National Tibetan Plateau/Third Pole Environment Data Center (TPDC)

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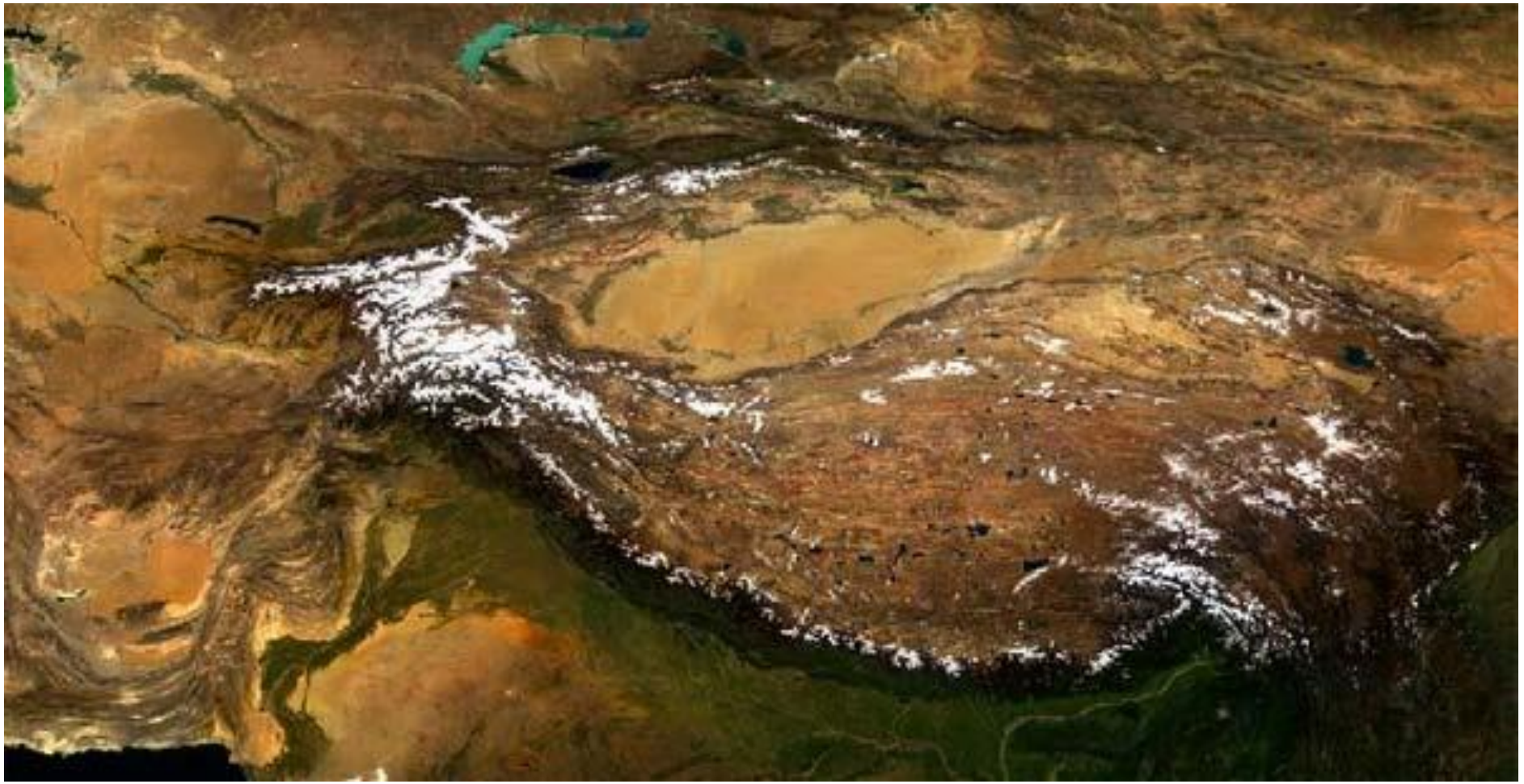
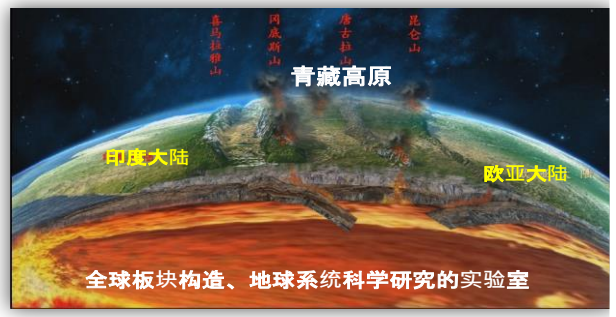
青藏高原地球系统与资源环境重点实验室
Key Laboratory of Tibetan Plateau Earth System, Environment and Resources

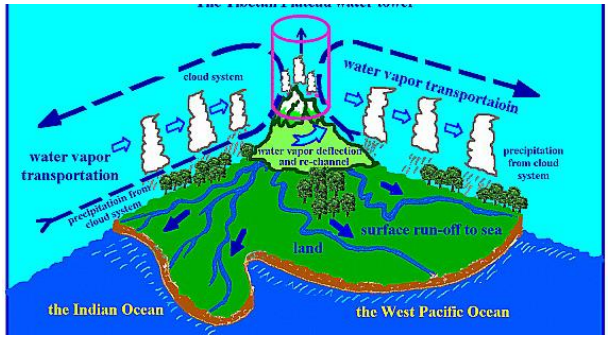
TPDC 国家青藏高原科学数据中心

Tibetan Plateau

The Tibetan Plateau, characterized by its unique multi-spherical features, is a region significantly impacted by global changes.





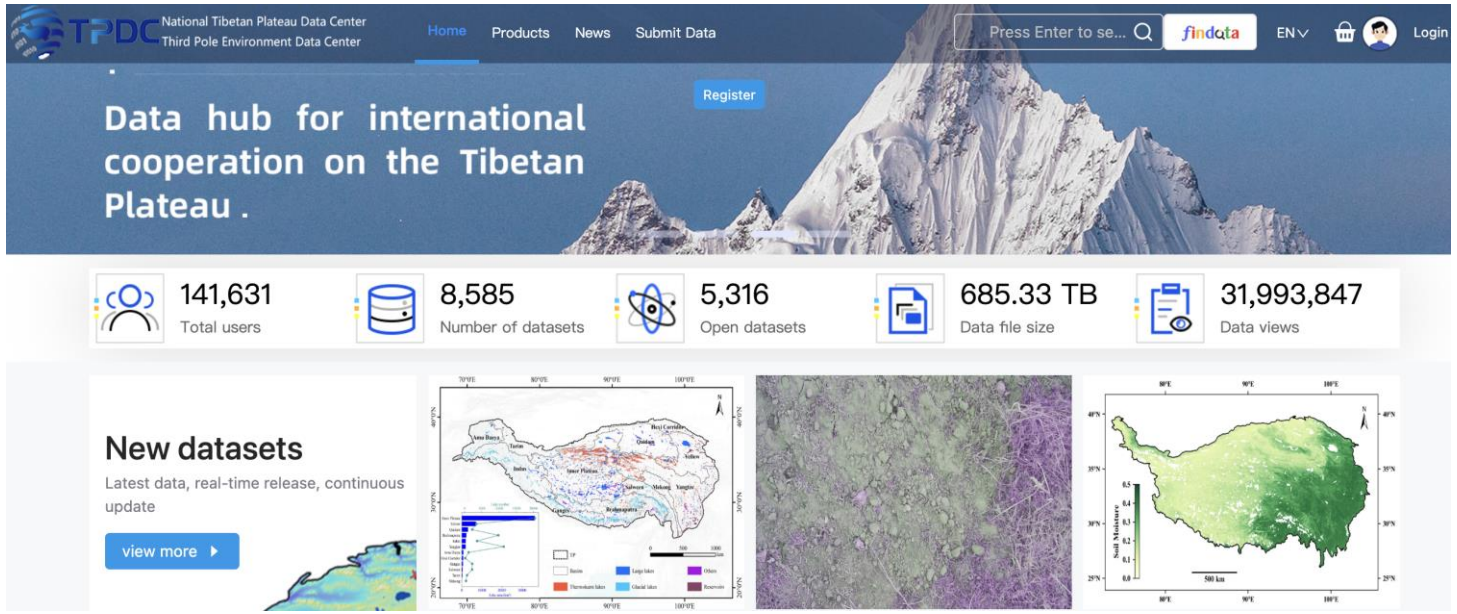


National Tibetan Plateau/Third Pole Environment Data Center (TPDC)

https://data.tpdc.ac.cn

Findable Accessible Interoperable Reusable

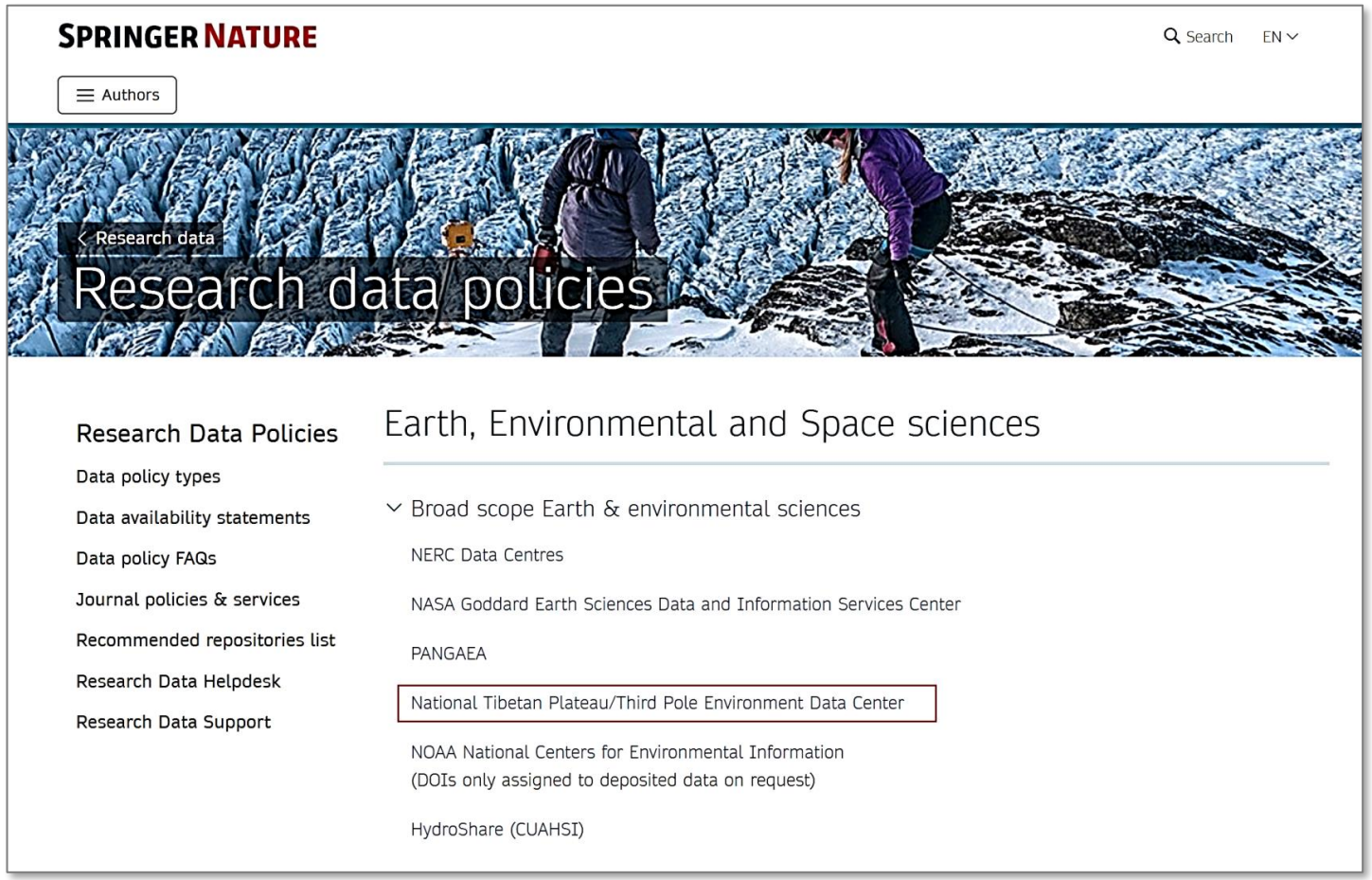
- Established in **2019**
- A **national data center** dedicated to promoting scientific data for the **Tibetan Plateau** and its surrounding regions
- Users **> 140,000** Datasets **> 8,500** Downloads: **685 TB** Views: **~32M**



