



GEWEX



GEWEX 4th Workshop on Central Asia

Hands-On with TPDC: Platform Workflows and Water Body Change Monitoring Tutorial

Xiaoduo Pan

National Tibetan Plateau / Third Pole Environment Data Center

Institute of Tibetan Plateau Research

Chinese Academy of Sciences

Outlines

01

Data Management

02

Data Resources

03

Open Data Achievement

04

Hands-On with TPDC



中国科学院 青藏高原研究所
Institute of Tibetan Plateau Research
Chinese Academy of Sciences



Data Platform and Data Resource Growth

- June 2019 — National Tibetan Plateau / Third Pole Environment Data Center was officially established
- August 2019 — Became a disciplinary data center of the Chinese Academy of Sciences
- September 2019 — The data center website officially launched

<https://data.tpdc.ac.cn>

National Tibetan Plateau Data Center
Third Pole Environment Data Center

Home Products News Submit Data

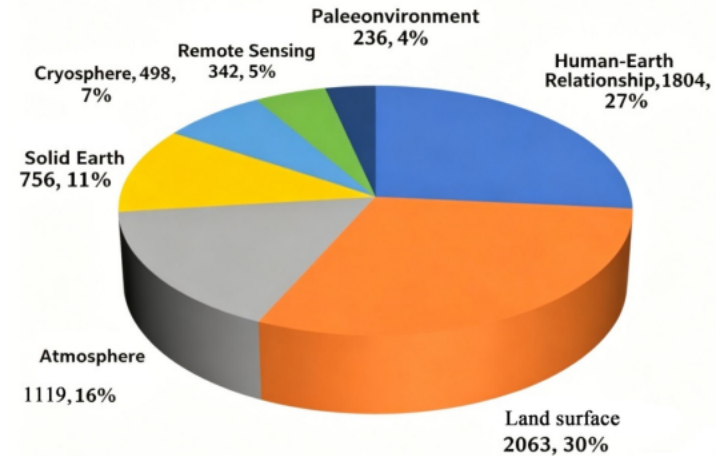
Press Enter to search... finddata EN V Login

Register

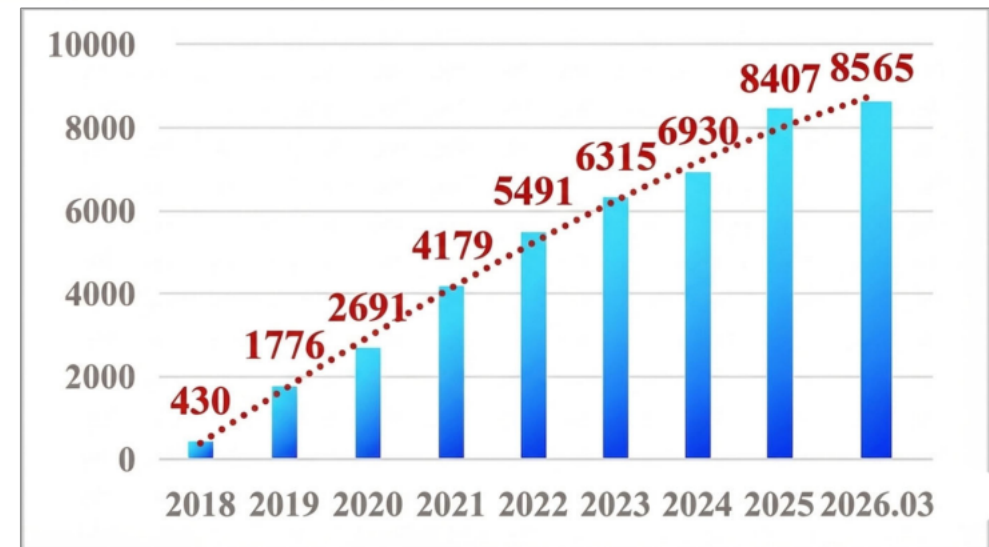
Data bank for Tibetan Plateau research projects.

139,022 Total users	8,565 Number of datasets	5,301 Open datasets	684.31 TB Data file size	31,766,776 Data views
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New datasets
Latest data, real-time release, continuous update
[view more](#)



Total: **8,565** datasets
(of which **5,301** are open access, accounting for over 62%)



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Authors

Research data

Research data policies

Research Data Policies Earth, Environmental and Space sciences

Data policy types

Data availability statements

Data policy FAQs

Journal policies & services

Recommended repositories list

Research Data Helpdesk

Research Data Support

- Broad scope Earth & environmental sciences
- NERC Data Centres
- NASA Goddard Earth Sciences Data and Information Services Center
- PANGAEA
- National Tibetan Plateau/Third Pole Environment Data Center**
- NOAA National Centers for Environmental Information (DOIs only assigned to deposited data on request)
- HydroShare (CUAHSI)

GEWEX QUARTERLY WCRP World Climate Research Programme

Vol. 30, No. 2 | Quarter 2, 2020

National Tibetan Plateau Data Center
Established to Promote Third-Pole Earth System Sciences

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¹National Tibetan Plateau Data Center, Key Laboratory of Tibetan Environmental Changes and Land Surface Processes, Institute of Tibetan Plateau Research, Chinese Academy of Sciences, Beijing, China; ²Center for Excellence in Tibetan Plateau Earth Sciences, Chinese Academy of Sciences, Beijing, China

The National Tibetan Plateau Data Center (TPDC) is one of the first of 20 national data centers established in 2019 by the Ministry of Science and Technology of China. It is the only

the largest volumes of ice outside of the polar regions, and it has experienced dramatic environmental changes (Yao, 2019; Yao et al., 2019) in recent decades. Datasets including in situ observations, remote sensing observations, reanalysis data, and other data sources are essential to comprehensively evaluate and analyze the characteristics of Third-Pole Earth system changes. However, these data resources have not been well collected, constructed, and published by an authoritative organization. TPDC was established to be such a platform, integrating and sharing data based on observational and research programs that will allow global scientists to explore the water resources, climate change adaptation, and disaster risk and resilience of the Third Pole. TPDC is also focused on acting as an important supporting platform for the ongoing STEP program, which was a national key program initiated in

6

Quarter 2 2020

Figure 1. Data portal for National Tibetan Plateau Data Center (<https://data.tpdc.ac.cn/>)



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Data Sharing Principles and Manners

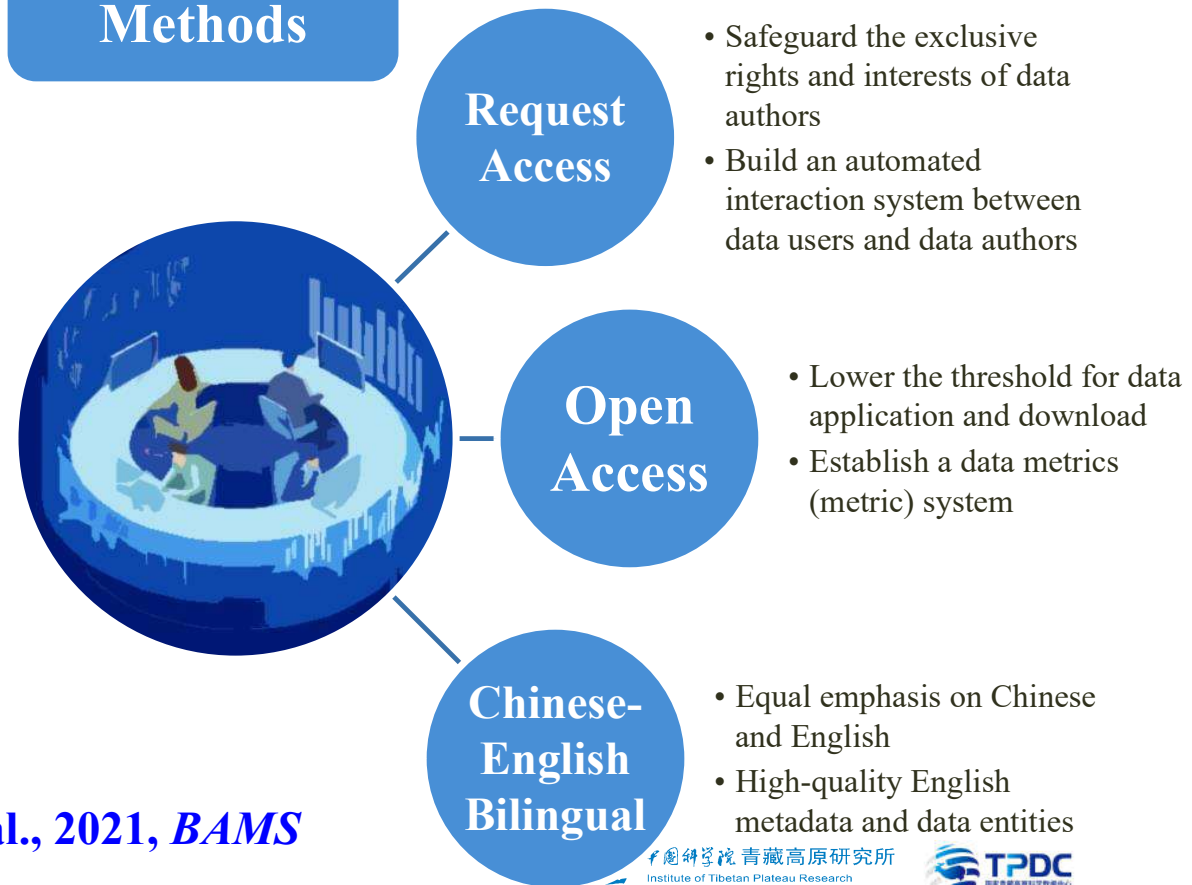
Sharing Principles



FULL & OPEN

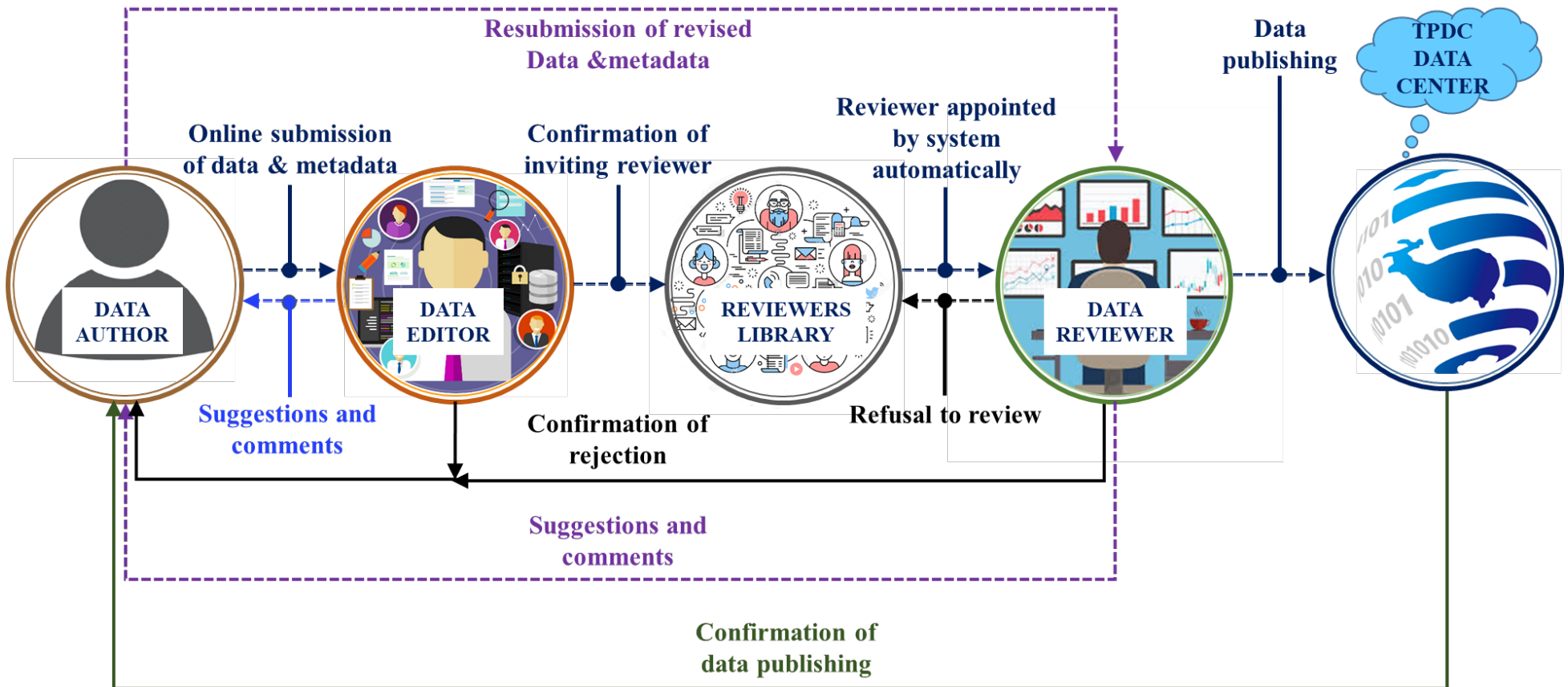


Sharing Methods



Pan et al., 2021, *BAMS*

Data Quality Control



Pan et al., 2021, *BAMS*

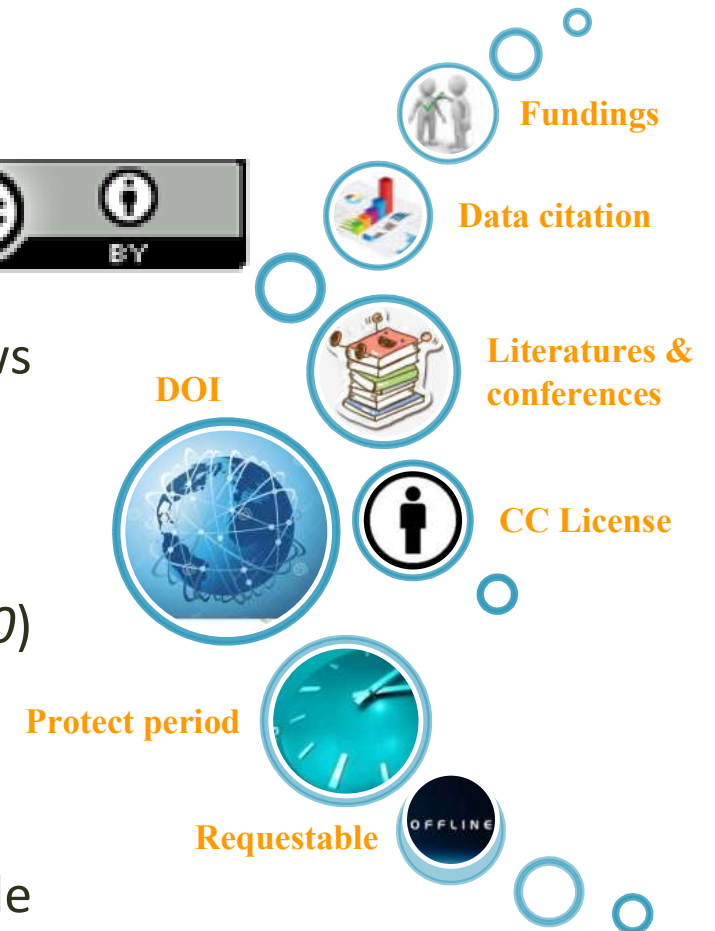


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Intellectual Property Protection

1. **Digital object identifier (DOI)** enables citing and tracking data through exchange and integration. For example:
DOI: 10.11888/category.tpdc.metadataID;
CSTR: 18406.11/category.tpdc.metadataID
2. **Data reference** (e.g., authors, DOI, publication dates) allows citing data in literatures.
3. **Related publications** are recommended for citing.
4. **Redistribution license** (*Creative Commons (CC) license 4.0*) for retaining author's copyright.
5. **Fundings** are acknowledged.
6. **Requestable access** and **protection period** are adoptable for authors who need to limit access to their data.



Promoting Data Sharing and Governance in China

” Establishing comprehensive open data sharing policies and incentive mechanisms for data contributors is the key to achieving broader open data sharing in China and participating in international academic governance.

 Check for updates

[comment](#)

Boosting geoscience data sharing in China

Enabling public sharing of scientific data in China not only needs top-down mandates but also incentive mechanisms that boost confidence and willingness to engage in data-sharing practices among Chinese researchers.

Xin Li, Guodong Cheng, Liangxu Wang, Juanle Wang, Youhua Ran, Tao Che, Guoqing Li, Honglin He, Qiang Zhang, Xiaoyi Jiang, Ziming Zou and Guofeng Zhao

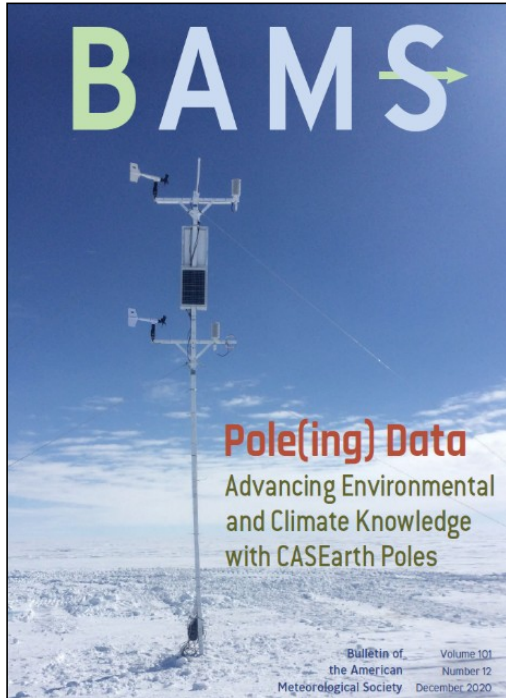
Li et al., 2021, *Nature Geoscience*



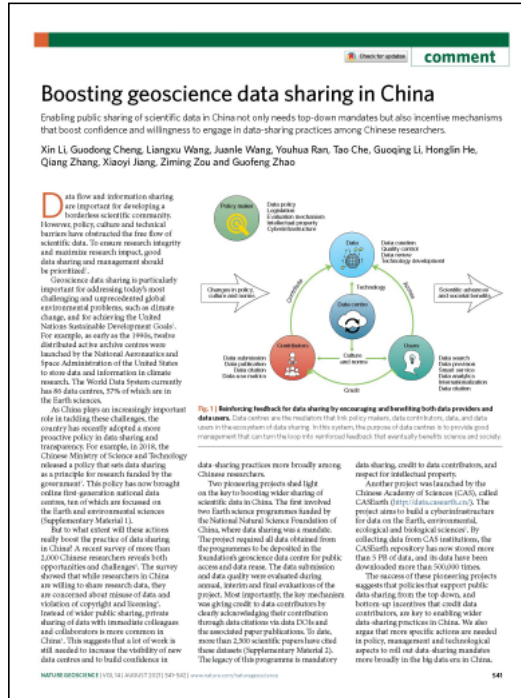
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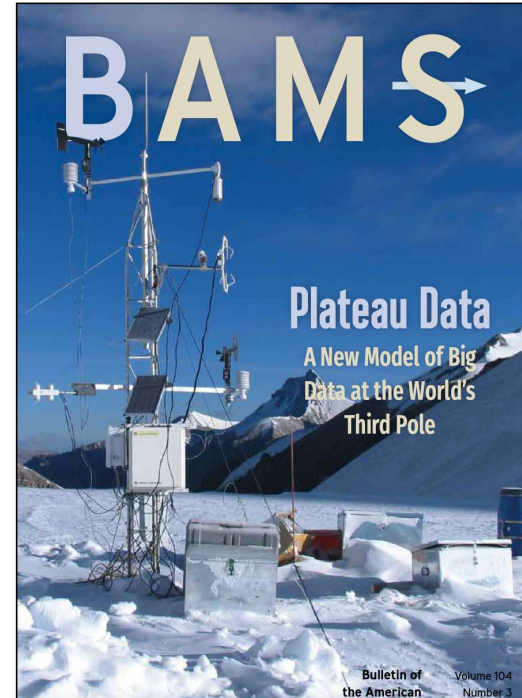
Research Articles on TPDC Data Management



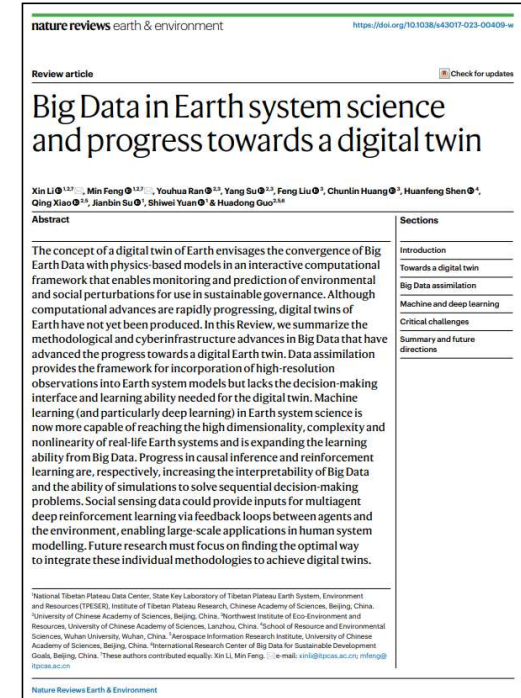
Li* et al., 2020,
BAMS
<https://doi.org/10.1175/BAMS-D-19-0280.1>



Li* et al., 2021,
Nature Geoscience
<https://doi.org/10.1038/s41561-021-00808-y>



Pan, Guo, Li* et al., 2021,
BAMS
<https://doi.org/10.1175/BAMS-D-21-0004.1>



Li* et al., 2023,
NREE
<https://doi.org/10.1038/s43017-023-00409-w>



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Chinese Academy of Sciences



TPDC
国家青藏高原科学数据中心
National Tibetan Plateau Data Center

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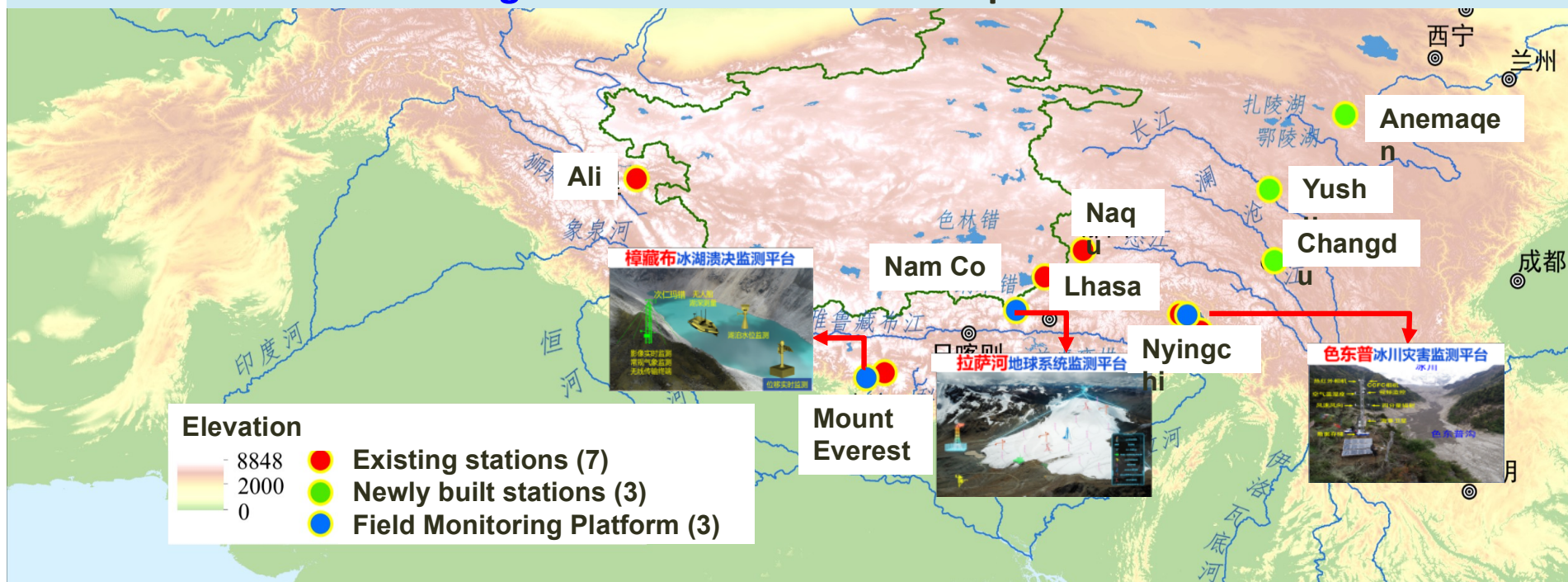
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Institute of Tibetan Plateau Research
Chinese Academy of Sciences



