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

Capacity Building Workshop for SIDS

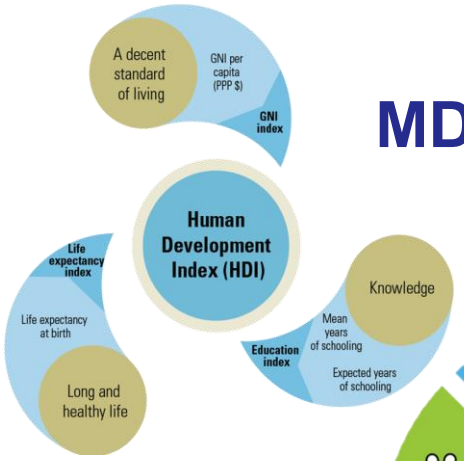
CBAS : Science Based Solutions for SDG Implementation

Fang Chen

September 1, 2025 Beijing, China

Sustainable Future

Humankind coexists with Earth, enjoying the beauty of its environment, yet faces significant challenges in achieving sustainable development.



MDGs 2000

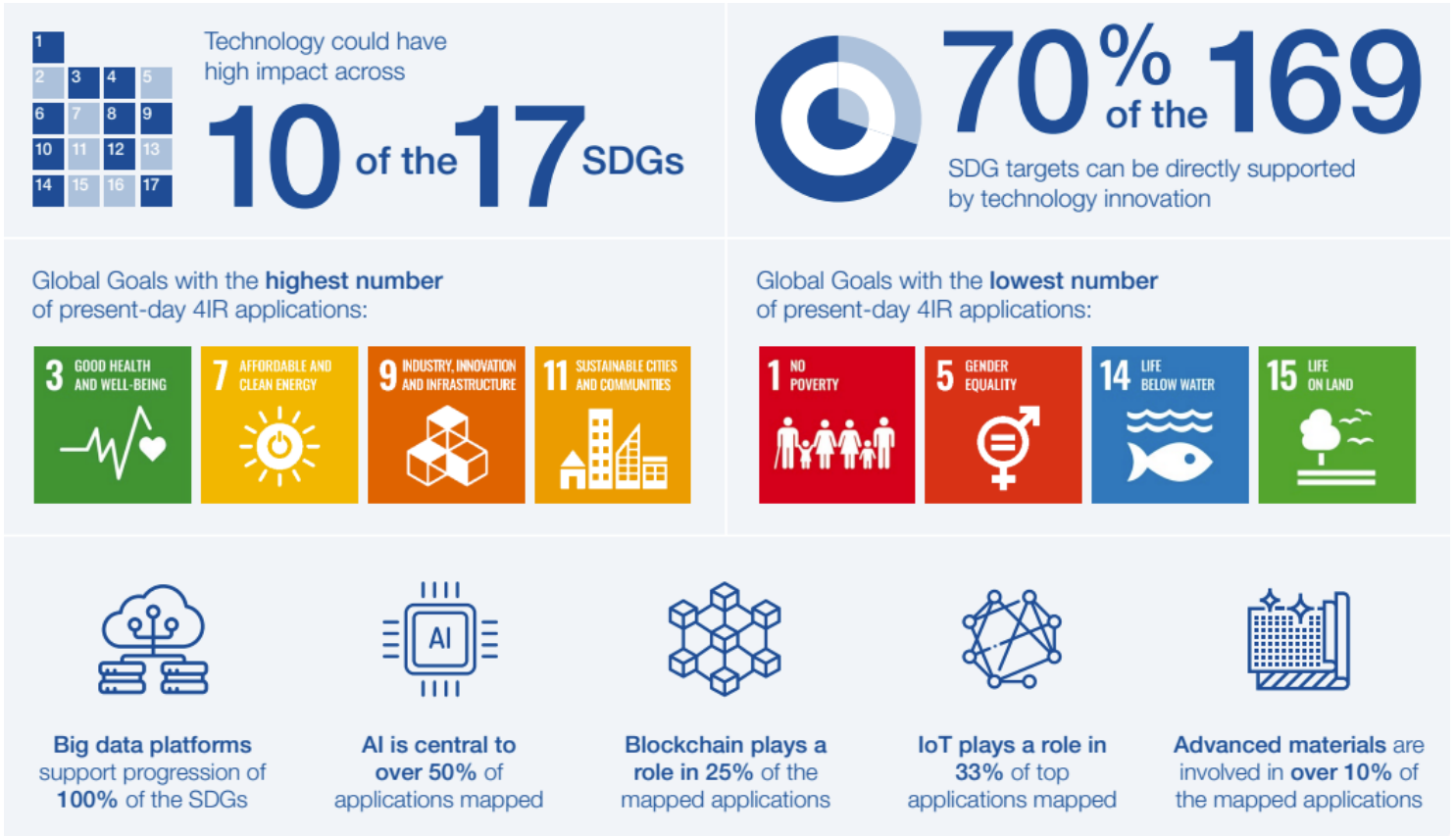
HDI 1990

SDGs 2015


SUSTAINABLE
DEVELOPMENT
GOALS
2030
2025
2015

Digital Technologies for SDGs

Digital Technologies are powerful tools to Achieving SDGs



- Digital Technologies
- Big Data
- Digital Infrastructure
- Artificial Intelligence
- Digital Twins
- ...

Source: PwC Research

Global Actions

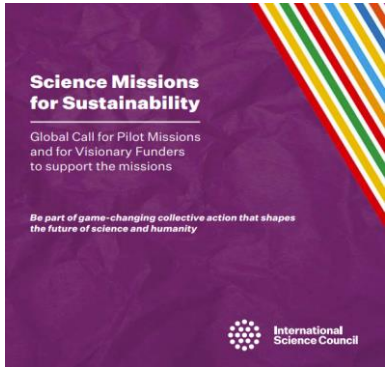
Digital Technology Accelerates SDG Progress

UN System

UN TFM
UNOOSA
"Space2030" Agenda

International Scientific and Technological Organizations

ISC Science Missions for Sustainability



UN System +Scientific Community

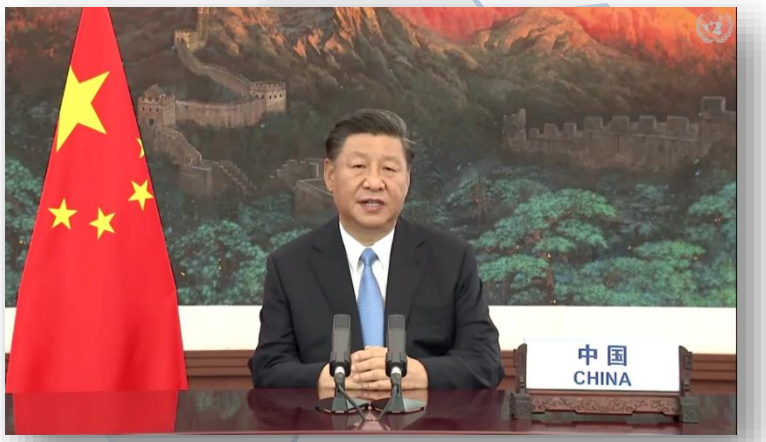
UNESCO International Decade of Sciences for Sustainable Development (IDSSD)

2024 • 2033
International Decade of Sciences for Sustainable Development

Digital Collaboration Across Global Sectors

Global Digital Compact

Inauguration of CBAS



"China will set up… an International Research Center of Big Data for Sustainable Development Goals to facilitate the implementation of the 2030 Agenda for Sustainable Development."

-- President Xi's speech at 75th UN GA

"This Research Centre will work side-by-side with the Regional Hub for Big Data to support the UN Global Platform. Together, we can do more to end poverty, protect the planet and promote peace."

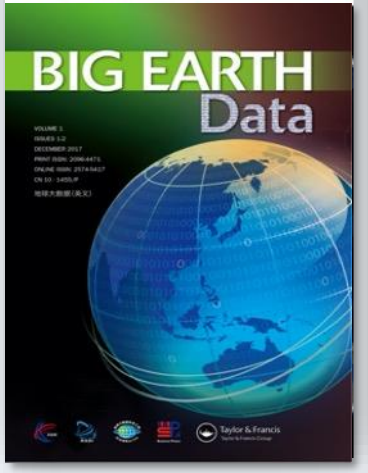
-- UNSG's video remarks at CBAS's launching

CBAS Vision

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

- *An Administration Team Led by The Steering Committee*
- *Five Scientific & Operational Branches of 190+ Scientists & Staffs and 200+ Students*
- *An Expert Committee & An International Advisory Committee of 46 Leading Experts from 12 Countries*

CBAS' Mission

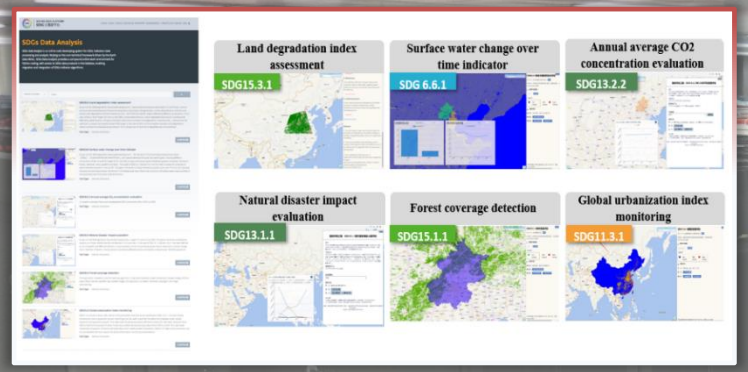


- Develop SDG **data infrastructure and information and data products**
- Provide new **knowledge** for SDG monitoring and evaluation
- Develop and launch **a series of SDG Satellites**
- Establish a **think tank** for STI to promote SDGs
- **Capacity development** for SDGs in developing countries