4 sub-centers in China

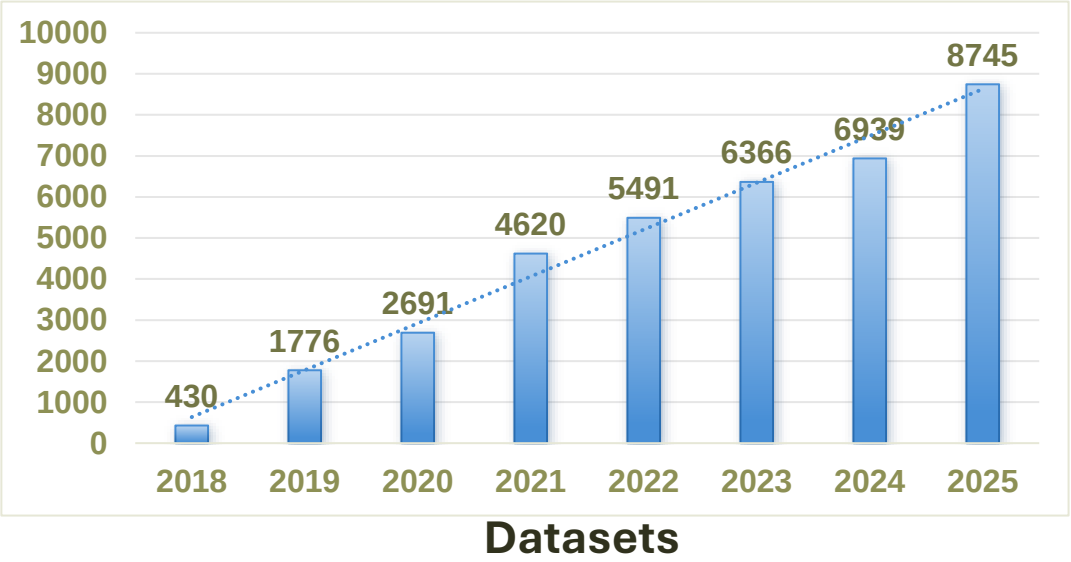
5316 datasets (~62%) are openly available for downloading without registration

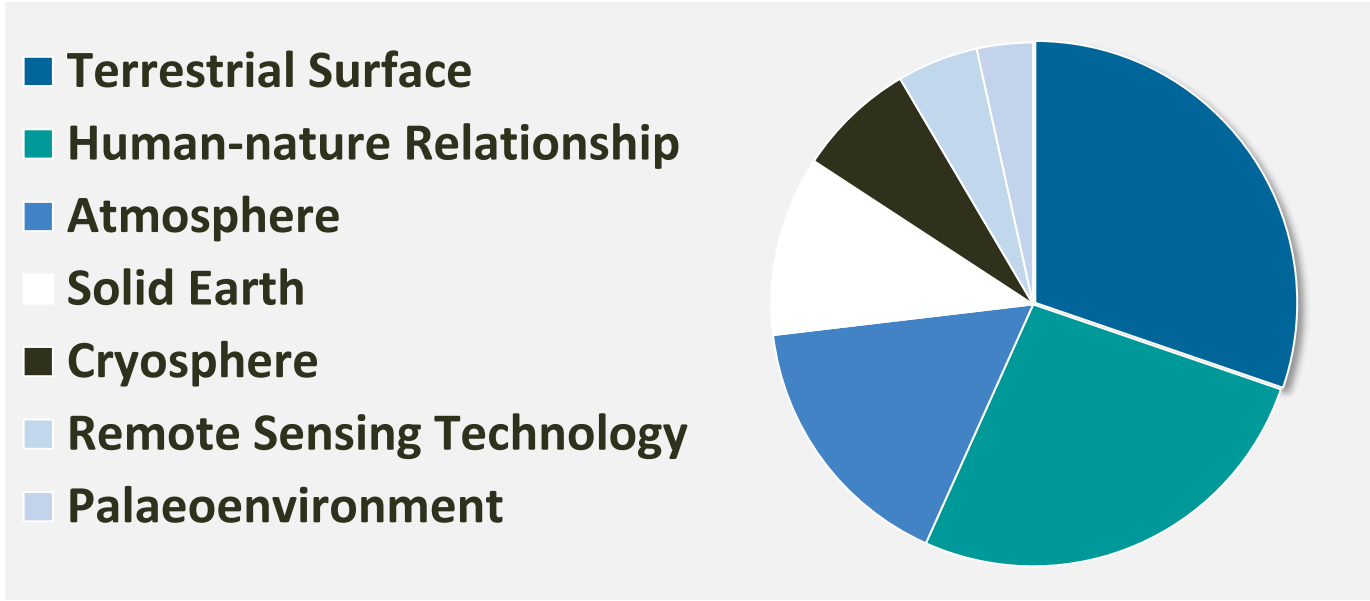
Data repositories



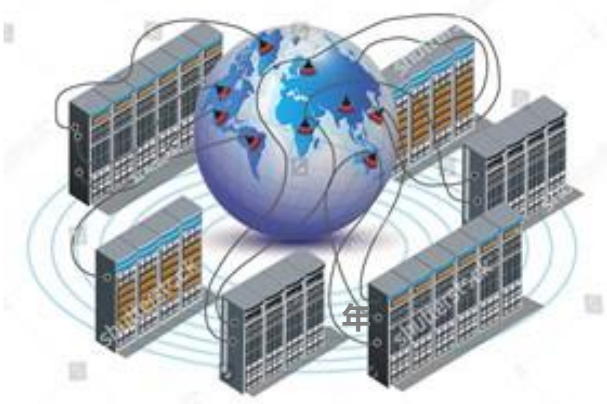
- The first data center in China certified by *Springer Nature* as a scientific data repository (July 2020)
- A trusted digital repository of the *AGU, ESSD* and *Data in Brief*
- The first Chinese member of *enabling FAIR data* program led by AGU
- Member of *DataCite*

Data resources



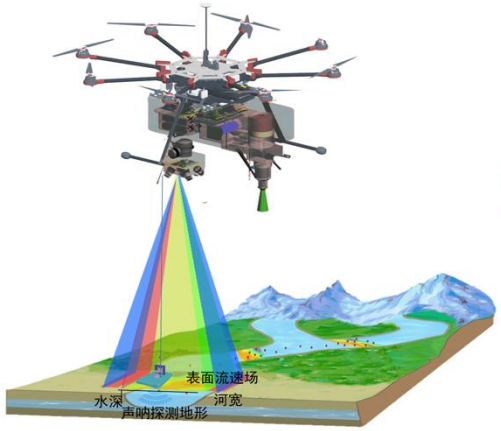


Data grocery store | Data library | Data lab | Digital twin

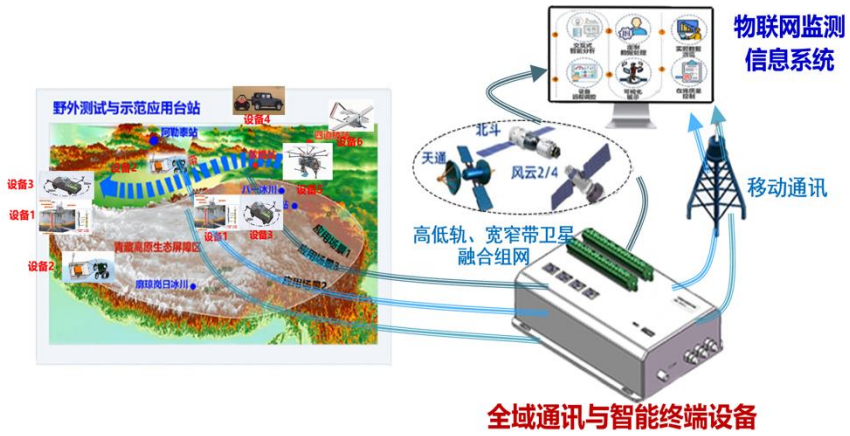


Ground observations

Develop extreme environment observation and data transmission technologies to achieve a leap from traditional point-based and sectional observations to wide-area, time-series intelligent monitoring.

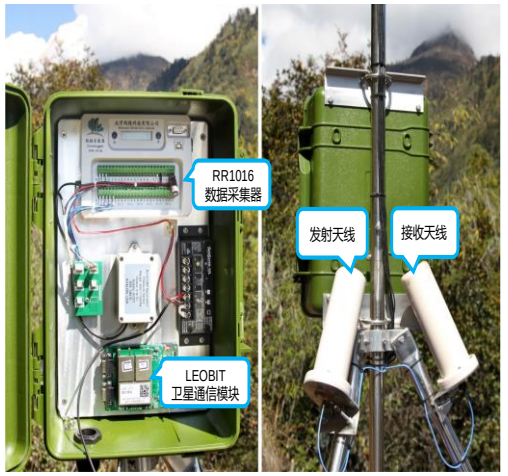


UAV-based runoff measurement system



Long-distance communication and intelligent terminal devices

Bionic eagle eye



Satellite Internet of Things (IoT) terminal

- ❑ 5 types of observation equipment and communication terminals
- ❑ Enables real-time monitoring and data transmission in extreme environments