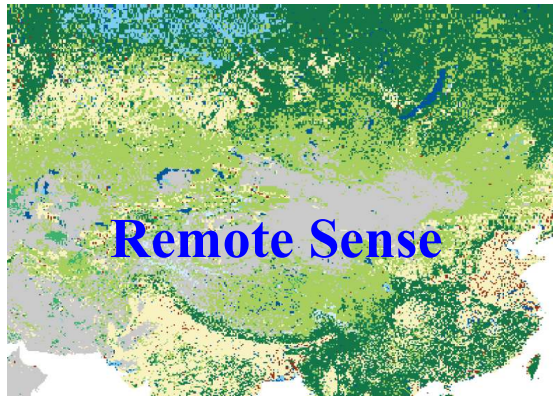
2.1 Data Resources: Observations from field stations



Preliminarily realization of **quasi-real-time transmission, online quality control, and integration of field observation platforms**



2.1 Data Resources: High Profile Paper-Associated Data

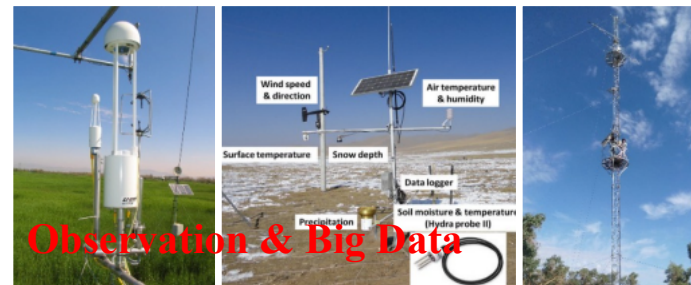


Chen et al., 2014, *Nature* DOI:10.1038/514434c



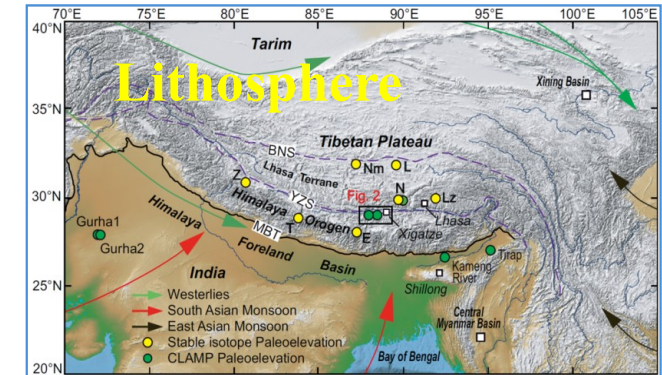
Anthroposphere

1. Chen et al., 2015, *Science* DOI: 10.11888/Paleoenv.tpcd.270105
2. Chen et al., 2019, *Nature* DOI: 10.11888/Paleoenv.tpcd.270296
3. Chen et al., 2008, *QSR* DOI: 10.11888/Paleoenv.tpcd.270066
4. Zhang et al., 2020, *Science* DOI: 10.11888/Socioeco.tpcd.271078



Observation & Big Data

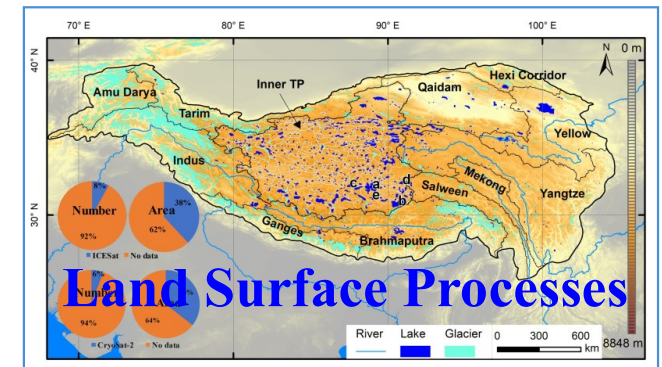
1. Li et al., 2013, *BAMS* <https://data.tpcd.ac.cn/en/special/heihe/>
2. Tang et al., 2019, *ESSD* DOI: 10.11888/Meteoro.tpcd.270112
3. He et al., 2020, *SD* DOI: 10.11888/AtmosphericPhysics.tpe.249369.file
4. Ma et al., 2020, *ESSD* DOI: 10.11888/Meteoro.tpcd.270910.
5. Yang et al., 2020, *SCES* DOI: 10.11888/AtmosphericPhysics.tpe.249448.file



1. Ding et al., 2017, *Geology* DOI: 10.11888/Geo.tpcd.270351
2. Huang et al., 2013, *CSB* DOI: 10.11888/Geo.tpcd.270351
3. Huang et al., 2015, *Lithos* DOI: 10.11888/Geology.tpe.249415

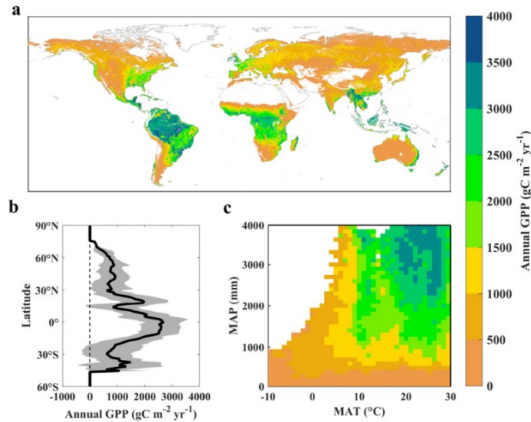


1. Yao et al., 2012, *NC* DOI: 10.11888/Hydro.tpcd.270100
2. Yao et al., 2013, *RG* DOI: 10.11888/Hydro.tpcd.270940
3. Gao et al., 2011, *JC* DOI: 10.11888/Hydro.tpcd.270937
4. Gao et al., 2016, *CD* DOI: 10.11888/Hydro.tpcd.270938



1. Zhang et al., 2019, *RSE* DOI: 10.11888/Hydro.tpcd.271169
2. Zhang et al., 2017, *GRL* DOI: 10.11888/Hydro.tpcd.270303
3. Zhang et al., 2014, *CSB* DOI: 10.11888/Hydro.tpcd.270302
4. Zhang et al., 2011, *RSE* DOI: 10.11888/Lake.tpe.249466.file

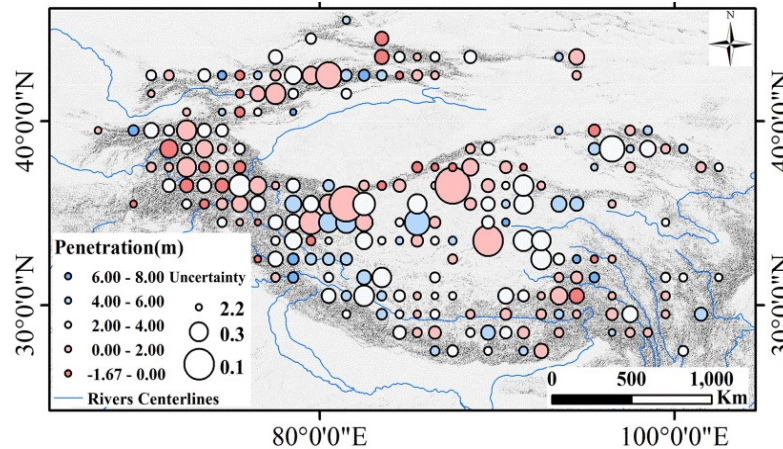
2.1 Data Resources: Publishing Scientist-Entrusted Archived Data



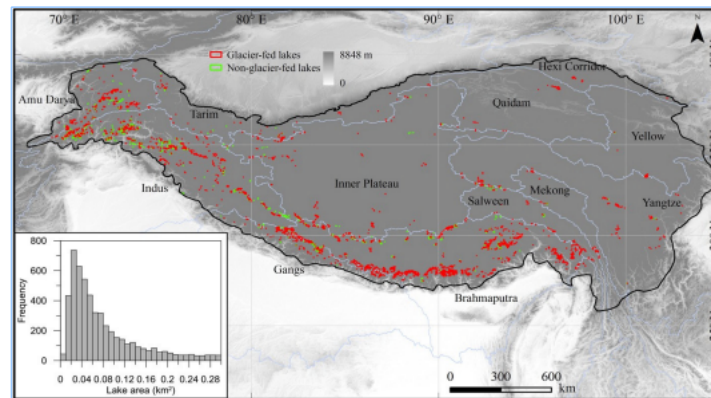
Wang, S., Zhang, Y. (2020). Long-term (1982-2018) global gross primary production dataset based on NIRv. National Tibetan Plateau / Third Pole Environment Data Center.
DOI: [10.6084/m9.figshare.12981977.v2](https://doi.org/10.6084/m9.figshare.12981977.v2).



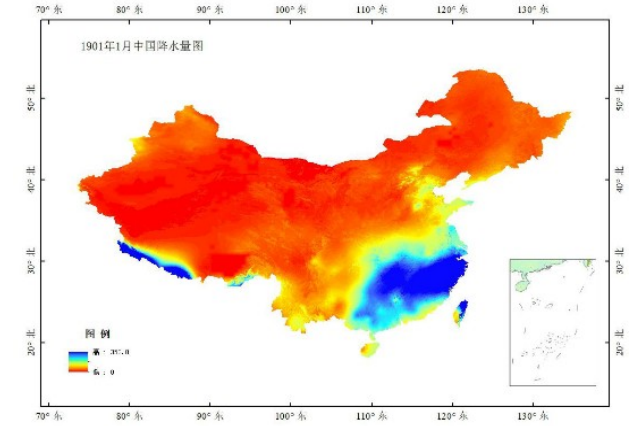
Zhang, Y. (2020). PML_V2 global evapotranspiration and gross primary production (2002.07-2019.08). National Tibetan Plateau / Third Pole Environment Data Center.
DOI: [10.11888/Geogra.tpcd.270251](https://doi.org/10.11888/Geogra.tpcd.270251).



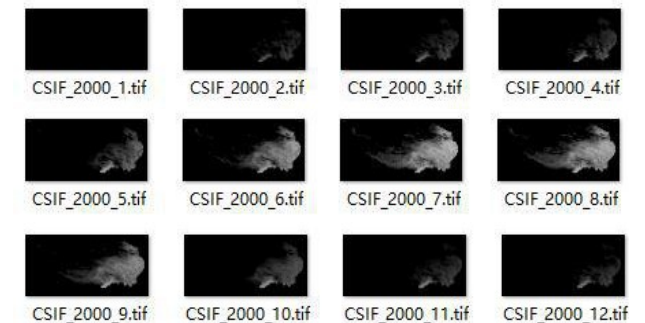
Jiang, L. (2021). The Datasets of the SRTM C/X-Band Radar Penetration Depth Differences on $1^\circ \times 1^\circ$ grid of High Mountain Asia Glaciers (2000). National Tibetan Plateau / Third Pole Environment Data Center.
DOI: [10.11888/Glacio.tpcd.271279](https://doi.org/10.11888/Glacio.tpcd.271279).



Zhang, G. (2018). Data on glacial lakes in the TPE (V1.0) (1990, 2000, 2010). National Tibetan Plateau / Third Pole Environment Data Center.
DOI/CSTR: [10.11888/Hydrology.tpc.249459.file](https://doi.org/10.11888/Hydrology.tpc.249459.file).

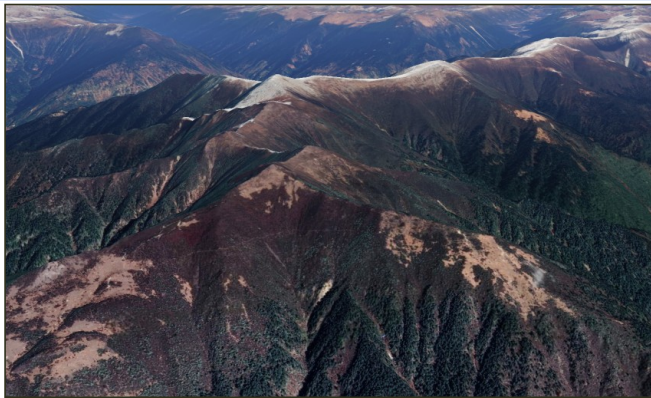


Peng, S. (2020). 1-km monthly precipitation dataset for China (1901-2024). National Tibetan Plateau / Third Pole Environment Data Center.
DOI: [10.5281/zenodo.3185722](https://doi.org/10.5281/zenodo.3185722).

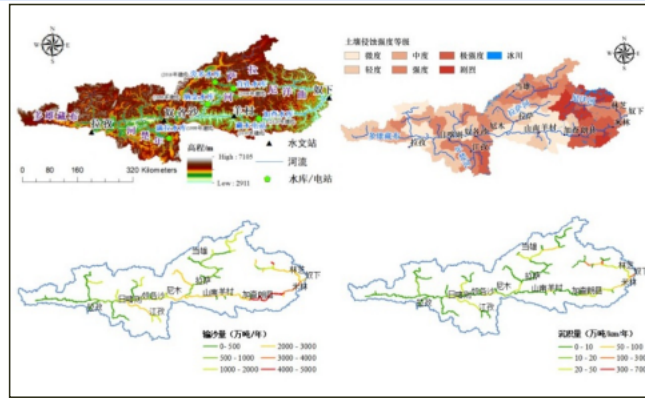


Zhang, Y. (2020). Contiguous solar induced chlorophyll fluorescence (CSIF) dataset of Tibetan Plateau (2000-2018). National Tibetan Plateau / Third Pole Environment Data Center.
DOI: [10.11888/Ecolo.tpcd.271037](https://doi.org/10.11888/Ecolo.tpcd.271037).

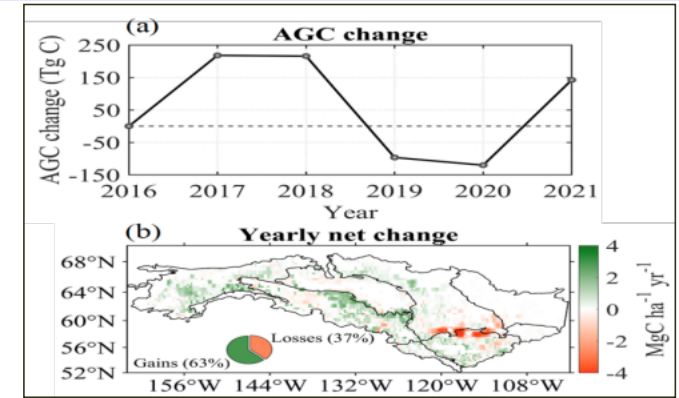
2.1 Data Resources: Article associated data repository



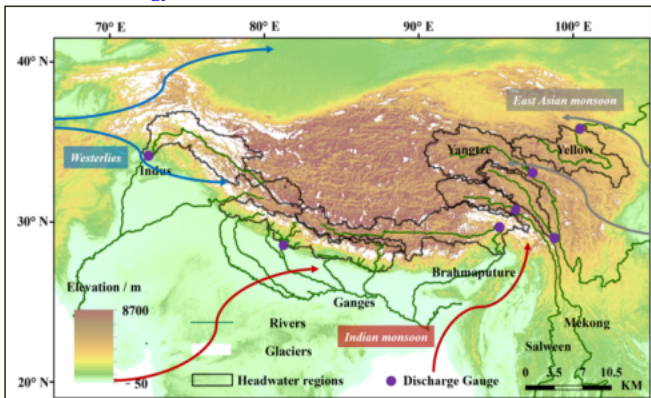
Xu, J., Wang, X., Wang, T. (2022). Distribution pattern of realized range limit of trees (treeline) over Tibetan Plateau (2015). National Tibetan Plateau / Third Pole Environment Data Center. <https://doi.org/10.11888/Terre.tpd.c.272809>.
Nature Ecology & Evolution



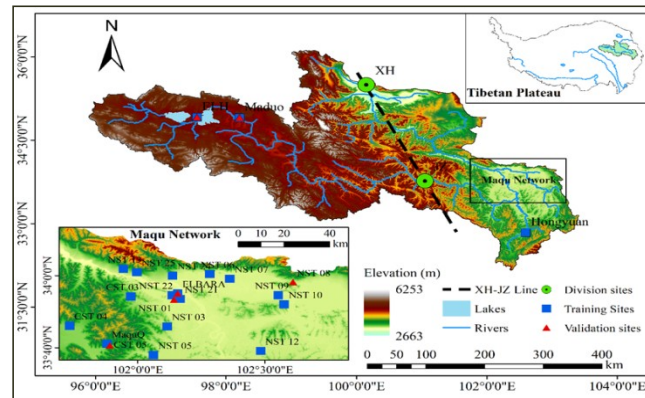
Chen, Y., Zhang, F. (2024). Spatial distribution of erosion and sediment transport in the middle the Yarlung Zangbo River basin and site simulation results (1983-2017). National Tibetan Plateau / Third Pole Environment Data Center. <https://doi.org/10.11888/Terre.tpd.c.301444>.
Water



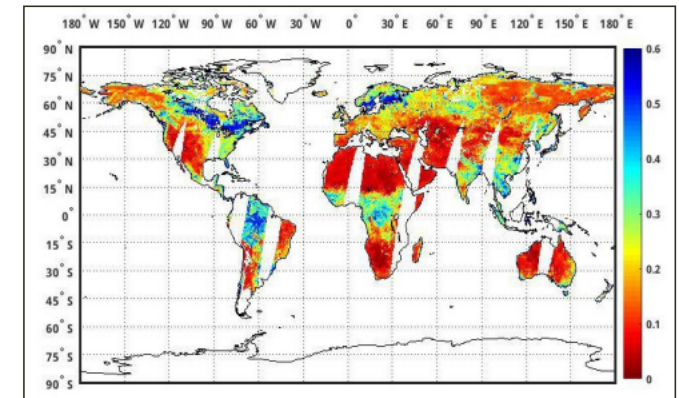
Fan, L. (2023). Dataset of tropical aboveground carbon (2014-2020). National Tibetan Plateau / Third Pole Environment Data Center. <https://doi.org/10.11888/Terre.tpd.c.300498>.
Global Change Biology



Wang, L., Liu, H., Wang, Y., Qi, J., Song, L., Chai, C., Liu, R., Fan, X., Li, X. (2024). Tibetan Plateau runoff and evapotranspiration dataset by an observation-constrained cryosphere-hydrology model. National Tibetan Plateau / Third Pole Environment Data Center. <https://doi.org/10.1038/s41597-024-03623-3>.
Scientific Data

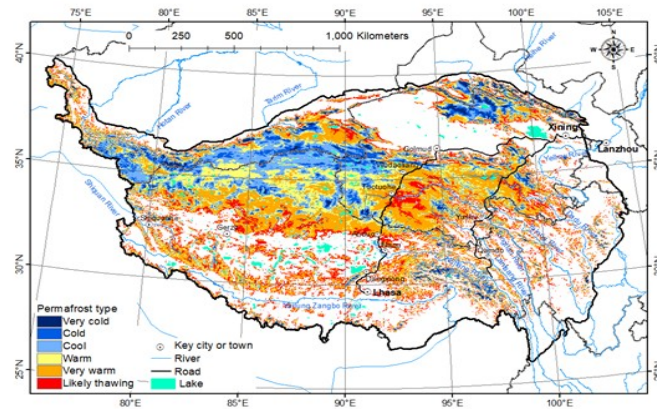


Fu, X., Zhang, Y., Guo, L., Jiang, X. (2024). 1-km surface soil moisture dataset considering differences in freezing-thawing periods in the source region of the Yellow River (2015-2021). National Tibetan Plateau / Third Pole Environment Data Center. <https://doi.org/10.11888/Terre.tpd.c.301535>.
Agricultural and Forest Meteorology



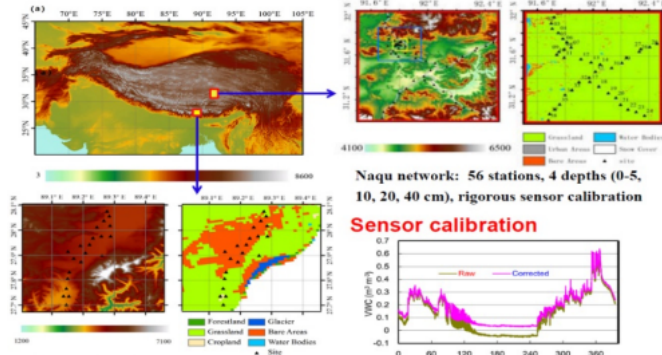
Yao, P., Lu, H. (2020). A long term global daily soil moisture dataset derived from AMSR-E and AMSR2 (2002-present). National Tibetan Plateau / Third Pole Environment Data Center. <https://doi.org/10.11888/Soil.tpd.c.270960>.
Scientific Data

2.1 Data Resources: Independently Developed Data Products



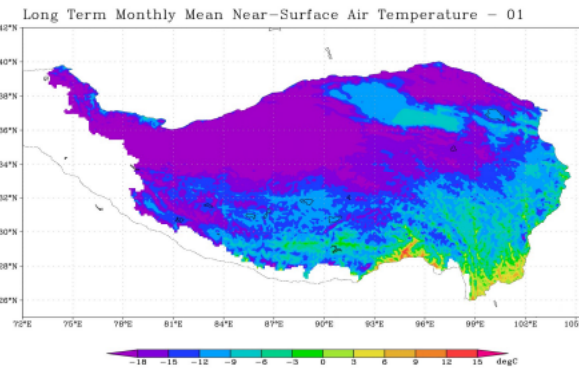
Permafrost Degradation Dataset on the Tibetan Plateau (1960s–2000s)

Ran, Li* et al., 2018, *Cryosphere* Highly Cited Paper



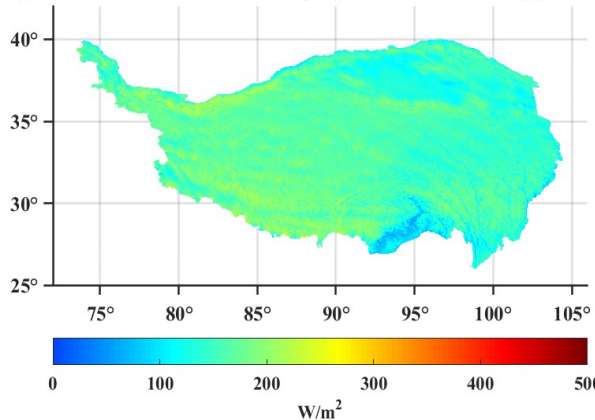
High-Density Soil Moisture Observation Dataset on the Tibetan Plateau

