INTERNATIONAL RESEARCH CENTER OF BIG DATA
FOR SUSTAINABLE DEVELOPMENT GOALS
可持续发展大数据国际研究中心

Data and Platforms to Support SDG Implementation in SIDS

Zhongchang SUN

sunzc@aircas.ac.cn

July 18th 2025 New York

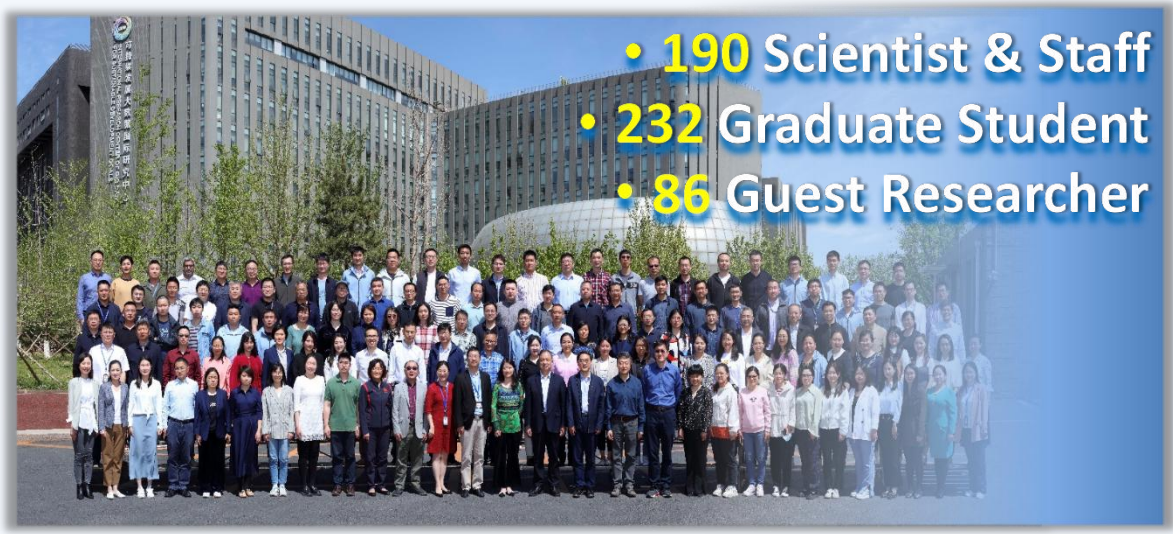
Who We Are

Our Vision in Brief: open data, accessible technology, shared ideas and knowledge

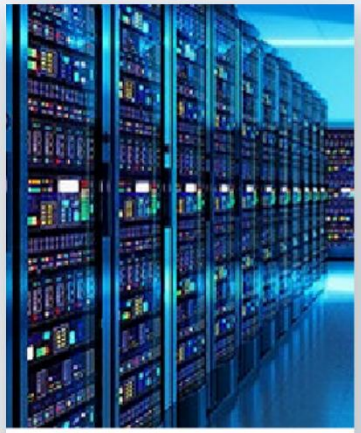
Organization Structure

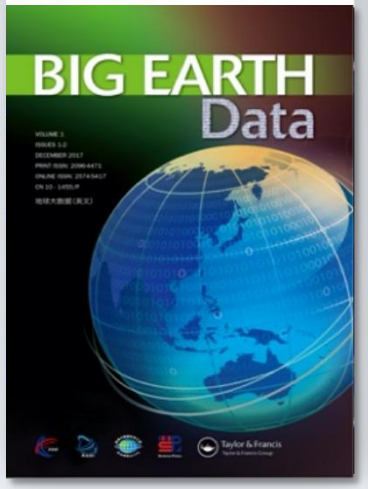
International Advisory Committee

18 leading experts from
12 countries



Mission of CBAS





- Develop SDG **data infrastructure and information and data products**
- Provide new **knowledges** for SDG monitoring and evaluations
- Develop and launch **a series of SDG Satellites**
- Establish a **think tank** for STI to promote SDGs
- **Capacity development** for SDGs in developing countries

CBAS Scientific Capacity for SDGs

SDG Implementation through Open Science

Infrastructure

- SDG Big Data Platform

Data & Products

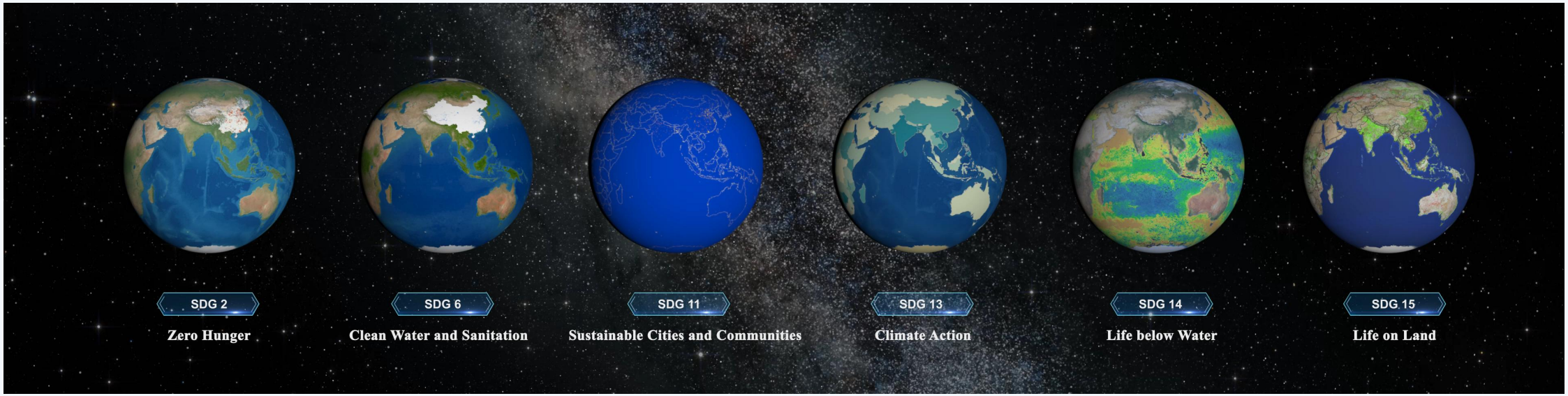
- Data Products
- SDGSAT-1

Knowledge

- Scientific Reports

Partnership

- Engagement with UN
- Key Platforms



Big Data Infrastructure for SDGs

SDG data cloud storage and cloud computing

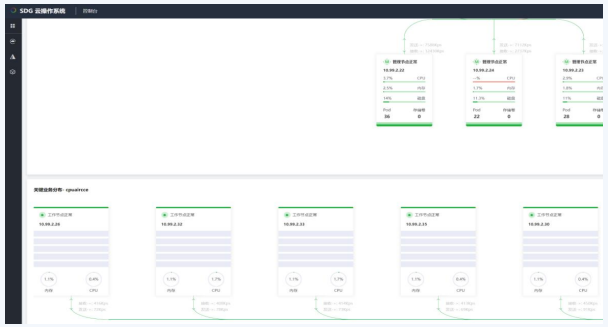
- Heterogeneous Cloud Platform
- Offsite Data Backup
- Big Data Analytics

2000 TF | 75 PB | 1200+ Gbps | 10000 Virtual Machine | Container cloud

Data cloud services

- Provide storage, publishing and sharing services for data resources

Cloud Computing services



- Support HPC, Cloud Computing, and artificial intelligence computing

Analyze cloud services

- Provides cloud services for online analysis and mining of scientific data
- Provides a Wide Variety of Models and Training Frameworks

Application cloud services

- Support on-demand customization of computing and analysis environment
- Support online development

Big Data Platform for SDGs

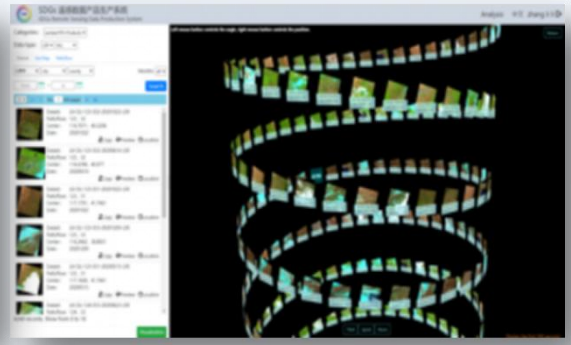
http://sdg.casearth.cn

- **SDG Big Data Platform** aims to integrate **Big Earth Data** with **cloud computing infrastructure** for SDGs monitoring and prediction and provide decision support for SDGs implementation. Currently, this platform prioritizes 7 SDGs, namely SDG 2, SDG 6, , SDG 7, SDG 11, SDG 13, SDG 14, and SDG 15.