Ground observations

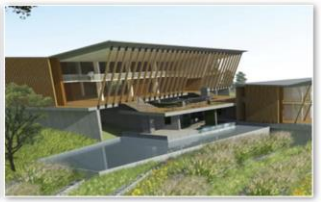

纳木错多圈层综合观测研究站


藏东南高山环境综合观测研究站


珠穆朗玛大气与环境综合观测研究站

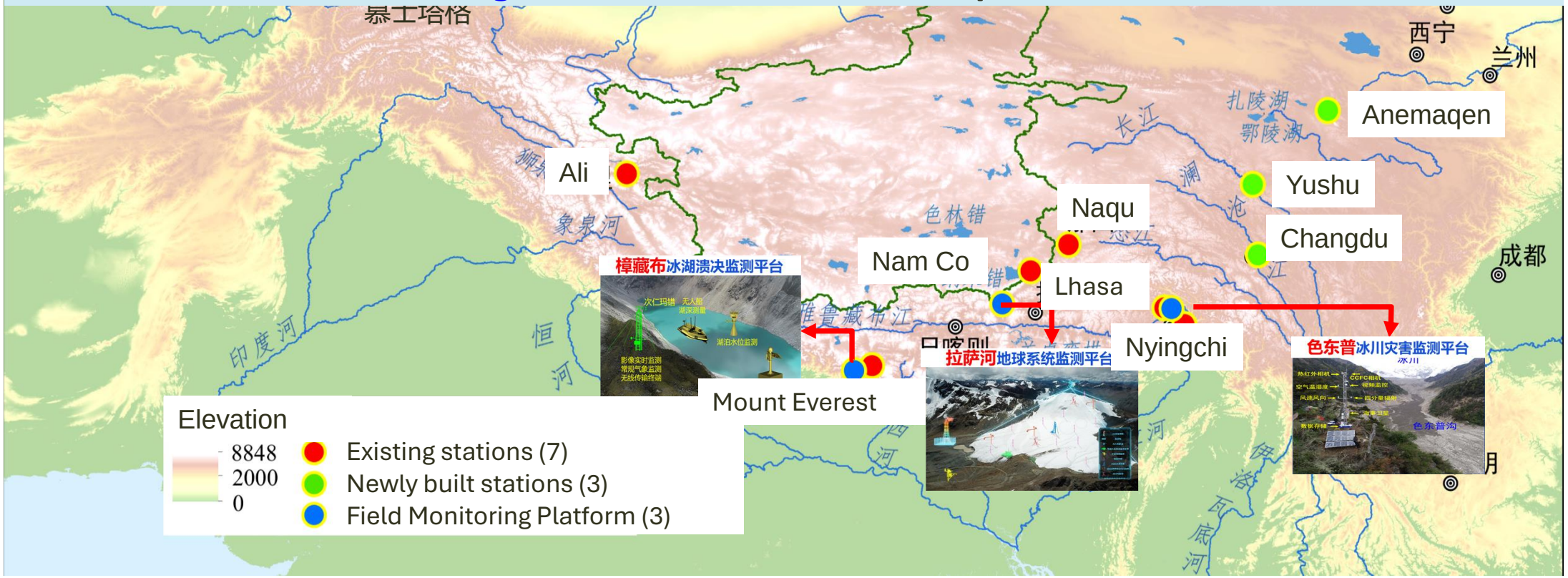

阿里荒漠环境综合观测研究站


慕士塔格西风带环境综合观测研究站


墨脱地球景观与地球系统综合观测研究中心


那曲高寒草地生态系统国家野外科学观测研究站

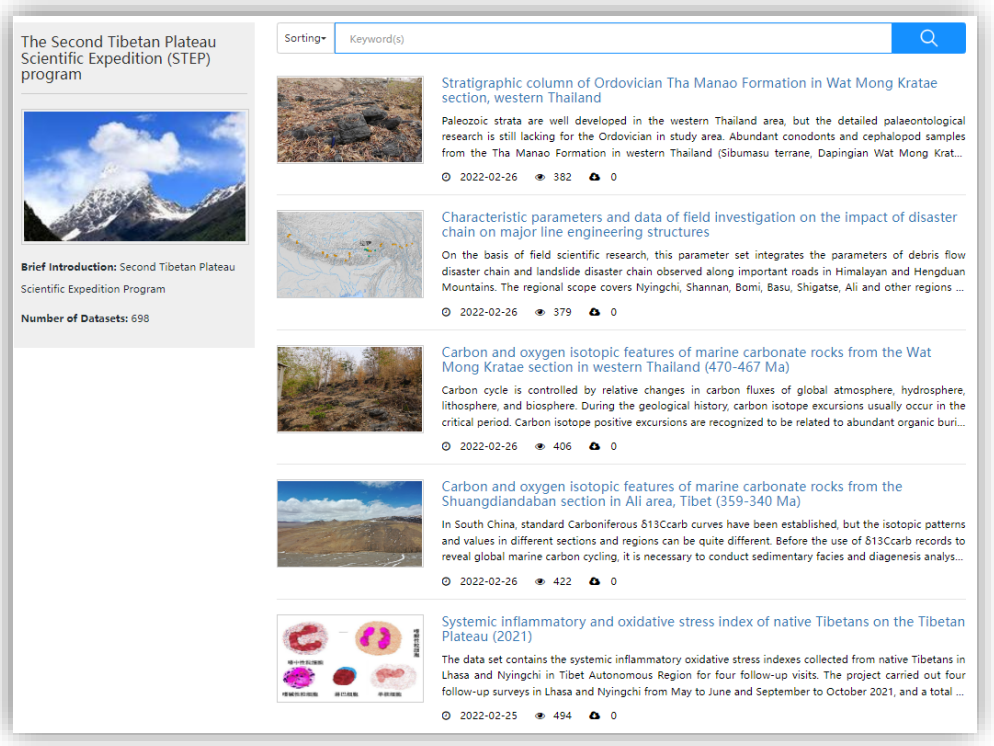
Preliminarily realization of quasi-real-time transmission, online quality control, and integration of field observation platforms



Field data

Second Tibetan Plateau scientific expedition

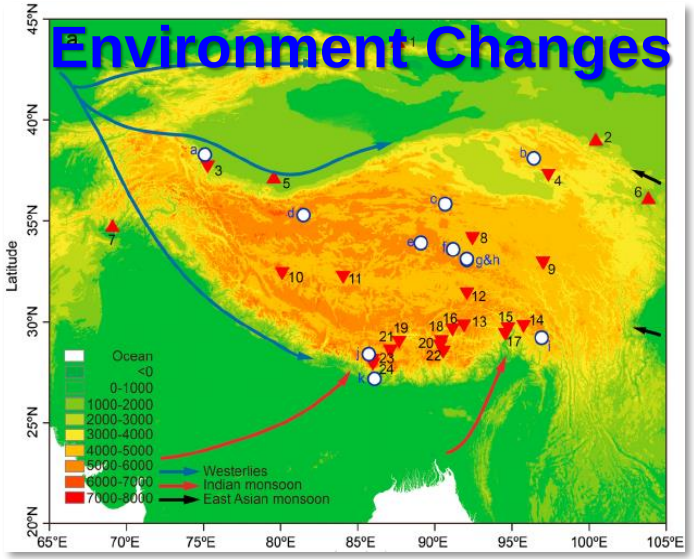
2,209 datasets >220TB



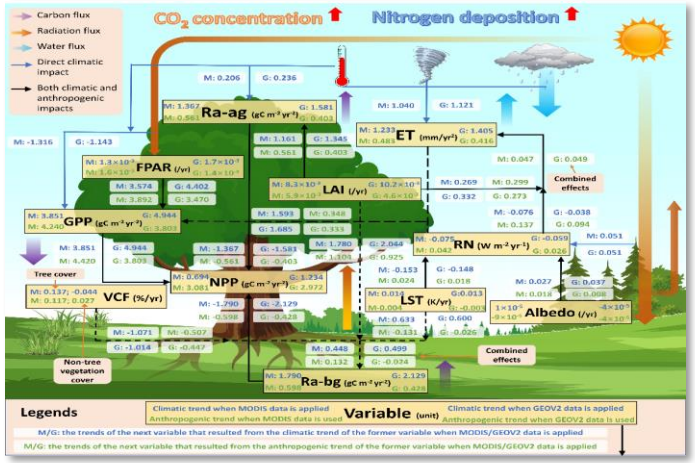
https://data.tpdc.ac.cn/en/special/step

From Prof. Tandong Yao

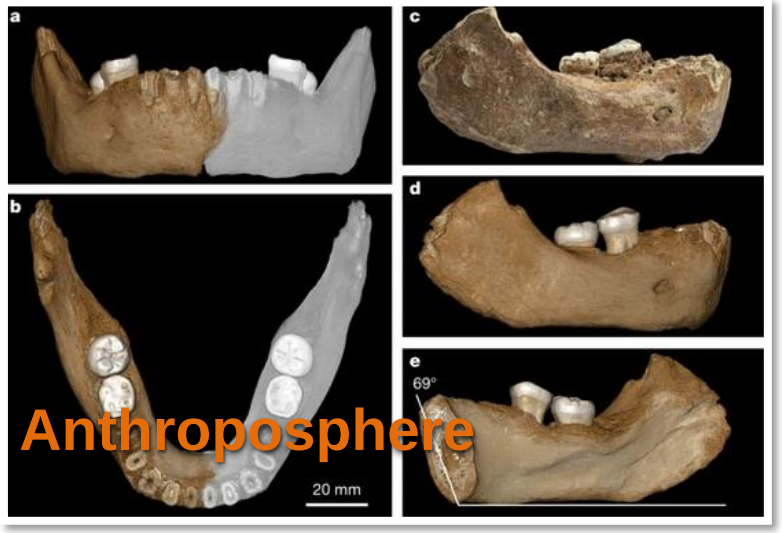
Publication associated datasets



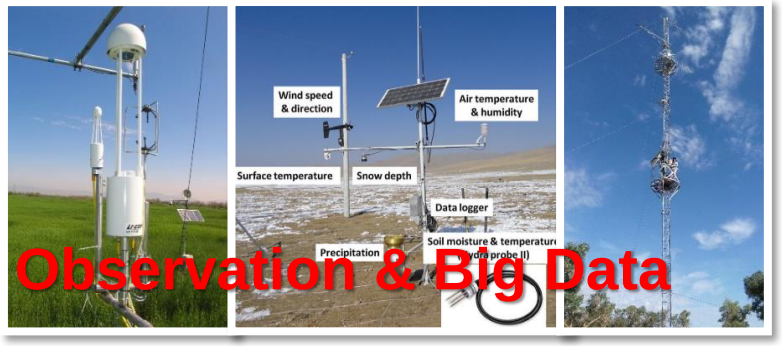
1. Yao et al., 2012, ***NC*** DOI: 10.11888/Hydro.tpdc.270100
2. Yao et al., 2013, ***RG*** DOI: 10.11888/Hydro.tpdc.270940
3. Gao et al., 2011, ***JC*** DOI: 10.11888/Hydro.tpdc.270937
4. Gao et al., 2016, ***CD*** DOI: 10.11888/Hydro.tpdc.270938



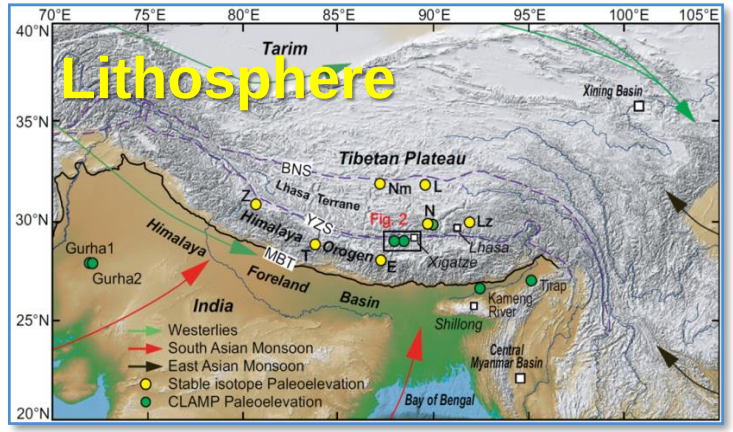
Chen et al., 2021, ***GCB*** DOI: 10.11888/Ecolo.tpdc.271667



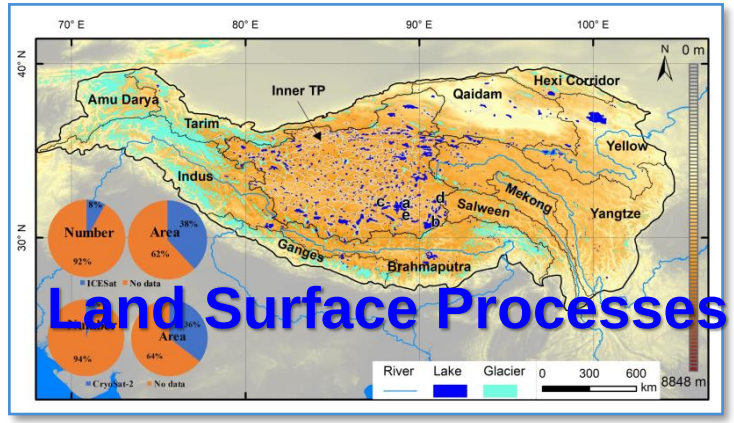
1. Chen et al., 2015, ***Science*** DOI: 10.11888/Paleoenv.tpdc.270105
2. Chen et al., 2019, ***Nature*** DOI: 10.11888/Paleoenv.tpdc.270296
3. Chen et al., 2008, ***QSR*** DOI: 10.11888/Paleoenv.tpdc.270066
4. Zhang et al., 2020, ***Science*** DOI: 10.11888/Socioeco.tpdc.271078