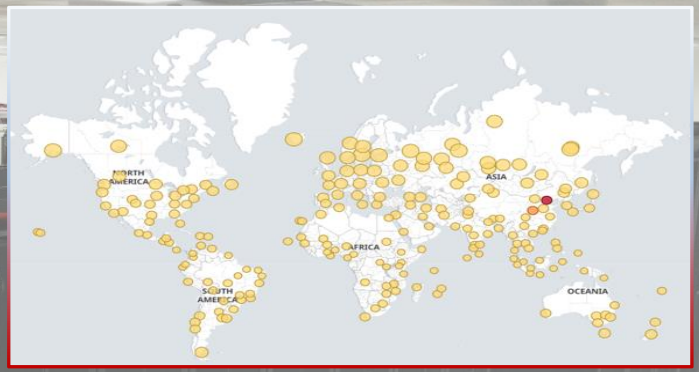
Infrastructure | SDG Big Data Platform

SDG data cloud storage and computing

Tailored Tools to Produce Specific SDG Datasets



Online Assessment Tools for SDG Indicators



Service Request Distribution (136 countries)

1000 Virtual Machines

1000 TFLOPS

50 Petabytes

1200 +Gbps

Infrastructure | SDG Big Data Platform

2025

19.78PB
Total Data

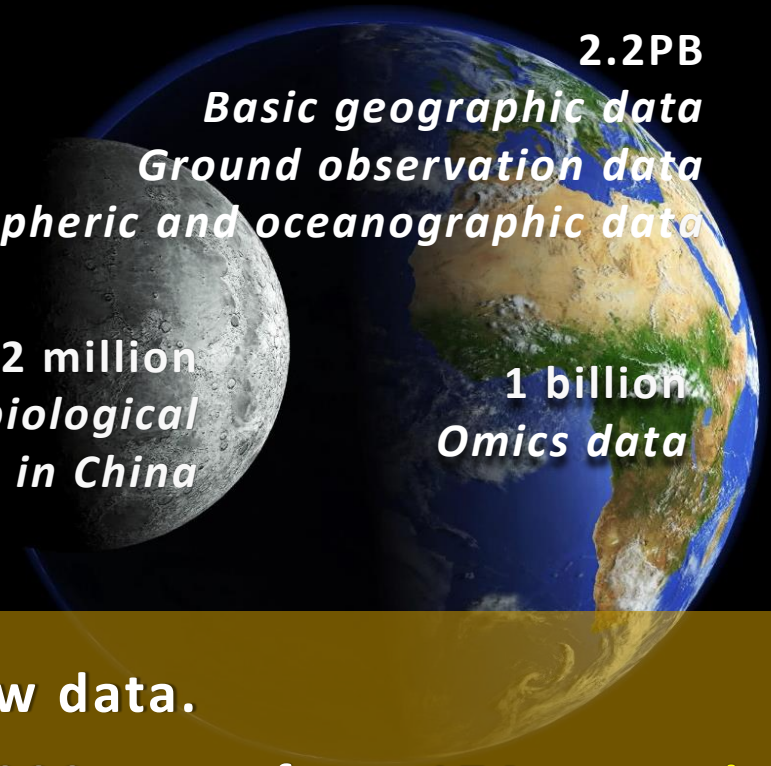
40 years
Satellite imagery data

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

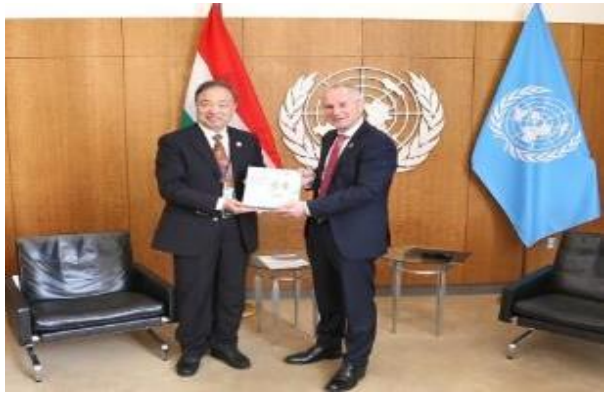
1 billion
Omics data

- 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.

Data & Products

Presenting 6 Global SDG Data Products to the United Nations

- SDG 2: cropping intensity & cropland; SDG 6 & 14: mangroves; SDG 11: impervious-surface; SDG 13: burned areas; SDG 15: forest cover

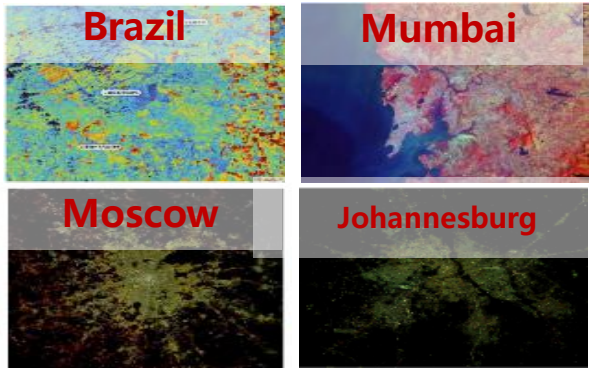


Presenting 7 Global Water Resource Data Products to the 77th UNGA President

- Evapotranspiration
- Cropland water-use efficiency
- Land surface water cover
- Surface water extent dynamics
- Forel-Ule Index of large lakes
- Algal bloom frequency of large lakes
- Groundwater storage change in Africa

Release of the 4 Sustainable Development Data Products for BRICS Countries

- Data Product of SDGSAT-1 Satellite for BRICS countries
- Global 30-m impervious-surface dynamic dataset in 2000-2020
- Spatial distribution of core urban built-up areas in BRICS cities
- Global 30-m spatial distribution of forest cover in 2020



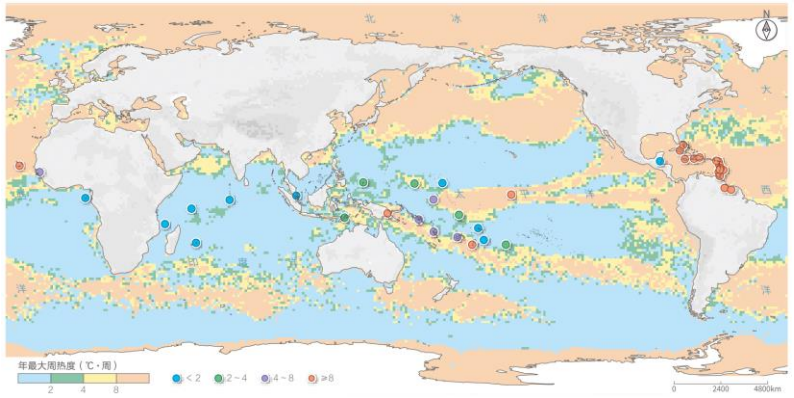
Data & Products for SIDS

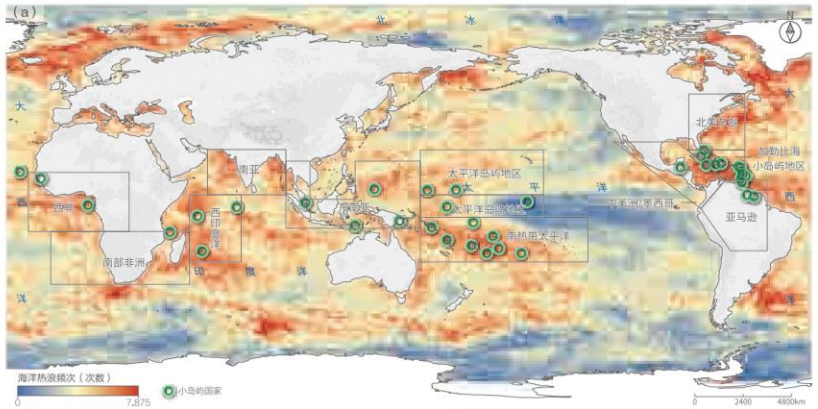
Capacity Building Workshop for SIDS
September 2-8, 2024 Beijing

CBAS Presenting Data Products for SIDS
September 6, 2024 Beijing

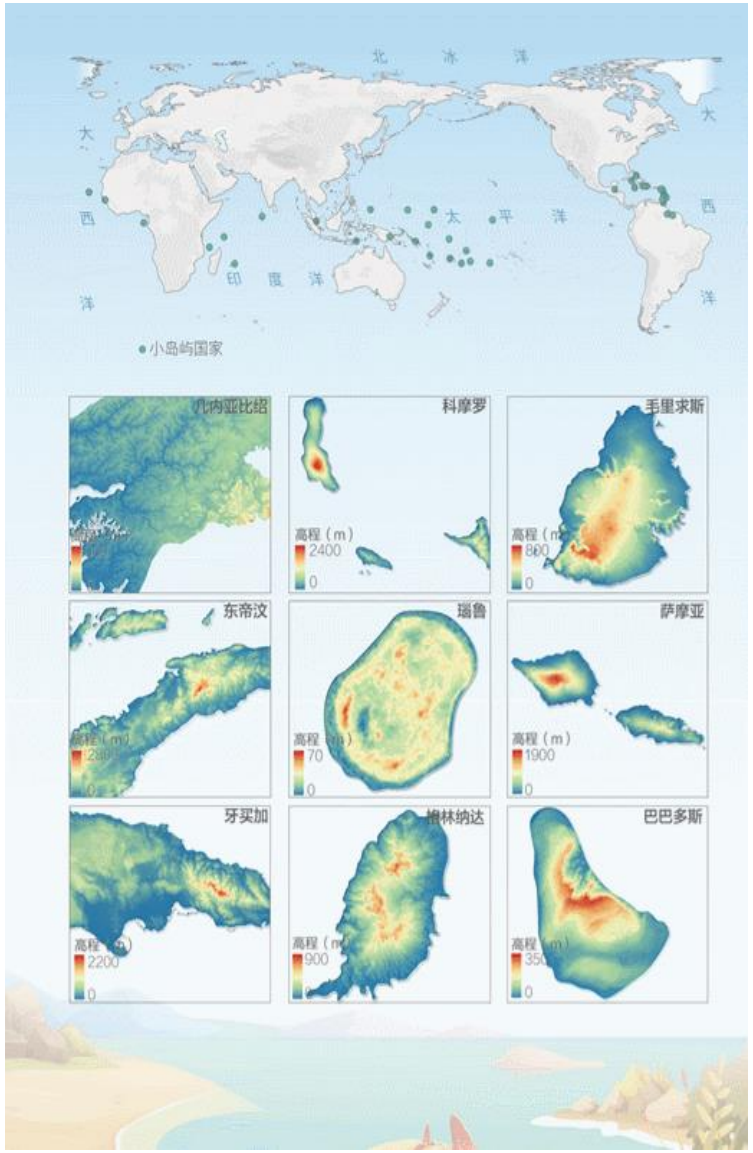
Data & Products for SIDS

- From 1985 to 2023, the thermal stress of coral bleaching in SIDS fluctuated **upward globally**, with countries like Micronesi experiencing the highest stress.
- From 1982 to 2022, the frequency, intensity, and duration of marine and terrestrial heatwaves in SIDS **increased**, with over one-third of these countries seeing a more than **30% increase in their exposed population**.
- Under future climate warming trends, countries like the **Bahamas and the Maldives face the highest risk of coastal inundation**.