HPC & Cloud Computing

SDGs Data Products

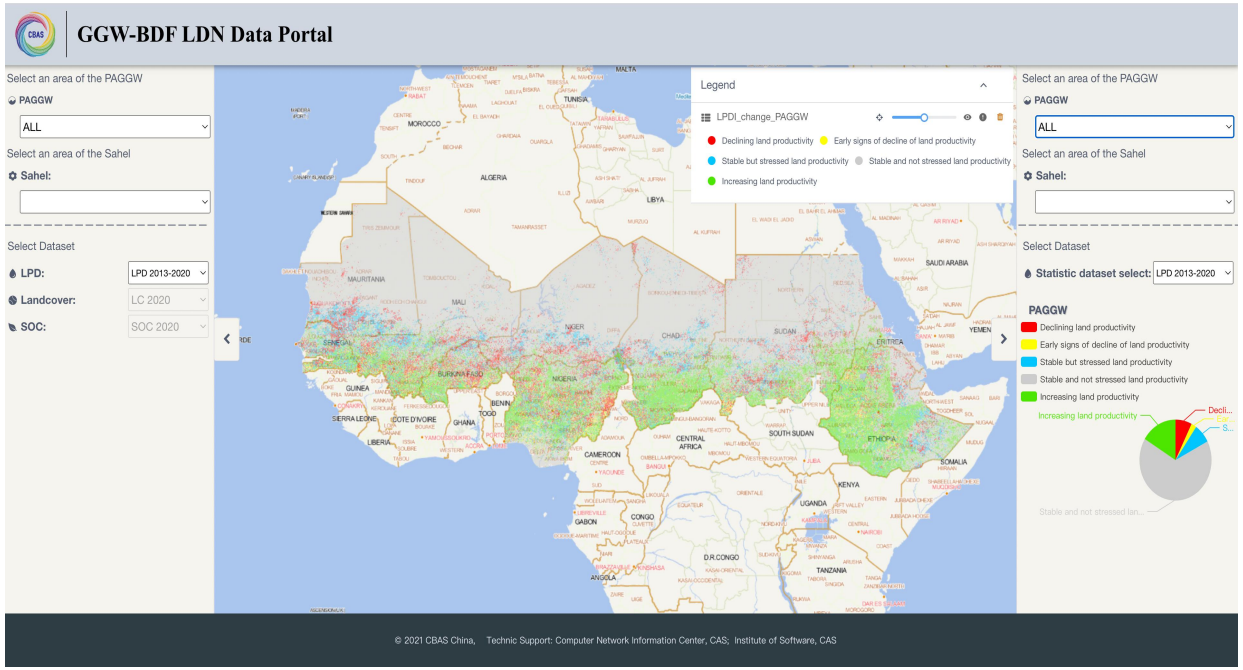
SDGs workbench



Remote Sensing Data Engine


Science Earth Platform- Water extraction system
DATA QUERY
Water Extraction
Water Product
Algorithm Library
please input...
Search
CN/EN
Login
ArcGIS Global Image
N
http://60.245.209.131:8011/extractwaterpro/#
300 km
Longitude: 144.0987 Latitude: 29.1606 Height: 9691154.0000

Big Data Platform for SDGs



- CBAS release the online tool for big data to support the construction of the Great Green Wall in Africa, which for the first time produced the highest spatial resolution products related to land degradation and integrated the Chinses ecosystem restoration practices.
- GGW-BDF has been adopted by the UNCCD, GEO, and the Chinese government as an important starting point to promote the construction of the Great Green Wall in Africa, and the African Union and 5 African countries have begun to apply the tool

Urban sustainable development indicators monitoring and evaluation system of Hainan Province

海南省城市可持续发展指标监测与评估

SDG1 无贫穷	SDG2 零饥饿	SDG3 良好健康与福祉
SDG4 优质教育	SDG6 清洁饮水和卫生设施	SDG7 经济适用的清洁能源
SDG8 体面工作和经济增长	SDG9 产业、创新和基础设施	SDG11 可持续的城市和社区
SDG13 气候行动	SDG14 水下生物	SDG15 陆地生物
SDG17 促进目标实现的伙伴关系		

Data Sharing Platform for SDGs

2025

19.78PB
Total Data

40 years
Satellite imagery data

7.75 million scenes
Satellite imagery data products

10.06PB
Bio-ecological data

7.52PB
Remote sensing data

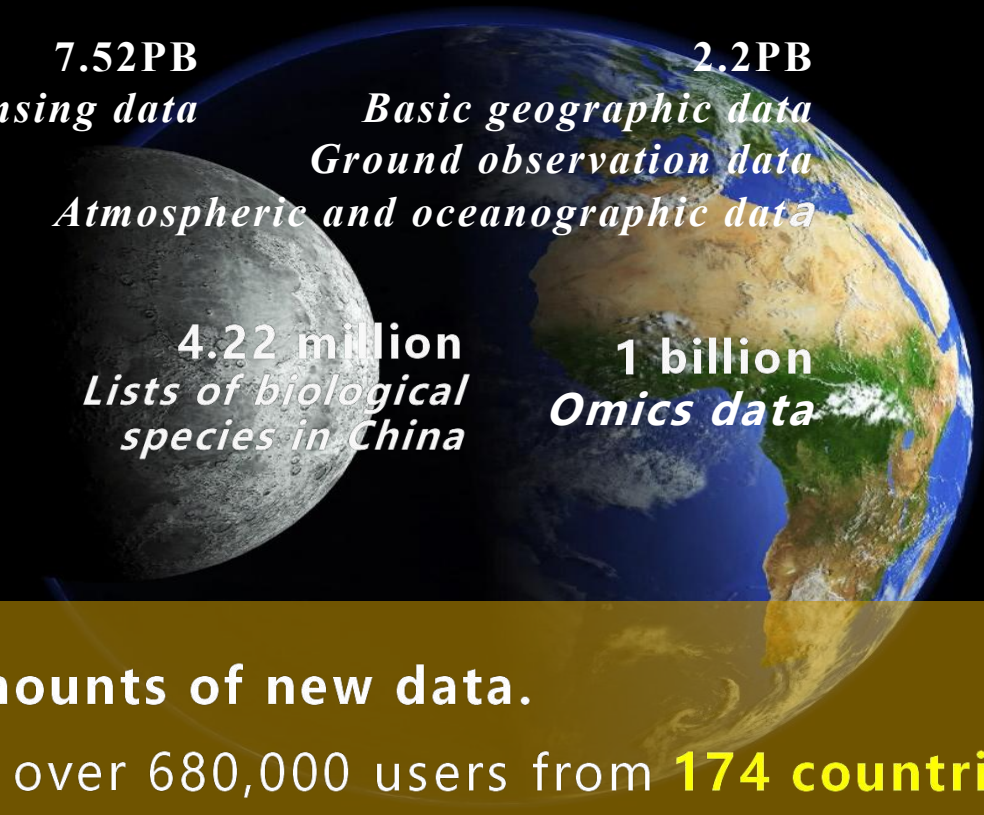
2.2PB
Basic geographic data
Ground observation data
Atmospheric and oceanographic data

1.44 million
GBDB data records
Microbial resource data

3.15 million
Internet of Things (IoT) data
Signalling data records

4.22 million
Lists of biological species in China

1 billion
Omics data



- **All are updated annually with massive amounts of new data.**
- Currently, the platform has been visited by over 680,000 users from **174 countries** (and regions), with over 165 million views and over **3.03 million** data downloads.