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

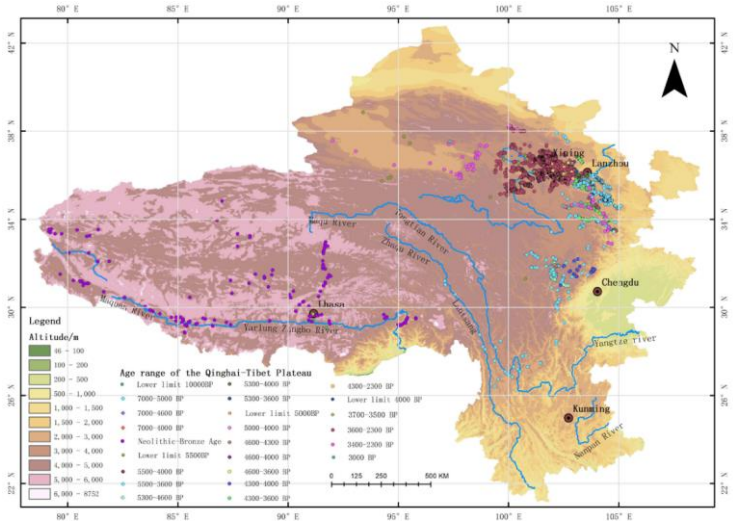


1. Ding et al., 2017, ***Geology*** DOI: 10.11888/Geo.tpdc.270351
2. Huang et al., 2013, ***CSB*** DOI: 10.11888/Geo.tpdc.270351
3. Huang et al., 2015, ***Lithos*** DOI: 10.11888/Geology.tpe.249415

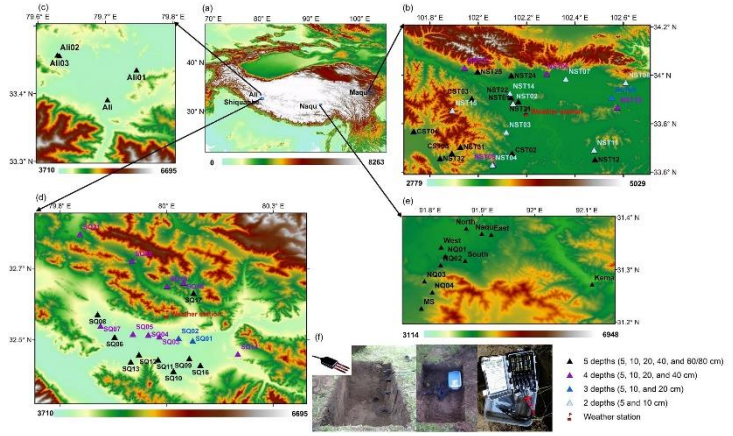


1. Zhang et al., 2019, ***RSE*** DOI: 10.11888/Hydro.tpdc.271169
2. Zhang et al., 2017, ***GRL*** DOI: 10.11888/Hydro.tpdc.270303
3. Zhang et al., 2014, ***CSB*** DOI: 10.11888/Hydro.tpdc.270302
4. Zhang et al., 2011, ***RSE*** DOI: 10.11888/Lake.tpe.249466.file

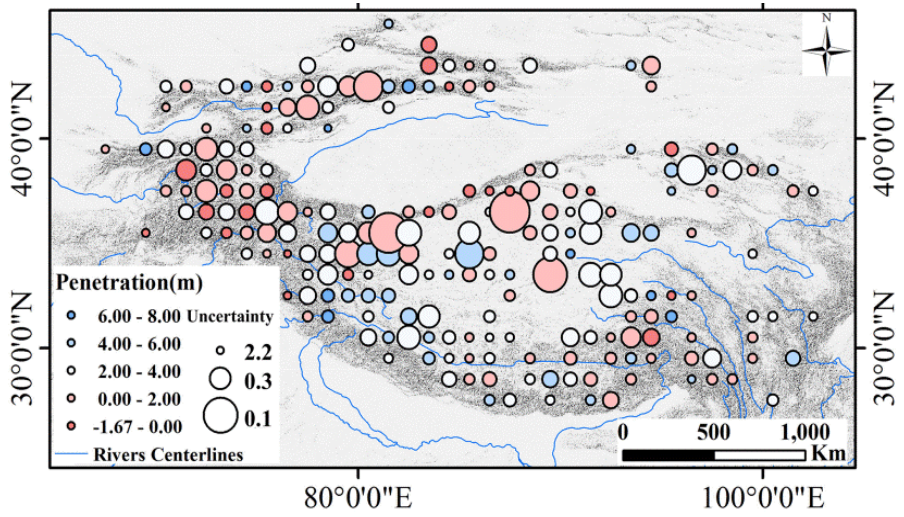
Publication associated datasets



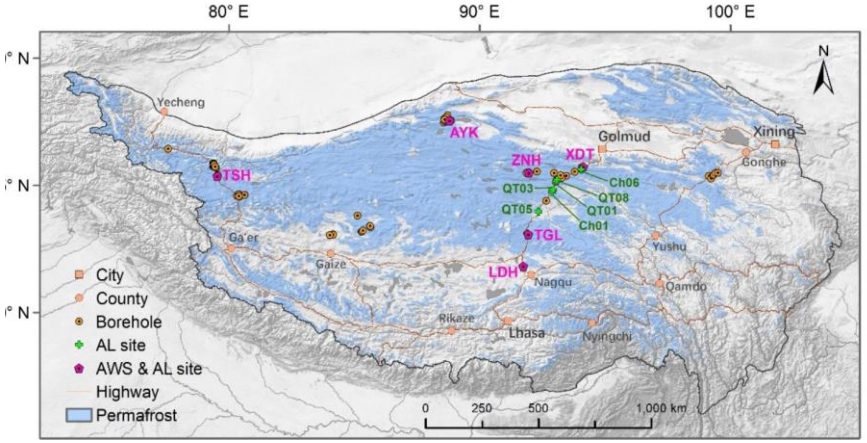
董广辉等. 2021. **青藏高原及周边地区史前时代遗址分布数据**. DOI: 10.11888/Paleoenv.tpdc.270997 ***Science***



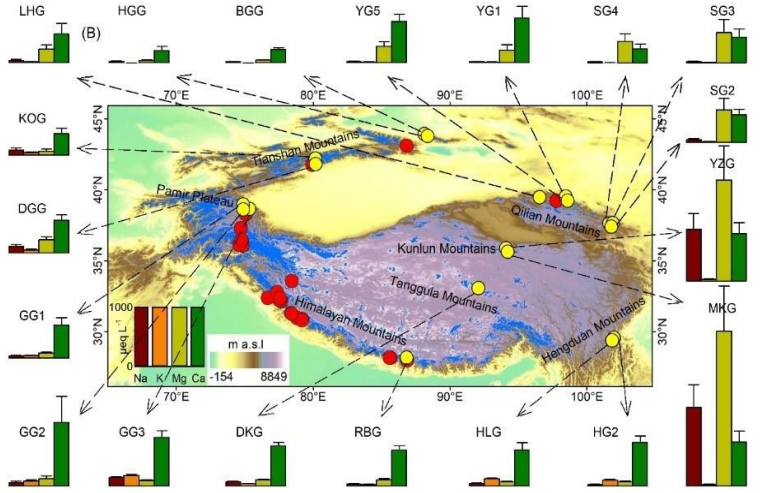
Bob Su, 阳坤. (2019). **青藏高原土壤温湿度逐时观测数据集（2008-2016）.** DOI: 10.11888/Soil.tpdc.270110. ***RSE***



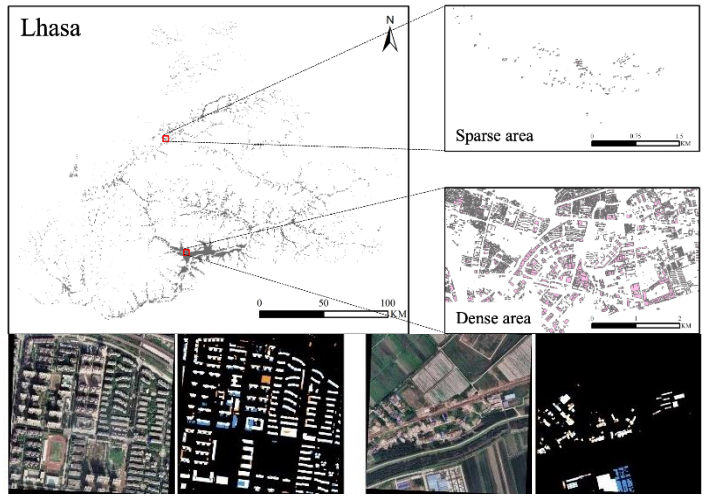
江利明. (2021). **高亚洲冰川1°×1°网格的SRTM C/X波段雷达穿透深度差异数据集（2000）**. DOI: 10.11888/Glacio.tpdc.271279. ***IEEE J-STARS***



赵林等. 2022. **青藏高原多年冻土综合监测数据集（2002-2018）**. DOI: 10.11888/Geocry.tpdc.271107 ***ESSD***



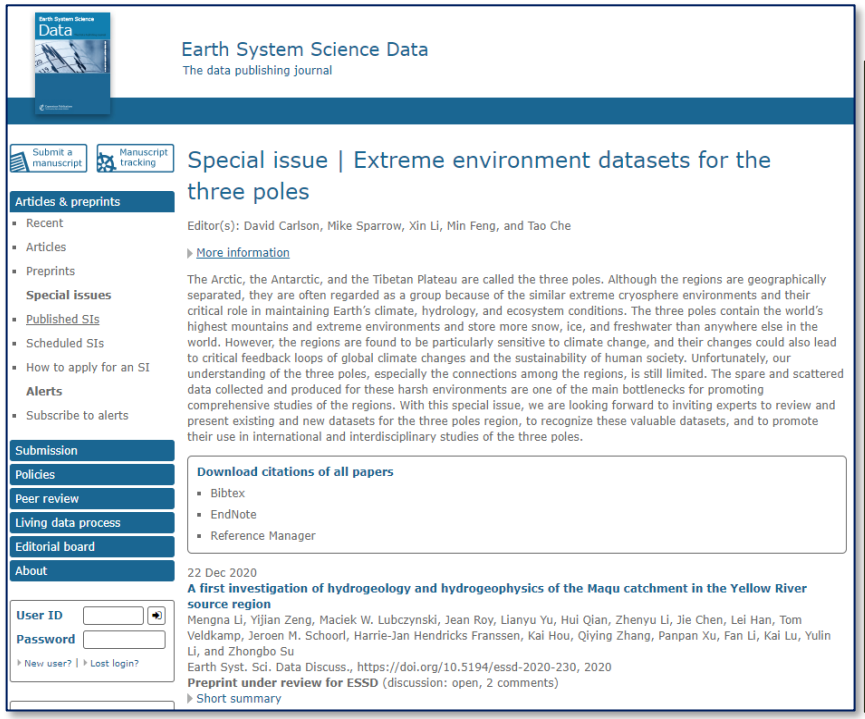
李向应. (2021).**全球冰川水化学与化学风化数据集**. DOI: 10.11888/Glacio.tpdc.271705. ***Nature Communication***