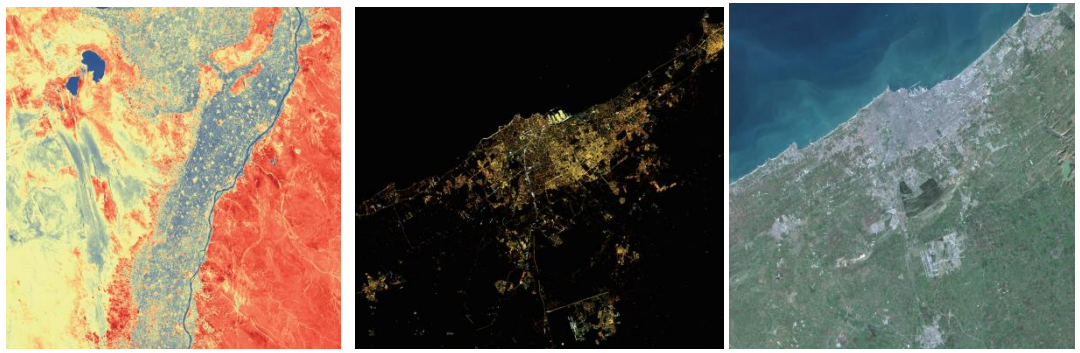




High exposure areas of marine heatwaves 1982-2022

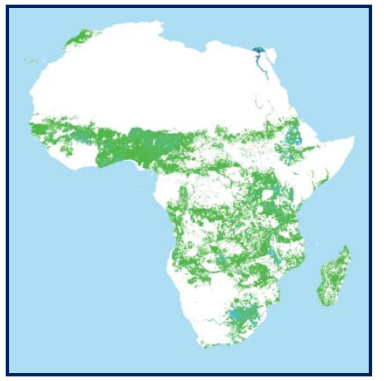


Data & Products | 8 sets of African sustainable development data products

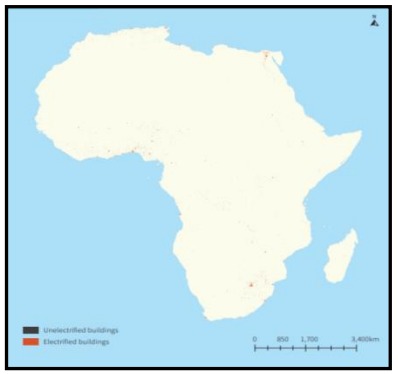


Sustainable Development Science Satellite 1 Data Product for African Countries

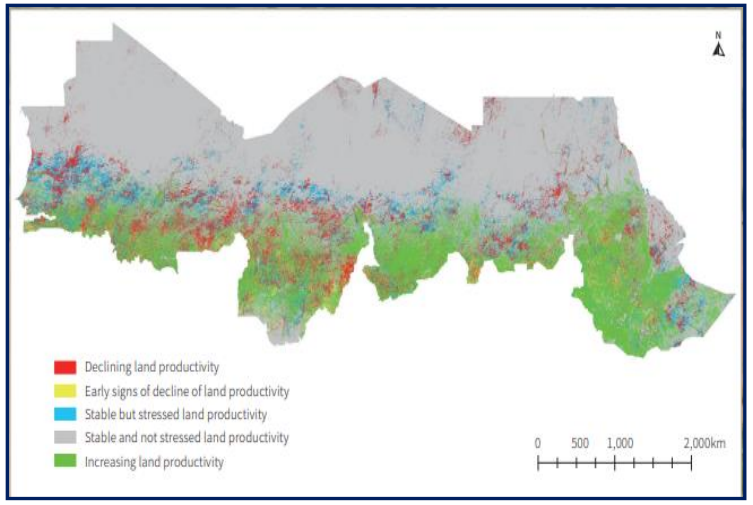
Desert locusts monitoring in Asia and Africa



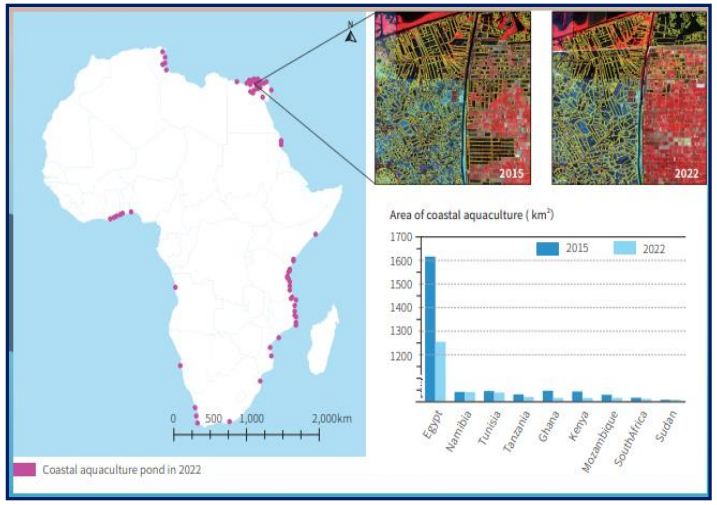
African Gridded Crop



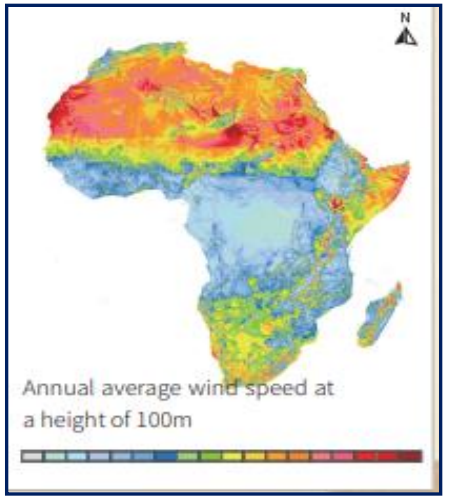
Electricity status of buildings in Africa



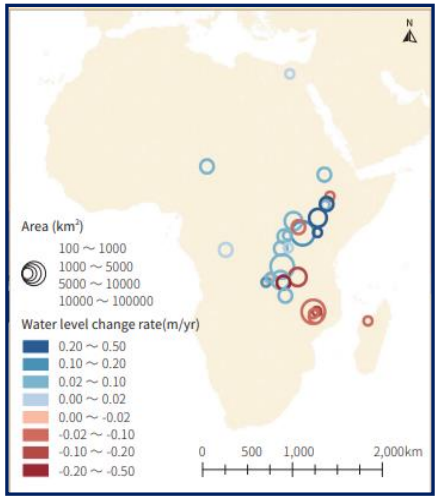
Land productivity dynamics



Coastal aquaculture pond dataset of Africa



wind energy and solar energy resources



Spatial distribution of water level and volume change rates

SDGSAT-1 Scientific Satellite

Launched on 5 Nov 2021, depicting anthropic interaction with Earth's environment.

- **300km wide swatch**, ensuring global data retrieval
- Glimmer： **10m/40m** panchromatic & RGB
- Thermal： **3 TIS bands， 0.2K** temp. recognition
- Multispectral： **2 deep blue & 1 red edge bands**

Multispectral

Glimmer

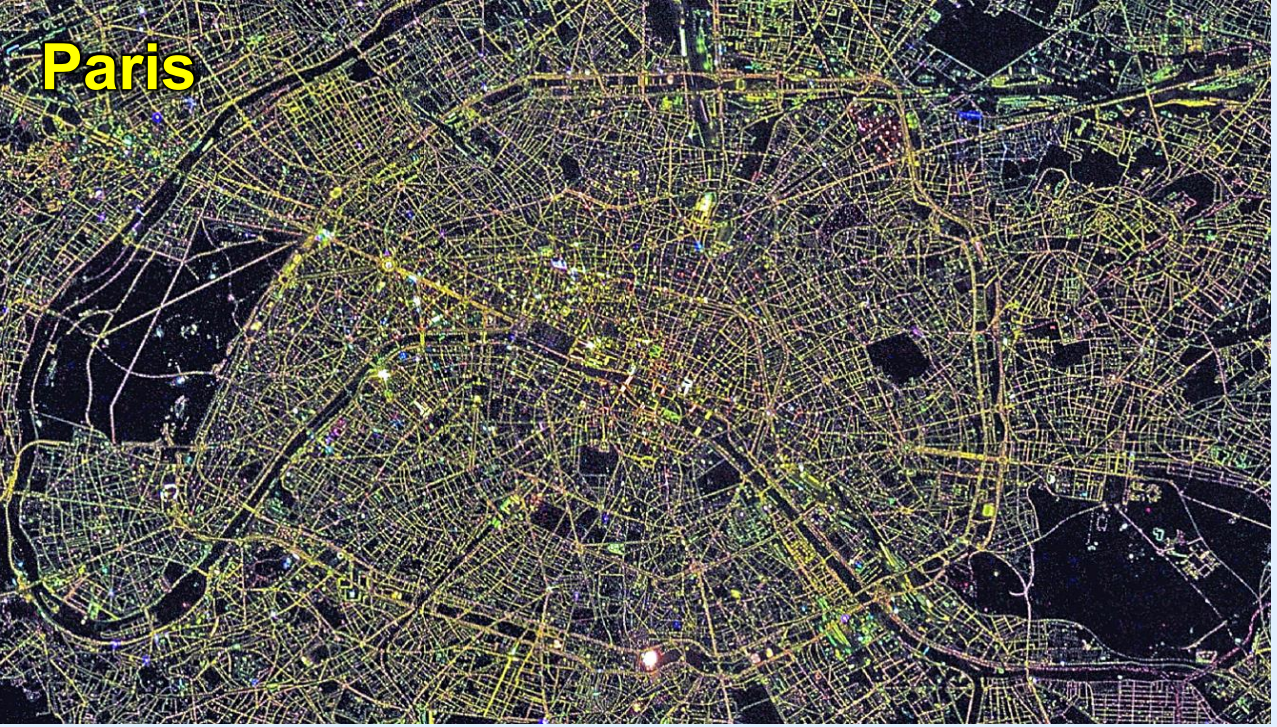
Thermal infrared

Data available through SDGSAT-1 Open Science Program (www.sdgsat.ac.cn)