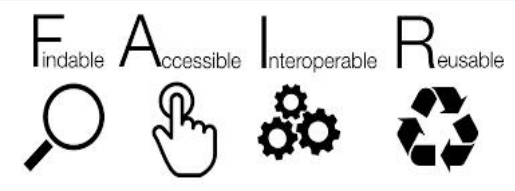
Goals of data sharing services

'Open science, open data' is the ideal and goal of Earth big data in the service of scientific research.

Big Earth Data are massive, multi-source, multi-temporal, heterogeneous, multi-scale big data in the field of Earth sciences with spatial attributes, covering space-based Earth observation data, as well as terrestrial, oceanic, atmospheric and human activity-related data.

The Data Sharing and Service Portal provides users with free Earth big data resources, promotes the integration and innovation of data from different fields, facilitates scientific knowledge discovery and technological change, and contributes to the achievement of global sustainable development goals.

Data Sharing Policy



- FAIR principles aim to enhance the usability and impact of data, promoting **transparency, reproducibility, and knowledge sharing** in the scientific community.

FINDABLE

Findable: CASEarth data should be uniquely and persistently identifiable by being assigned a global unique and persistent identifier so that CASEarth users can find the data easily with well described metadata registered and indexed in a searchable resource.

ACCESSIBLE

Accessible: The conditions of CASEarth data should be clearly described by formal visiting address and access approaches. CASEarth users can thus understand how the data can be accessed. In addition, metadata should be accessible even when the data are no longer available.

INTER-OPERABLE

Interoperable: For knowledge representation, a formal, accessible, shared, and broadly applicable language is adopted to provide references to other (meta)data, making CASEarth data easy to integrate with other data and applications.

REUSABLE

Reusable: CASEarth metadata and data should be replicated and/or combined in various settings, with a wide range of accurate attributes. All data should be released with a clear and accessible data usage license and detailed provenance, and complies with relevant community standards as well.

Data Sharing and Service Portal

One-stop Data Sharing Platform

- ☑ Massive Earth Science data from CAS
- ☑ Provide data object identification and references
- ☑ Free data at your fingertips

Multi-disciplinary | Multi-source | PB-level

Biology
- Mammals
- Birds
- Fish
- Insects
- Reptiles
- ...
- Algae plants
- Seed plants
- Moss plants
- Viruses
- Bacteria
- Fungi

Earth observaton
- Satellite Remote Sensing
- Aerial Remote

Land surface
- Land use/cover
- Terrain
- Landforms
- Soil
- Desert/Deser t
- Wetlands
- Forests
- ...
- Surface Water

Atmosphere
- ...
- Temperature
- Altitude
- Precipitation
- Humidity / Dryness
- Evaporation
- Sunlight
- Barometric pressure
- Wind
- Radiation

Ocean
- Ocean Scent
- Marine Biology
- Marine Chemistry
- Marine Hazards

SDG13 Climate Action
- SDG13.1 Climate-Related Disasters
- SDG13.2 National Policies
- SDG13,3 Education
- ...
- SDG13.a Facilitation Mechanisms
- Other

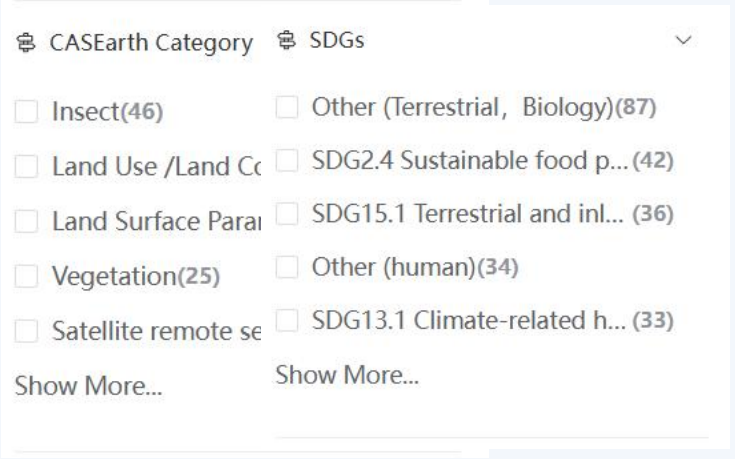
SDG2 Zero Hunger
- SDG2.1 Zero Hunger
- SDG2.2 End all forms of malnutrition
- SDG2.3 Agricultural productivity and income
- ...
- SDG2.a Investment
- SDG2.b Trade
- SDG2.c Food prices

Classification System for Big Earth Data and SDGs

For big Earth data resources, continuous and systematic methods are applied to enhance its classification systems and whole-life management. CBAS unifies the two classification systems for SDGs and Big Earth Data.

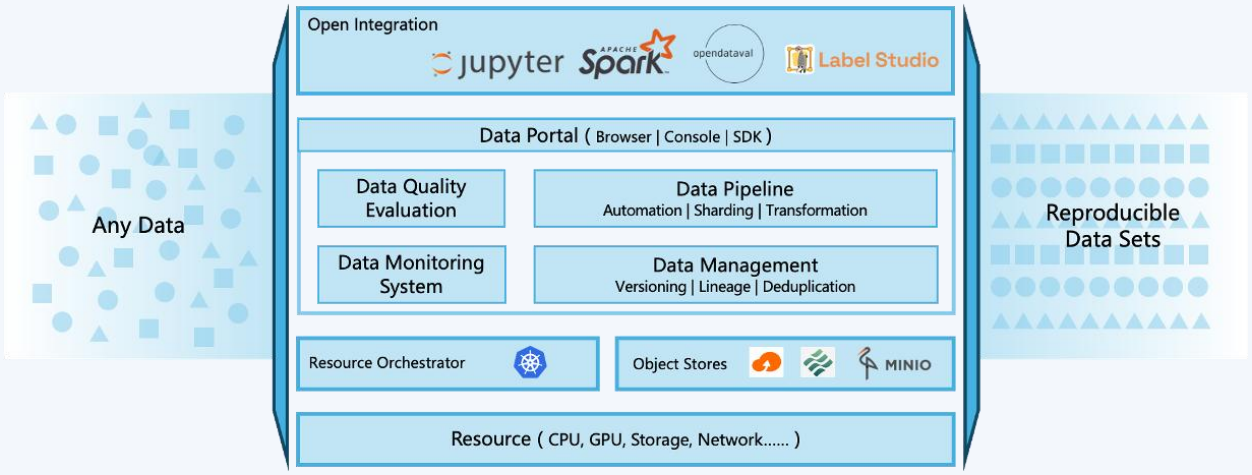
- Discipline Classification for Big Earth Data
- Classification System for SDGs

