 3166-1 (alpha-3) country code
entity_type	Entity type for ClimActor classification (Region, Sub-region, City and Associations)
right_simpl	Simplified name of subnational entity (i.e New York)
ent_type_eng	Official denomination of the subnational entity in English
ent_type_local	Official denomination of the subnational entity in original language
climactor_id	Unique subnational actor ID for ClimActor databases
admin1_code	Code of the Region (Admin Level 1) where the subnational entity is located.
GDAM_id	Unique code of subnational entity's boundary in geodatabase
Caverphone, Caverphone.modified, Cologne, Lein, Metaphone,Nysiis,Nysiis.modified, Onca, Onca.modified, Onca.refined, Onca.modified.refined, Phonex, Rogerroot, Soundex,Soundex.refined, and Statcan.	Phonetic representation of simplified name using different phonetic algorithms (Used for phonetic matching steps)
Long_lat	Longitude and Latitude of subnational entity centroid

Area	Area of subnational entity
Population	Population of subnational entity for the year 2020
Database 2: Actors	
name	Name of subnational entity as reported in original datasource.
iso	ISO 3166-1 (alpha-3) country code
entity_type	Entity type for ClimActor classification (Region, Sub-region, City and Associations)
climactor_id	Unique subnational actor ID for ClimActor databases
orig_id	Original actor ID from the datasource
datasource_id	Datasource unique ID
Database 3: Emissions Inventories and Target Baselines	
climactor_id	Unique subnational actor ID for ClimActor databases
inv_year	Year of emissions (YYYY)
total_emissions	Value of self-reported emissions
inv_unit	Unit of total_emissions.
inv_scopes	Inventory Scopes. Scope represented by integers 1, 2, or 3 combined with '+' (i.e. 1+2)
inv_sectors	All sectors included in the inventory, combined with "+". Possible options include: AFOLU, Energy, Waste, IPPU, Transportation, Buildings, Public, Other and Unspecified. Note: AFOLU = Agriculture, Forestry, and Other Land Use, IPPU = Industrial processes and product use

ghgs_included	Explicit coverage of greenhouse gases. Possible options include: CO2 only, CO2 + other gases, or a combination of specific gases (i.e CO2+CH4)
inv_emissfactor_source	Emission factor source, if available
inv_boundary	Indicates whether the emissions correspond to Community-Wide emissions from the whole administrative entity, only emissions from Municipal Operations, or for larger geometries such as regions. Possible values include Same, Smaller, Larger
inv_boundary_desc	Includes any details from the data source to describe the administrative and/or geographic boundary of the emissions inventory.
inv_method	Methodology used to estimate inventory
inv_url	URL link to emissions inventory if available
inv_comments	Additional comments or description associated emissions
datasource_id	Datasource unique ID
year_group	Numeric Group index value that indicates similarity between emissions values of the same year. Similarity between emissions values is considered if there is an overlap in the +/- 1.5% range of the emission value with the range +/- 1.5% of another emission value for the same year.
year_check	Binary variable (0 or 1) that checks if inv_year falls outside of the range of 198 to 2024. Value of 1 indicates potential errors in self-reported inventory year
ts_check	Binary variable (0 or 1) that checks for inconsistencies using the rate of change of three consecutive measures for each sector and subnational entity. Inconsistencies are defined as a yearly rate of change of over 30% from the first point of the group. Value of 1 indicates a yearly change of over 30% which can suggest potential errors in self-reported data
emission_pc_check	Binary variable (0 or 1) that checks for inconsistencies in the per capita emissions. Value of 1 indicates a a per capita emission of less than 0.02 or more than 40 tons of CO_2 or CO_2eq per year