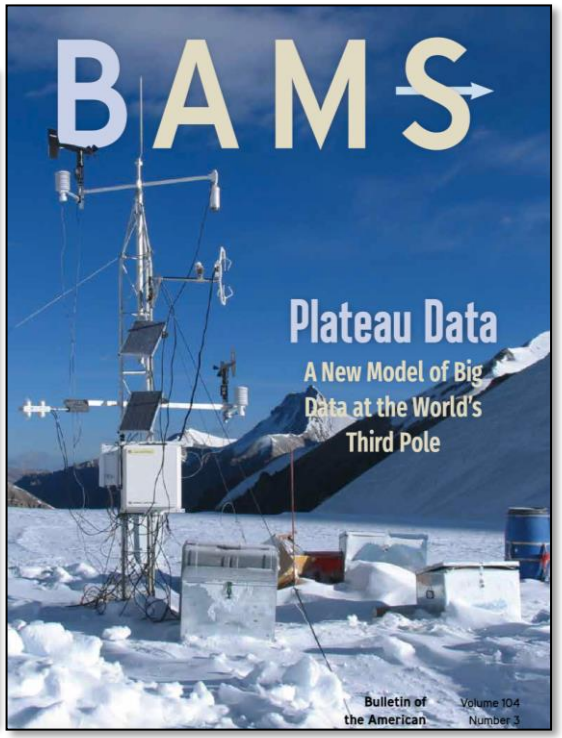


陈旻等. 2020. **拉萨城市建筑物屋顶矢量数据集.** DOI: 10.11888/Geogra.tpdc.271702 ***Scientific Data***

Support scientific research

- **The datasets shared on TPDC have supported >11,000 publications**





Extreme environment datasets in **ESSD (IF: 11.2) 48 articles published, and 26 datasets shared on TPDC**

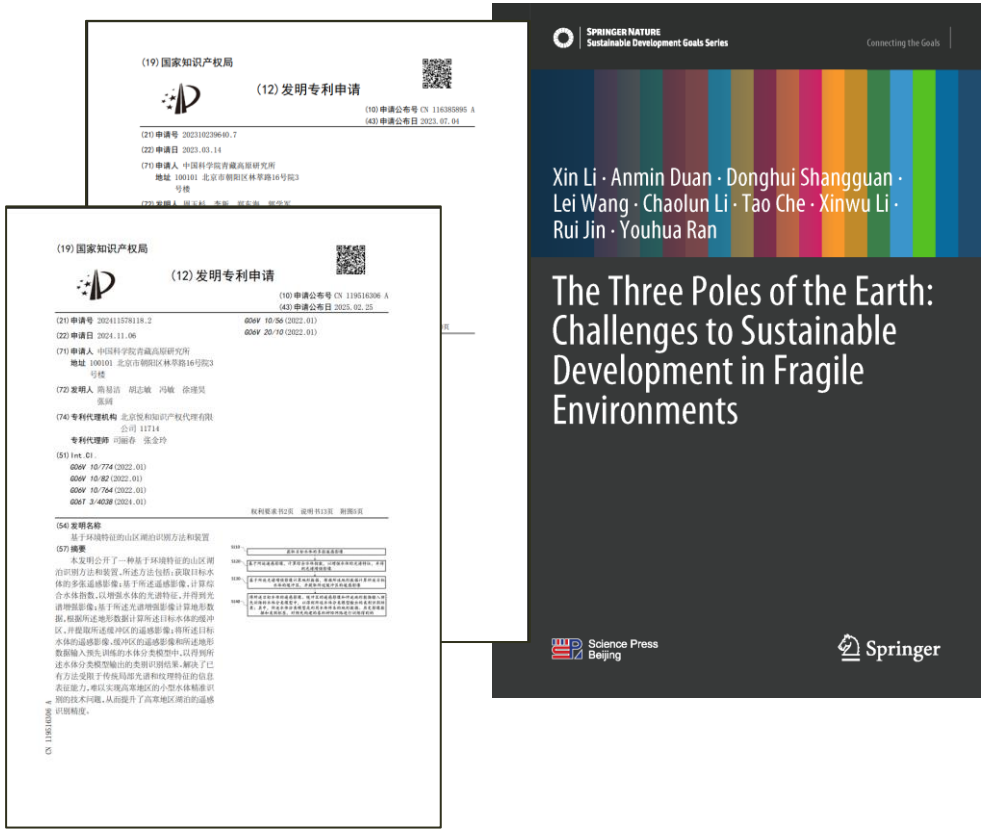
Plateau Data – A New Model of Big Data at the World's Third Pole

Publications

Published over 460 papers, include 82 papers published in 2025

2 in *Nature Communications*

8 in *Science Bulletin (IF=21)*

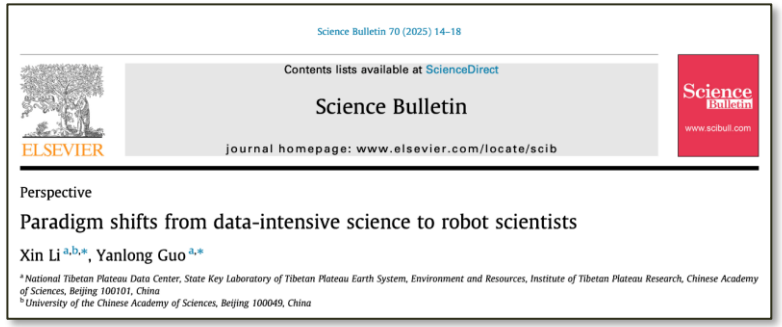


2 patents

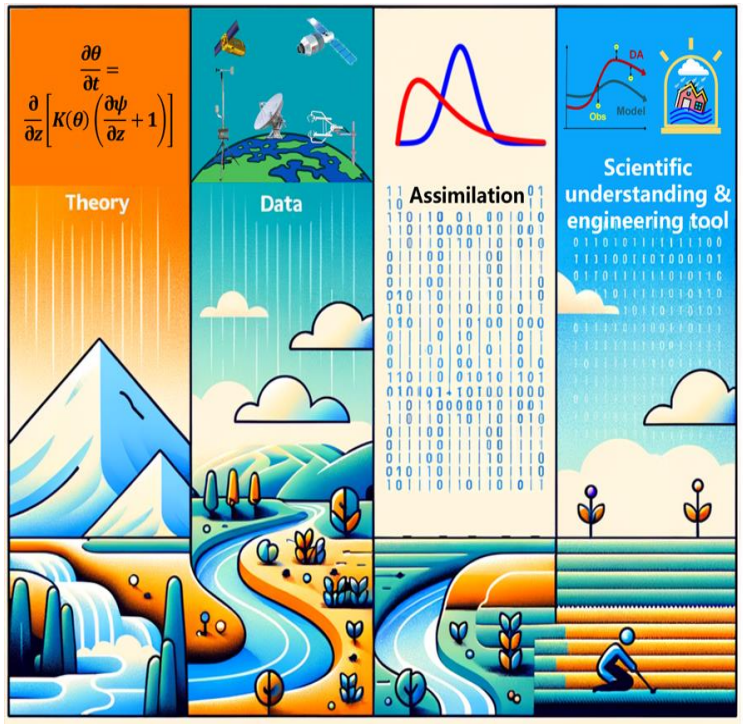
Explore big data and AI in Earth sciences

Exploring the applications of big data and artificial intelligence in Earth sciences to advance a new paradigm in geoscientific research.

Li, et al. 2023, *Nature Review of Earth & Environment*



Li and Guo. 2025, *Science Bulletin*

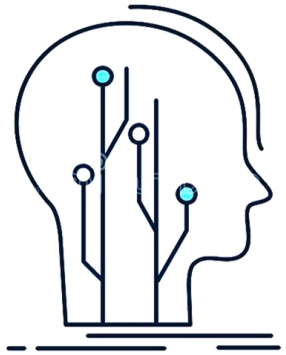


Li, et al. 2024, *Review of Geophysics*

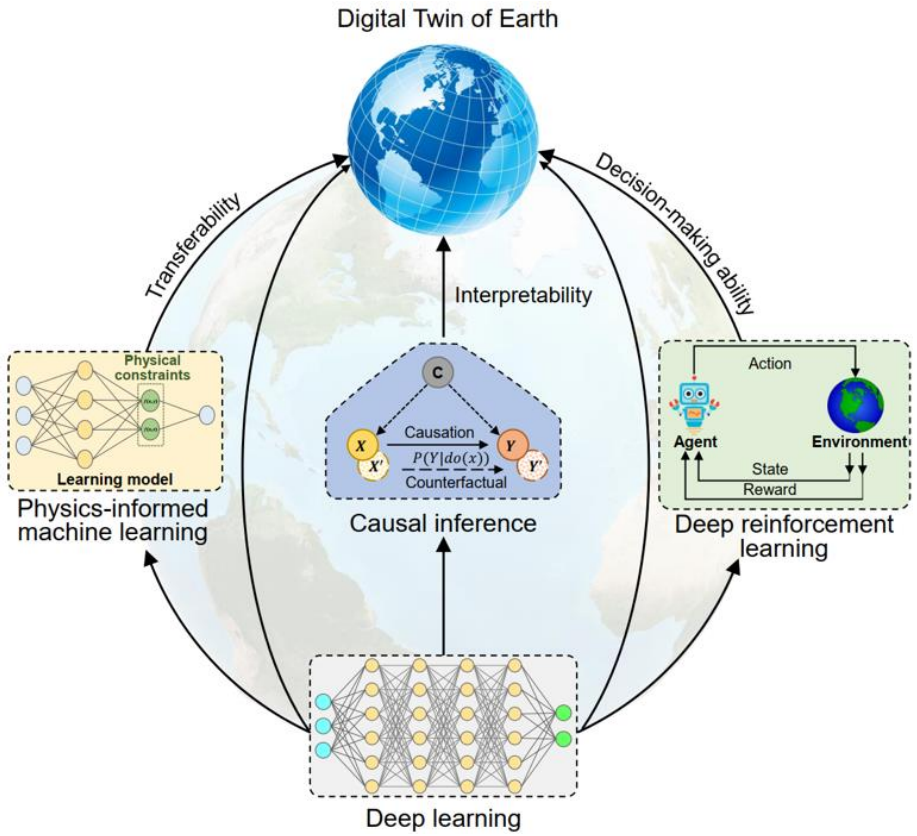
Develop high-quality datasets

Utilizing new artificial intelligence methods to independently develop high-quality, long-timescale data products, and promoting highly open sharing.