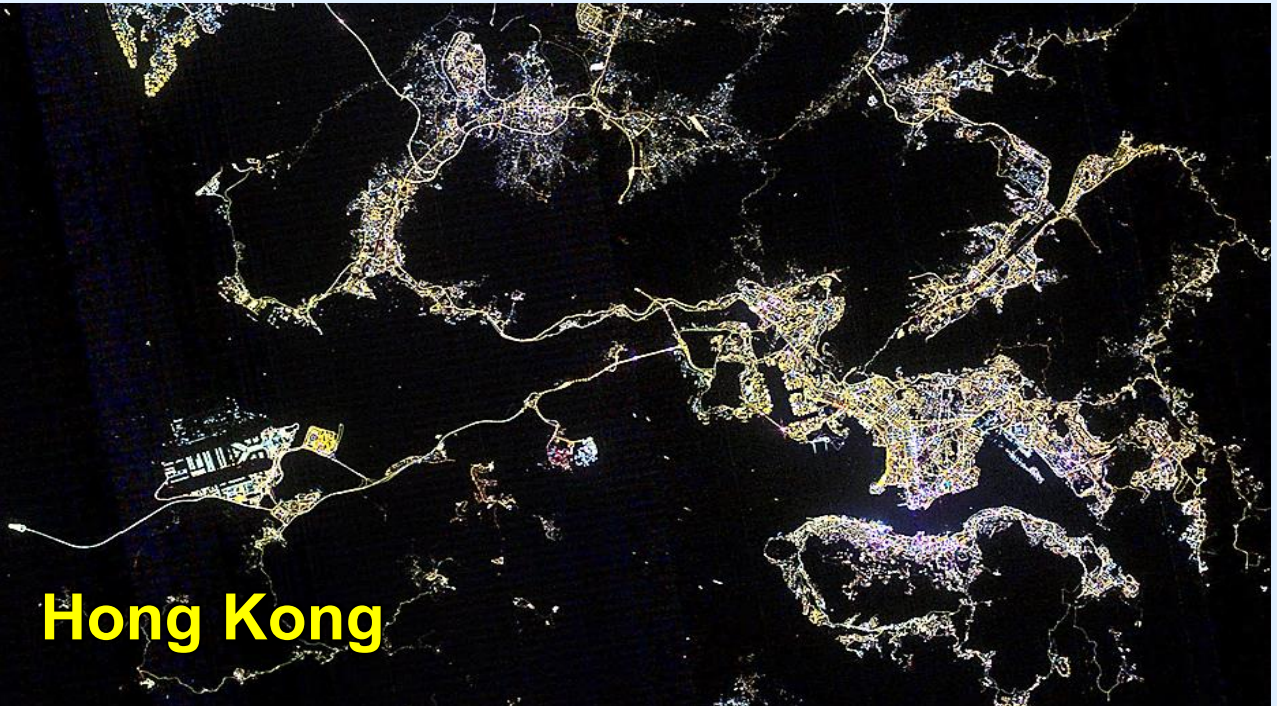
SDGSAT-1 Nightime Light Image of Beijing

Water Cube

Tiananmen Square


Paris

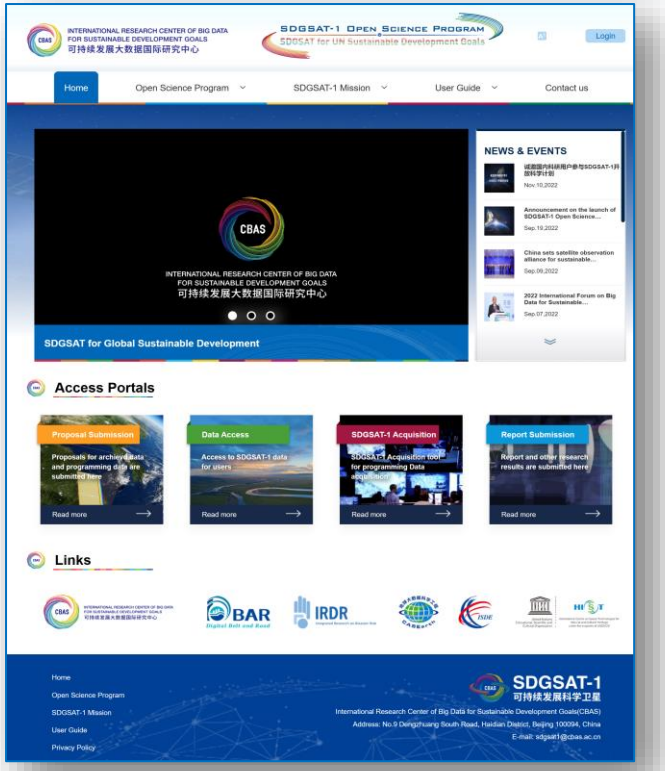

Dubai


Hong Kong


New York

SDGSAT-1 Open Science Program

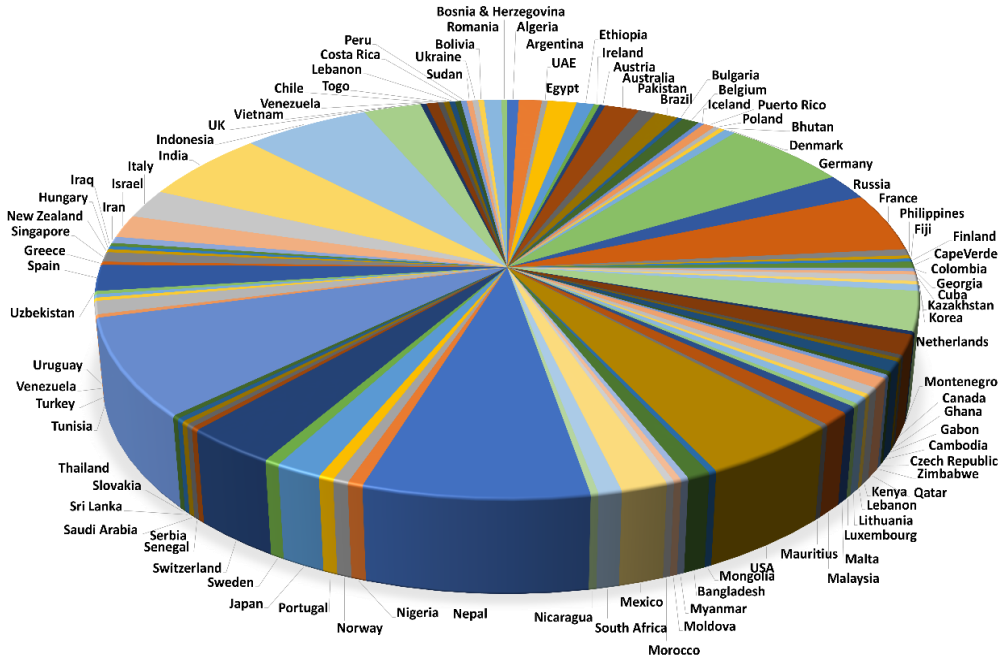
SDGSAT-1 data via the SDGSAT-1 Open Science Program (www.sdgsat.ac.cn)



www.sdgsat.ac.cn

360,000+ Images of SDGSAT-1

2 Journals that include
Special Issues on SDGSAT-1



More than 420,000 SDGSAT-1 images are shared with scientists from over 104 countries through the "SDGSAT-1 Open Science Program"

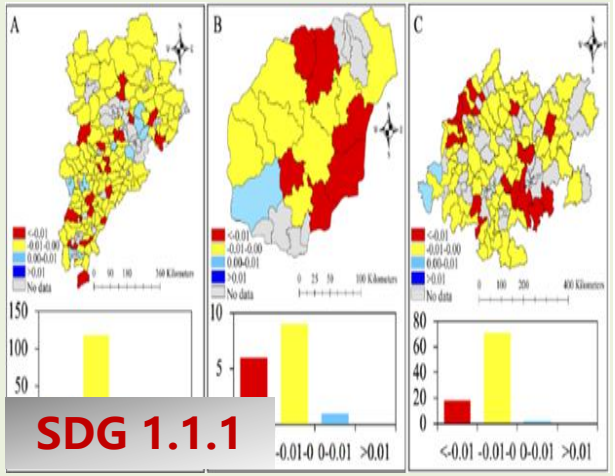
SDGSAT-1 data are shared to global users *free of charge*

SDGSAT-1 Scientific Satellite

Fill in data gaps

The change assessment of economic circle poverty index makes up for the lack of statistical data.