http://data.casearth.cn



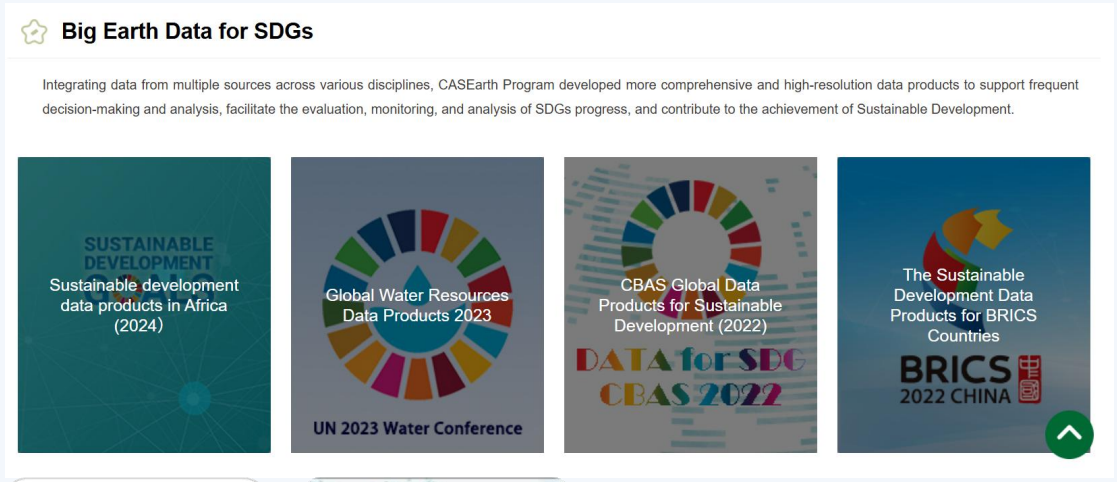
User-oriented data services

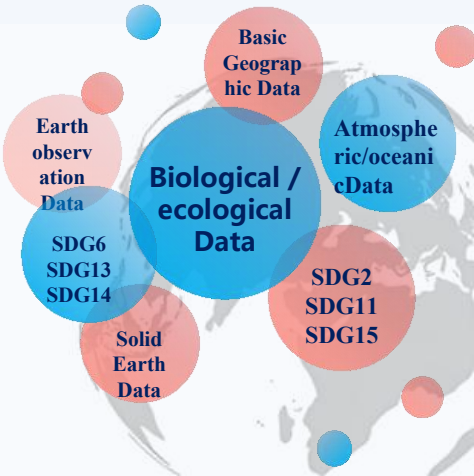
Service oriented open sharing model



- ☑ Provide private cloud space for users to manage and publish personal data
- ☑ Provide open API and S3 interface
- ☑ Open data lake to access more public data resources

Study on scientific data in the service of global and regional sustainable development goals





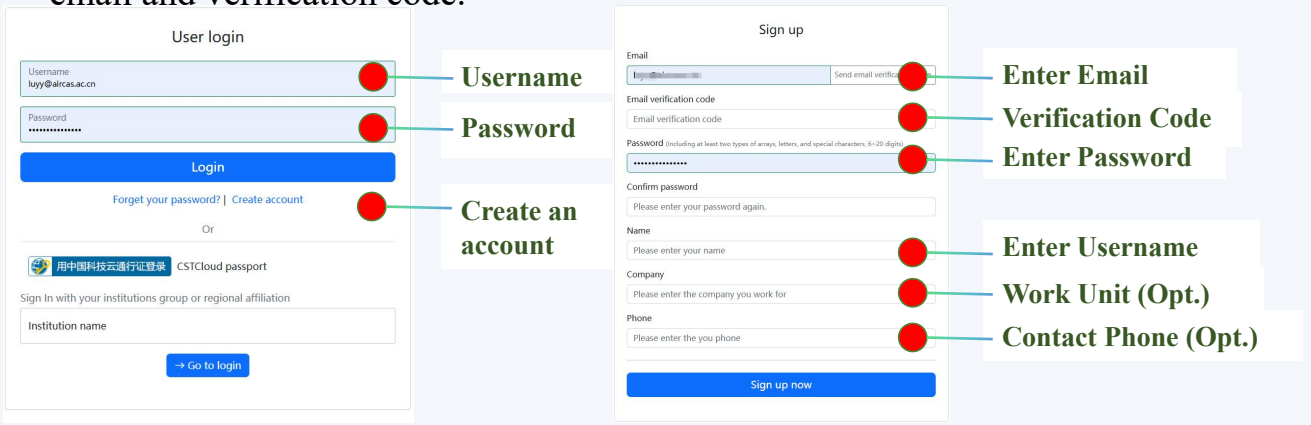
Guidelines for portal users

➢ How to Access Data?

Users can search directly on the portal using keywords, SDG classification tags, Big Earth Data classification tags.
https://data.casearth.cn/
Global and regional sustainable development data products can be accessed in the Big Earth Data Thematic Data System.
https://data.casearth.cn/thematic/?themeId=12

➢ User Login and Registration

Access the Data Sharing and Service Portal through a browser, click "Login", then select "Create account" to complete registration via email and verification code.



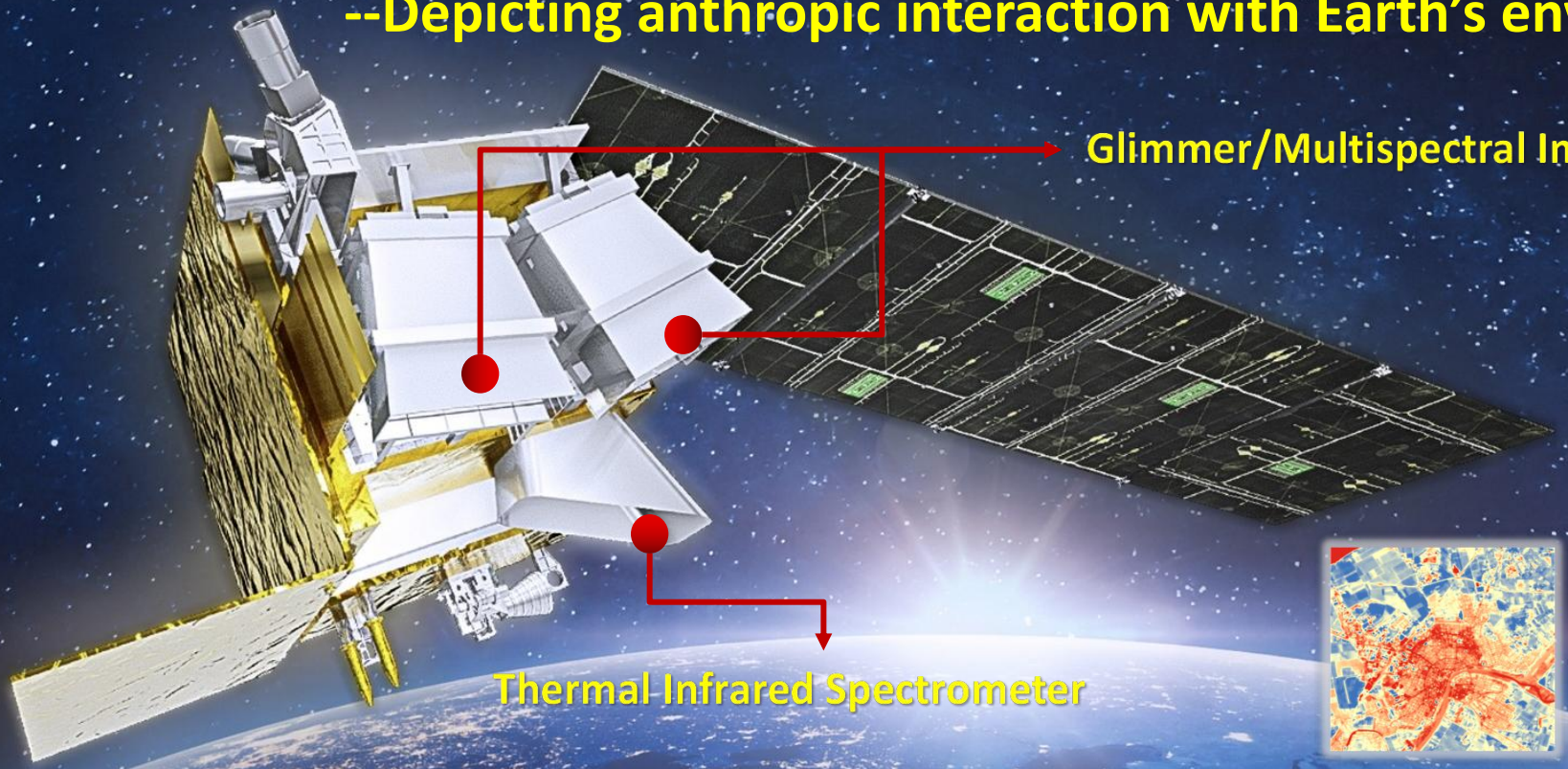
➢ How to download data files in batches?