Chen et al., 2017, *JGR*

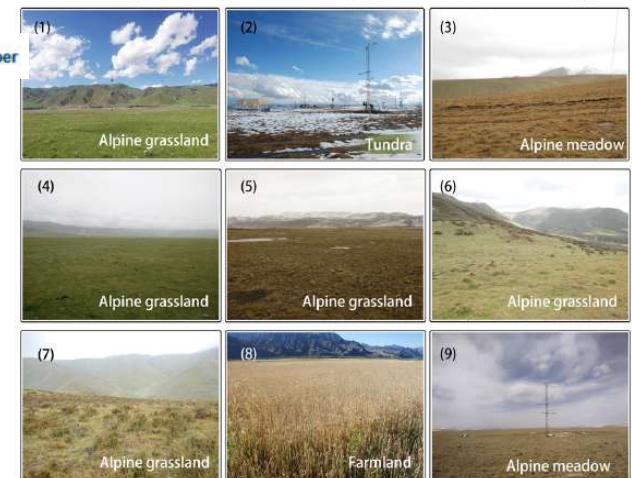
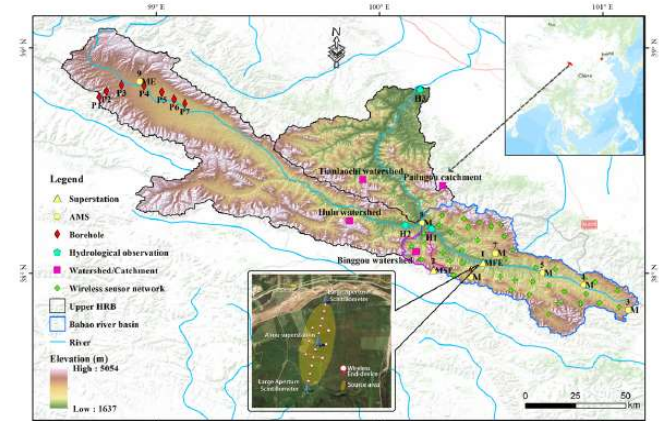


China Surface Gridded Meteorological Dataset (1979–2018)

He, Yang*, et al., 2020, *SD Jan.* Highly Cited Paper



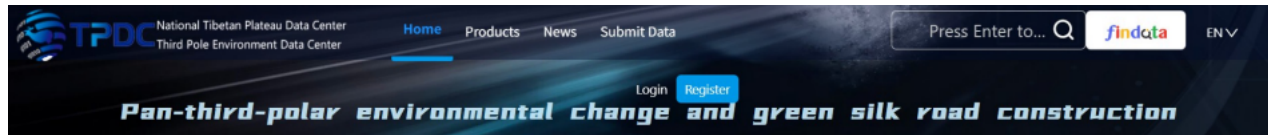
Global 10 km Downward Shortwave Radiation Dataset (1983.7–2018.12)



Comprehensive Observation Dataset for Alpine Areas in the Upper Heihe River Basin

Che et al., 2019, *ESSD* TPDC

2.2 Project Data Resources: CAS Silk Road Environment Category A Special Project



Introduction

The Pan-Third Pole expands from the Third Pole to the west and north, covering the Eurasian highlands and their environmental impact areas of the Tibetan Plateau, Pamirs, Hindu Kush, Iranian Plateau, Caucasus, Carpathians and other mountains. It covers an area of more than 20 million square kilometers and is related to the living environment of more than 3 billion people (Yao, 2018). Pan-third pole region and the ' Belt and Road ' core area highly overlapped. In-depth research on the rules, mechanisms and future trends of environmental change in the pan-third Pole region, and solutions to resource and environmental problems in key regions, key countries and key projects will provide scientific basis for the sustainable development of the Silk Road Economic Belt, where environmental change and human activities are most intense, and provide decision support for building a green, healthy, intellectual and peaceful Belt and Road (Yao et al., 2019).

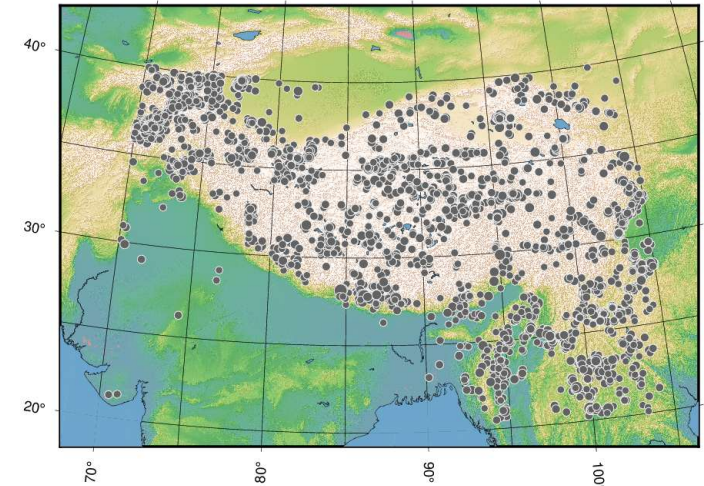
Strategic Priority Research Program of Chinese Academy of Sciences "Pan-Third Pole Environment Study for a Green Silk Road (Pan-TPE)" was launched in Beijing on September 30, 2018. This project will follow Xi Jinping the guiding spirit of the General Secretary's important speeches on The Second Tibetan Plateau Scientific Expedition and Research and ecological progress on the Tibetan Plateau in the New Era. And it is integrated with The Second Tibetan Plateau Scientific Expedition and Research and Environment and Climate Change at the Third Pole. Focusing on water, ecology and human activities, the following issues will be carried out, such as the mechanism of environmental change, the carrying capacity of resources and environment, disaster risk and the way of green development (Yao, 2019).

The National Tibetan Plateau Data Center undertakes the integration of scientific data products for the Pan-TPE project. In order to facilitate scientific researchers to quickly understand and use the scientific data output of this project, this special data project is established. At the end of 2022, 1317 scientific data sets have been integrated to provide data support for revealing the processes and mechanisms of environmental change in the Pan Tertiary Region and its impact and response to global environmental change, and improving regional disaster prediction, early warning, and mitigation capabilities (Pan, et al., 2021).



Popular data rankings

1	1-km monthly precipitation dataset for China (1901-2024)	59830	276621
2	China meteorological forcing dataset v1.6 (1979-2018)	38620	308930
3	Landuse dataset in China (1980-2015)	14085	50286
4	Integration dataset of Tibet Plateau boundary	11395	51863
5	Dataset of soil properties for land surface modeling over China	8341	63312
6	Long-term series of daily snow depth dataset in China (1979-2025)	7473	69923
7	The second glacier inventory dataset of China (version 1.0) (2006-2011)	4971	80969
8	1-km monthly maximum temperature dataset for China (1901-2024)	4784	28264
9	Dataset of high-resolution (3 hour, 10 km) global surface solar radiation (1983-2018)	4603	84348
10	Dataset of river basins map over the TP (2016)	4351	25324



Wang, J. (2021). **Catalogue of destructive earthquakes in the Tibetan Plateau since 1970**. National Tibetan Plateau / Third Pole Environment Data Center. <https://doi.org/10.11888/Disas.tpdc:271300>.




The Silk Road Environment Special Project has submitted a total of 1,326 project output datasets to TPDC

2.2 Project Data Resources: The Second Tibetan Plateau Scientific Expedition

The Second Tibetan Plateau Scientific Expedition

>1100 datasets

The Second Tibetan Plateau Scientific Expedition (STEP) program

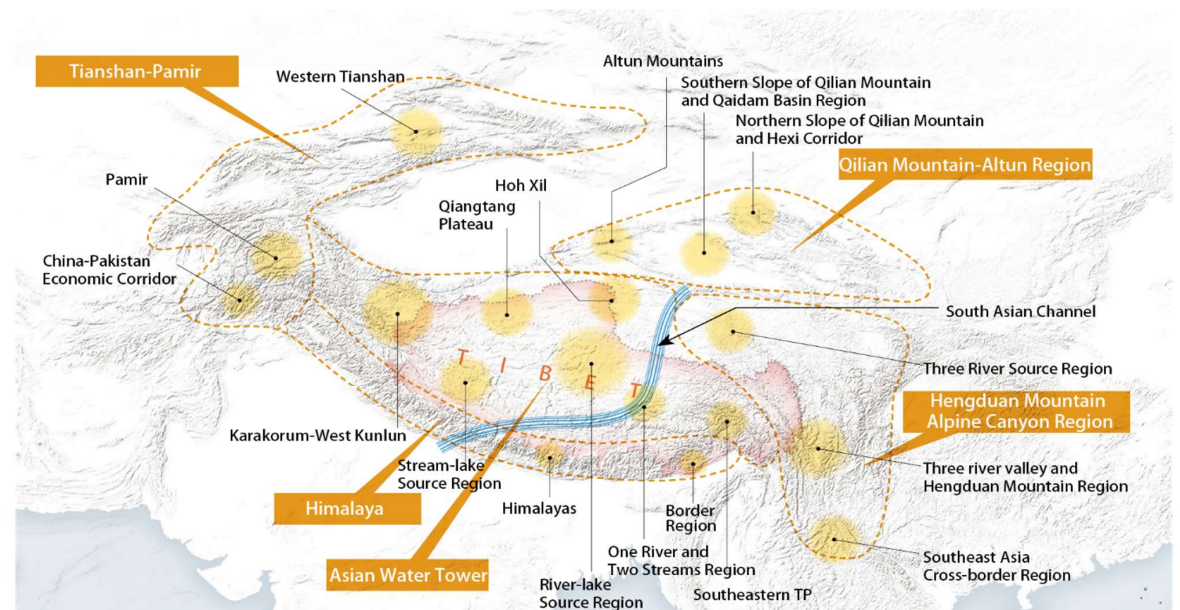


Brief Introduction: Second Tibetan Plateau Scientific Expedition Program
Number of Datasets: 698

Sorting* Keyword(s) [Search]

- Stratigraphic column of Ordovician Tha Manao Formation in Wat Mong Kratae section, western Thailand**
Paleozoic strata are well developed in the western Thailand area, but the detailed paleontological research is still lacking for the Ordovician in study area. Abundant conodonts and cephalopod samples from the Tha Manao Formation in western Thailand (Sibumasu terrane, Dapingian Wat Mong Krat...
© 2022-02-26 ● 382 ▲ 0
- Characteristic parameters and data of field investigation on the impact of disaster chain on major line engineering structures**
On the basis of field scientific research, this parameter set integrates the parameters of debris flow disaster chain and landslide disaster chain observed along important roads in Himalayan and Hengduan Mountains. The regional scope covers Nyingchi, Shannan, Bomi, Basu, Shigatse, Ali and other regions...
© 2022-02-26 ● 379 ▲ 0
- Carbon and oxygen isotopic features of marine carbonate rocks from the Wat Mong Kratae section in western Thailand (470-467 Ma)**
Carbon cycle is controlled by relative changes in carbon fluxes of global atmosphere, hydrosphere, lithosphere, and biosphere. During the geological history, carbon isotope excursions usually occur in the critical period. Carbon isotope positive excursions are recognized to be related to abundant organic buri...
© 2022-02-26 ● 406 ▲ 0
- Carbon and oxygen isotopic features of marine carbonate rocks from the Shuangdianaban section in Ali area, Tibet (359-340 Ma)**
In South China, standard Carboniferous $\delta^{13}\text{C}_{\text{carb}}$ curves have been established, but the isotopic patterns and values in different sections and regions can be quite different. Before the use of $\delta^{13}\text{C}_{\text{carb}}$ records to reveal global marine carbon cycling, it is necessary to conduct sedimentary facies and diagenesis analys...
© 2022-02-26 ● 422 ▲ 0
- Systemic inflammatory and oxidative stress index of native Tibetans on the Tibetan Plateau (2021)**
The data set contains the systemic inflammatory oxidative stress indexes collected from native Tibetans in Lhasa and Nyingchi in Tibet Autonomous Region for four follow-up visits. The project carried out four follow-up surveys in Lhasa and Nyingchi from May to June and September to October 2021, and a total ...
© 2022-02-25 ● 494 ▲ 0

Targeting at five expedition areas which include 19 key zones



<https://data.tpdc.ac.cn/en/special/step/>

From Prof. Tandong Yao

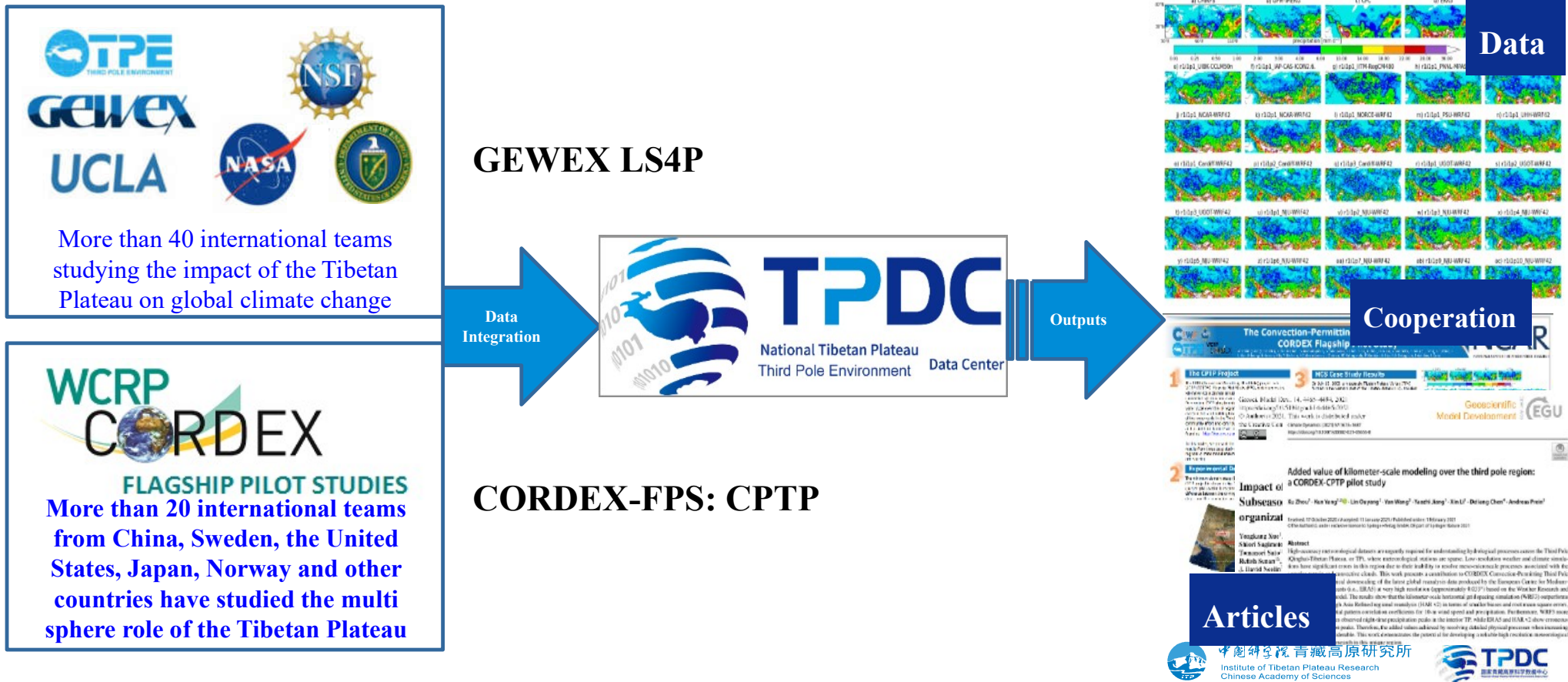


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2.2 Project Data Resources: Cooperation with international projects

Support interdisciplinary **data exchange** and collaboration for international programs such as the Third Pole Environment (**TPE**) and the Global Energy and Water Exchange (**GEWEX**) project



GEWEX LS4P

Logos: TPE, GEWEX, UCLA, NASA, NSF, etc.

More than 40 international teams studying the impact of the Tibetan Plateau on global climate change

CORDEX-FPS: CPTP

Logos: WCRP, CORDEX

FLAGSHIP PILOT STUDIES

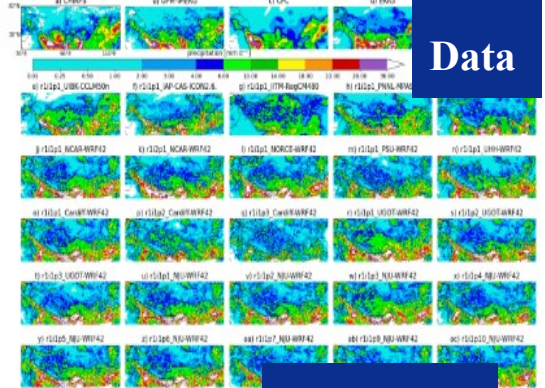
More than 20 international teams from China, Sweden, the United States, Japan, Norway and other countries have studied the multi sphere role of the Tibetan Plateau

GEWEX LS4P

CORDEX-FPS: CPTP

TPDC

National Tibetan Plateau Third Pole Environment Data Center



Cooperation

The Convection-Permittin CORDEX Flagship

1. The CPTP project... 2. Impact of Subseon... 3. The CPTP project...

Articles

Added value of kilometer-scale modeling over the third pole region: a CORDEX-CPTP pilot study

Impact of Subseon... organization

Yousuqun Xue, Shoufeng Suo, Mubai Xuan, Li David Heister

2.3 Data Resource Integration: Featured Datasets

No.	Category	Dataset Name
1	Observational Datasets (9)	Tibetan Plateau Corridor Ground Temperature Dataset (2000–2010)
2		Tibetan Plateau Soil Moisture Continuous Observation Dataset (2008–2016)
3		Heihe River Basin Soil Anisotropy Observation and Validation Dataset (2012–2014)
4		Tibetan Plateau Land Surface Interaction Process High-Resolution (hourly) Comprehensive Observation Dataset (2005–2016)
5		Stable Isotope Synchronous Site Dataset (2008)
6		China Cold and Arid Region Engineering and Environmental Monitoring Network Water Dataset (2018)
7		China Cold Region Land Surface Environment and Monitoring Network Climate Dataset (2014–2017)
8		China 1 km Resolution Monthly Minimum Temperature Dataset (1901–2020)
9		Global Energy and Water Cycle to Asian Monsoon Tibetan Plateau Test Study (GAME/Tibet) Dataset (1997–1998)
10	Cryosphere Datasets (12)	Tibetan Plateau Snow Depth Remote Sensing Dataset (1989–2018)
11		Yangtze River Sequential Ice Melt Dataset — Dual Indicator Algorithm (1978–2015)
12		Tibetan Plateau Corridor Active Layer Thickness Distribution (1980–2015)
13		China Western Glacier Lake Dataset (2015)
14		Tibetan Plateau New Permafrost Distribution Map (2017)
15		China Tibetan Plateau Permafrost Classification Dataset (2000–2010)
16		China Glacier Length Time Series Dataset (1979–2021)
17		China Second Glacier Inventory Dataset (V1.0) (2006–2011)
18		Tibetan Plateau Permafrost Thermal Stability Zoning Dataset (2005–2015)
19		Northern Hemisphere Permafrost Climate–Ecosystem Sensitivity Zoning Dataset (2000–2016)
20		High-Resolution Northern Hemisphere Permafrost Dataset (2000–2016)
21		North Tibetan Plateau Lake Growth Long-term Dataset (1985–2020)
22	Near-Surface Atmospheric Driving Datasets (7)	China Regional Land Surface Key Driving Factors Dataset (1979–2018)
23		China 1 km Resolution Monthly Precipitation Dataset (1901–2020)
24		Long Time Series High Time-Resolution Monthly Precipitation and Temperature Dataset (1951–2011)
25		Future Climate Prediction for China Based on RegCM4.6 Multi-Scenario Multi-Model (2007–2099)
26		Global 3 km Resolution (3h, 10 km) Surface Solar Radiation Dataset (1983–2018)
27		China 1 km Resolution Monthly Maximum Temperature Dataset (1901–2020)
28		China 1 km Resolution Monthly Minimum Temperature Dataset (1901–2020)

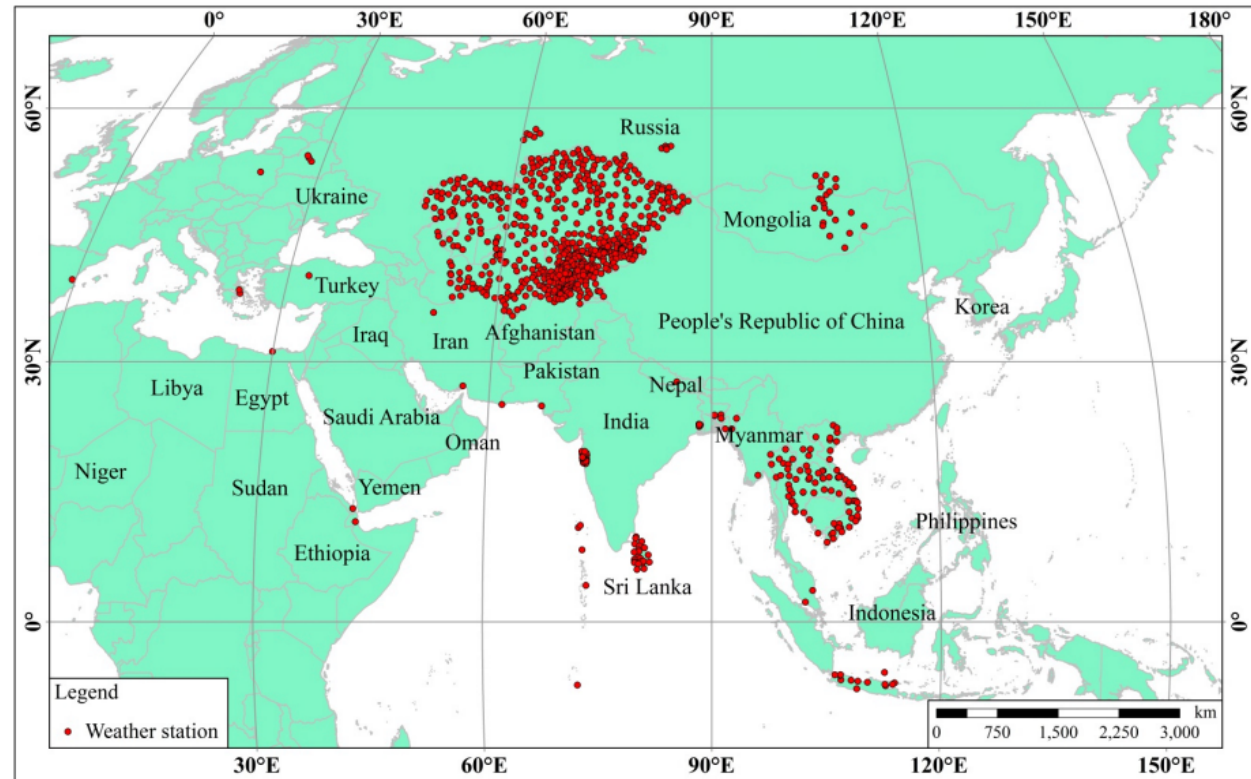
No.	Category	Dataset Name
29	Land Surface Parameter Datasets (13)	Tibetan Plateau Lakes Larger than 1 km ² Water Volume Change (1976–2020) v2.0
30		Tibetan Plateau Lake Area Long-term Time Series Dataset (1970–2013)
31		China Digital Elevation Model (1 km)
32		China High-Resolution Boundary Dataset (2016)
33		Tibetan Plateau Boundary Dataset
34		China Western Six-Province Land Use Status Monitoring Dataset (1970s, 1980s, 1995, 2000, 2005, 2010, 2015)
35		"Belt and Road" Asia–Europe Regional Boundary Map
36		China Soil Organic Matter Dataset
37		China Arid Region Monthly Lake Extent Dataset (2000–2015)
38		Tibetan Plateau 1:100,000 Administrative Boundary Dataset (2017)
39		China Soil Characteristic Dataset (2010)
40		China Vegetation Functional Map (1 km)
41		China Land Cover Dataset 2000
42	High-Impact Paper-Linked Datasets (18)	Tibetan Plateau Glacier Meltwater Erosion Intensity Dataset
43		Agricultural Technology Revolution Facilitated Human Settlement 3,600 Years Ago on the Tibetan Plateau
44		Climate Change and Human Activity Impact on China Vegetation Cover Quantitative Dataset (2001–2018)
45		Yarlung Tsangpo Grand Canyon Uplift History and Its Indicator of South Asian Monsoon Seasonality
46		Tibetan Plateau Peripheral Region Glacier Changes and Their Relationship with Atmospheric Circulation (1970s–2000s)
47		Tibetan Plateau Mountain Plant Canopy Group Composition Dataset (2019)
48		Tree Ring Records of Early Quaternary East–South Tibetan Plateau Seasonal Temperature Change (1340–2007)
49		Genome assembly dataset of Salix matsudana, an alpine plant from the Qinghai-Tibet Plateau (2019)
50		Tibetan Plateau Snow Depth 18O Isotope Site Dataset (1991–2008)
51		Ningxia Helan Mountain Ice Core Stable Isotope Dataset (1864–2006)
52		Tibetan Plateau 3 m Deep Soil Moisture Grid Dataset (2019)
53		Longmen Mountain Seismic Wave Velocity Before and After Post-Earthquake Recovery Process (2000–2014)
54		Caribbean Deep-Sea Hydrogen and Oxygen Stable Isotope Site Dataset (2016–2018)
55		Multi-Site Observation Network Precipitation Stable Isotope Dataset (2017–2018)
56		New Holocene Period Tibetan Plateau Nile-Source Ancient Human Subsistence
57		China Southwest Region Past 70 Years Temperature Measurement Dataset
58		Tibetan Plateau Human Footprint Dataset (1990–2017)
59		Machine Learning Method to Construct Ice Volume Changes Based on Tibetan Plateau Vegetation Variables