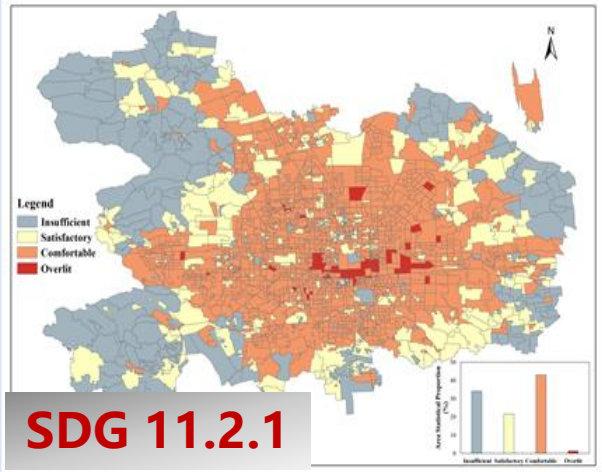
REMOTE SENS ENVIRON, 2023.



Improve detection accuracy

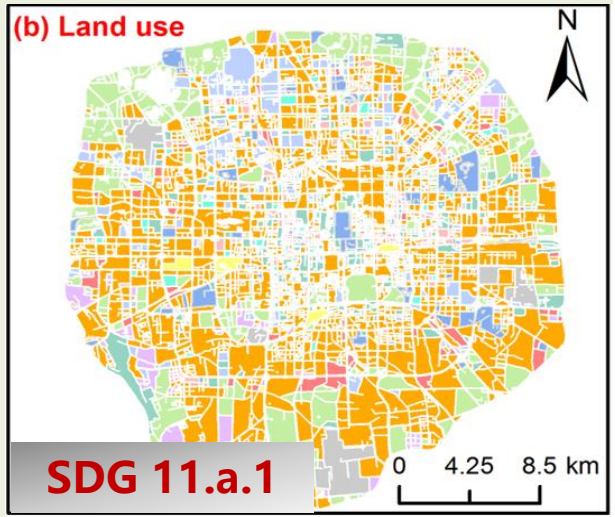
For the first time, the 10-meter high precision urban lighting evaluation was realized.

SUSTAIN CITIES SOC, 2023.



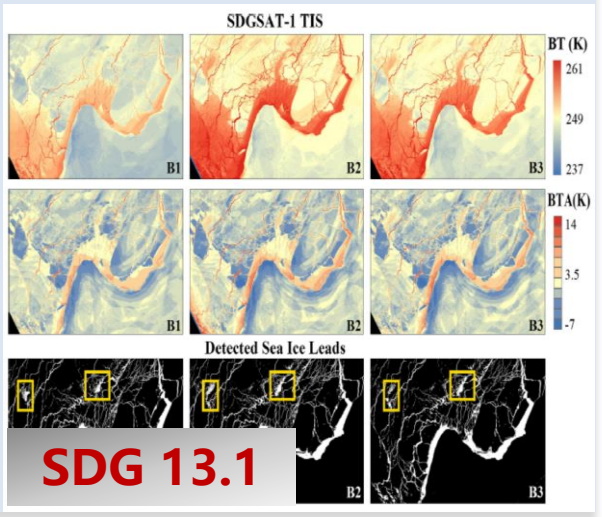
Improve the identification accuracy of urban functional areas reflecting social and economic activities.

INT J APPL EARTH OBS, 2023.



It is the first time to use infrared data to realize the fine monitoring of 30 meters of ice cracks.

CRYOSPHERE, 2023.



Knowledge | Big Earth Data in Support of SDGs

The Big Earth Data in Support of SDGs Reports were released by Chinese Government since 2019

- ◎ **7 SDGs** in diverse geographical scales
- ◎ **147 Case Studies** to provide decision support
- ◎ **116 Data Products** to fill in data gaps
- ◎ **79 Innovative Methodologies** to monitor SDG progress

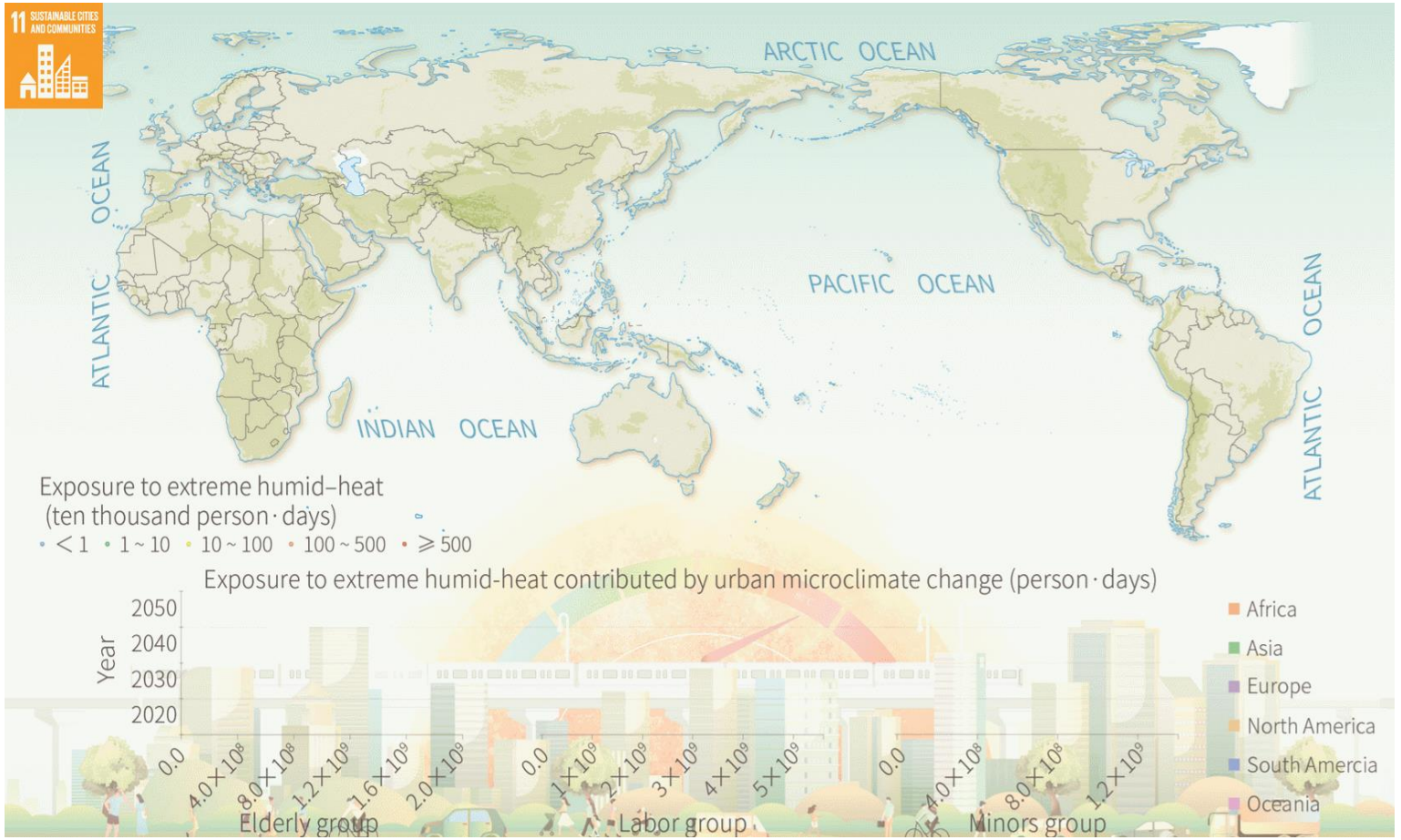
https://sdgs.un.org/events/big-earth-data-strengthening-potential-digital-technologies-sdgs-post-covid-world-52849

Big Earth Data in Support of SDGs
(2019, 2020, 2021, 2022, 2023 , 2024)

Vice President of China

SDG 11 Sustainable Cities & Communities

From 2020 to 2050, global extreme humid-heat exposure is projected to increase



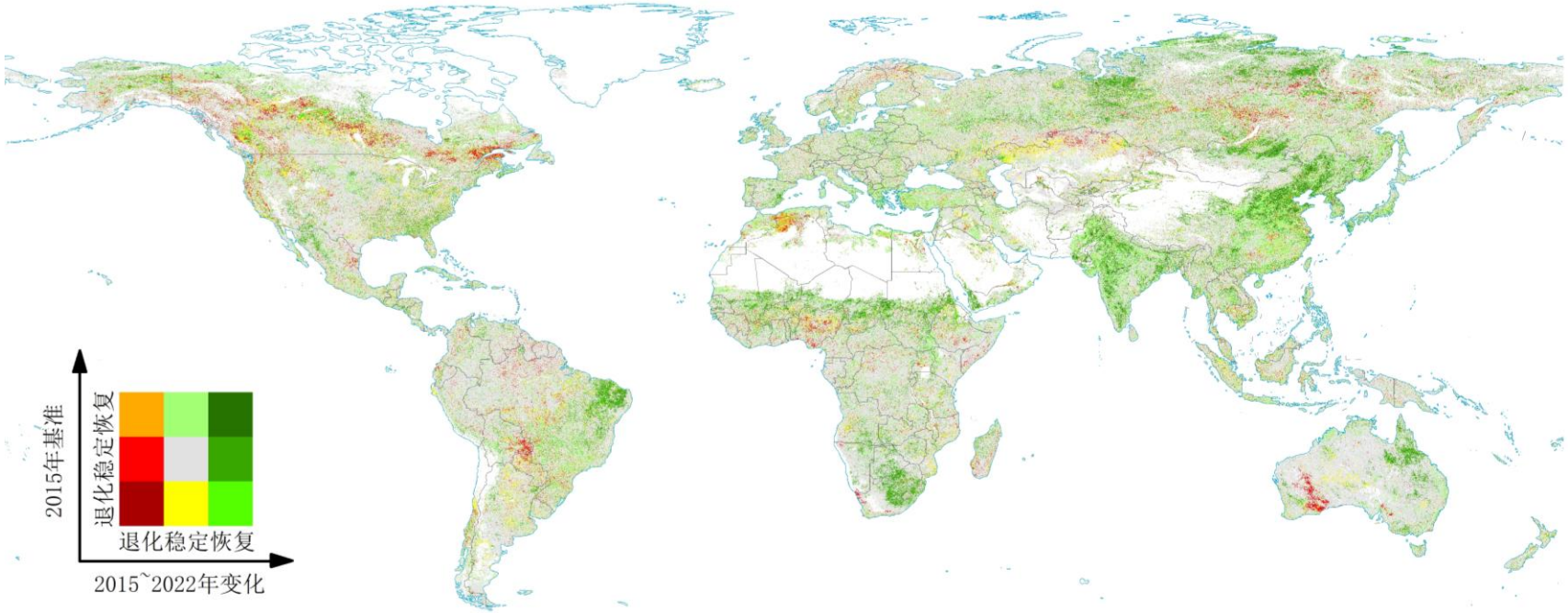
Urban microclimate changes severely impact the labor population in Asian, African, and North American cities, and the elderly population in European cities