Bulk downloads are available through API integration, using programming languages such as Python or Java. A sample Python code snippet is provided below.

```
data= = requests.get(f'https://data.casearth.cn{Get File List By ID}').json()['data']
os.makedirs('./downloads', exist_ok=True)
for item in data:
    url = f'https://data.casearth.cn{Single File Download}'
    open(f'./downloads/{item["file_name"]}', 'wb').write(requests.get(url).content)
```

The Sustainable Development Goals Science Satellite 1 (SDGSAT-1)

--Depicting anthropic interaction with Earth's environment



Thermal Infrared


Multispectral

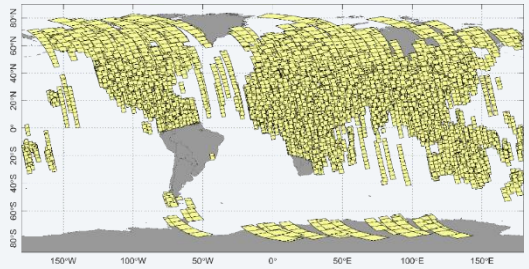

Glimmer

Launched on 5th Nov. 2021

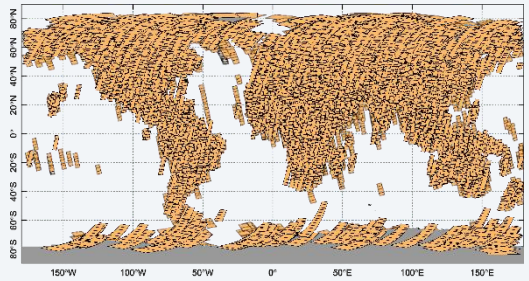
Synergistically observing Earth day and night with 3 Sensors, 300km swath width

- Glimmer Imager: 10m panchromatic & / 40m RGB
- Thermal Infrared Spectrometer: 30m resolution with 3 bands， 0.2K temp. difference recognition
- Multispectral Imager: 2 deep blue &1 red edge bands

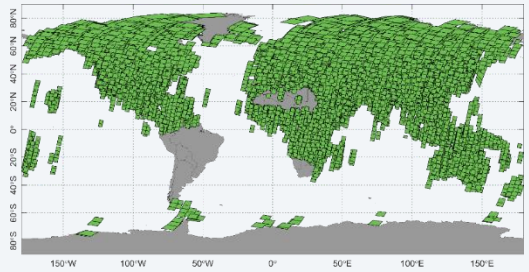
SDGSAT-1 Open Science Program



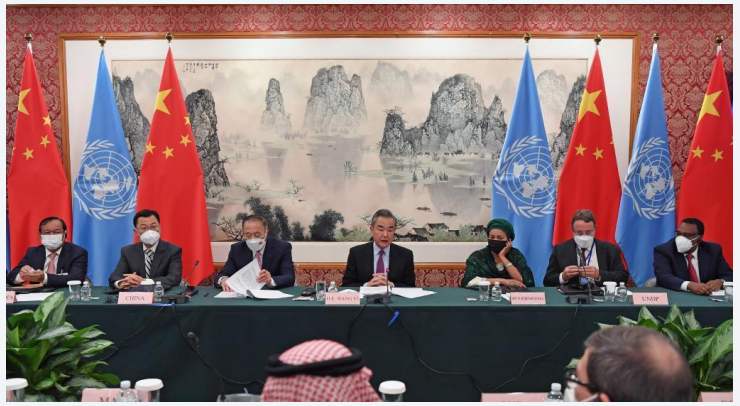
GLI datasets coverage



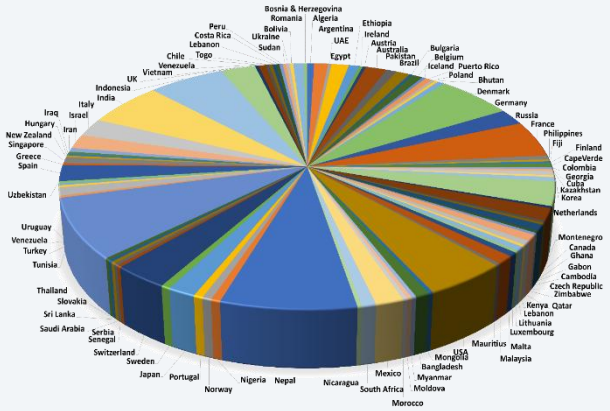
TIS datasets coverage



MSI datasets coverage



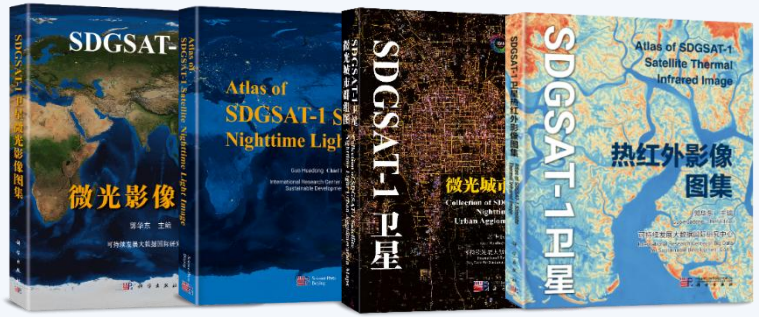
FM of PRC announced global sharing of SDGSAT-1 data



More than 450,000 SDGSAT-1 images are shared with scientists from 106 countries

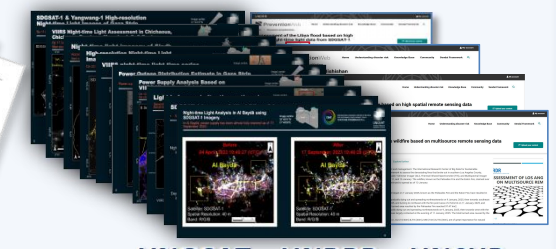
It is one of the seven practical measures to implement the 2030 Agenda by China.