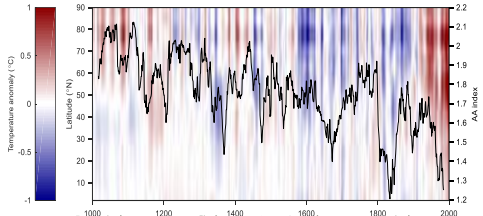
Data



Knowledge

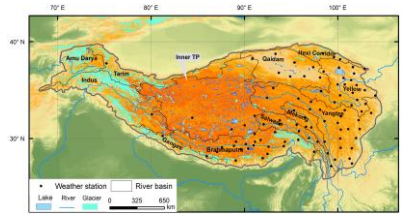


(Li*, Feng*, et al., 2023, *NREE*)



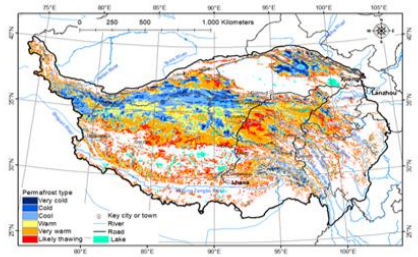
过去千年北半球气温纬向变化及千年北极放大效应指数序列

Fang, Li*, et al, 2021, *NC*



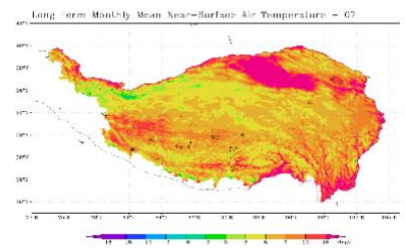
青藏高原湖泊数据集

Zhang, et al, 2023, *NG*



多年冻土潜在热退化数据集(1960s-2000s)

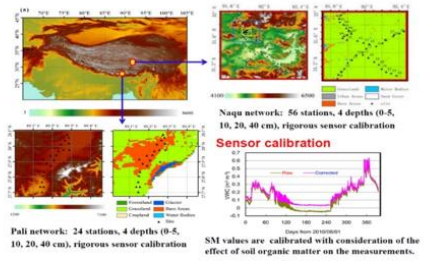
Ran, Li* et al., 2018, *Cryosphere*



青藏高原地表网格气象数据集 (1979-2018)

He, Yang* et al., 2020, *SD*

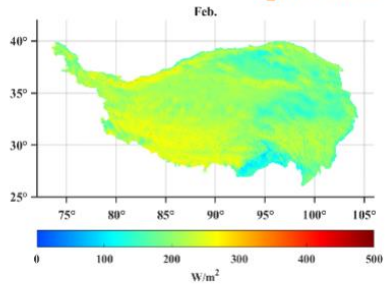
Highly Cited Paper



青藏高原土壤温湿度加密观测数据集（2010-2021）

Chen et al., 2017, *JGR*

Highly Cited Paper

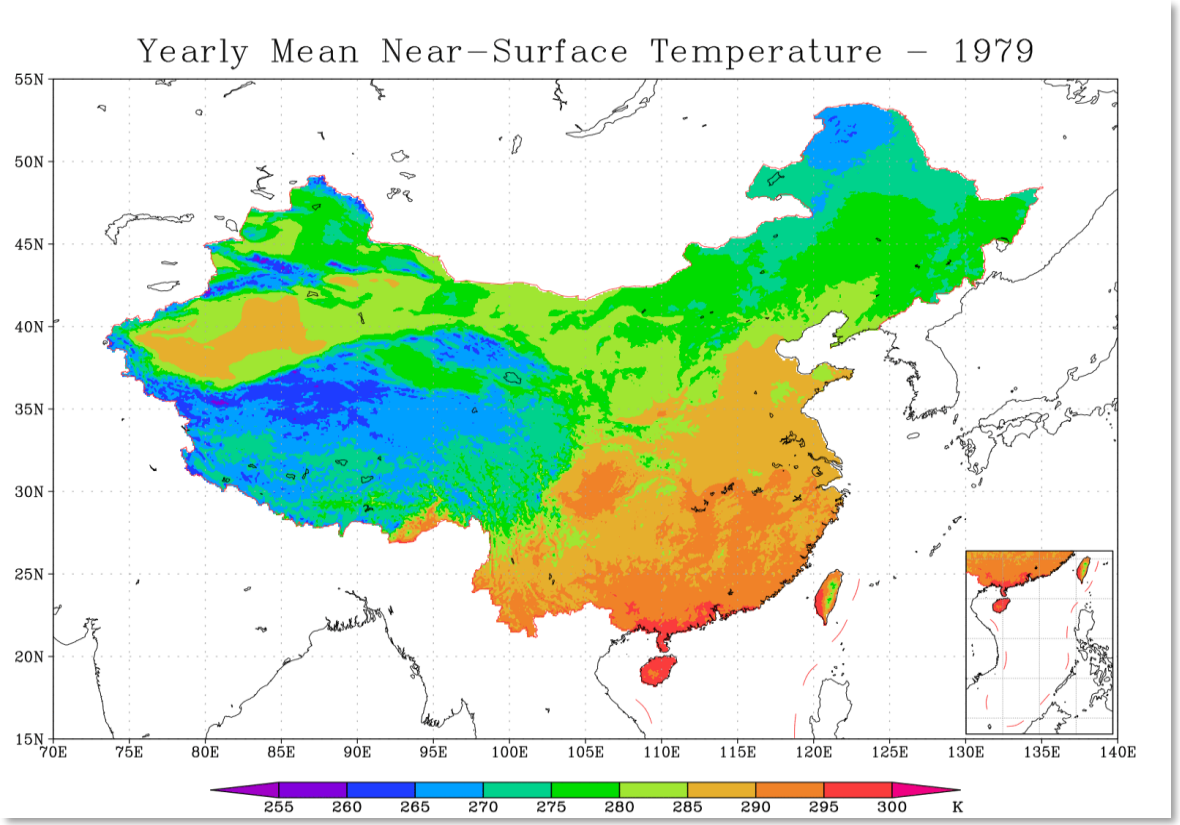


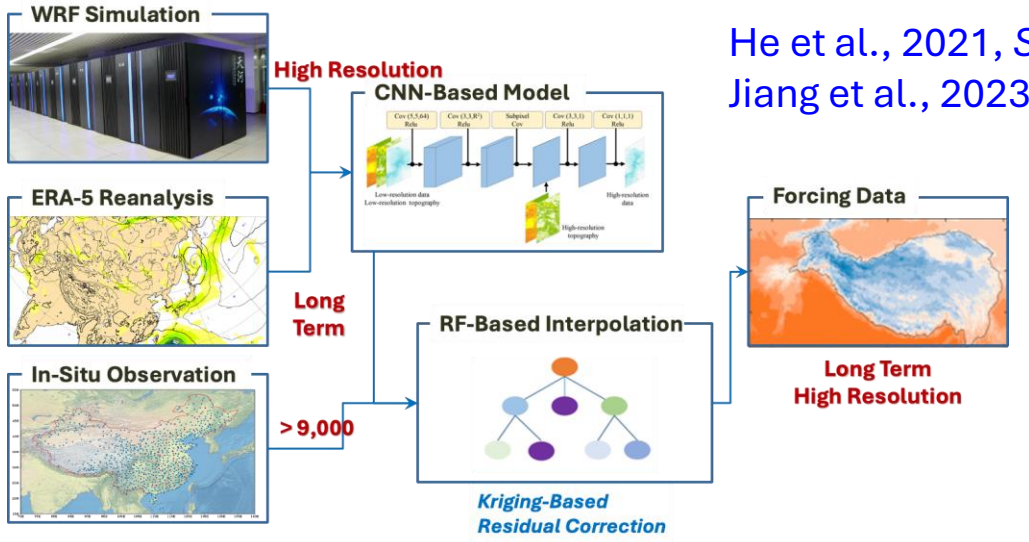
青藏高原10km地表短波辐射数据集 (1983.7-2018.12)

Tang et al., 2019, *ESSD*

Meteorological forcing dataset

The independently developed Chinese high-resolution surface meteorological forcing dataset





He et al., 2021, *SD*
Jiang et al., 2023, *ESSD*

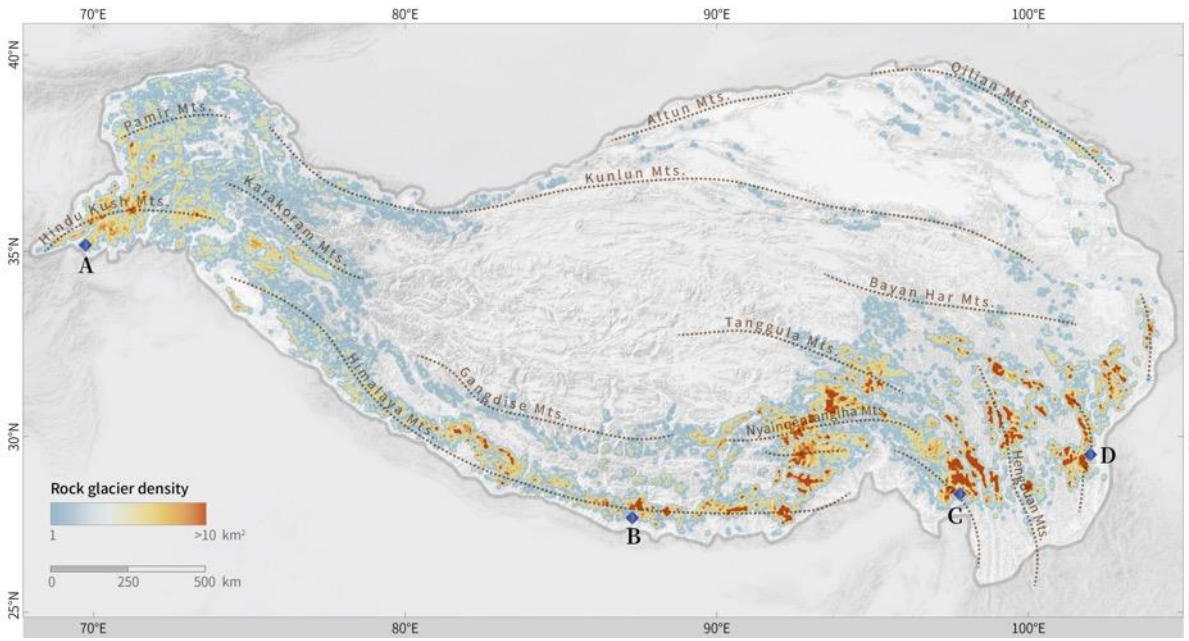
> 260,000 views and 33,000 downloads, and selected as an ESI top 0.1% hot paper and a top 1% highly cited paper.

Yang, He et al., (2019). China meteorological forcing dataset (1979-2018). National Tibetan Plateau Data Center, DOI: 10.11888/AtmosphericPhysics.tpe.249369.file.

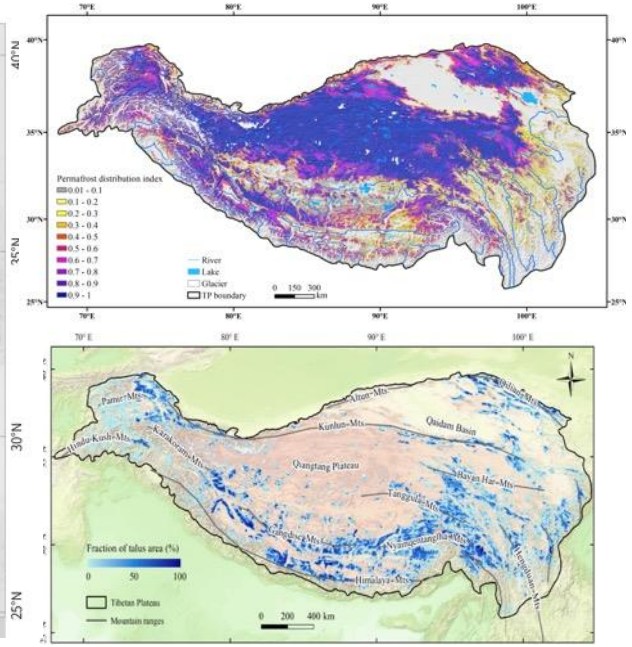
Yang, Jiang et al., (2023). A high-resolution near-surface meteorological forcing dataset for the TP region (1979-2020). National Tibetan Plateau Data Center, DOI: 10.11888/Atmos.tpdc.300398.