- **Robust projections of future urban microclimate changes have been innovatively developed on a global scale, skillfully balancing estimation precision and tractability.**
- **Climate change is the main driving factor (exceeding 50%). and urban microclimate changes contribute about 20%.**

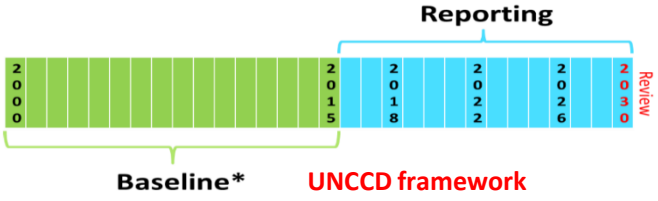
SDG 15 Life on Land

Global land degradation neutrality tracking

- CBAS keep tracking the global land degradation progress (SDG 15.3.1).
- From 2015 to 2022, the proportion of net restored land area was **4.36% globally and 11.12% in China** respectively, which shows China made a very good progress on SDG 15.3.1.

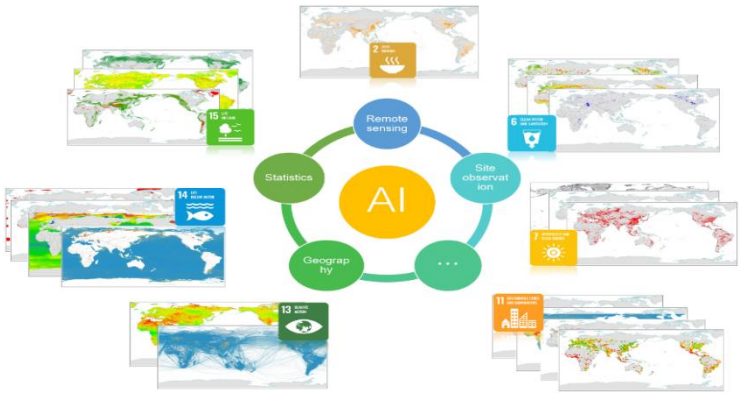


Spatial Distribution of Global Land Degradation Baselines and Dynamics

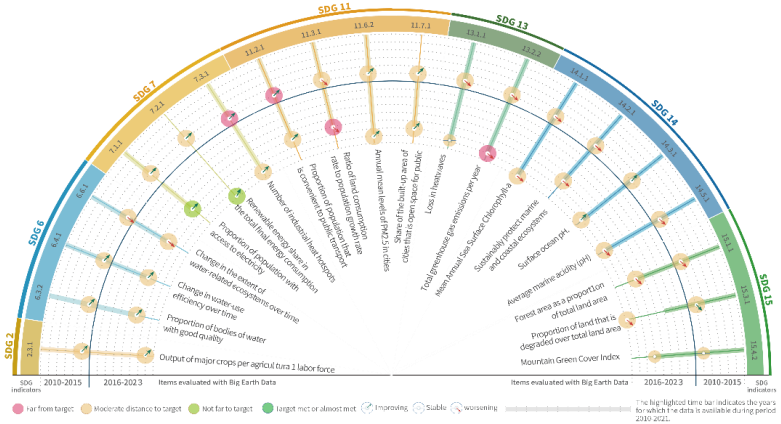


Global 20 SDG Indicators Progress

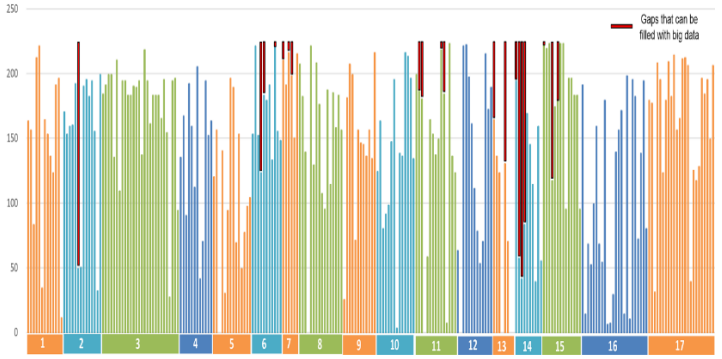
- We developed and collected **20 datasets**. Especially for global crop production in SDG 2, marine environment in SDG 14, only **less than 1/3 countries has available data.**
- Among the 20 indicators, **only two indicator (7.1.1 and 7.2.1) are close to their 2030 targets.**
- Land use efficiency and greenhouse gas emissions are far from their targets. Other indicators have moderate distance to their targets.
- SDG 2, 6, 7, 11, which are closer related to **human-built environment, the evaluated indicators are improving**. SDG 13, 14, 15, which are closer related to **natural environment, the indicators get worse**.



20 indicators from 7 SDGs acquired by AI and Big Earth Data



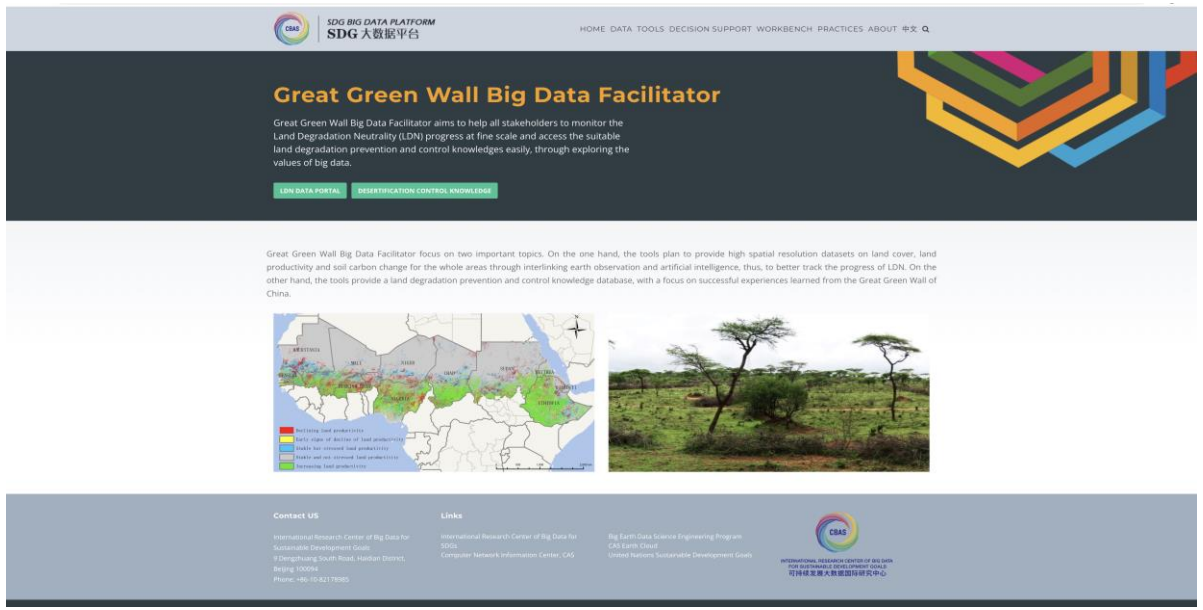
State and trend of 20environmental indicators during 2015-2023

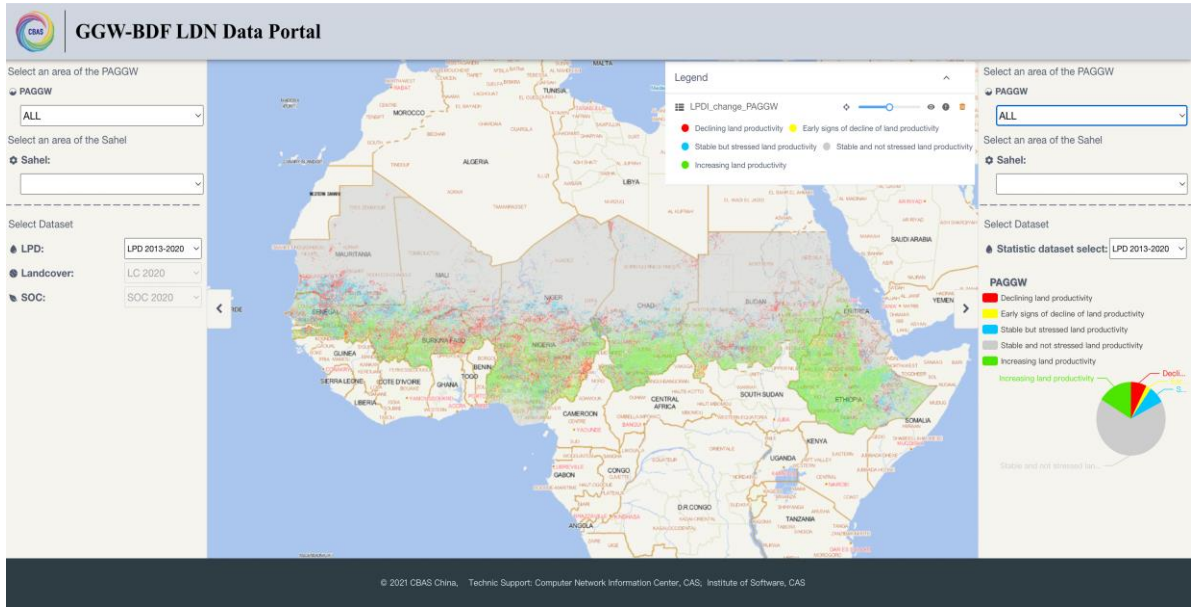


Fill the global SDG data gap with the datasets

Great Green Wall-Big Data Facilitator

- CBAS release the online tool for big data to support the construction of the Great Green Wall in Africa, which provides the **highest spatial resolution products related to land degradation.**
- 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