SDGSAT-1 Contributions



4 Atlases of SDGSAT-1 Images

158+ SCI Papers Published

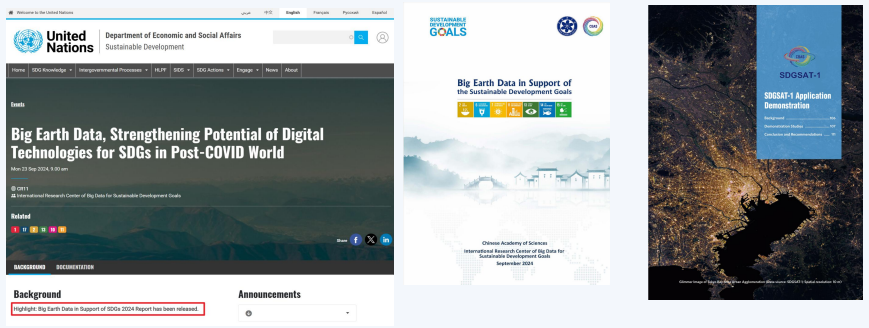


UNOSAT、UNDRR、UNCHR

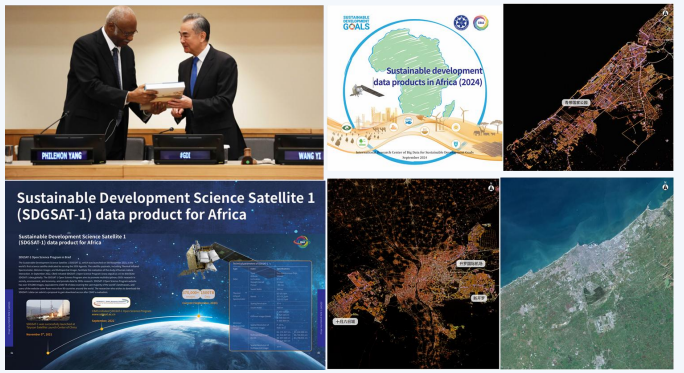
17 Reports Released by UN agencies

Provide SDGSAT-1 technical training

Science Exhibition of SDGSAT-1



SDGSAT-1 Application Demonstration in *Big Earth Data in Support of SDGs*



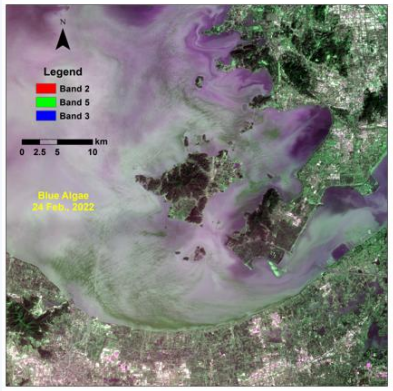
Presenting data products of African countries to the UN

Practice the concept of earth observation servicing SDGs via SDGSAT-1

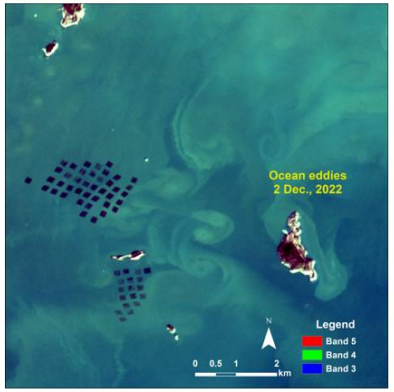
SDGSAT-1 for SDGs Monitoring and Assessment

MSI

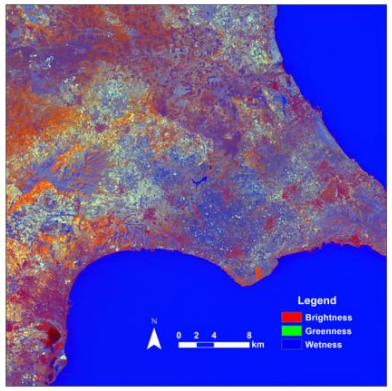
SDGs 6.1 Safe and affordable drinking water



SDGs 14.2 Protect and restore marine and coastal ecosystems

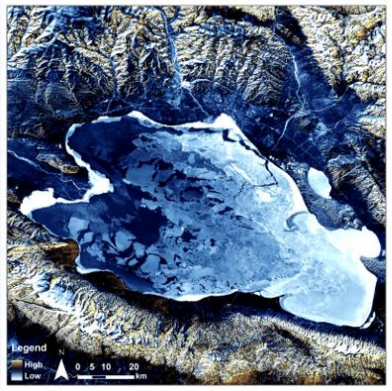


SDGs 2.4 Sustainable food and resilient agricultural practices

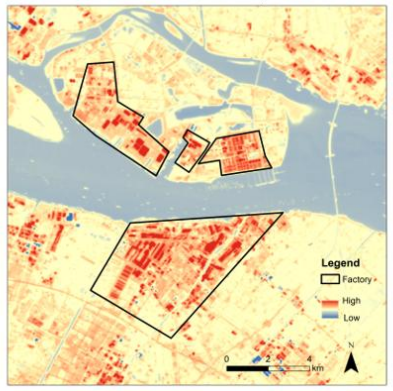


TIS

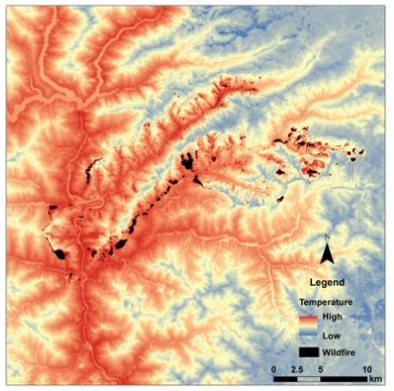
SDGs 13.2 Integrate climate change measures into policy and planning



SDGs 9.4 Upgrade all industries and infrastructures for sustainability



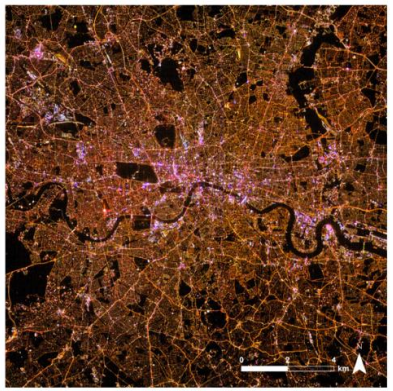
SDGs 15.1 Conserve and restore terrestrial and freshwater ecosystems



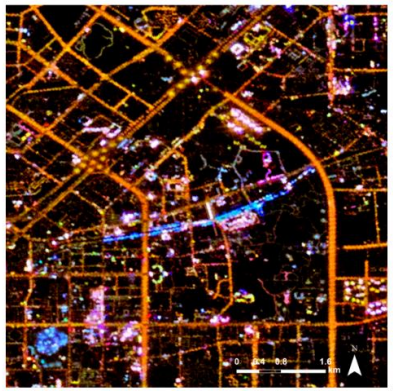
Water: Indispensable for Human Existence

GLI

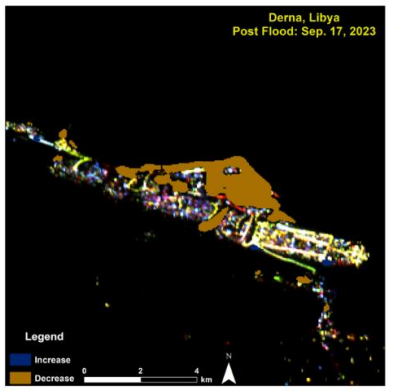
SDGs 7.3 Double the improvement in energy efficiency



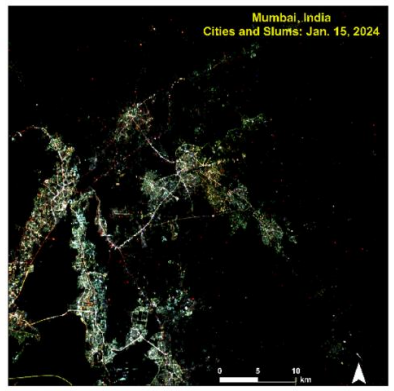
SDGs 3.4 Reduce mortality from non-infectious diseases