Periglacial datasets

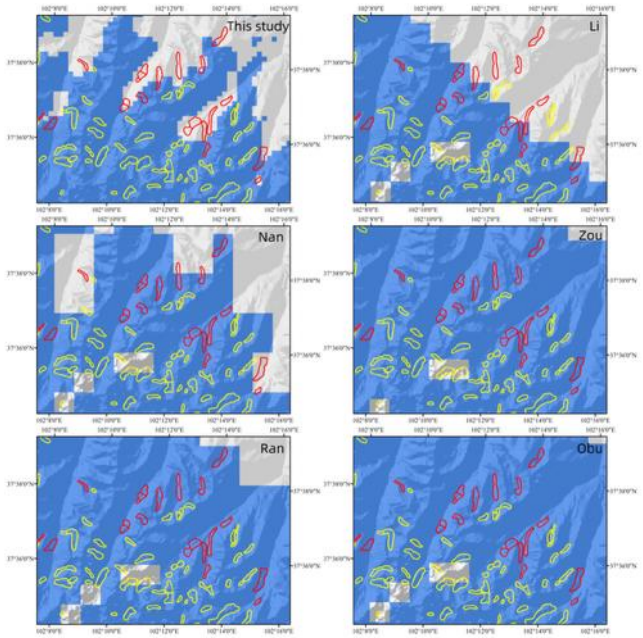
Inventories of rock glaciers, talus, and water bodies



Rock glacier inventory of TP



Tulas inventory of TP



Mountainous permafrost

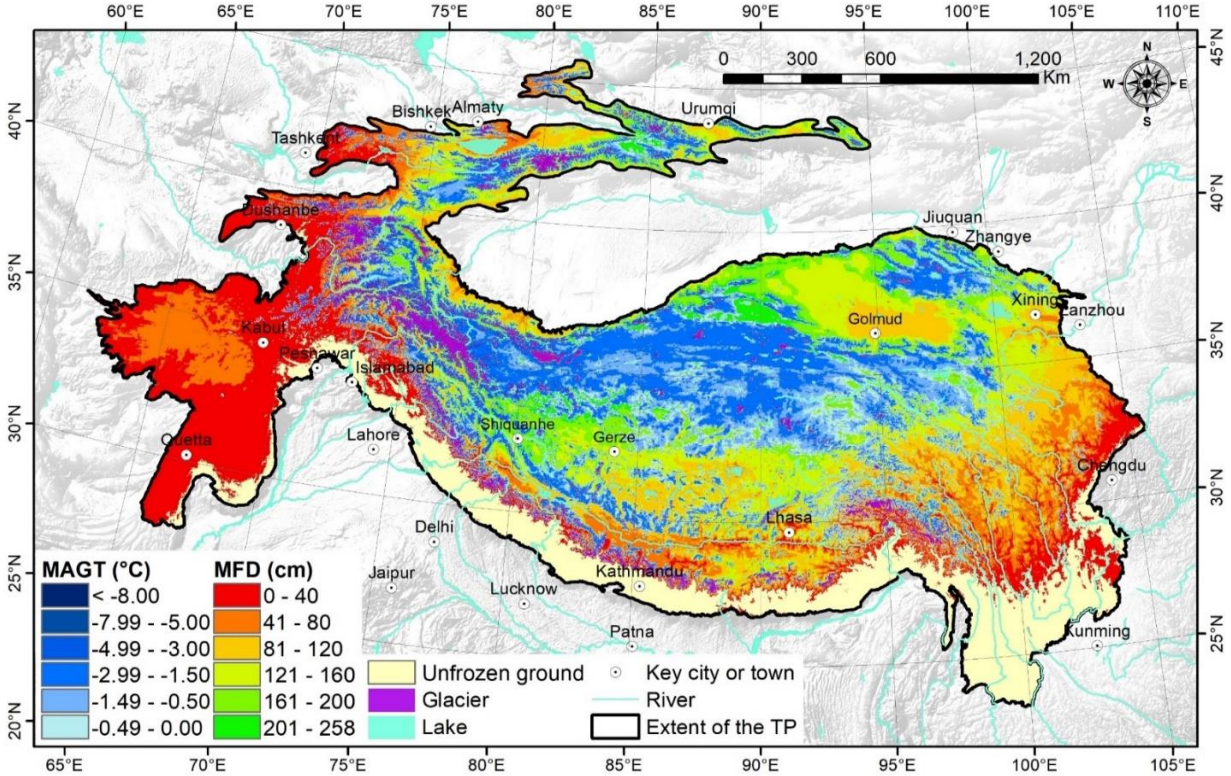
- ❑ **Identified +130,000 rock glaciers, more than the total of previously reported worldwide**
- ❑ **Important refresh water resource reserve.**

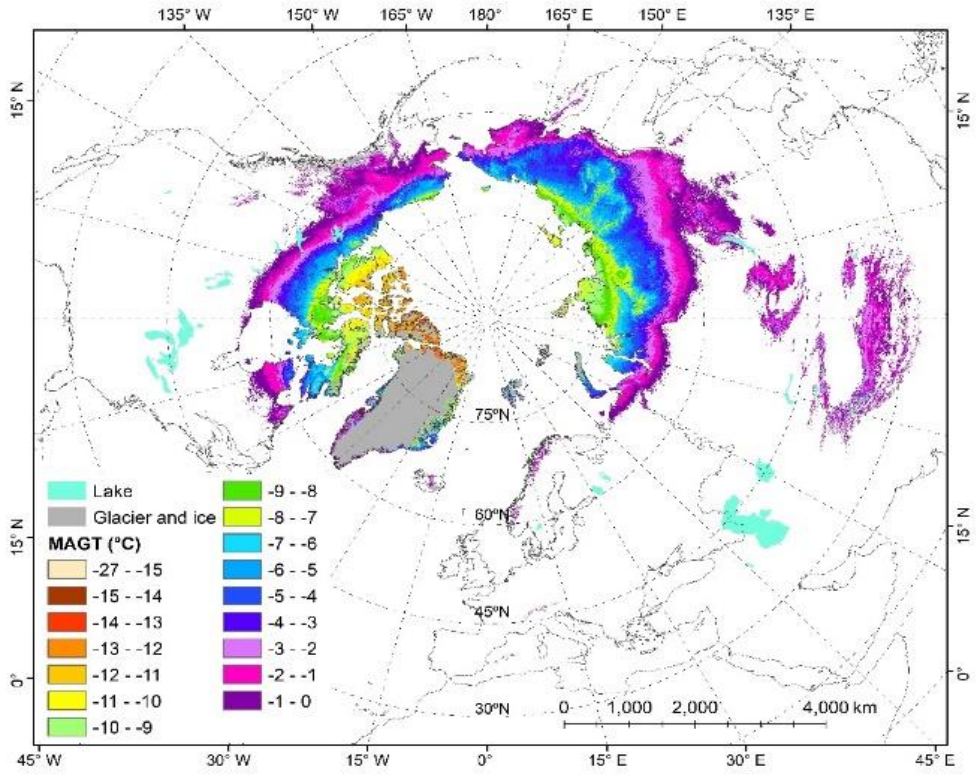
Feng, et al. *Science Bulletin*, 2025; Jiang, Feng*, *IJDE*, 2025; Hu, Feng*, et al., *IJDE*, 2024; Yan, Feng*, et al., *PPP* 2025; Xu, Feng*, et al. *Water*, 2023; Hu, Feng*, et al. *Water*, 2024; Zhang, Feng*, et al, *SRE*, 2024

Permafrost datasets

MAGT and ALT with 1-km resolution over the Third pole and the Northern Hemisphere were produced.

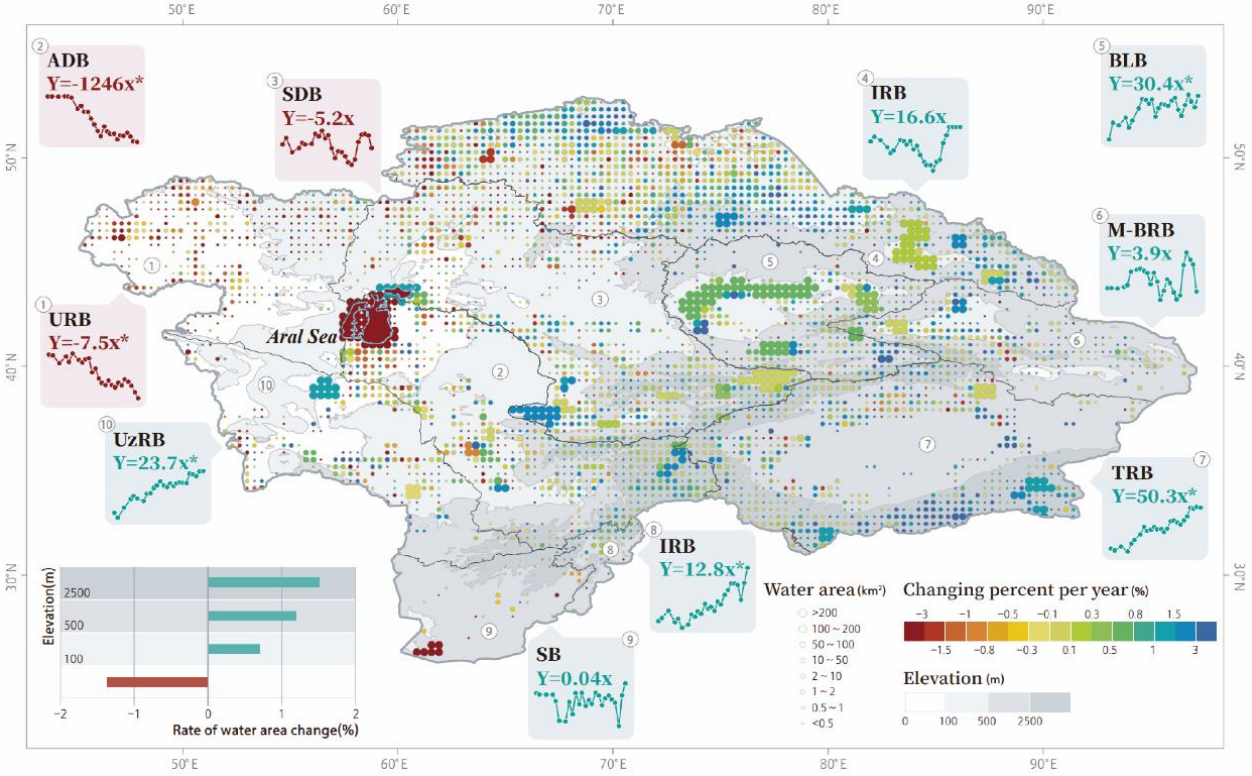
DOI: 10.11888/Geogra.tpdc.270672
DOI: 10.11888/Geocry.tpdc.271190
DOI: 10.11888/Geocry.tpdc.271659
DOI: 10.11888/Geocry.tpdc.271774