2.3 Data Resource Integration: Pan-Third Pole Cross-Border Meteorological Dataset Integration

No.	Dataset Name	Observed Variables	No. of Weather Stations
1	Meteorological Station Temperature and Precipitation Data from Five Central Asian Countries	Daily maximum temperature, daily minimum temperature, temperature at observation time, precipitation	599
2	Daily/Monthly/Annual Meteorological Observation Dataset for Key Node Areas across the Pan-Third Pole Region	Daily/monthly/annual mean maximum, mean minimum, and mean temperature; monthly total precipitation and snowfall, etc.	270
3	Basic Meteorological Data from Weather Stations along the China–Mongolia–Russia Economic Corridor	Wind speed, wind direction, precipitation, air temperature, and snow depth	29
4	Routine Meteorological Element Dataset from 22 Observation Stations in Sri Lanka	Air temperature, air pressure, relative humidity, wind speed, wind direction, precipitation, radiation, water vapor pressure, and other daily values	22
5	Central Asia Field Weather Station Observation Dataset	Air temperature, precipitation, wind direction and speed, relative humidity, air pressure, radiation, soil heat flux, sunshine duration, and soil temperature, etc.	10
6	Central Asia Field Weather Station Observation Dataset	Air temperature, precipitation, wind direction and speed, relative humidity, air pressure, radiation, soil heat flux, etc.	10
7	Glacial Meteorological Monitoring Data from Kara-Batkak Glacier, Kyrgyzstan Tianshan Mountains	Air temperature, maximum temperature, time of maximum temperature occurrence, minimum temperature, time of minimum temperature occurrence, 0.1 mm/hour rainfall, 0.5 mm/hour rainfall, etc.	1
8	South Asian Meteorological Dataset: Meteorological Data from the Chinese Academy of Sciences Kathmandu Science and Education Center	Daily mean of air temperature, air pressure, radiation and wind speed; daily total of precipitation	1
9	Meteorological Station Monitoring Data for Dhaka City, Bangladesh	Air temperature, wind speed, dew point, and precipitation, etc.	1

Pan-Third Pole (Overseas) Weather Station Distribution Map



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2.4 Special Data Issue for Pan-Third Pole Regions

- Pan, X., Li, H., Feng, M., Ge, C., Wang, J., Qi, J. (2021). **A series of background datasets over the Pan-Third Pole (1980-2020).** National Tibetan Plateau / Third Pole Environment Data Center. <https://doi.org/10.11888/Geogra.tpdc.271328>.

The screenshot shows the TPDC website interface. At the top, there is a navigation bar with 'Home', 'Products', 'News', and 'Submit Data'. A search bar contains 'Press E...' and a 'finddata' button. The main content area features a title 'A series of background datasets over the Pan-Third Pole (1980-2020)' with statistics: 86 stars, 6911 views, and 780 downloads. A grid of 12 maps is displayed on the left. Technical specifications are listed in the center: Temporal resolution (Hourly), Spatial resolution (10m - 100m), Sharing way (Open access), Size (3.08 TB), Data time range (1980-01-01 — 2020-12-31), and Metadata update time (2023-09-07). A QR code is on the right. At the bottom, there are 'Subscribed' and 'Download' buttons.

Datasets Summary

Data relevant to the Pan-Third Pole region are huge but fragmented due to these data are scattered in individuals or small groups, which hinders from better understanding the unprecedented environmental changes and the intense multi-sphere interactions over the Pan-Third Pole region. In this study, we adopt the latest data from multiple data platforms combined with the integrated method of data fusion to produce higher quality and detailed Pan-third Pole dataset. According to the scientific content of the data, the quality of these data is controlled, and then the data are integrated. For some datasets, using data fusion techniques, data from multiple sources will be combined to produce detailed data. The fusion of data from different sources will produce innovative data products with higher data quality and more recent times that will better serve the research on land surface process models. The latest data from multiple data platforms, and data integration methods such as data fusion, were used to produce the Pan-Third Pole background Datasets with higher quality and more recent times. The Pan-Third Pole natural

Keywords

Subject: Cryosphere, Atmosphere, Terrestrial Surface

Theme: Harmonized world soil database, Frozen Ground, Frozen ground distribution, Land Use/Land Cover, Land cover change

- Li, H., Pan, X., Feng, M., Ge, C., Wang, J., & Qi, J. (2024). A dataset of comprehensive background data series over the Pan-Third Pole (1980–2020). *China Scientific Data*, 9(3), 268-293.



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2.4 Special Data Issue for Pan-Third Pole Regions

No.	Primary Category	Secondary Category	Dataset Name	Spatial Resolution	Temporal Resolution	Year of Data	Data Format
1	Basic (4)	Land Use	Pan-Third Pole Land Cover Dataset	30 m	\	2020	tif
2		Vegetation Function	Pan-Third Pole Vegetation Function Dataset	500 m	\	2019	nc/tif
3		DEM	Pan-Third Pole Digital Elevation Model Dataset	30 m	\	2000	tif
4		Soil	Pan-Third Pole Soil Dataset	30"	\	2008	nc/tif
5	Cryosphere (7)	Permafrost	Pan-Third Pole Permafrost Distribution Dataset	100000 m	\	2017	shp
6			Pan-Third Pole Permafrost Hydrothermal Zonation Dataset	1000 m	\	2000-2016	shp
7			Pan-Third Pole Permafrost Zonation Index Dataset	1/120°	\	2012	nc/tif
8			Pan-Third Pole Permafrost Surface Roughness Dataset	1/120°	\	2012	nc/tif
9		Glacier	Pan-Third Pole Glacier Distribution Dataset	1:100000	\	2017	shp
10		Glacial Lake	Pan-Third Pole Glacial Lake Distribution Dataset	1:100000	\	2015	shp
11		Snow	Pan-Third Pole Snow Depth Dataset	0.25°	Day	1980-2018	nc/txt
12	Hydrology & Atmosphere (11)	Rivers and Lakes Distribution	Pan-Third Pole Rivers and Lakes Dataset	500 m	\	2008	shp
13		Evapotranspiration	Pan-Third Pole Evapotranspiration Dataset	500 m	Year	2019	nc/tif
14		Soil Evaporation	Pan-Third Pole Soil Evaporation Dataset	0.05°	8 days	2002-2019	nc/tif
15		Water Body and Snow Evaporation	Pan-Third Pole Water Body and Snow Evaporation Dataset	0.05°	8 days	2002-2019	nc/tif
16		Canopy Interception Evaporation	Pan-Third Pole Canopy Interception Evaporation Dataset	0.05°	8 days	2002-2019	nc/tif



2.4 Special Data Issue for Pan-Third Pole Regions

No.	Primary Category	Secondary Category	Dataset Name	Spatial Resolution	Temporal Resolution	Year of Data	Data Format
17	Hydrology & Atmosphere (11)	Surface Thermal Radiation	Pan-Third Pole Surface Thermal Radiation Dataset	0.1°	Hour	1981-2020	nc
18		Surface Solar Radiation	Pan-Third Pole Surface Solar Radiation Dataset	0.1°	Hour	1981-2020	nc
19		Precipitation	Pan-Third Pole Total Precipitation Dataset	0.1°	Hour	1981-2020	nc
20		Atmospheric Pressure	Pan-Third Pole Atmospheric Pressure Dataset	0.1°	Hour	1981-2020	nc
21		Temperature	Pan-Third Pole 2m Temperature Dataset	0.1°	Hour	1981-2020	nc
22		Wind Field	Pan-Third Pole Wind Field Dataset	0.1°	Hour	1981-2020	nc
23	Ecology (2)	Gross Primary Production	Pan-Third Pole Gross Primary Production Dataset	0.05°	8 days	2002-2019	nc/tif
24		Vegetation Transpiration	Pan-Third Pole Vegetation Transpiration Dataset	0.05°	8 days	2002-2019	nc/tif
25	Disaster (2)	Landslide	Pan-Third Pole Landslide Susceptibility Dataset	1 km	\	2017	nc/tif
26		Earthquake	Pan-Third Pole Seismic Zoning Dataset	15 km	\	2003	shp/nc/tif
27	Human Geography (6)	Population Density	Pan-Third Pole Population Density Dataset	1:1,000,000	\	2018	shp
28		Roads	Pan-Third Pole Traffic Road Dataset	1:1,000,000	\	2018	shp
29		Railways & Airports	Pan-Third Pole Railway Airport Dataset	5'	\	2017	nc/tif
30		Economic GDP	Pan-Third Pole GDP Per Capita Dataset	\	\	2018	shp
31			Pan-Third Pole Income Level Distribution Dataset	\	\	2018	shp
32		World Heritage	Pan-Third Pole World Heritage Distribution Dataset	\	\	2012	shp



2.4 Special Data Issue for Pan-Third Pole Regions

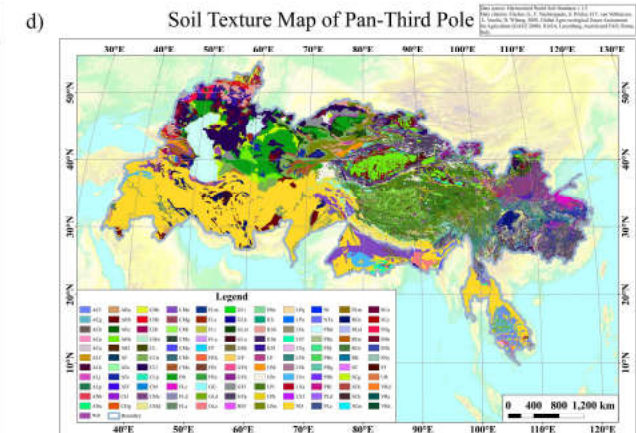
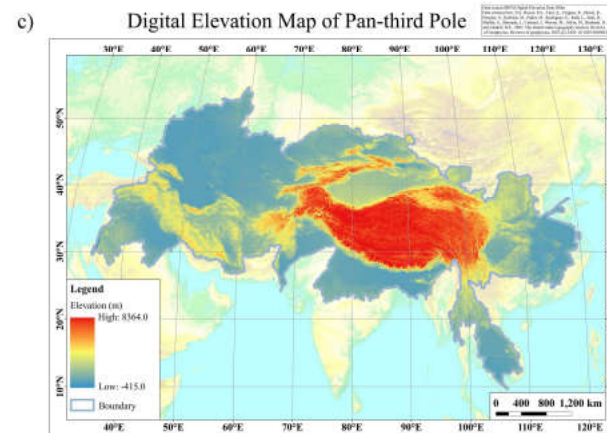
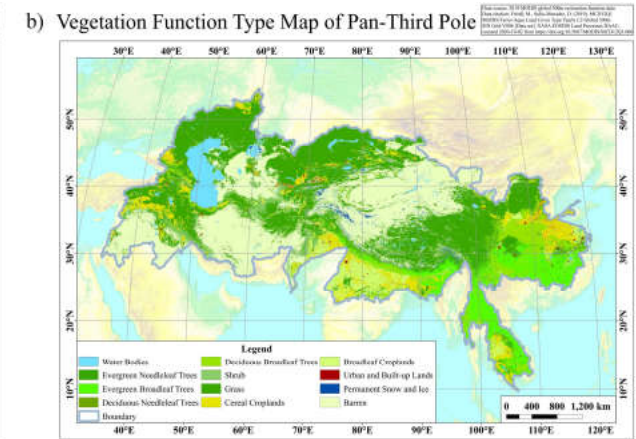
(1) Pan-Third Pole Basic Datasets

1) Pan-Third Pole 30 m Land Cover Data (2020)

2) Pan-Third Pole 500 m Vegetation Function Data (2019)

3) Pan-Third Pole 30 m Digital Elevation Data (2000)

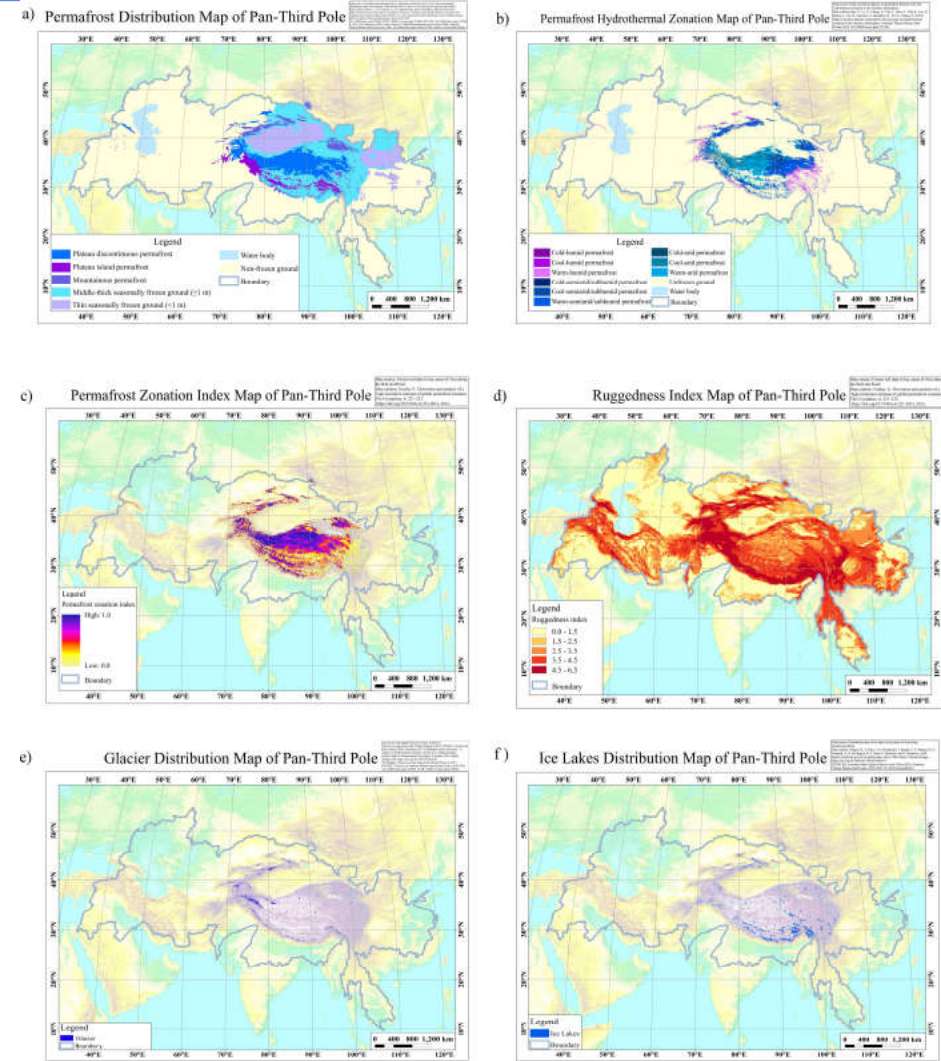
4) Pan-Third Pole Soil Dataset (2008)



2.4 Special Data Issue for Pan-Third Pole Regions

(2) Pan-Third Pole Cryosphere Datasets

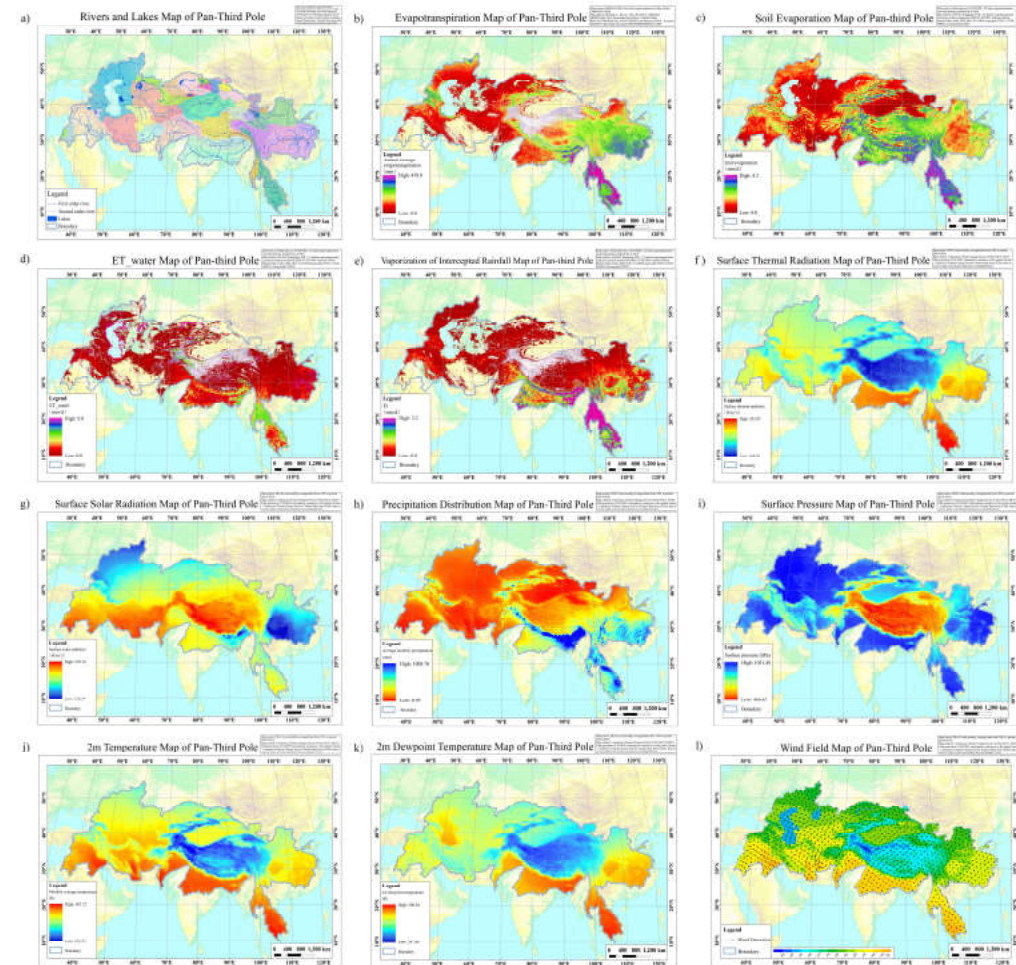
- 1) Pan-Third Pole Permafrost Distribution Data (2017)
- 2) Pan-Third Pole Permafrost Hydrothermal Zonation Dataset (2000-2016)
- 3) Pan-Third Pole Permafrost Surface Roughness Data (2012)
- 4) Pan-Third Pole Permafrost Index Data (2012)
- 5) Pan-Third Pole Glacier Distribution Data (2017)
- 6) Pan-Third Pole Glacial Lake Distribution Data (2015)
- 7) Pan-Third Pole Daily 0.25° Snow Depth Dataset (1980-2018)



2.4 Special Data Issue for Pan-Third Pole Regions

(3) Pan-Third Pole Hydrometeorological Datasets

- 1) Pan-Third Pole Rivers and Lakes Dataset (2018)
- 2) Pan-Third Pole Annual Average Evapotranspiration Dataset (2019)
- 3) Pan-Third Pole 8-day 0.05° Soil Evaporation Dataset (2002-2019)
- 4) Pan-Third Pole 8-day 0.05° Water Body Ice and Snow Evaporation Dataset (2002-2019)
- 5) Pan-Third Pole 8-day 0.05° Canopy Interception Evaporation Dataset (2002-2019)
- 6) Pan-Third Pole Hourly 0.1° Surface Thermal Radiation Dataset (1981-2020)
- 7) Pan-Third Pole Hourly 0.1° Surface Solar Radiation Dataset (1981-2020)
- 8) Pan-Third Pole Hourly 0.1° Total Precipitation Dataset (1981-2020)
- 9) Pan-Third Pole Hourly 0.1° Surface Pressure Dataset (1981-2020)
- 10) Pan-Third Pole Hourly 0.1° 2m Temperature Dataset (1981-2020)
- 11) Pan-Third Pole Hourly 0.1° Wind Field Dataset (1981-2020)