SDGs 11.5 Reduce the adverse effects of natural disasters



SDGs 1.1 Eradicate extreme poverty for all people



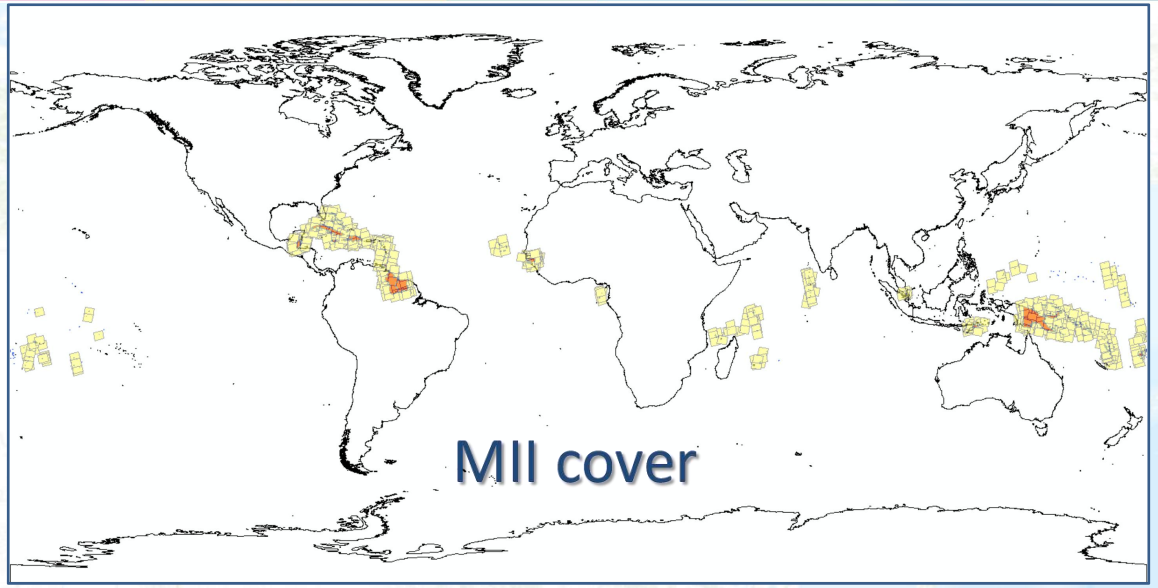
Heat: The Pulse of Economic Production Activities

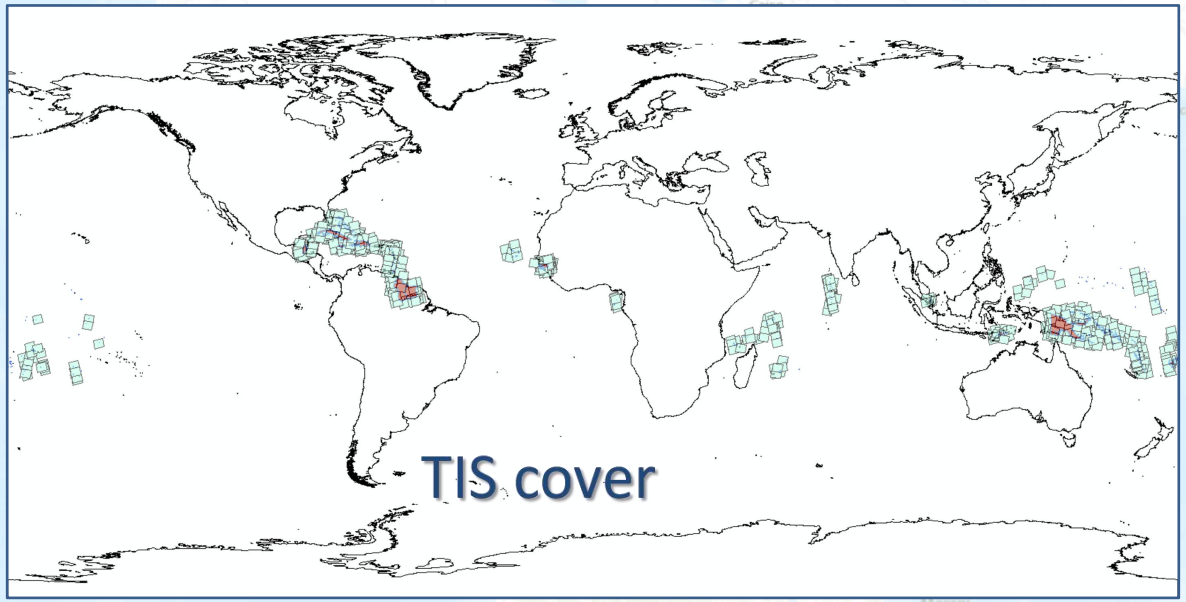
Light: The Traces of Nocturnal Activities

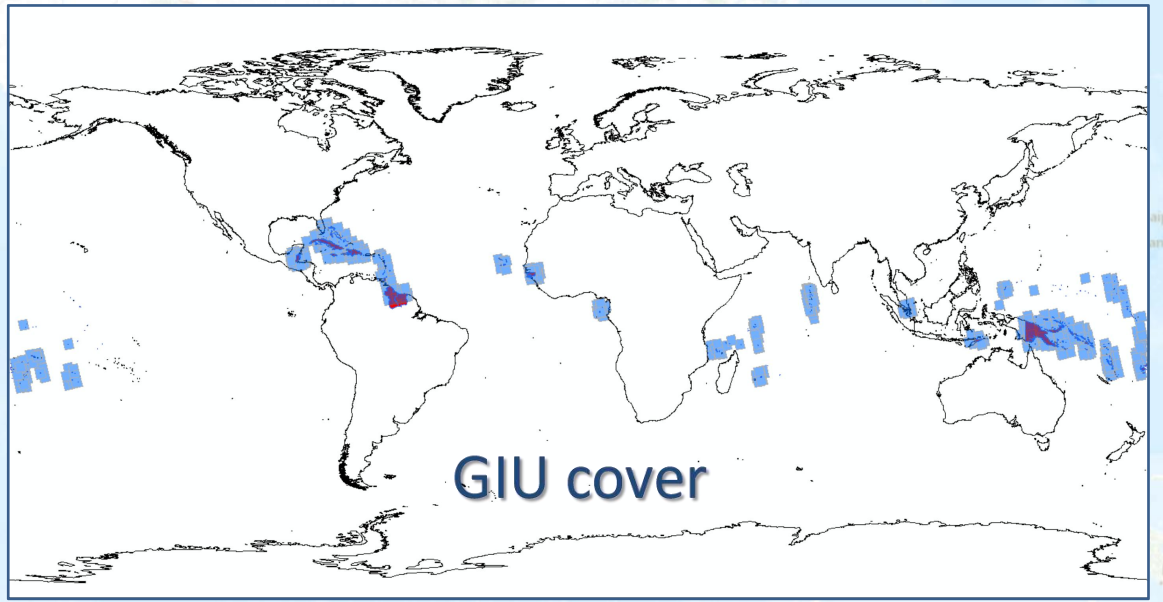
➢ Guo H. et al. 2023. SDGSAT-1: the world's first scientific satellite for sustainable development goals. ***Science Bulletin***, 68, 34-38.