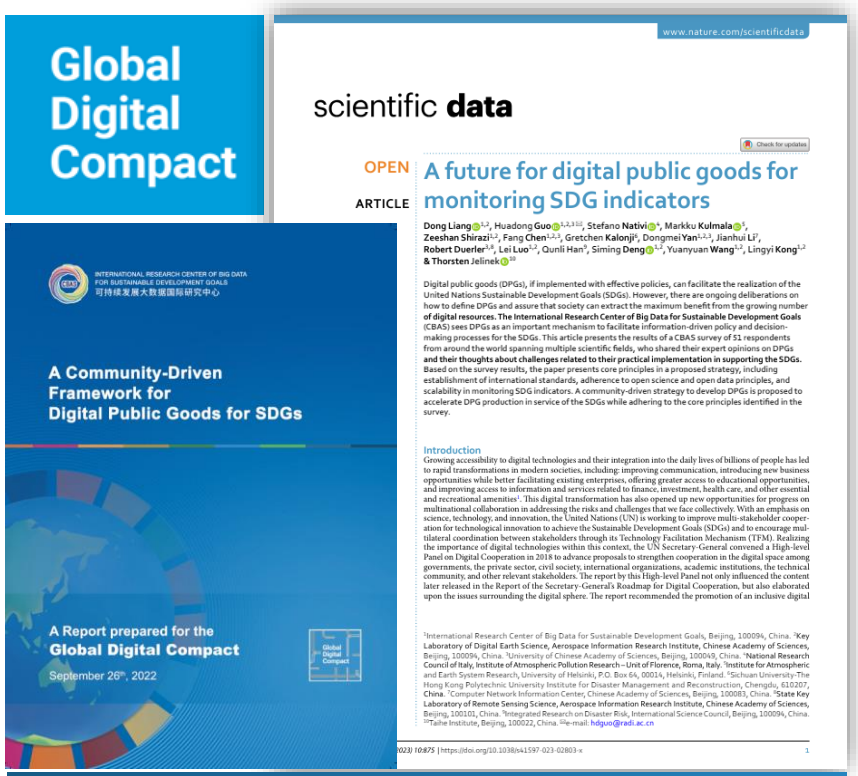
Knowledge | A Framework of Digital Public Goods for SDGs

CBAS

CBAS organized dedicated digital technology researchers to study **Digital Public Goods** in support of the *Global Digital Compact*.

- Surveyed 51 experts from 13 countries;
- Established 6 core principles of DPGs;
- Proposed a framework of community-driven DPG development.

United Nations | Common Agenda



- Community Driven
- Open Data Platform admin by UN
- Double-Verification Process

Results published in *Scientific Data Special report* submitted to UNSG's Envoy on Technology

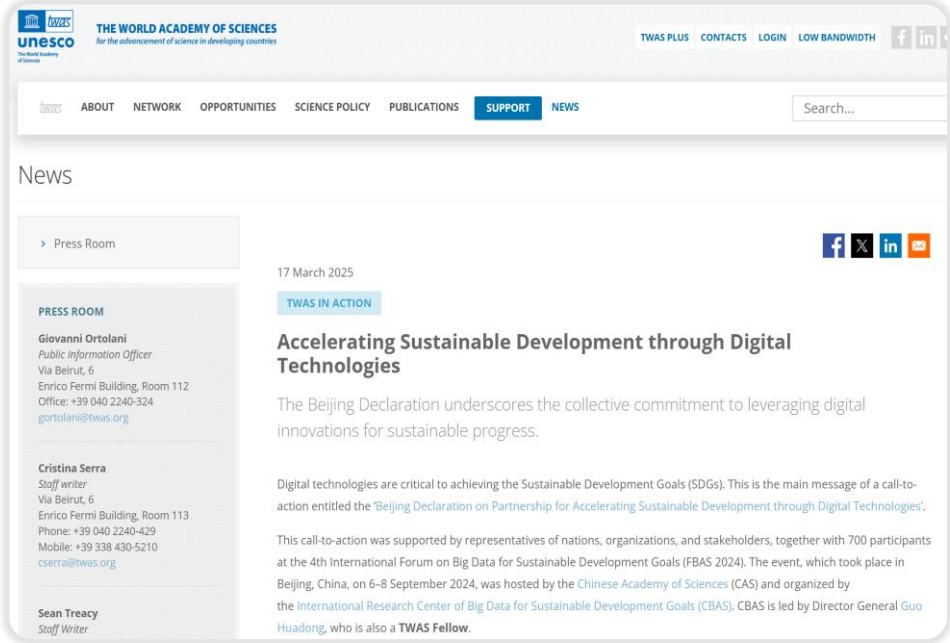
Liang, D., Guo, H., Nativi, S. *et al.* A future for digital public goods for monitoring SDG indicators. *Scientific Data* 10, 875 (2023).

Launch of the International Forum on Big Data for Sustainable Development (FBAS)

- The FBAS has been successfully held for **four consecutive sessions**, attracting nearly **3,000 experts** from **over 90 countries**.
- It has evolved into a vital international platform for scientific collaboration among UN agencies, research institutions, government bodies, corporations, and international organizations.

The Beijing Declaration of FBAS 2025 was released by ISC and TWAS

- At the closing ceremony of FBAS 2024, the assembly adopted the *Beijing Declaration on Partnership for Accelerating Sustainable Development through Digital Technologies*.
- The Declaration proposes **seven key actions** and was endorsed by nearly **800 delegates from 67 countries** worldwide.
- The Beijing Declaration has been officially released and promoted by **ISC** and **TWAS**.



11 Scholars Selected as CBAS Fellows

The CBAS Fellow, established in 2023, is the highest academic honor conferred by CBAS to individuals. It recognizes outstanding contributions worldwide in advancing sustainable development through technological innovation, while fostering global collaboration in data and technology to achieve SDGs.

CBAS Fellows 2023


Quarraisha Abdool Karim


Peter Gluckman

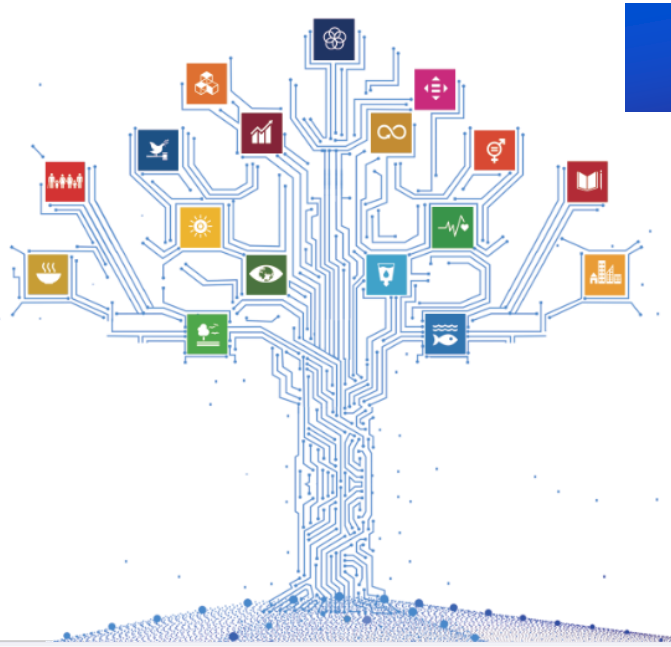

Gretchen Kalonji


Markku Tapio Kulmala


Irina Bokova


Huadong Guo


Csaba Kőrösi



CBAS Fellows 2024


Abbas Rajabifard


Jeffrey D. Sachs

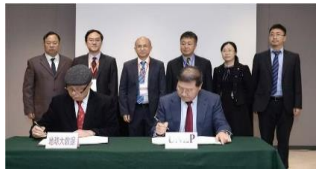

Deliang Chen


Simon Redfern

CBAS Has Signed International Cooperation Agreements With 6 UN Agencies

Leveraging Digital Technologies to Advance Sustainable Development

United Nations Environment Programme

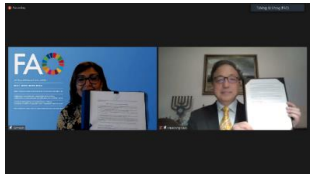


Leveraging Earth observation technology and big data to support environmental monitoring and scientific reporting

United Nations Human Settlements Programme

Support UN-Habitat's urban monitoring framework to jointly improve urban sustainable development monitoring systems

Food and Agriculture Organization of the United Nations



Provide decision-making research support to FAO in applying big data for agricultural sustainable development

United Nations Satellite Centre

Collaborate in providing spatial technology support for disaster reduction, heritage protection, and sustainable development

United Nations Development Programme

Enhance South-South cooperation to advance digital technology applications for monitoring SDG progress

United Nations Department of Economic and Social Affairs

Jointly implement multiple scientific innovation initiatives in Africa and Small Island Developing States (SIDS) to accelerate SDG achievement

Partnership| Building Key Platforms for Scientific Cooperation

- CBAS Global SDG Partnership
- International Forum on Big Data for Sustainable Development Goals (FBAS)

INTERNATIONAL SOCIETY FOR DIGITAL EARTH

In **July 2004**, the International Society for Digital Earth (ISDE) was inaugurated.

ISDE Secretariat is hosted by the Aerospace Information Research Institute, Chinese Academy of Sciences.

The International Society for Digital Earth (ISDE) is a non-governmental international academic organization initiated by the Chinese Academy of Sciences and co-founded by relevant institutions at home and abroad. It principally promotes academic exchange, science and technology innovation, education, and international collaboration towards Digital Earth.