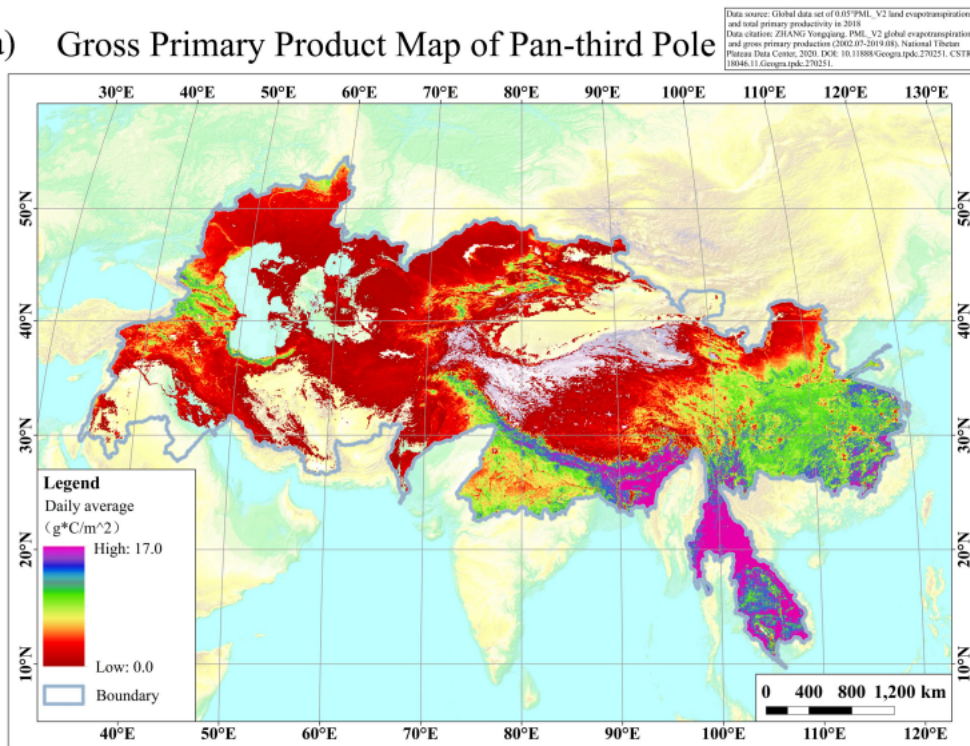
2.4 Special Data Issue for Pan-Third Pole Regions

(4) Pan-Third Pole Ecological Datasets

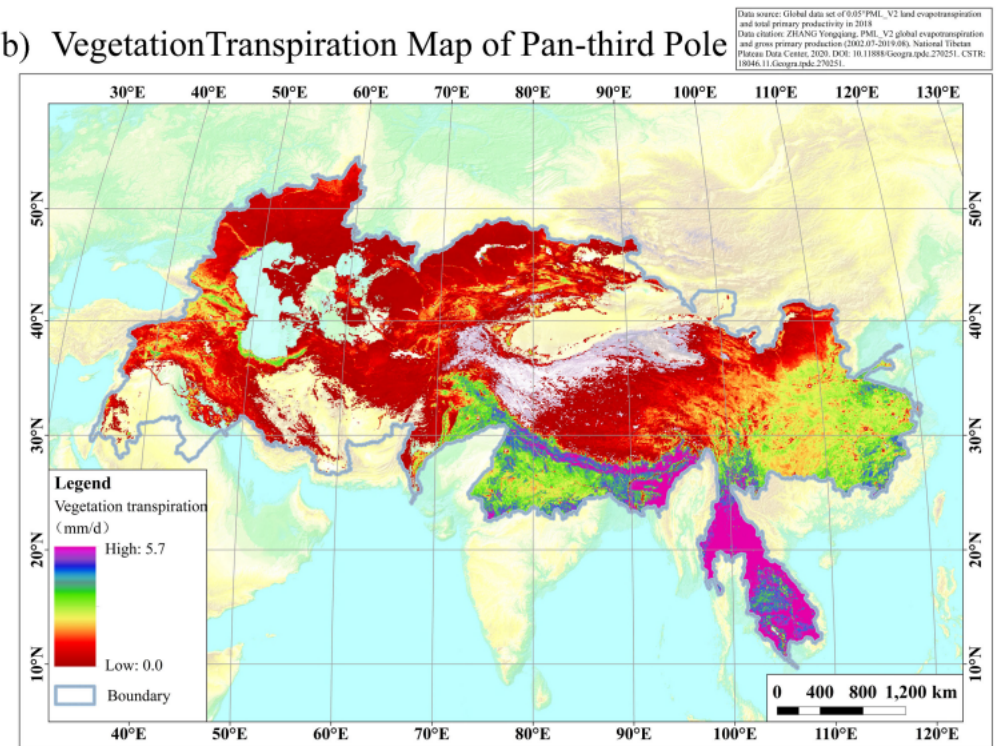
1) Pan-Third Pole 8-day 0.05° Gross Primary Production Dataset (2002-2019)

2) Pan-Third Pole 8-day 0.05° Vegetation Transpiration Dataset (2002-2019)

a) Gross Primary Product Map of Pan-third Pole



b) Vegetation Transpiration Map of Pan-third Pole



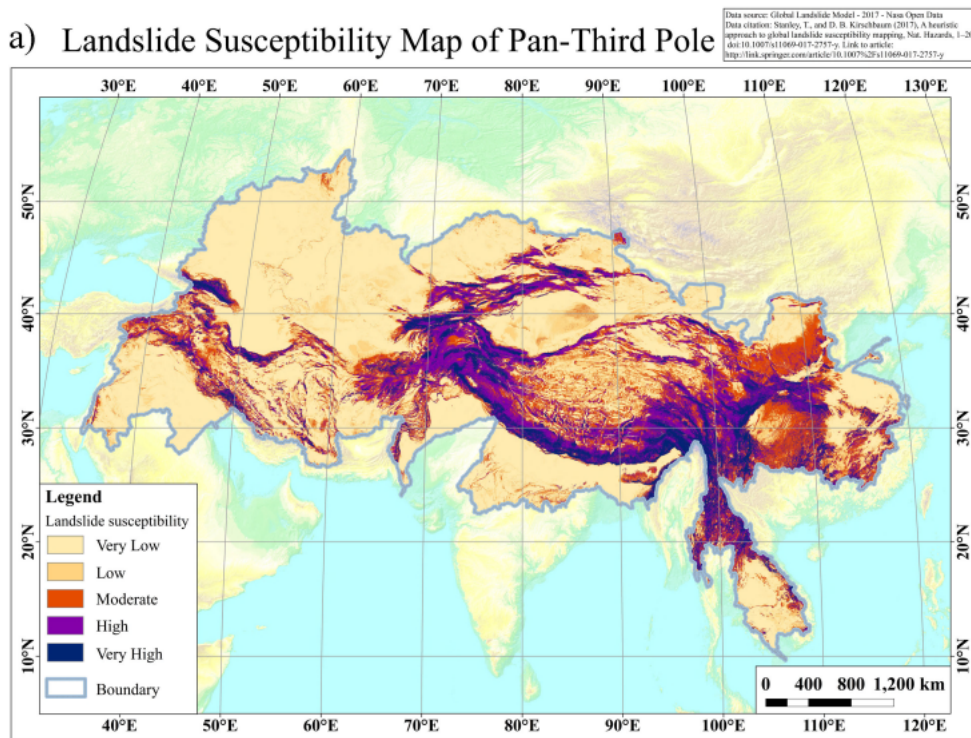
2.4 Special Data Issue for Pan-Third Pole Regions

(5) Pan-Third Pole Disaster Datasets

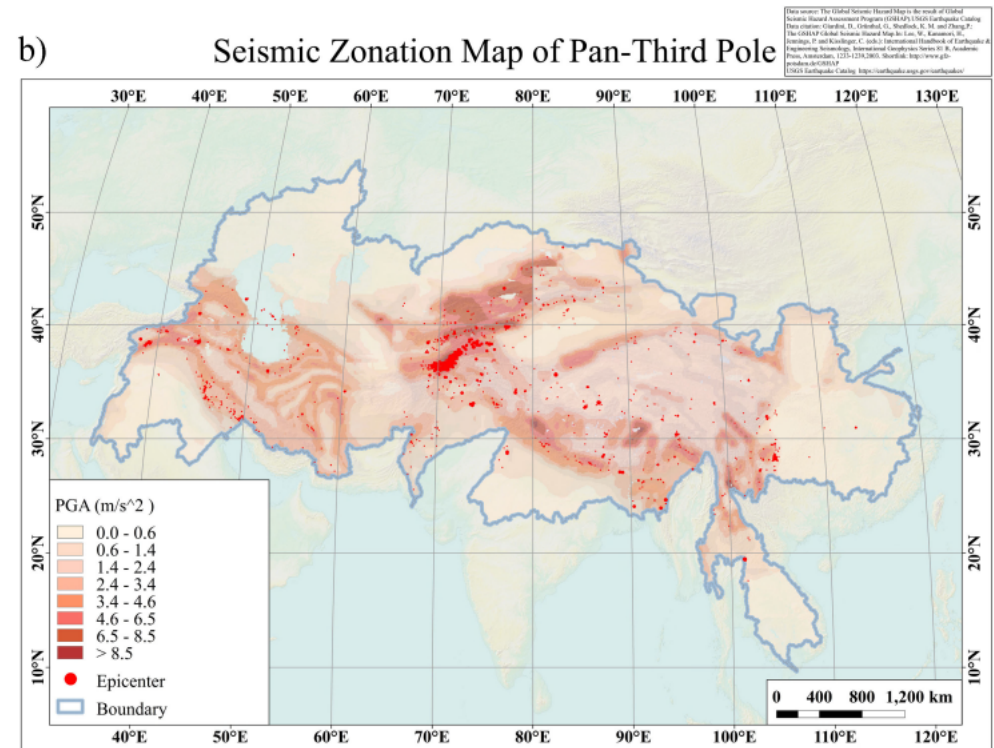
1) Pan-Third Pole Landslide Susceptibility Data (2017)

2) Pan-Third Pole Seismic Zoning Data (2003)

a) Landslide Susceptibility Map of Pan-Third Pole



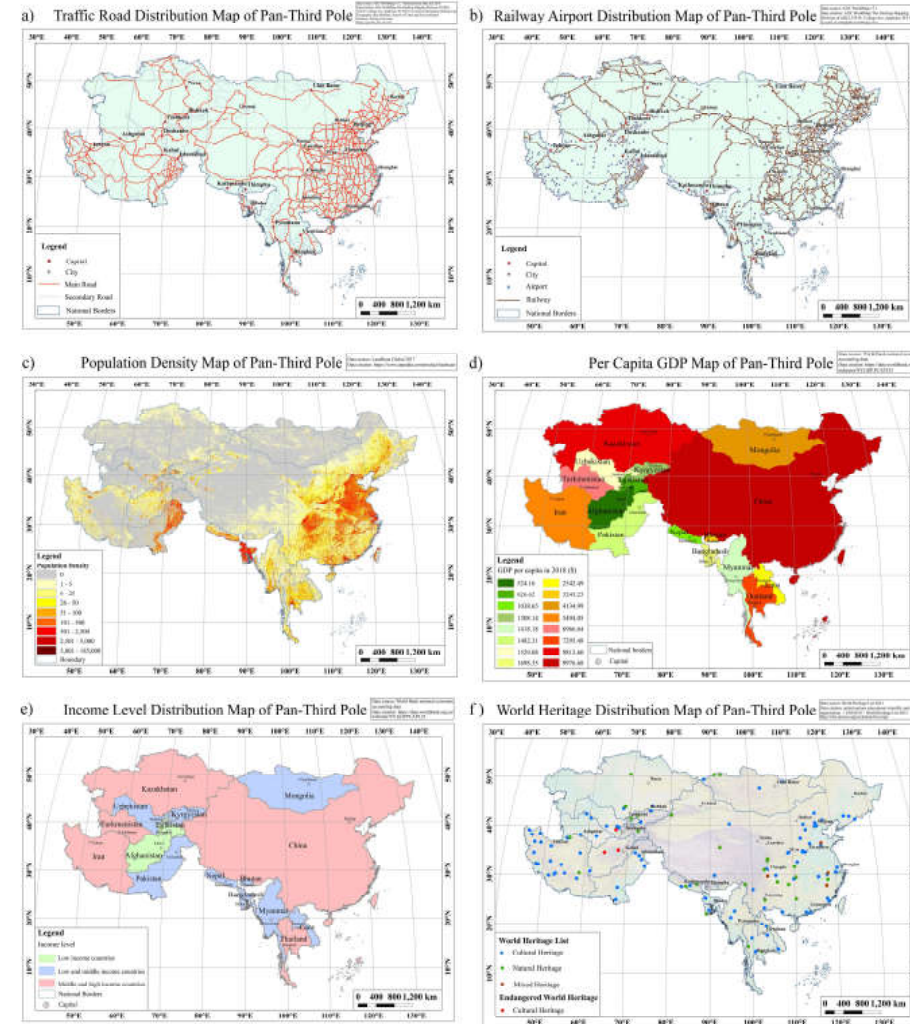
b) Seismic Zonation Map of Pan-Third Pole



2.4 Special Data Issue for Pan-Third Pole Regions

(6) Pan-Third Pole Human Geography Datasets

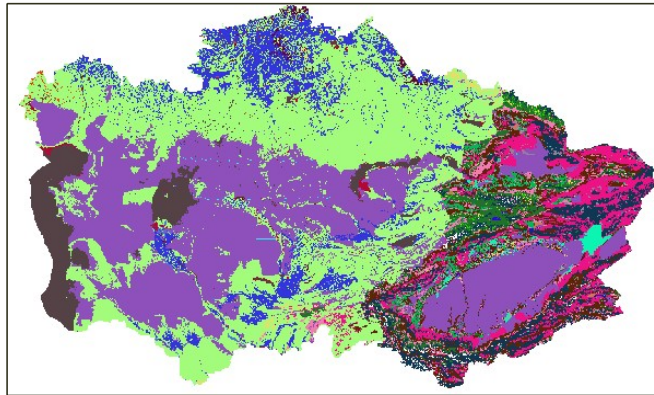
- 1) Pan-Third Pole Transportation Road Data (2018)
- 2) Pan-Third Pole Railway and Airport Data (2018)
- 3) Pan-Third Pole Population Density Data (2017)
- 4) Pan-Third Pole Per Capita GDP Data by Country (2018)
- 5) Pan-Third Pole Income Level Data by Country (2018)
- 6) Pan-Third Pole World Heritage Distribution Data (2012)



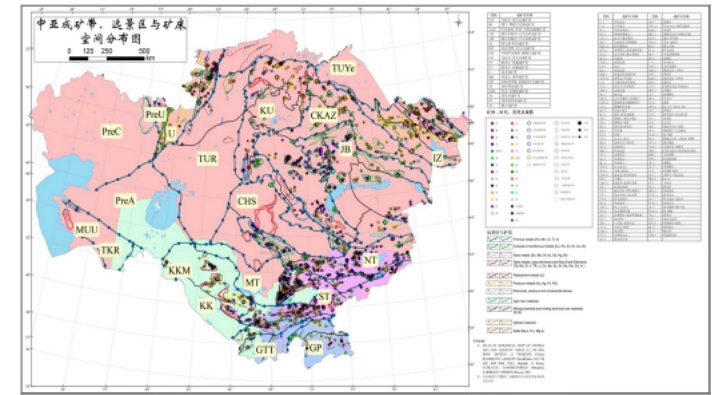
2.5 Typical Datasets of the Central Asian (~204)



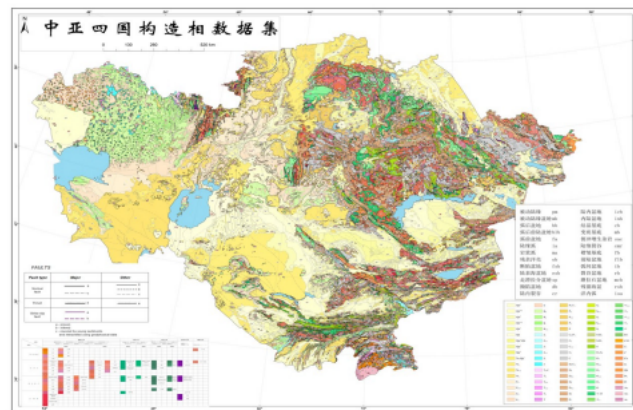
Huo, W. (2021). **Kyrgyzstan glacier meteorological station (2018-2020)**. National Tibetan Plateau / Third Pole Environment Data Center. <https://doi.org/10.11888/Meteoro.tpdc.271746>.



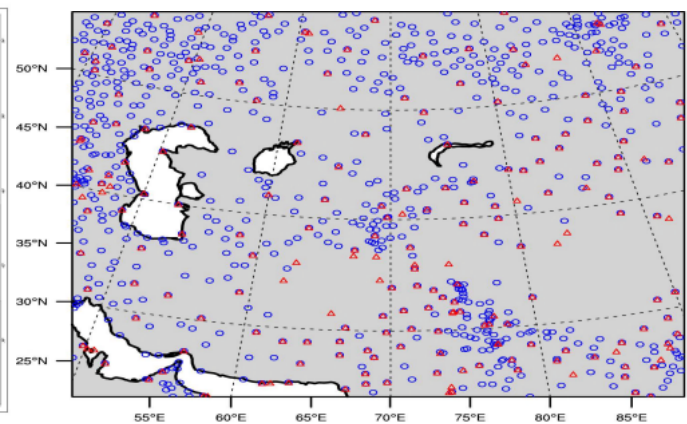
Luo, G., Zhang, C.. (2021). **Land use data set in Central Asia I(1970, 2005, 2015)**. National Tibetan Plateau / Third Pole Environment Data Center. <https://doi.org/10.11888/Geogra.tpdc.271132>.



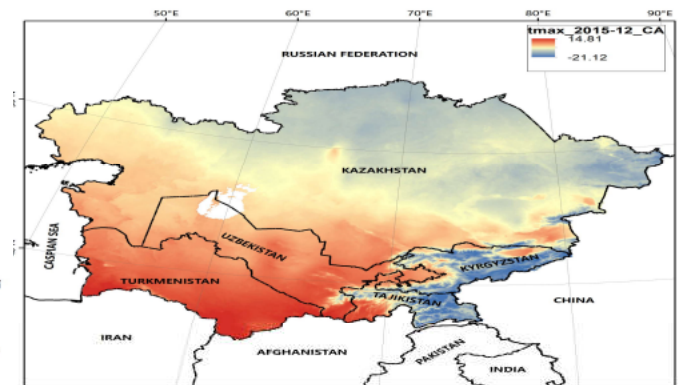
Liu, Y. (2024). **Central Asian metallogenic belt - prospective area - mineral concentration area - mineral Dataset (2022.1-2024.1)**. National Tibetan Plateau / Third Pole Environment Data Center. <https://doi.org/10.11888/SolidEar.tpdc.301014>.



Liu, Y. (2024). **Tectonic facies dataset of four Central Asian countries (2022.1-2024.12)**. National Tibetan Plateau / Third Pole Environment Data Center. <https://doi.org/10.11888/SolidEar.tpdc.301010>.



Yao, Y. (2020). **Conventional and satellite meteorological data in Central Asia (2017)**. National Tibetan Plateau / Third Pole Environment Data Center. <https://doi.org/10.11888/Meteoro.tpdc.270346>.



Xu, X., Tan, M. (2020). **Historical meteorological data of Central Asia (1990 - 2015)**. National Tibetan Plateau / Third Pole Environment Data Center.

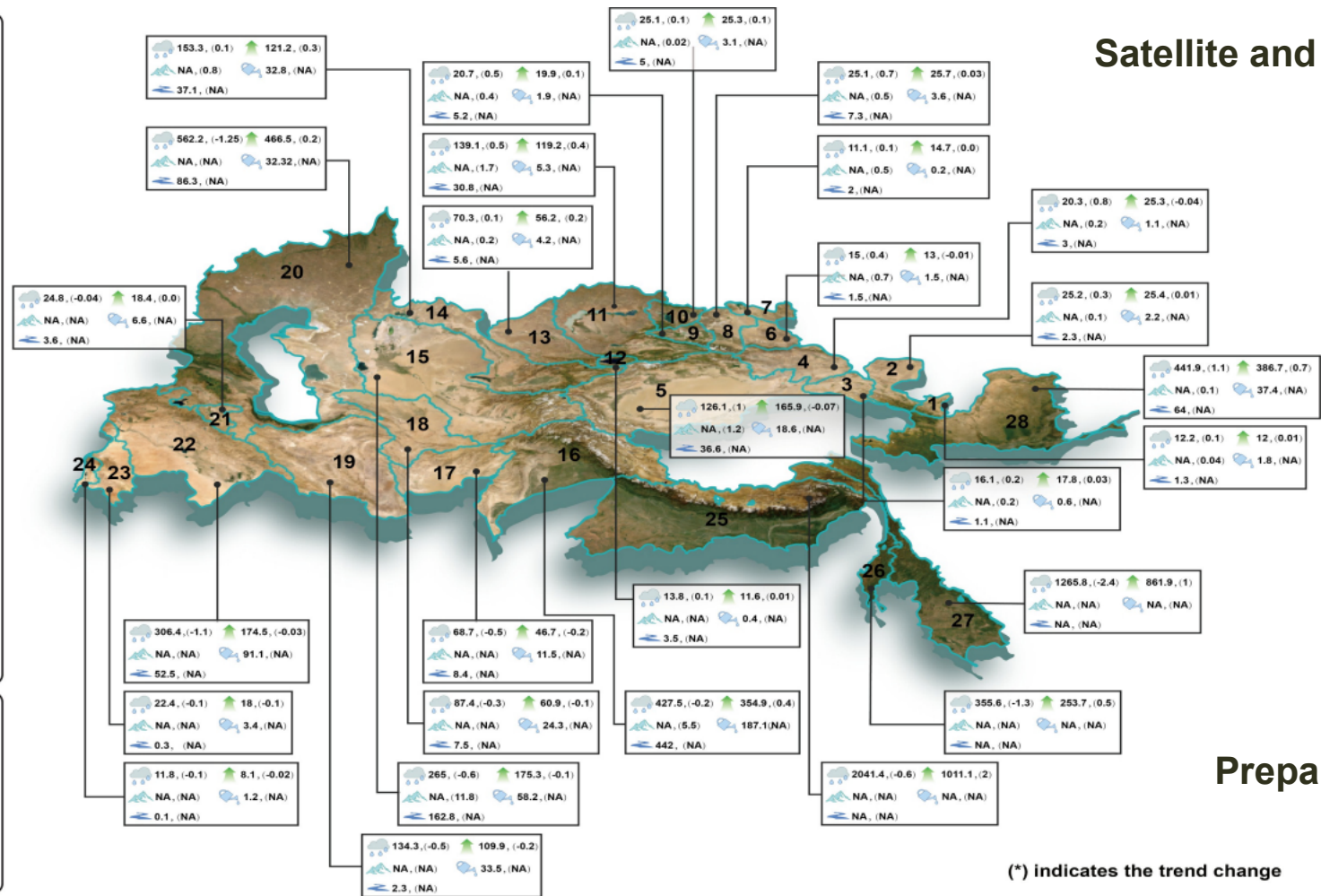


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2.6 Basins in Central Asia and China – Water Cycle Assessment

1. Shiyang River Basin
 2. Heihe River Basin
 3. Shule River Basin
 4. Turpan-Hami Basin
 5. Tarim River Basin
 6. Junggar Basin
 7. Ulungur River Basin
 8. Manas River Basin
 9. Ebinur Lake Basin
 10. Emin River Basin
 11. Yili River Basin
 12. Issyk-Kul Lake Basin
 13. Chu-Talas river Basin
 14. Syr Darya Basin
 15. Amu Darya Basin
 16. Indus River Basin
 17. Sistan Basin
 18. Harirud-Murgab River Basin
 19. Iran Inland Basin
 20. Caspian Sea Basin
 21. Urmia Lake Basin
 22. Tigris-Euphrates Basin
 23. Eastern Jordan River Basin
 24. Dead Sea Basin
 25. Yaluzangbu River Basin
 26. Nujiang River Basin
 27. Lancang River Basin
 28. Yellow River Basin
-
- Precipitation (km³)
 - Glacier melt change (km³/yr)
 - Evapotranspiration (km³)
 - Irrigation water withdrawal (km³)
 - Runoff (km³)



Satellite and Model

Preparing...