SDGSAT-1 and Small Island Developing Countries

- SDGSAT-1 is now able to provide almost complete coverage of small island States. These include:
  - Glimmer Imager(GLI): 906 images
  - Multispectral Imager(MII): 853 images
  - Thermal Infrared Spectrometer(TIS): 2156 images

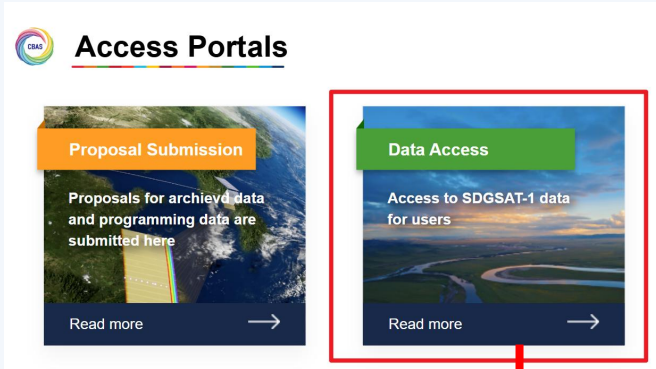




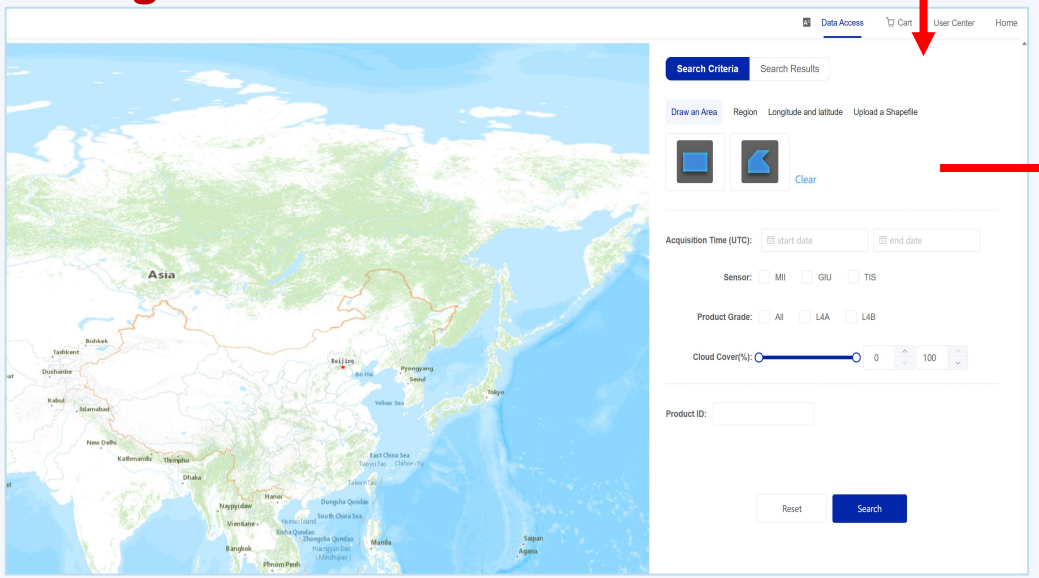


Data search and download

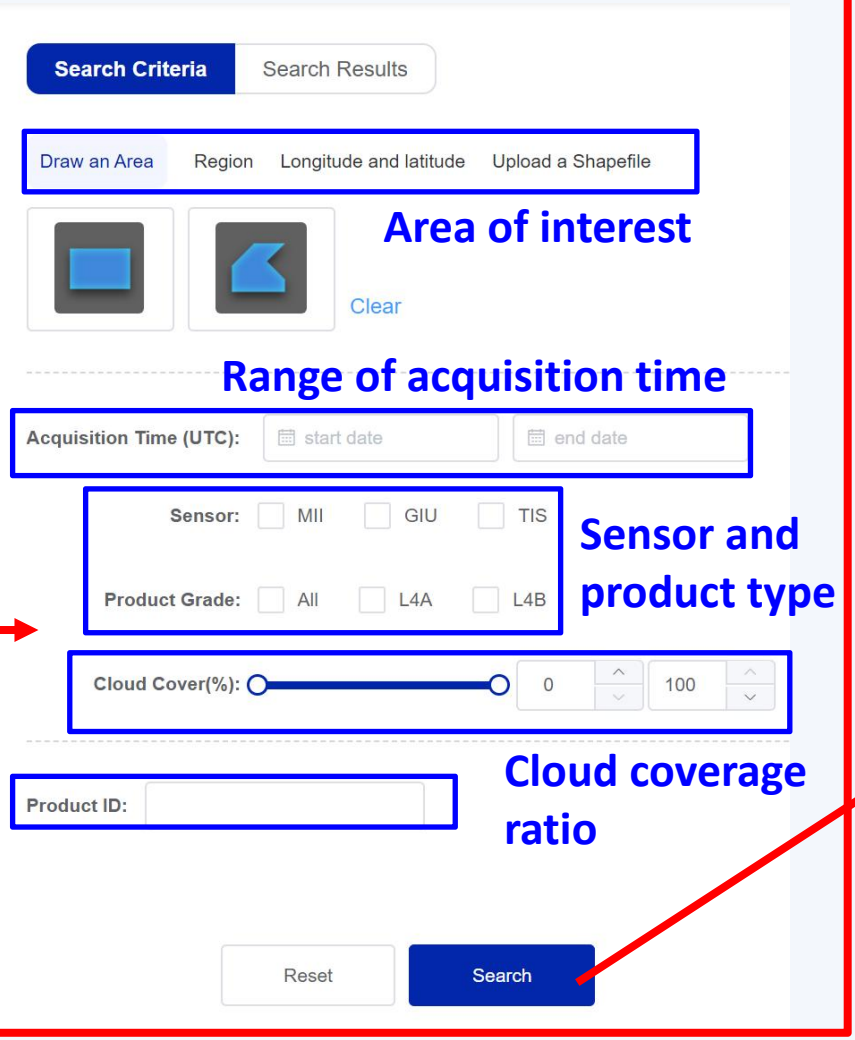
Scan the QR code to Registration



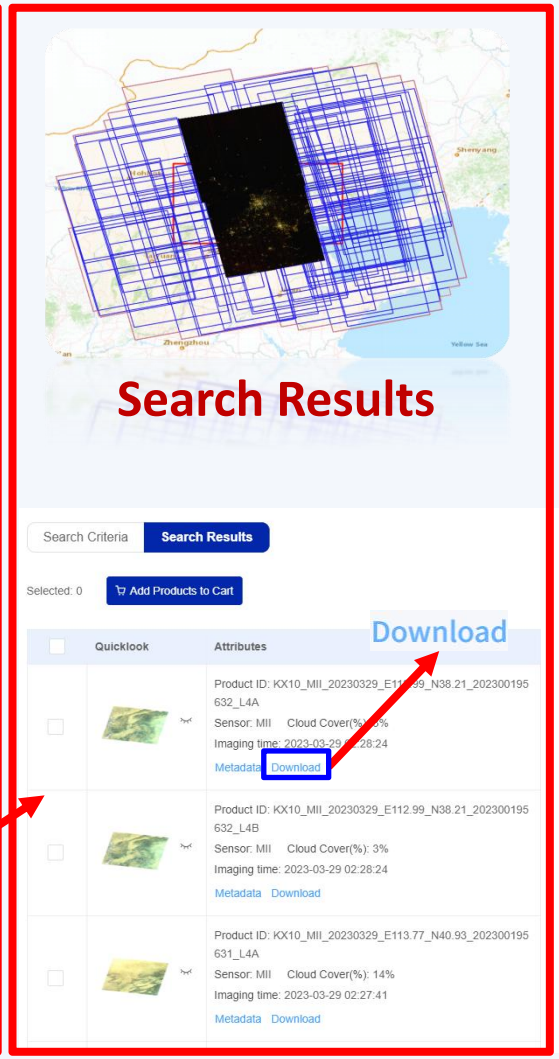
Module portal



Web page of Data search



Search criteria setting



Results list

THANKS

E-mail：cooperation@cbas.ac.cn
Website：www.cbas.ac.cn/en/