Database 4: Emissions Breakdown	
climactor_id	Unique subnational actor ID for ClimActor databases
inv_year	Year of emissions (YYYY)
emissions_value	Value of self-reported emissions
inv_unit	Unit of total_emissions.
scope	Inventory Scopes. Scope represented by integers 1, 2, or 3 combined with '+' (i.e. 1+2)
sector	All sectors included in the inventory, combined with "+". Possible options include: AFOLU, Energy, Waste, IPPU, Transportation, Buildings, Public, Other and Unspecified. Note: AFOLU = Agriculture, Forestry, and Other Land Use, IPPU = Industrial processes and product use
subsector	Self-reported details on subsector
ghgs_included	Explicit coverage of greenhouse gases. Possible options include: CO2 only, CO2 + other gases, or a combination of specific gases (i.e CO2+CH4)
comment	Additional comments or description associated emissions
datasource_id	ID of the DataSource the emission information came from
Database 5: Targets	
climactor_id	Unique subnational actor ID for ClimActor databases
target_type	The self-reported type of target. The following values are widely used: - "Peak of carbon emissions": A goal to reach a peak of carbon emissions, after which emissions will begin going down. Peak value is given as the target value - "Relative emission reduction": A reduction in emissions versus baseline year. Percentage is the typical unit - "Absolute emission reduction": An absolute reduction in

	emissions. Despite the name, both tonnes of CO2 equivalent and percentage versus baseline value are used - "Carbon intensity reduction": reducing the amount of CO2 equivalent produced relative to economic output, such as GDP or revenue. Typically measured in percent - "Net zero target": cutting greenhouse gas emissions to as close to zero as possible, with any remaining emissions re-absorbed from the atmosphere, including by oceans and forests (UN, 2023). Targets similar to net zero targets, such as carbon neutrality targets, zero emission targets, zero carbon targets, are all included in 'Net zero targets', but the scope is labeled in target_GHG variable.
target_year	Year of completion (YYYY). Targets may have year values in the past for historical targets
target_unit	Unit of the target value. Possible options include:tCO2e: tonnes of CO2 equivalent, 'percent': percentage reduction
target_value	Value of the target in target_units
target_boundary	Indicates whether the emissions correspond to Community-Wide emissions from the whole administrative entity, only emissions from Municipal Operations, or for larger geometries such as regions. Possible values include Same, Smaller, Larger
target_boundary_desc	Includes any details from the data source to describe the administrative and/or geographic boundary of the emissions inventory
target_scopes	Scopes covered by the target. Scope represented by integers 1, 2, or 3 combined with '+' (i.e. 1+2)
target_gases	Explicit coverage of greenhouse gases. Possible options include: CO2 only, CO2 + other gases, or a combination of specific gases (i.e CO2+CH4)
target_sectors	All sectors included in the inventory, combined with "+". Possible options include: AFOLU, Buildings, Energy, IPPU, Transportation, Waste, Other Note: AFOLU = Agriculture, Forestry, and Other Land Use, IPPU = Industrial processes and product use
baseline_year	Baseline for target comparison (YYYY). If the baseline year and target year are identical, the target is against "business as usual" or "BAU", that is, what would or could happen if no mitigation effort was attempted

baseline_value	Value of the baseline
baseline_unit	Unit of the baseline value
target_url	URL of a human-readable document on the target
target_summary	Short English summary of the target
target_comments	Comments or description of the emissions covered (gases, scopes, sectors) provided by the data source
datasource_id	ID of the DataSource the sector information came from
Database 6: Plans	
climactor_id	Unique subnational actor ID for ClimActor databases
plan_type	Notated as either 'Mitigation', 'Adaptation', 'Integrated', 'Energy', or 'Other'
plan_name	Name of the plan
plan_adopted_year	Year of plan adoption
plan_end_year	If available, the last year that the plan covers
plan_boundary	Administrative and/or geographic boundary covered by the plan in relation to the actor. Options include: 'Same', 'Smaller', 'Larger'
plan_boundary_desc	Includes details from the data provider to describe the plan boundary.
plan_url	Publicly accessible link to plan if available
plan_comments	Comments or descriptions related to the plan, as provided by the data source
datasource_id	ID of the DataSource the plan information came from

Database 7: Initiatives	
climactor_id	Unique subnational actor ID for ClimActor databases
orig_Id	Original actor ID that came with the datasource, if available
initiative_Id	GCAP id for the Initiative
initiative_Name	Name of the Initiative
initiative_Clim_Focus	Climate Focus of the Initiative. Possible Options: ‘Mitigation and Adaptation/Resilience”; "Mainly Mitigation" and “Mainly Adaptation/Resilience”
Initiative_Status	Reported most recent status of the Initiative. Possible options:"Unknown" and "Active".
Initiative_Description	Description of the initiative as reported in GCAP
Datasource_Id	ID of the DataSource the sector information came from

Online Table 2. *Description of files and variables*

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