(* indicates the trend change)

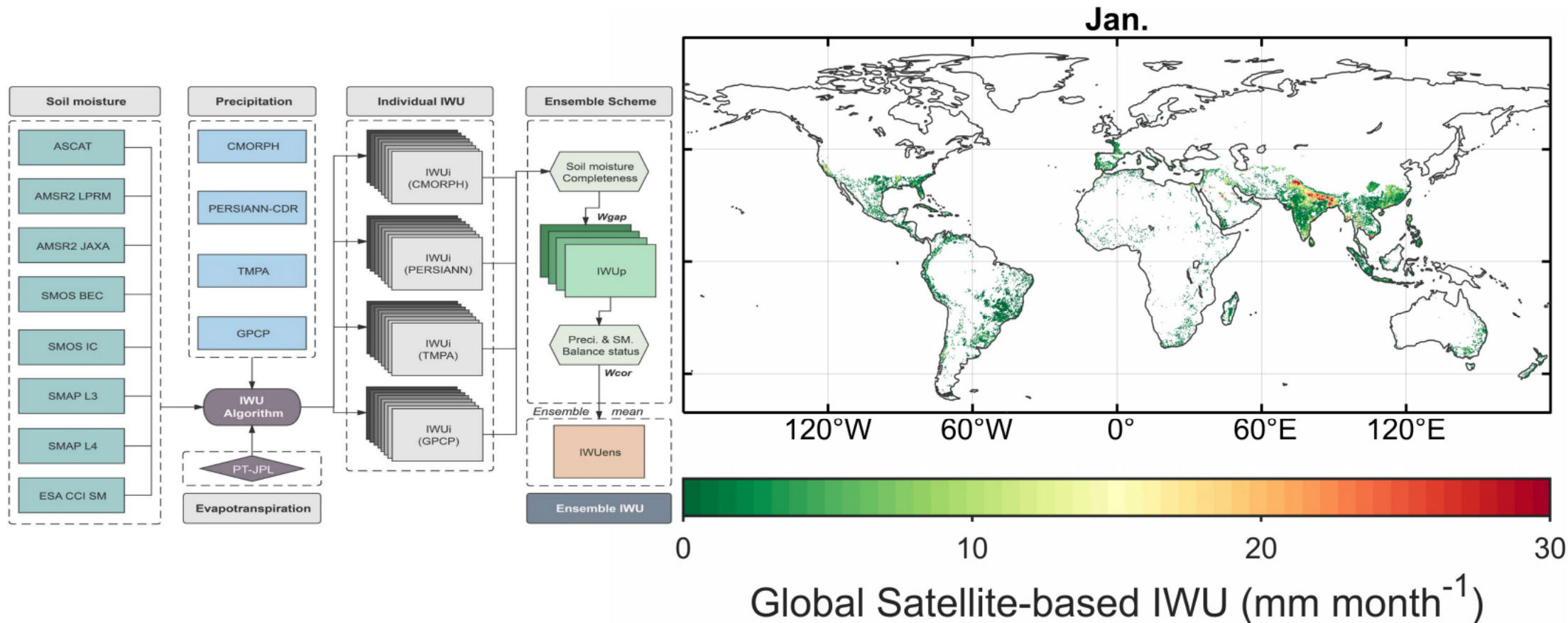


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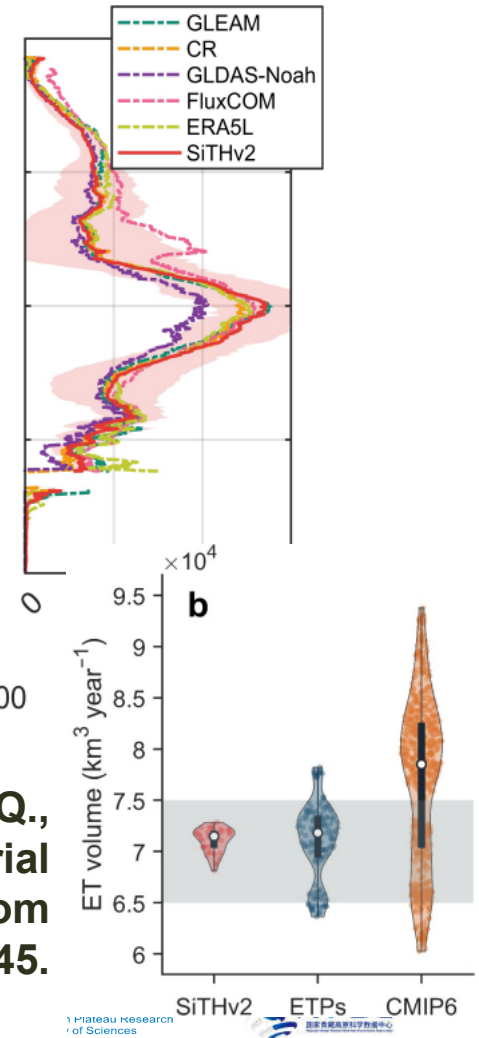
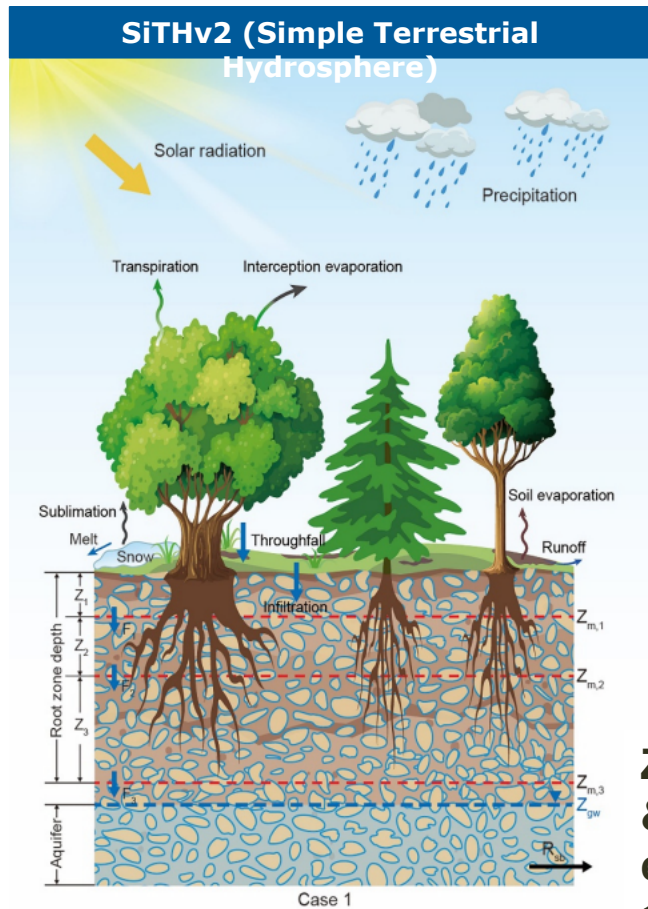
PDC
Institute of Desert and Environment
Chinese Academy of Sciences

2.6 Satellite-based Irrigation Water Use Dataset



Zhang, K., Li, X., Zheng, D., Zhang, L., & Zhu, G. (2022). Estimation of Global Irrigation Water Use by the Integration of Multiple Satellite Observations. *Water Resources Research*, 58(3), e2021WR030031. <https://doi.org/10.11888/Terre.tpdc.300751>.

2.6 Process model-based ET and Soil Water Dataset



Zhang, K., Chen, H., Ma, N., Shang, S., Wang, Y., Xu, Q., & Zhu, G. (2024). A global dataset of terrestrial evapotranspiration and soil moisture dynamics from 1982 to 2020. *Scientific Data*, 11(1), 445. <https://doi.org/10.11888/Terre.tpdc.300751>.

Outlines

01

Data Management

02

Data Resources

03

Open Data Achievement

04

Hands-On with TPDC



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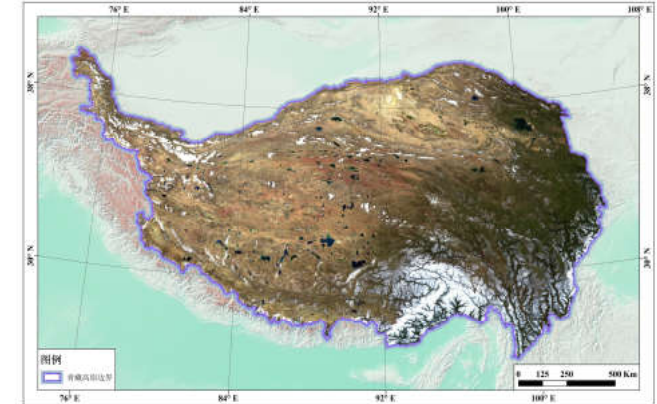


3.1 Serving STEP National Special Project

Service Assurance System For the Second Tibetan Plateau Scientific Expedition and Research Program

Compiled a Tibetan Plateau Foundational Dataset and Atlas Covering Dozens of Elements Across Multiple Disciplines

青藏高原遥感影像镶嵌图



第二次青藏高原综合科学考察研究服务保障系统
Service Assurance System For the Second Tibetan Plateau Scientific Expedition and Research Program

首页 青藏科考地区 青藏科考队 共享平台 使用说明

习近平总书记重要指示



中国科学院青藏高原综合科学考察研究队：

值此第二次青藏高原综合科学考察研究启动之际，我向参加科学考察的全体科研人员、青年学生和保障人员，表示热烈的祝贺和诚挚的问候！青藏高原是世界屋脊、亚洲水塔，是地球第三极，是我国重要的生态安全屏障、战略资源储备基地，是中华民族特色文化的重要保护地。开展这次科学考察研究，揭示青藏高原环境变化机理，优化生态安全屏障体系，对推动青藏高原可持续发展、推进国家生态文明建设、促进全球生态环境保护将产生十分重要的影响。希望你们发扬老一辈科学家艰苦奋斗、团结奋进、勇攀高峰的精神，聚焦水、生态、人类活动，着力解决青藏高原资源环境承载力、灾害风险、绿色发展路径等方面的问题。

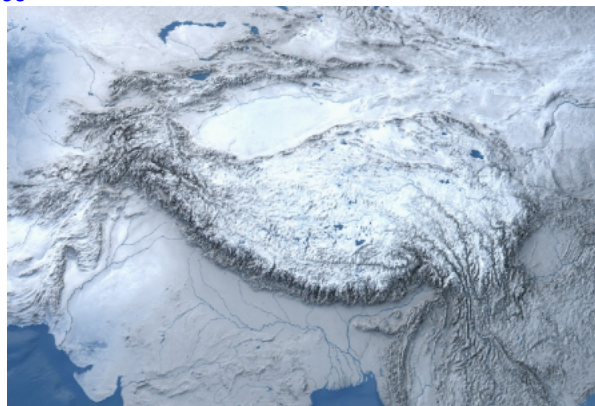
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<http://service.step.ac.cn>

Results of the Second Tibetan Plateau Scientific Expedition Participated in the National "13th Five-Year Plan" Science and Technology Innovation Achievement Exhibition

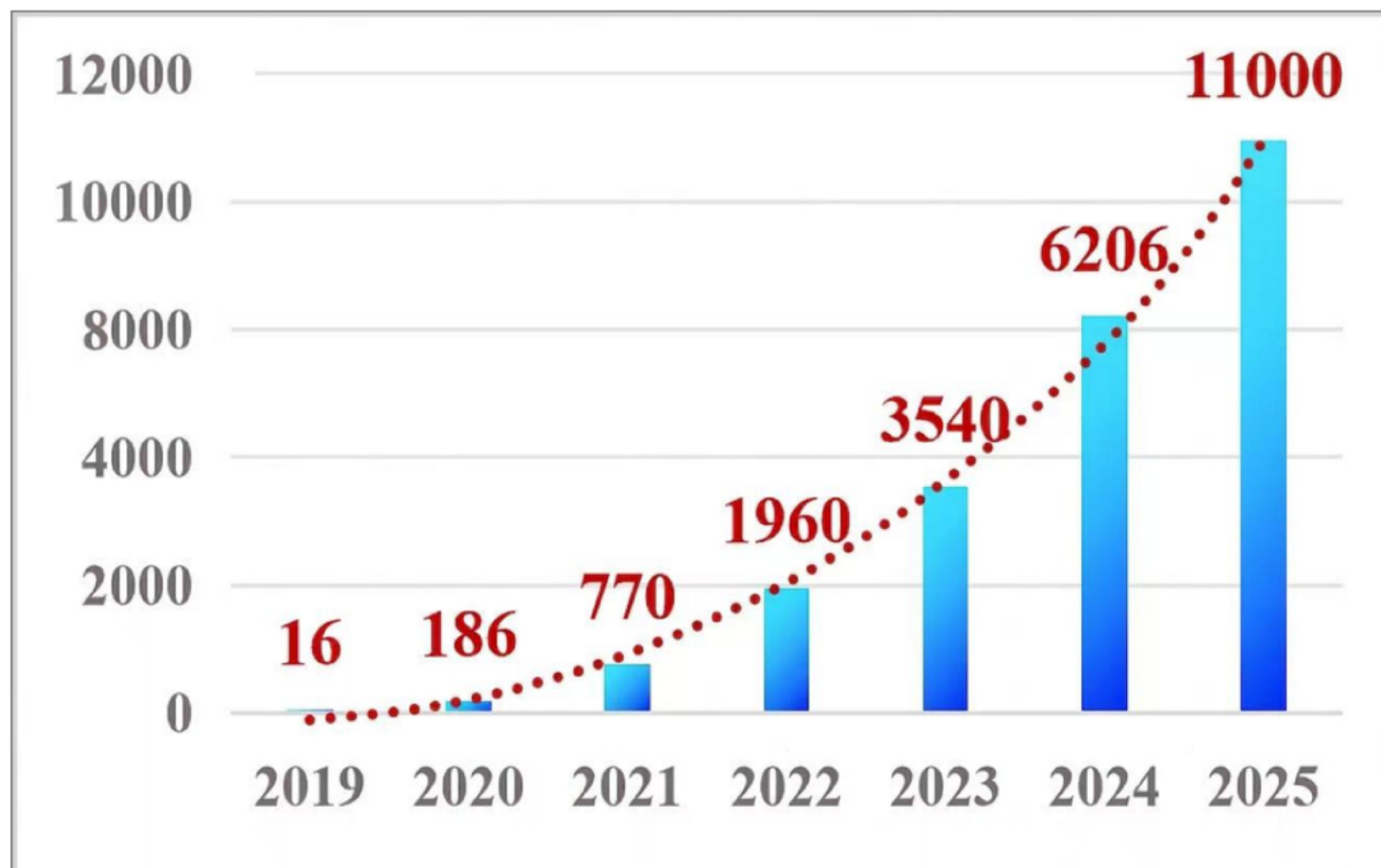


习近平在参观国家“十三五”科技创新成就展时强调 坚定创新自信紧抓创新机遇 加快实现



3.2 Scientific Achievements: TPDC Data Citation Statistics

- TPDC data has been extensively cited in academic papers, with the number of citations growing rapidly year by year
- Total data citations have surpassed **11,000** times, representing a nearly **680-fold** increase



3.3 Scientific Achievements: TPDC Data Citation Example

Supported the publication of high-impact papers

The screenshot shows the top of a Science Advances article page. The title is "Time and space catch up with restoration programs that ignore ecosystem service trade-offs". The authors listed are Ruonan Li, Hua Zheng, Patrick O'Connor, Huashan Xu, Yunkai Li, Fei Lu, Brian E. Robinson, Zhiyun Ouyang, Yue Hai, and Gretchen C. Daily. The article is categorized as a Research Article in Ecology. It has 1,201 downloads and 6 citations. The DOI is 10.1126/sciadv.abf8650.

The screenshot shows the top of a Nature Communications article page. The title is "Recent fall Eurasian cooling linked to North Pacific sea surface temperatures and a strengthening Siberian high". The article is categorized as an Article. It has a DOI of 10.1038/s41467-020-19014-2 and is marked as "OPEN". There is a "Check for updates" button.

Data sources

..... The **actual evapotranspiration dataset**, from 1982 to 2015, was provided by the National Tibetan Plateau Data Center (<http://data.tpdc.ac.cn>),

Data availability

The ERA5-Land and ERA5 data are downloaded from the Climate Data Store (<https://cds.climate.copernicus.eu/>). The air temperatures of 474 stations are from the Global Surface Summary of the Day database (GSOD, <ftp://ftp.ncdc.noaa.gov/pub/data/g sod>). The time series of MODIS LST are obtained from the National Tibetan Plateau Data Center (<http://data.tpdc.ac.cn>). The MOD11C3 and MYD11C3 data are from the NASA

The image shows the PNAS logo and the title of the article: "Are China's water bodies (lakes) underestimated?". The PNAS logo includes the text "Proceedings of the National Academy of Sciences of the United States of America".

Fig. 1.

Lake number and area in China and their changes. (A) Lake distribution including 2,554 lakes ($>1 \text{ km}^2$) in 2015 and 17,167 glacial lakes with size in the range 0.0036 to 1 km^2 in 2015. Glacial lakes are derived from <http://data.tpdc.ac.cn/en/> (B) Reservoir and dam distributions in China. The boundary of the Tibetan Plateau (TP) is outlined. Reservoir and dam inventories are from a global dataset at <http://globaldamwatch.org/data/>. (C) Lake number and area changes in China between the 1970s and 2015. (D) Lake number and area changes in

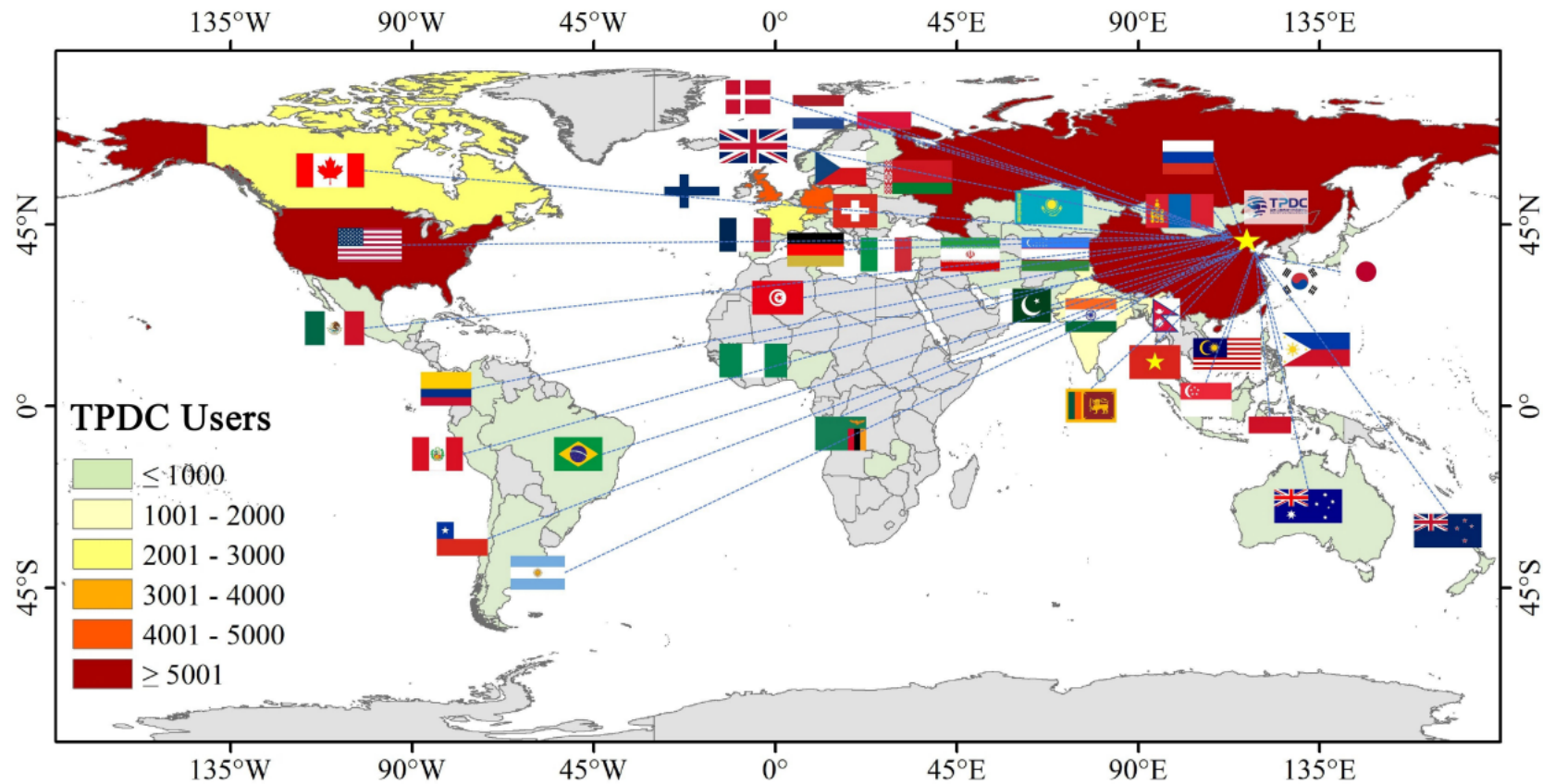
3.2 Scientific Achievements: Scientific Highlights Supported by TPDC Data

Supported research in cryosphere change, Asian water tower, disaster risk assessment