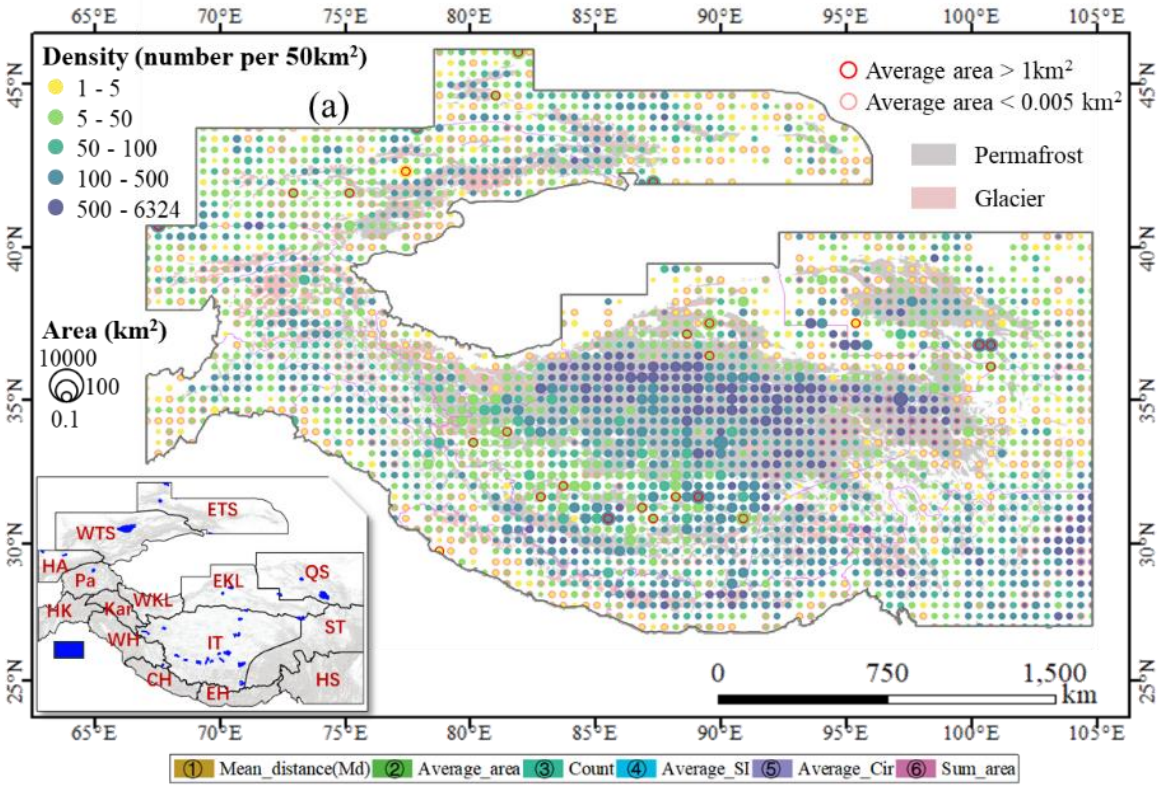


Water bodies

Fine-scale water body surveys across key arid and high-mountain regions in Central and High-Mountain Asia to improve global small water body mapping accuracy



Su et al. *Science Bulletin* 2025



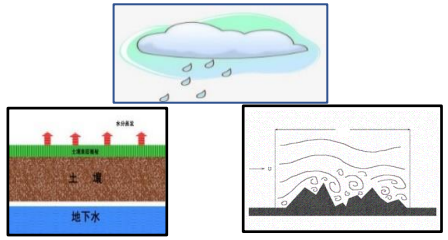
Sui et al. *Scientific Data* 2025

Tibetan Plateau Earth System Model

- Developing Earth system models for the Tibetan Plateau is the long-term goal of TPDC, aiming to create a fine-scale process model with characteristics unique to the Plateau.
- We have completed the TPCSM model and moved on to the TPESSM development.

I: Tibetan Plateau Climate System Model (TPCSM)

Atmosphere

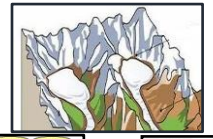


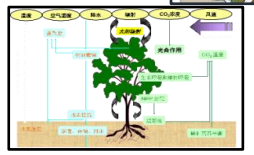
Land surface process

Complex terrain

II: Tibetan Plateau Earth Surface System Model (TPESSM)

Cryosphere



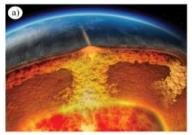


Biosphere

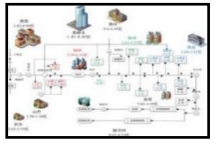
Hydrosphere

III: Tibetan Plateau Earth System Model (TPESM)

Lithosphere



Human-land interaction

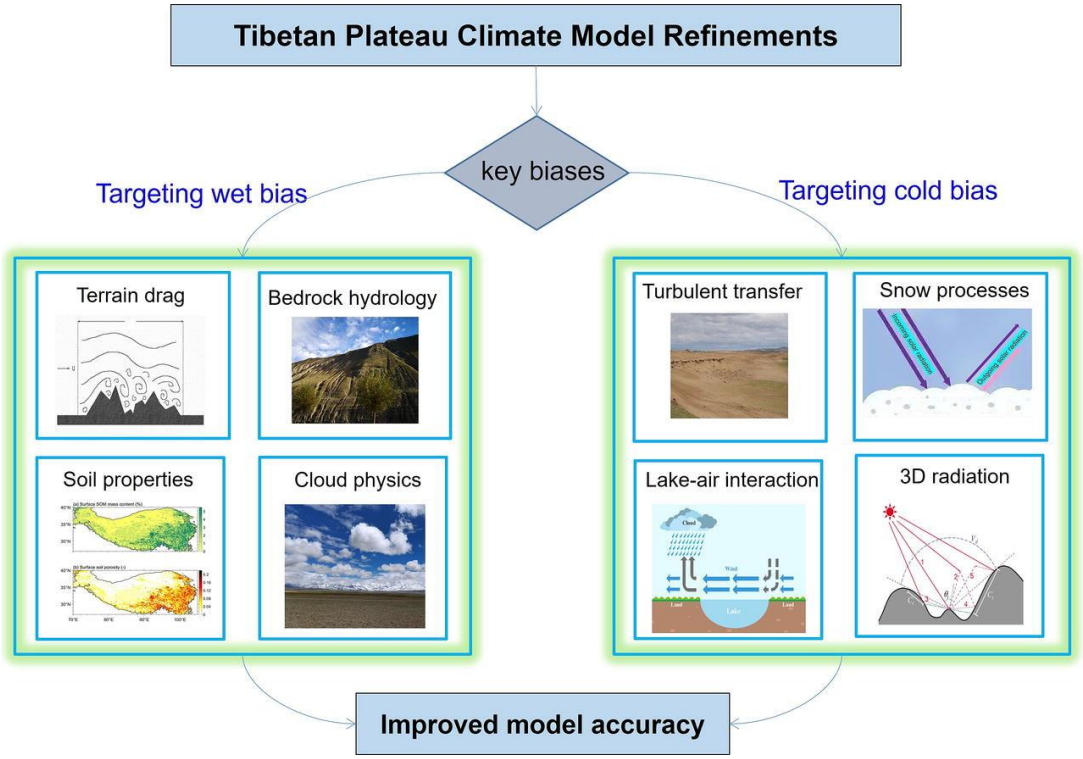


Socio-economic system

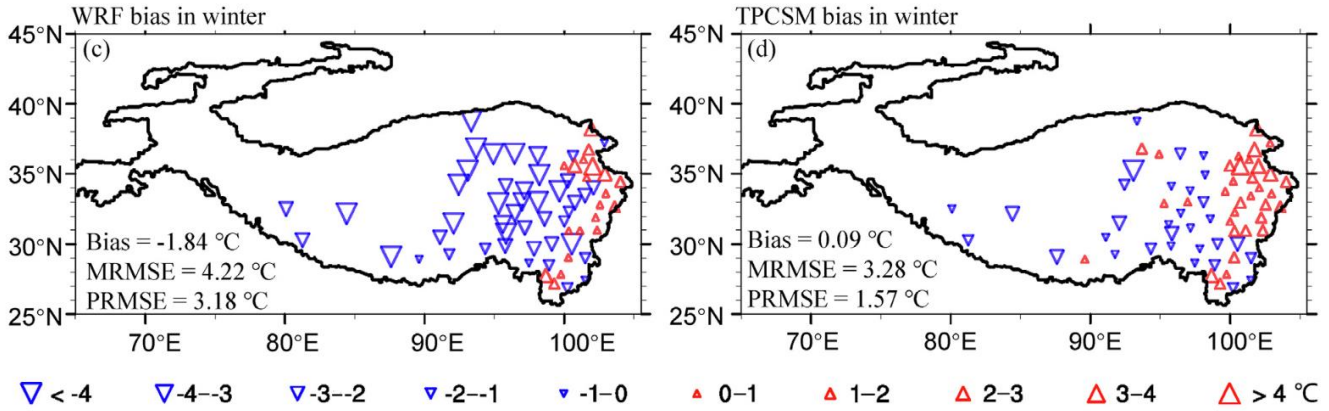
Tibetan Plateau Earth System Model

The Tibetan Plateau Climate System Model (TPCSM), developed based on WRF4.0

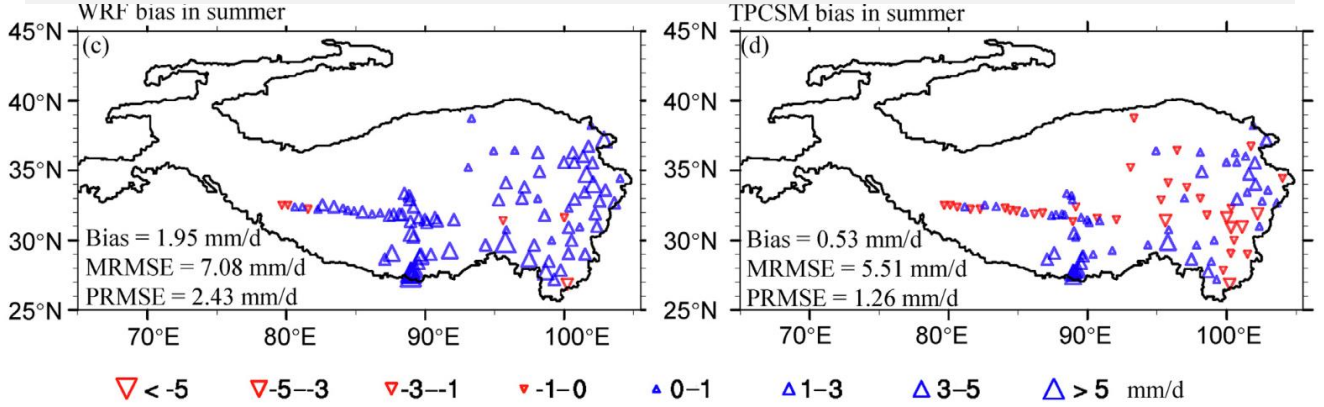
TPCSM



Bias of water temperature: -1.8 → 0.1 ℃



Bias of summer precipitation: 2.0 → 0.5 mm/day



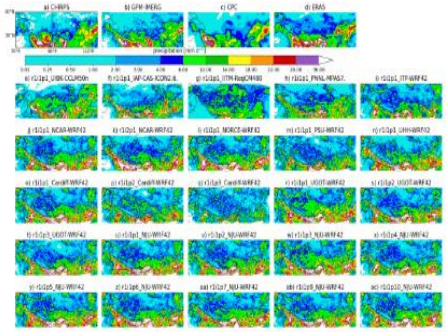
Yang, K., Zhou, X., Ma, X., Chen, D., Chen, F., Dai, Y., Jiang, Y., Huang, A., Lin, Y., Liu, J., Lu, H., Sun, J., Wang, J., Wang, Y., Yue, S., Zhao, D. & Li, X., 2025. A physically-refined regional climate model for the Tibetan Plateau. Sci. Bull. 70, 4070–4079

International collaborations

Dedicated to support international programs and cooperation for the Tibetan Plateau.

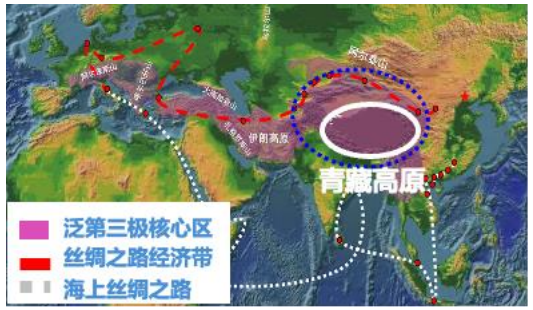
GEWEX LS4P

CORDEX-FPS: CPTP



Datasets

Publications



ATES

PlateauPlus

ANSO

Established data and metadata exchange channels with the WMO and ICIMOD

Thank you!

- TPDC

- https://data.tpdc.ac.cn
- data@itpcas.ac.cn
- +86-10-64833041