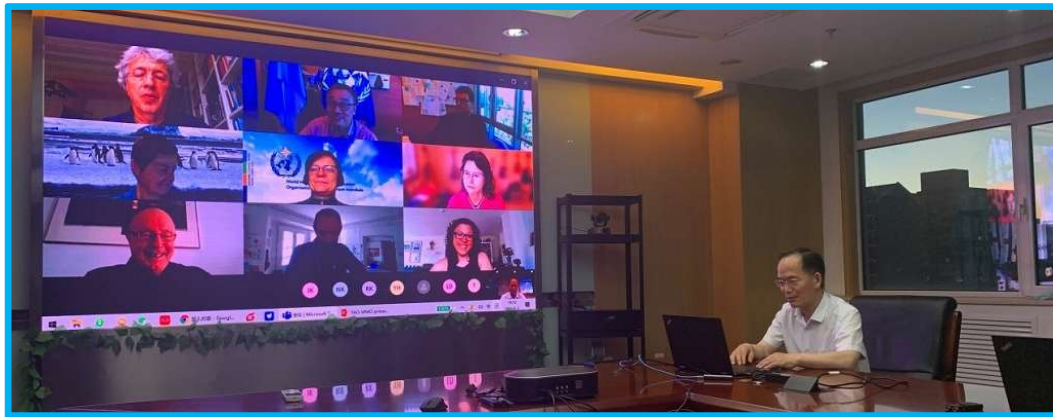
Cryosphere Change	<p>Supporting the identification of glaciers, permafrost, and snow changes on the Tibetan Plateau under climate change (IPCC AR5, 2013; M ölg et al., 2014; Dong et al., 2016; Brun et al., 2017; Liu et al., 2018; Kääb et al., 2018; Smith and Bookhagen, 2018; Orsolini et al., 2019; Zhang et al., 2019b; Wang et al., 2020a; Zhang et al., 2020; Cao et al., 2020; Zhang et al., 2021a; Wang et al., 2021; Zhang et al., 2021b)</p>	<ol style="list-style-type: none"> 1) Long-term series of daily snow depth dataset in China (1979-2020) (Che, et al., 2008) 2) A permafrost thermal type map on the Tibetan Plateau (2000-2010) (Ran, et al., 2018) 3) Long-term surface soil freeze-thaw states dataset of China using the dual-index algorithm (1978-2015) (Jin et al., 2015) 4) The second glacier inventory dataset of China (version 1.0) (2006-2011) (Guo et al., 2015) 5) Different glacier status with atmospheric circulations in Tibetan Plateau and surroundings (1970s-2000s) (Yao et al., 2012) 	Ecosystem Change	<p>Supporting quantification of ecosystem changes under global climate change (Huang et al., 2014; Shen et al., 2015; Li et al., 2016; Guo et al., 2017; Guo et al., 2018; Gan et al., 2019; Liu et al., 2021; Sun et al., 2021; Yan et al., 2021)</p>	<ol style="list-style-type: none"> 1) Multi-source integrated Chinese land cover map (2000) (Ran et al., 2009) 2) Plant functional types map in China (1 km) (Ran et al., 2012) 3) Land cover products of China (Ran et al., 2010)
Asian Water Tower	<p>Supporting vulnerability assessment of the Asian Water Tower under climate change (Lutz et al., 2014; Xu et al., 2014; Wang et al., 2017; Luo et al., 2018; Gao et al., 2019; Wang et al., 2020b; Nie et al., 2021)</p>	<ol style="list-style-type: none"> 1) Different glacier status with atmospheric circulations in Tibetan Plateau and surroundings (1970s-2000s) (Yao et al., 2012) 2) Long-term sequence dataset of lake area on the Tibetan Plateau (1970-2013) (Zhang et al., 2017) 3) Long-term series of daily snow depth dataset in China (1979-2020) (Che et al., 2008) 4) Long-term surface soil freeze-thaw states dataset of China using the dual-index algorithm (1978-2015) (Jin et al., 2015) 5) China meteorological forcing dataset (1979-2018) (He et al., 2020; Yang et al., 2010) 	Disaster Risk Assessment	<p>Supporting assessment of permafrost degradation, glacier melting, snow avalanche, and lake expansion disaster risks on the Tibetan Plateau under global climate change (Zhang and Wu, 2012; Mo et al., 2017; Wang et al., 2019a; Ye et al., 2019; Wang et al., 2020c; Zhang et al., 2021a; Zhu et al., 2021)</p>	<ol style="list-style-type: none"> 1) Long-term series of daily snow depth dataset in China (1979-2020) (Che et al., 2008) 2) A permafrost thermal type map on the Tibetan Plateau (2000-2010) (Ran et al., 2018) 3) Long-term surface soil freeze-thaw states dataset of China using the dual-index algorithm (1978-2015) (Jin et al., 2015) 4) Different glacier status with atmospheric circulations in Tibetan Plateau and surroundings (1970s-2000s) (Yao et al., 2012) 5) Long-term sequence dataset of lake area on the Tibetan Plateau (1970-2013) (Zhang et al., 2017)
			Remote Sensing	<p>Supporting calibration and validation of Tibetan Plateau remote sensing products (Huang et al., 2016; Ma et al., 2018; Wang et al., 2019b; Zhang et al., 2019a; Zhang et al., 2019b; Yang et al., 2020; Li et al., 2021; Yao et al., 2021)</p>	<ol style="list-style-type: none"> 1) 30-meter Global land cover data (2010, 2015 and 2017) for key nodes of pan-third pole region (Gong et al., 2013) 2) China meteorological forcing dataset (1979-2018) (He et al., 2020; Yang et al., 2010) 3) Long-term series of daily snow depth dataset in China (1979-2020) (Che et al., 2008) 4) Datasets of HiWATER: "The Heihe Watershed Allied Telemetry Experimental Research" and WATER: "The Watershed Allied Telemetry Experimental Research (WATER)" https://data.tpdc.ac.cn/en/special/heihe/ (Che et al., 2019; Liu et al., 2018; Li et al., 2013)

3.3 Providing Data Support for International Users

- ❑ Served **130,000 registered users** across **89 countries** and regions worldwide (excluding anonymous users), with an annual data download volume reaching **1.9 PB**



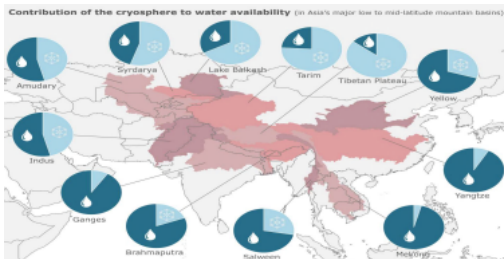
3.4 Providing Data Support for International Cooperation



第二次青藏科考深化与世界气象组织合作

第二次青藏高原综合科学考察研究（简称“第二次青藏科考”）一直高度重视国际合作。通过“第三极环境（TPE）”国际计划，第二次青藏科考加强与国际组织和国际计划合作，与世界气象组织（WMO）联合推进亚洲水塔观测-模拟-预警集成研究，与联合国环境署（UNEP）联合发布第三极环境变化科学评估报告，与联合国教科文组织（UNESCO）正在共同启动亚洲水塔图计划，第二次青藏科考亚洲水塔成果支撑联合国《团结于科学2020》报告发布，产生了重要的国际影响。

<http://www.step.ac.cn/info/14801>



The Furthest and Most Frigid Parts of the Globe

Author(s): Árni Snorrason, Øystein Godoy, Sue Barrell, Rodica Nitu

Tags: Cryosphere Polar Data exchange

Contact:

Theme: Polar

Bulletin n°: Vol 70 (2) - 2021

For high mountain regions, the data landscape is much more fragmented (Thornton et al., 2021, Shahgedanova et al., 2021). Collective efforts are being made (Adler, Pomeroy and Nitu, 2020) to address barriers through mechanisms such as those facilitated by the Mountain Research Initiative and its flagship activity, such as GEO Mountains, and the International Network for Alpine Research Catchment Hydrology (INARCH). In 2019, GCW signed a 5-year Memorandum of Understanding with the Third Pole Environment program, with a dedicated focus on establishing interoperability with the Third Pole Environment Data Center (Xin Li et al., 2021, also # 10). Similar engagements are being pursued with other research data centres to further facilitate the access to critical streams of cryosphere and ancillary data.

TPDC data will provide invaluable observational data for the WMO Global Cryosphere Watch (GCW) program, significantly enriching first-hand meteorological observation records in high-altitude mountainous regions.

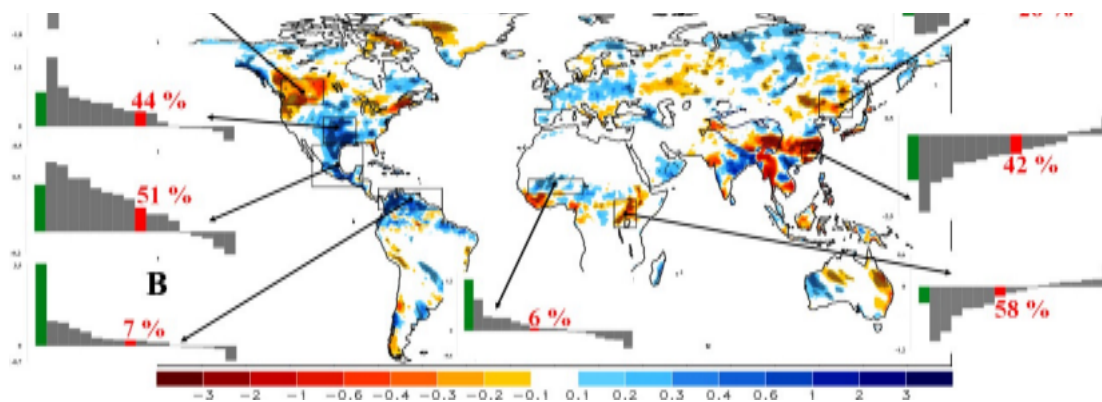


<https://public.wmo.int/en/resources/bulletin/furthest-and-most-frigid-parts-of-globe>



3.4 Providing Data Support for International Cooperation

The **LS4P Project**, co-led by Professor Yongkang Xue from UCLA and STEP Chief Scientist Academician Tandong Yao. All simulation results of the project are shared on TPDC.



This study for the **first time** revealed that mountain land surface temperature may be an important source of S2S precipitation predictability, with an influence potentially as large as the sea surface temperature of the globally identified "hot spot" regions confirmed here. This LS4P approach should inspire more follow-up explorations.

Data availability:

The CMA observational datasets are available from <http://data.cma.cn/en>. CRU datasets are available from https://crudata.uea.ac.uk/cru/data/hrg/cru_ts_4.05/. CAMS datasets are available from <https://psl.noaa.gov/data/gridded/data.ghecnams.html>. Reanalysis 1 is available from <https://psl.noaa.gov/data/gridded/data.ncep.reanalysis.html>. All simulation datasets are available from <http://data.tpdc.ac.cn/en/>. See Xue et al. (2021) for download instruction.

Y. Xue et al.: LS4P-I: organization and experimental design


Data availability. The LS4P data are stored by and will be distributed through the National Tibetan Plateau Data Center (Li et al., 2020, <http://data.tpdc.ac.cn/en/>) and the U.S. Lawrence Liver-



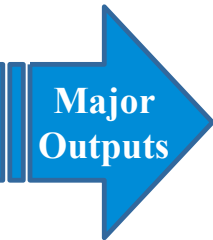
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3.4 Providing Data Support for International Cooperation



CPTP PI: Academician Deliang Chen
COLEADER: Academician Tandong Yao



中国科学院科技创新发展中心

CD: 公里级高分辨率模拟显著提高青藏高原地区降水和风速模拟精度

Springer Link

Published: 01 February 2021

Added value of kilometer-scale modeling over the third pole region: a CORDEX-CPTP pilot study

Xu Zhou, Kun Yang, Lin Ouyang, Yan Wang, Yaozhi Jiang, Xin Li, Deliang Chen & Andreas Prein

为有效降低这一模拟偏差，中科院青藏高原所所三极观测与大数据团队周旭博士在CORDEX (Coordinated Regional Downscaling Experiment) CPTP (Convection-Permitting simulation over the Third Pole) 框架下与清华大学、瑞典哥德堡大学和美国国家大气研究中心(NCAR)等单位合作，在引入复杂地形拖曳力参数化方案的WRF模式基础上，实现了整个青藏高原区域的对流解析分辨率（格距大概为3km）模拟。与目前使用最广泛的欧洲中心再分析数据（ERA5）和柏林工业大学制作的高亚洲地区精细化数据（HAR）相比，该模拟有效降低了风速和降水的偏差、均方根误差，提高了它们与站点观测的空间相关性（图1）；同时，还能直接解析大气深对流过程，避免了由对流参数化方案带来的不确定性，更好地再现降水的日变化峰

Outlines

01

Data Management

02

Data Resources

03

Open Data Achievement

04

Hands-On with TPDC



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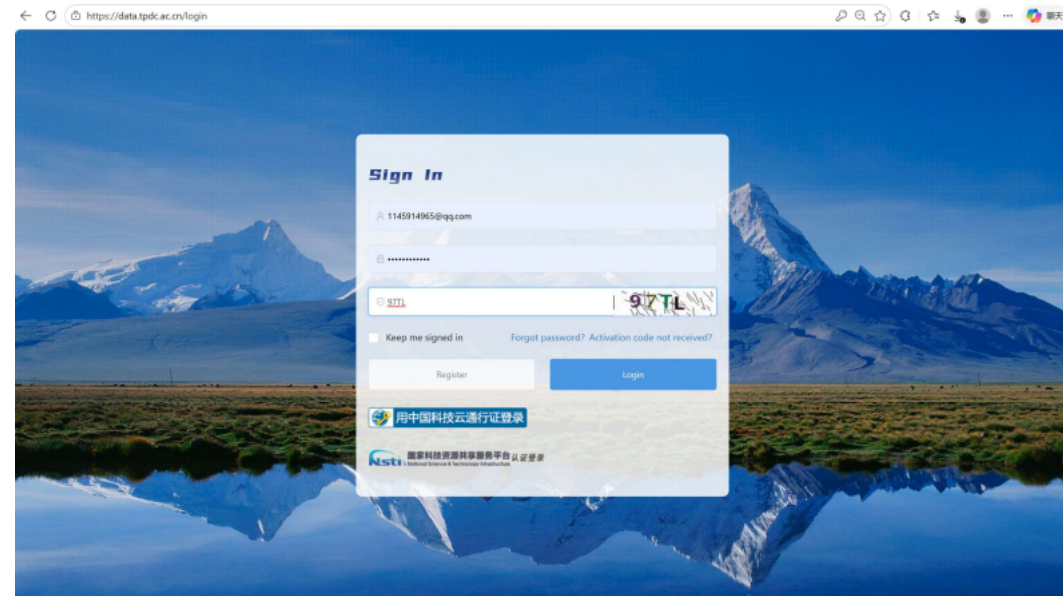
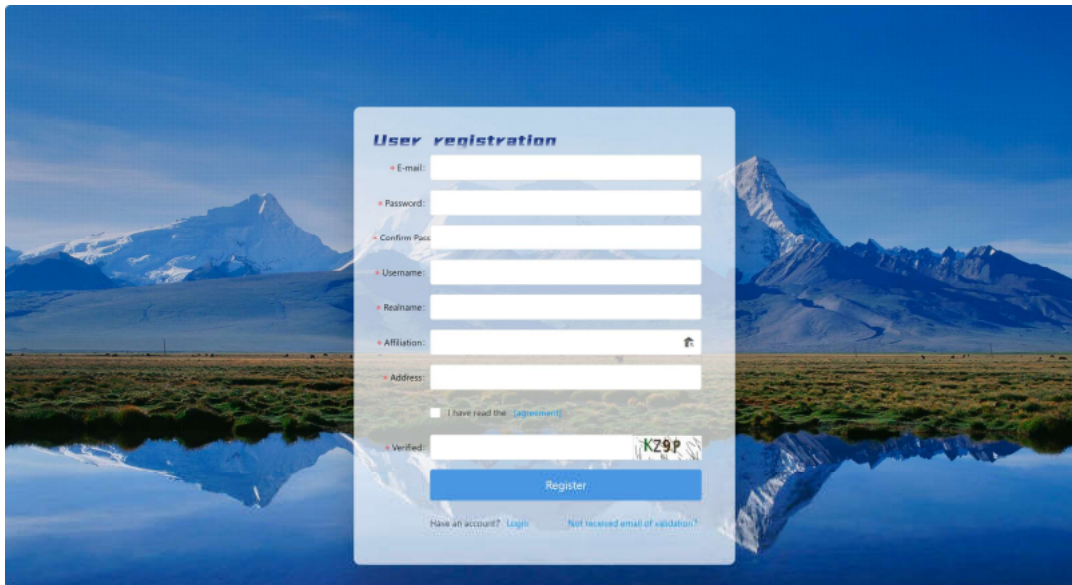
Training Contents

- **Registration / Login**
- **Data Search**
- **Data Access**
- **Data Upload**
- **Big Data Analysis**



4.1 Registration / Login <https://data.tpdc.ac.cn>

- ❑ Click **"Register"** to enter the user registration page. All fields marked with an asterisk (*) are required. Click **"Submit"** to complete the registration form.
- ❑ After submission, open your registered email inbox — you will receive an **activation email**. Click the activation link to activate your account.
- ❑ Once registration is complete, return to the homepage and click the **"Login"** button. Enter your **username and password** to access the Data Center.



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4.2 Data Search

➤ A **persistent search bar** is available on the website homepage and page header, supporting **fuzzy matching** across titles, keywords, authors, and descriptive content.

➤ In the **Data Products** section, multiple logical data browsing and classification methods are provided: **Themes, Authors, Spatial Search, Key Datasets, Latest Datasets**

➤ On the **search results page**, data resources can be further filtered and refined using keywords such as **discipline / topic / location**.

The screenshot displays the TPDC (Third Pole Environment Data Center) website interface. The top navigation bar includes 'Home', 'Products', 'News', and 'Submit Data'. A search bar is prominently featured in the top right, with a red box highlighting the search input field and the 'find data' button. Below the navigation, the 'Products' section is active, showing a search for 'Central Asia' with 'about 193 query results'. The left sidebar contains filters for 'DataSet Type' and 'Subject Keywords', with 'Subject Keywords' highlighted in red. The main content area lists three data products, each with a map thumbnail and a brief description. The first product is titled '1. Dynamic downscaling simulation climate data set in Central Asia driven by ...' and includes details about the data provider (ZHOU Jiewei, LUO Yong, SHI Wen) and the date (2021-09-07). The second product is titled '2. Dynamic downscaling simulation climate data set in Central Asia driven by ...' and includes details about the data provider and the date (2022-12-23). The third product is partially visible and titled '3. Dynamic downscaling simulation climate data set in Central Asia driven by ...'.



4.3 Data Access / Download oshsu1939

- It is recommended to install **FlashFXP**
- **Open Data Access:** After locating the desired data through search, click on the **metadata title** to enter the metadata details page. Here you can view a full introduction to the dataset (including data abstract, data citation, article citation, keywords, etc.). Click the **Download button** — an FTP account will pop up.
- Enter the **FTP account information** into **FlashFXP** to log in to the server. Select the desired file, right-click, and choose **Download**.

TPDC National Tibetan Plateau Data Center
Third Pole Environment Data Center

Home Products News Submit Data

Observation data set of field meteorological station

Temporal resolution Monthly

Spatial resolution

Sharing way Open access

Size 130.52 KB

Data time range 2019-10-01 — 2020-12-31

Metadata update time 2022-01-04

FTP account

host: ftp2.tpd.ac.cn copy ftp3.tpd.ac.cn copy

port: 6201 copy

username: download_43006017 copy

password: 77038637 copy

Files larger than 1 GB can only be downloaded through FTP.
Please use FTP client tools (e.g. TP Rush, WinSCP, Filezilla or other else).

Subscribe Download without login

FlashFXP Evaluation Copy

Session Sites Options Queue Commands Tools Directory View Help

Local Browser

C:\Users\11459\Documents

Parent Directory

Adobe

Quick Connect

History:

Connection type: FTP

Address or URL: ftp3.tpd.ac.cn Port: 6201

User name: download_43006017 Anonymous

Password: [masked]

Remote path:

Proxy server: (Default)

Connect Close

Keywords

Name	Size
Parent Directory	
Observation data set of field meteorological stations in Central Asia and Western Asia (2019-2020).rar	130 KB

1 File, 0 Folders, 1 Total (130 KB)

fto3.todc.ac.cn

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国家青藏高原科学数据中心

4.3 Data Access / Download

➤ **Apply for access:** Click the **Download** button — a login interface will pop up. After logging in, locate the desired dataset again and click the **Download** button. An **Apply for Download** button will appear on the page. Click **Apply for Download**, enter your **reason** for the application in the text input box that appears, and click **Submit**.

Conventional and satellite meteorological data in Central Asia (2017)

Temporal resolution: Hourly
Spatial resolution: 10km - 100km
Sharing way: Apply for access
Size: 275.88 MB
Data time range: 2017-01-12 - 2018-01-11
Metadata update time: 2022-04-18

Apply for downloading

Data added to the data basket, you can only fill in the data purpose once, batch submit download application, fill in the detailed and accurate data purpose can obtain better data services

* Reason
Please enter your data usage

Note:
Please fill in your real name, company email and the purpose detail of use.
If there is project support, fill in the details, such as: National Science and Technology major project [2016YFA0600303-3].
For master and doctoral papers, please indicate the name of the paper and the name of the supervisor in the purpose.

Please read it before using the data [Data reference](#) [Add to data basket](#) [Submit](#) [help](#)

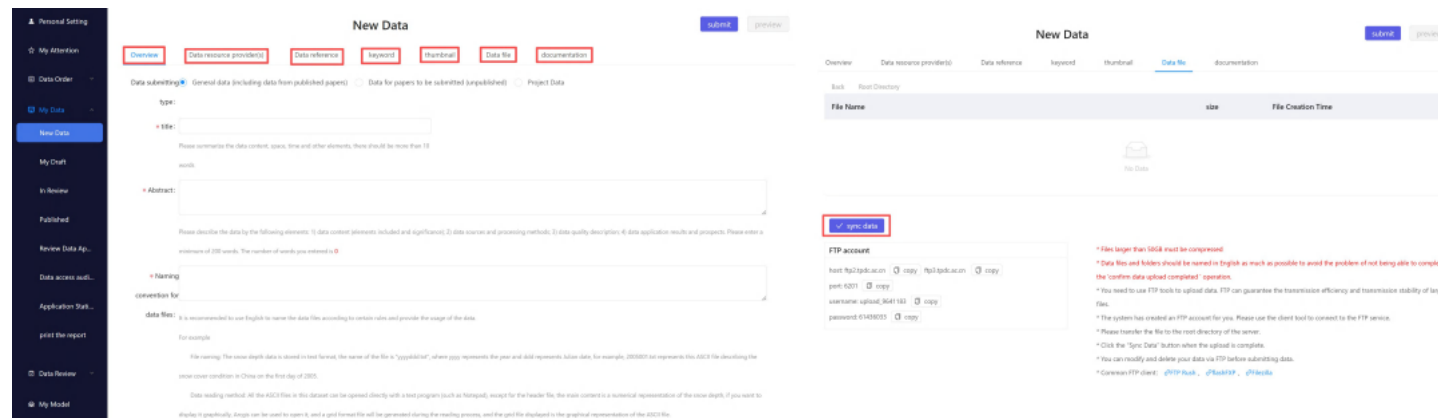
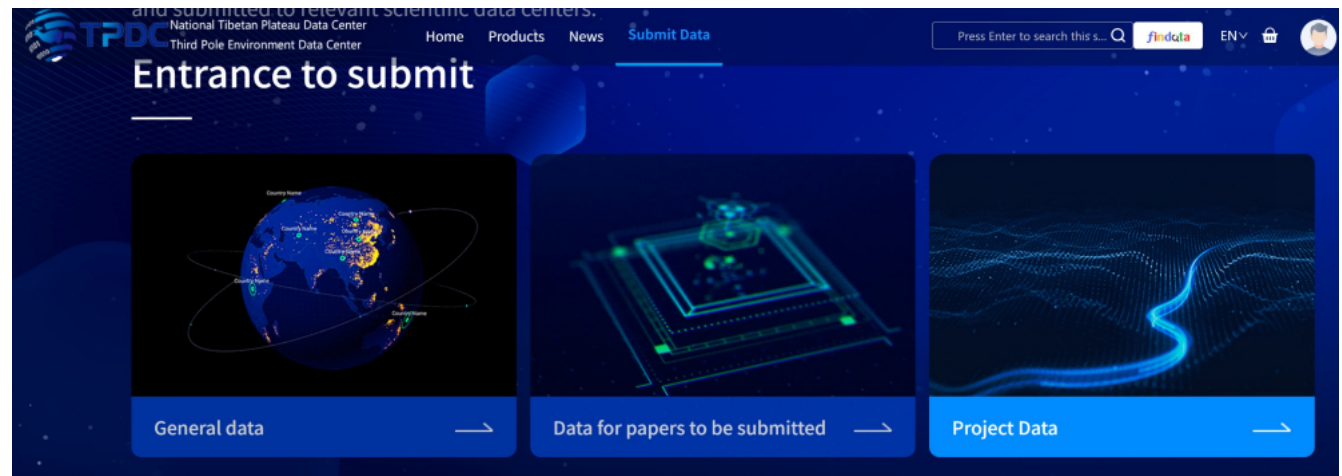
Data applied	Reason	Data size	Application time	download explain	Status
Conventional and satellite meteorological data in Central Asia (2017)	免登录下载	275.88 MB	2026-04-19 22:44:40	within the validity period	Pending
Boundary data of Heihe River Basin in Hexi Corridor	免登录下载	87.95 KB	2026-04-18 15:41:15	within the validity period	Passed
ETMonitor Global Actual Evapotranspiration Dataset with 1-km Resolution	免登录下载	105.62 GB	2026-03-21 21:43:05	Please apply again after expiry date	Passed
The atmospheric forcing data in the Heihe River Basin (2000-2025)	免登录下载	113.10 GB	2026-02-03 08:52:32	Please apply again after expiry date	Passed
The atmospheric forcing data in the Heihe River Basin (2000-2025)	免登录下载	113.10 GB	2026-01-13 11:23:45	Please apply again after expiry date	Passed
Xizang's "data element X" high-quality data set - socio-economic data - population and urbanization	免登录下载	74.56 KB	2026-01-13 09:11:34	Please apply again after expiry date	Passed

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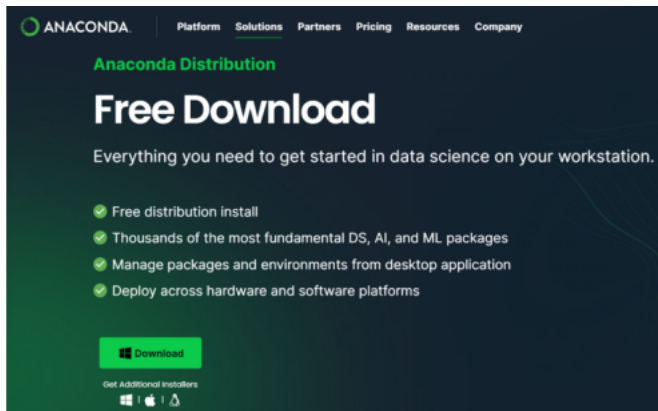
4.4 Data Submission

- The **data submission** module supports various types of data submissions, including:
 - **Routine data submission**
 - **Data repository for manuscripts of unpublished papers**
 - **Project submission portal**
- Click the corresponding submission entry point — for example, **Routine Data Submission** — to enter the **Create New Metadata** interface.

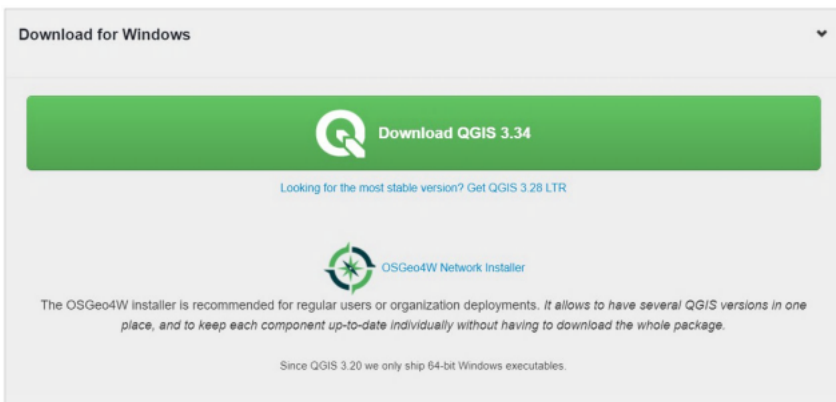
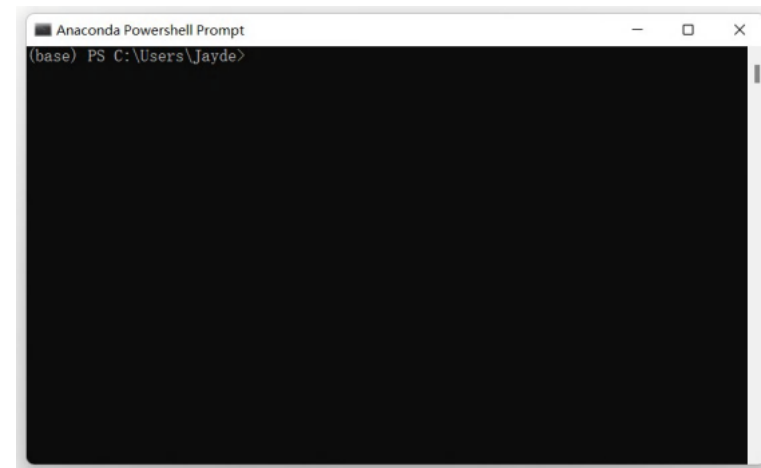


4.5 Big Data Analysis

➤ Software Installation and Data Acquisition



<https://www.anaconda.com/download>



- ❑ Download **QGIS 4.0** (or QGIS 3.44 LTR for the most stable version) from: <https://download.qgis.org/downloads/QGIS-OSGeo4W-4.0.2-1.msi>
- ❑ It is recommended to use the OSGeo4W Network Installer, which allows multiple QGIS versions to coexist and supports individual component updates without downloading the full package.



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4.5 Big Data Analysis **wifi-201 20042026**

Image Download

- **Landsat 7:** <https://code.earthengine.google.com/b23caacca6baaled43a42f87ff576dba>
- **Landsat 8:** <https://code.earthengine.google.com/78ba511f7561648d460a659288f0599a>

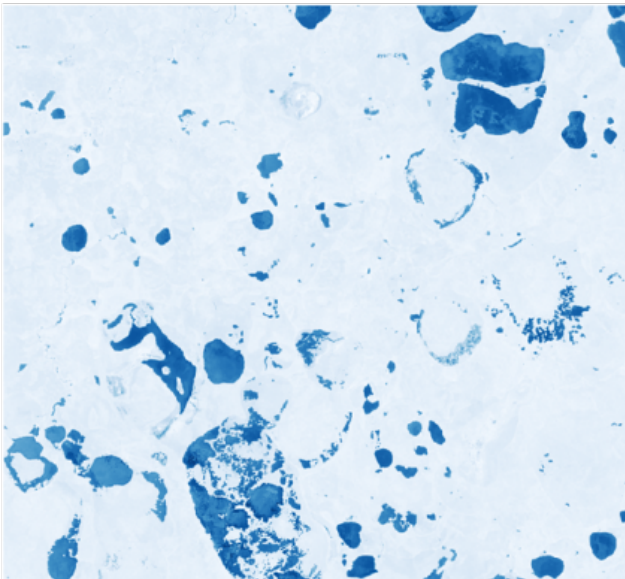


4.5 Big Data Analysis

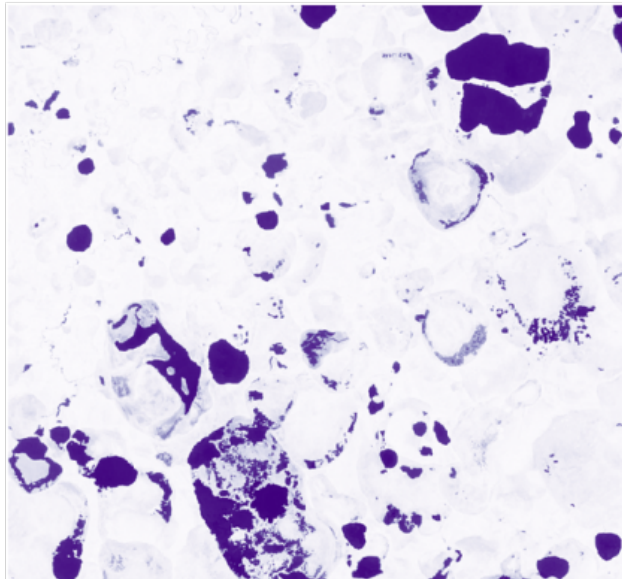
Water Body Change Monitoring Model Construction

- NDWI — Normalized Difference Water Index
- NDSI — Normalized Difference Snow Index
- NDVI — Normalized Difference Vegetation Index

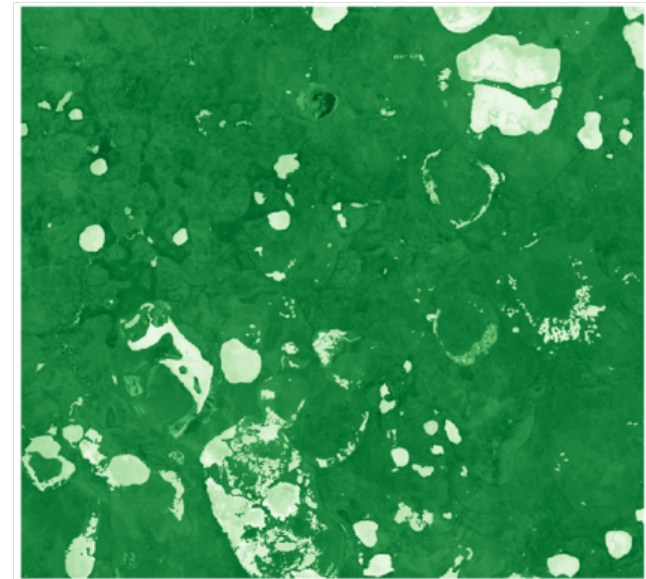
NDWI



NDSI



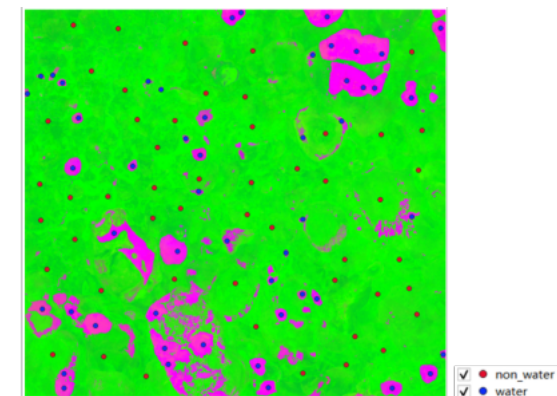
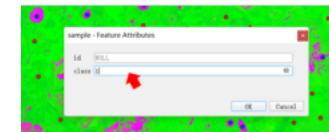
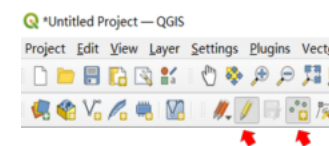
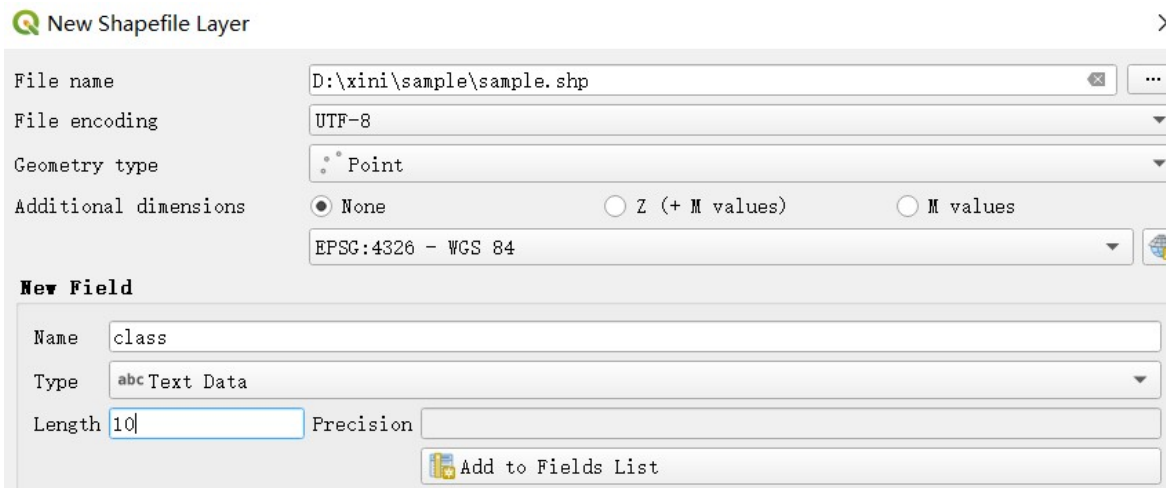
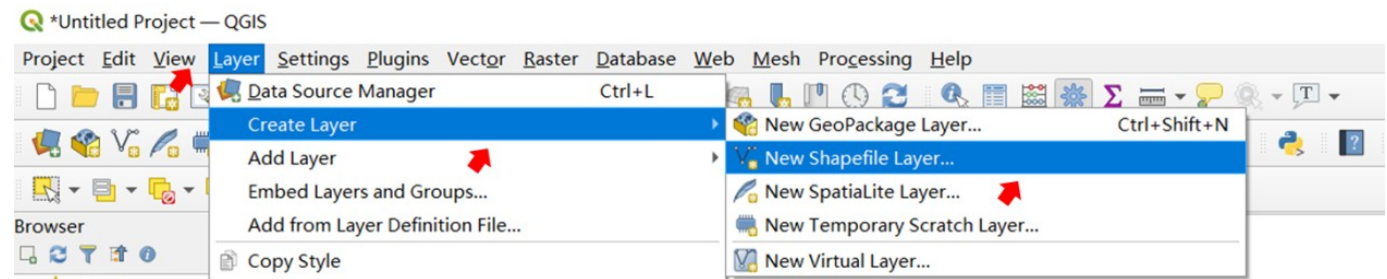
NDVI



4.5 Big Data Analysis

Creating Sample Points (Part I)

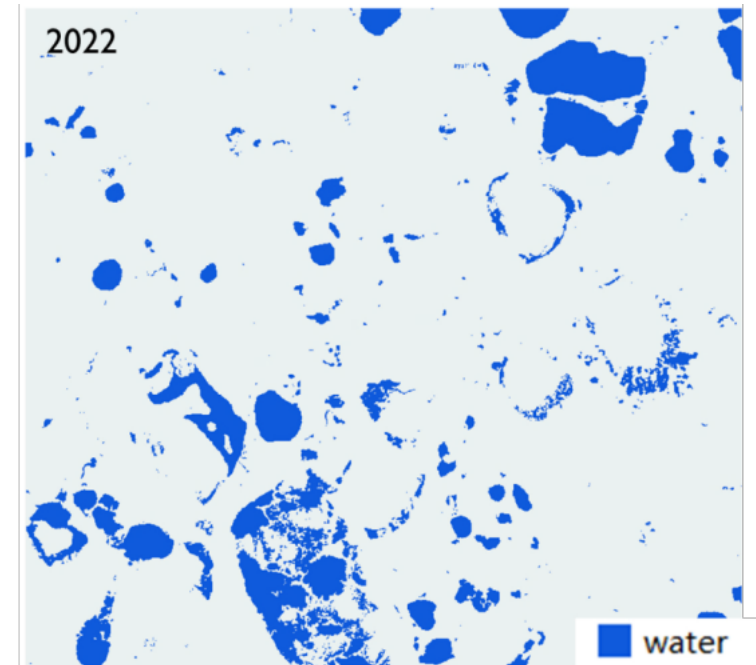
- ✓ **Step 1:** Create a Point Layer in QGIS
- ✓ **Step 2:** Parameter Settings
- ✓ **Step 3:** Select Sample Points
- ✓ **Step 4:** Add Attribute Values



4.5 Big Data Analysis

- ❑ Creating the Training Dataset
- ❑ Model Training
- ❑ Image Classification

```
def getfeat(points, feature, pathout):  
    import rasterio  
    from rasterio.features import geometry_mask  
    import fiona  
    from shapely.geometry import shape, Point  
    import pandas as pd  
  
    src = rasterio.open(feature)  
    narray = src.read()  
  
    feature_list = []  
    with fiona.open(points, 'r') as vector_file:  
        for feature in vector_file:  
            geom = shape(feature['geometry'])  
            point = Point(geom.x, geom.y)  
  
            row, col = src.index(point.x, point.y)  
            value = narray[:, row, col]  
  
            newRow = {'class':feature['properties']['class'], 'lon':geom.x, 'lat':geom.y, 'NDSI':value[0], 'NDVI':value[1], 'NDWI'  
            feature_list.append(newRow)  
  
    df = pd.DataFrame(feature_list)  
    df.to_csv(pathout + '/' + 'feature_L8_2022.csv', index=False)  
  
    #print(df)  
  
    return
```



4.5 Big Data Analysis

- ✓ Water Body Area Statistics
- ✓ Water Body Area Change Trend Plot
- ✓ Relationship Between Water Body Area and Temperature

```
def stat(data):
    from osgeo import gdal
    import numpy as np

    ds = gdal.Open(data)
    band = ds.GetRasterBand(1)
    array = band.ReadAsArray()
    del ds

    count = np.ma.masked_where(array!=1, array).count()

    area = count*30*30/1000000

    return area

def main():
    import pandas as pd

    pathin = r'results/predict/all'
    pathout = r'results/stat'

    datas = listdatas(pathin)

    feature_list = []
    for data in datas:
        year = int(data.split('/')[0].split('.')[0].split('.')[1])
        area = stat(data)

        newRow = ('year':year, 'area':area)
        feature_list.append(newRow)

    df = pd.DataFrame(feature_list)
    df = df.sort_values(by='year')
    df.to_csv(pathout + '/' + 'area_stat.csv', index=False)
```

	year	area
0	2000	751.9707
1	2001	835.4691
2	2002	744.4233
3	2003	778.1913
4	2004	863.5896
5	2005	824.9652
6	2006	851.4369
7	2007	768.9402
8	2008	782.5617
9	2009	822.5928
10	2010	808.0740
11	2011	972.1836
12	2012	848.2608
13	2013	769.9806
14	2014	814.0887
15	2015	898.2675
16	2016	848.2356
17	2017	930.5487
18	2018	884.9322
19	2019	969.8400
20	2020	887.1039
21	2021	869.3370
22	2022	866.0025

```
def draw_1(data, pathout):
    import pandas as pd
    from scipy.interpolate import make_interp_spline
    import scipy.stats as stats
    from scipy.optimize import curve_fit

    df = pd.read_csv(data, header=0)
    print(df)

    fig, ax = plt.subplots()

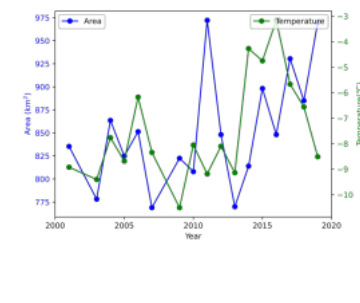
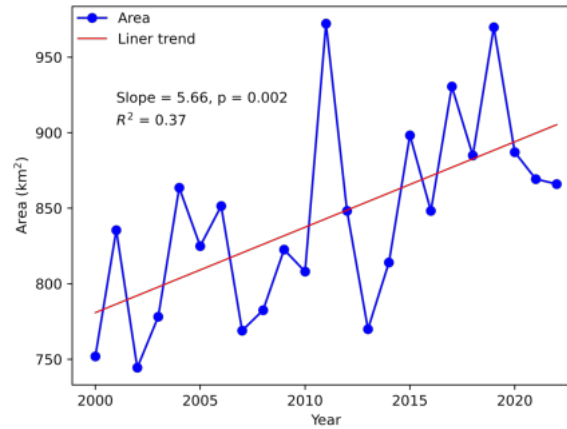
    ax.plot(df['year'], df['area'], color='blue', marker='o', label='Area')
    ax.set_xlabel('Year')
    ax.set_ylabel('Area (km²)', color='k')

    # slope, intercept, r_p, p_value, std_err = stats.linregress(df['year'], df['area'])
    # ax.plot(df['year'], func(df['year'], slope, intercept), color='r', linestyle='--', linewidth=1, label='Linear trend')

    # plt.text(2000, 900, 'Slope = 0, p = 0', format(round(slope, 2), round(p_value, 3)))
    # plt.text(2000, 880, 'R² = 0', format(round(r_p, 2)))

    ax.tick_params(axis='y', labelcolor='k')
    ax.legend(ncol=1, frameon=False, loc=2, borderaxespad=0)
    plt.show()

    fig.savefig(pathout + '/' + 'fig_area.png', dpi=700, bbox_inches='tight', transparent=True)
    return
```



```
def draw_2(data_water, data_climate, pathout):
    import pandas as pd
    from scipy.interpolate import make_interp_spline
    import scipy.stats as stats
    from scipy.optimize import curve_fit
    from matplotlib import pyplot as plt
    from matplotlib.pyplot import MultipleLocator
    import matplotlib as mpl
    import matplotlib.gridspec as gridspec

    df_water = pd.read_csv(data_water, header=0)
    df_climate = pd.read_csv(data_climate, header=0)
    print(df_climate)

    df_merged = pd.merge(df_water, df_climate, on='year', how='inner')
    print(df_merged)

    fig, ax1 = plt.subplots()

    ax1.plot(df_merged['year'], df_merged['area'], color='blue', marker='o')
    ax1.set_xlabel('Year')
    ax1.set_ylabel('Area (km²)', color='k')
    ax1.tick_params(axis='y', labelcolor='k')

    ax1.set_ylim(2000, 2020)
    ax1.set_xticklabels([2000, 2005, 2010, 2015, 2020], rotation=0)
    ax1.legend(['Area'], loc='upper left')

    # ax2 = ax1.twinx()
    # ax2.plot(df_merged['year'], df_merged['Temperature'], color='green', marker='s')
    # ax2.set_ylabel('Temperature (°C)', color='green')
    # ax2.tick_params(axis='y', labelcolor='green')
    # ax2.legend(['Temperature'], loc='upper right')

    plt.show()
```

```
def draw_3(data_water, data_climate, pathout):
    import pandas as pd
    from scipy.interpolate import make_interp_spline
    import scipy.stats as stats
    from scipy.optimize import curve_fit
    from matplotlib import pyplot as plt
    from matplotlib.pyplot import MultipleLocator
    import matplotlib as mpl
    import matplotlib.gridspec as gridspec

    df_water = pd.read_csv(data_water, header=0)
    df_climate = pd.read_csv(data_climate, header=0)
    df_climate = df_climate.dropna()
    print(df_climate)

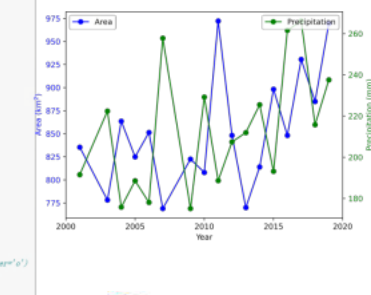
    df_merged = pd.merge(df_water, df_climate, on='year', how='inner')
    print(df_merged)

    fig, ax1 = plt.subplots()

    ax1.plot(df_merged['year'], df_merged['area'], color='blue', marker='o')
    ax1.set_xlabel('Year')
    ax1.set_ylabel('Area (km²)', color='k')
    ax1.tick_params(axis='y', labelcolor='k')

    ax1.set_ylim(2000, 2020)
    ax1.set_xticklabels([2000, 2005, 2010, 2015, 2020], rotation=0)
    ax1.legend(['Area'], loc='upper left')

    # ax2 = ax1.twinx()
    # ax2.plot(df_merged['year'], df_merged['Precipitation'], color='green', marker='s')
    # ax2.set_ylabel('Precipitation (mm)', color='green')
    # ax2.tick_params(axis='y', labelcolor='green')
    # ax2.legend(['Precipitation'], loc='upper right')
```





GEWEX



Thank You!

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