OUR MISSION

To benefit society by promoting the development and realization of Digital Earth

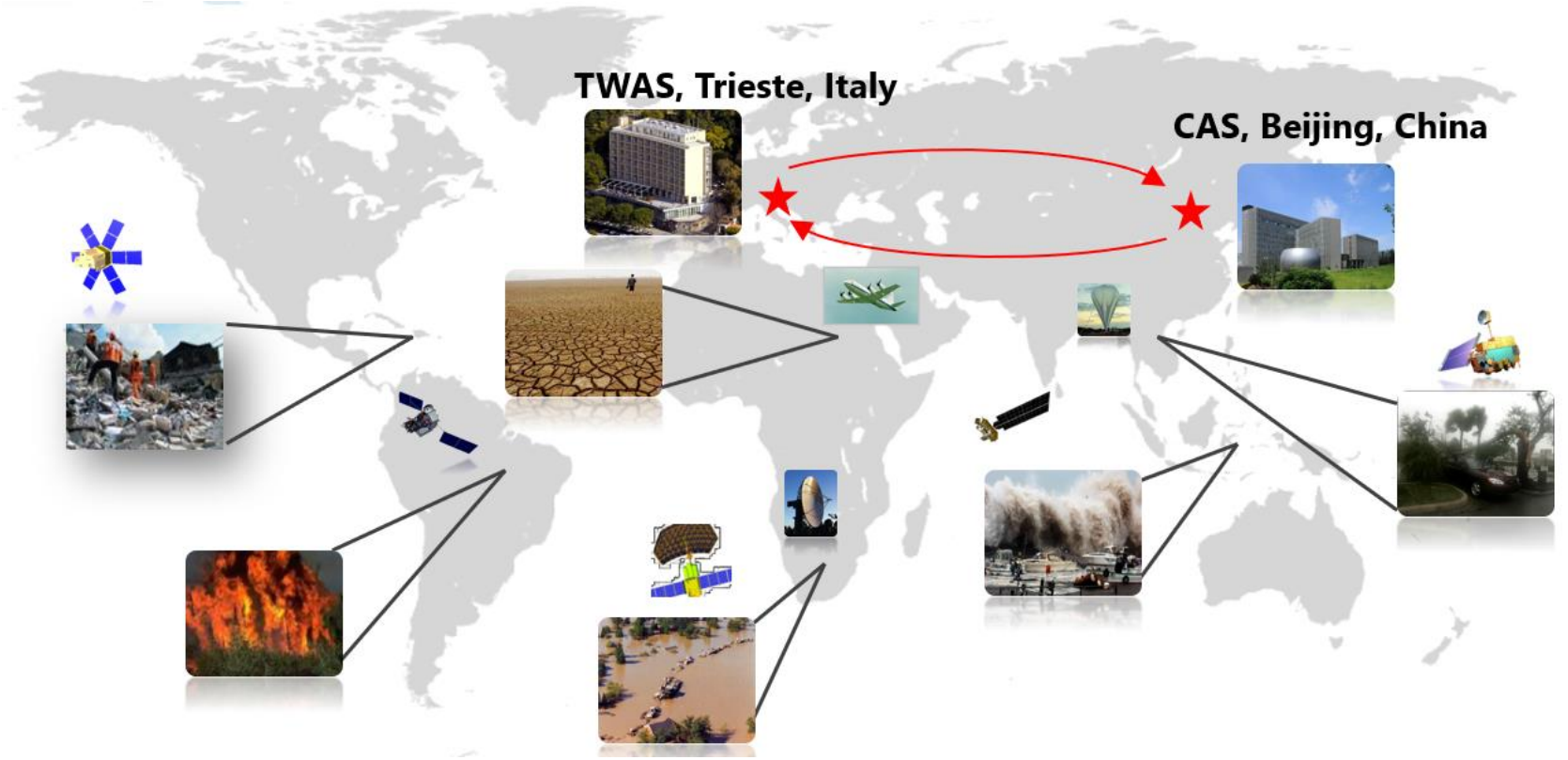
▲ The ISDE Launch Ceremony

▲ The 1st ISDE Executive Committee meeting

▲ The 1st Executive Committee

CAS-TWAS Centre of Excellence on Space Technology for Disaster Mitigation (SDIM)

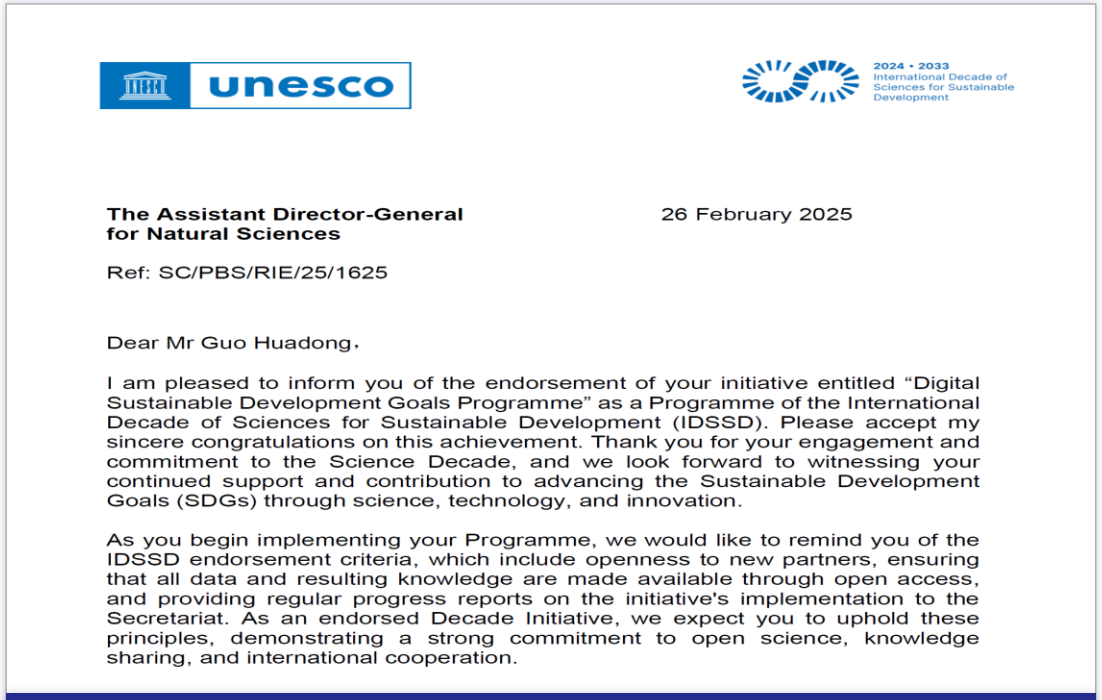
Vision: *To enhance scientific and research capacities for* ***disaster mitigation in developing countries*** *through the use of the most advanced* ***space technologies***



CBAS Launches Digital Sustainable Development Goals Programme (DSP)

Digital Sustainable Development Goals Programme (DSP)

DSP was approved by the United Nations Educational, Scientific and Cultural Organization (UNESCO) in 2025



unesco

2024 • 2033 International Decade of Sciences for Sustainable Development

The Assistant Director-General for Natural Sciences

26 February 2025

Ref: SC/PBS/RIE/25/1625

Dear Mr Guo Huadong,

I am pleased to inform you of the endorsement of your initiative entitled "Digital Sustainable Development Goals Programme" as a Programme of the International Decade of Sciences for Sustainable Development (IDSSD). Please accept my sincere congratulations on this achievement. Thank you for your engagement and commitment to the Science Decade, and we look forward to witnessing your continued support and contribution to advancing the Sustainable Development Goals (SDGs) through science, technology, and innovation.

As you begin implementing your Programme, we would like to remind you of the IDSSD endorsement criteria, which include openness to new partners, ensuring that all data and resulting knowledge are made available through open access, and providing regular progress reports on the initiative's implementation to the Secretariat. As an endorsed Decade Initiative, we expect you to uphold these principles, demonstrating a strong commitment to open science, knowledge sharing, and international cooperation.

DSP's Approval Letter

2024 • 2033 International Decade of Sciences for Sustainable Development

Digital Sustainable Development Goals Programme (DSP)

Science Decade Programme

- **Lead institution**: International Research Center of Big Data for Sustainable Development Goals (CBAS)
- **Country:** China
- **Contact:** liushaobo@cbas.ac.cn
- **Short name and/or acronym of the activity:** DSP
- **Start date:** 01/12/2024
- **End date:** 31/12/2033

UNESCO's official website has released the DSP

Digital Sustainable Development Goals Programme (DSP)

Scientific Objectives：Establish the "Satellite-Cloud- Intelligence-Wisdom" Innovation System

- Bridge global-scale sustainability data gaps（Satellite）

- Develop a novel big data paradigm for SDG assessment（Cloud）

- Foster data-driven sustainability knowledge discovery (Intelligence)

- Promote scientific decision-making and intelligent services for sustainable development（Wisdom）

Digital Sustainable Development Goals Programme (DSP)

52 Institutions from 29 Countries Have Joined the DSP

UN Agencies

UNESCO, France
UNEP, Kenya
UN-Habitat, Kenya
UNDP, United States
DESA, USA
FAO, Italy
HIST-UNESCO, China
UNITAR, Switzerland

International Organizations

ISPRS, Germany
CODATA, France
IGU, Turkey
GEO, Switzerland
WRI, USA
ISDE, China
IRDR, China
DBAR, China
SDIM, China

Asia (19)

NSSTC, UAE
ECOSF, Pakistan
ICIMOD, Nepal
Keio University, Japan
University of Peshawar, Pakistan
NRCT, Thailand
AIT, Thailand
NTU, Singapore
UTM, Malaysia
BRIN, Indonesia
Khulna University, Bangladesh
CPDRC, China
ECNU, China
HKU, China
Laoshan Laboratory
PKU , China
NJU , China
CUG , China
NNU , China

South America (1)

CONICET, Argentina

Europe (9)

RIAAM, Russia
CNR-IMAA, Italy
SSE, Sweden
KTH, Sweden
Forest Research, UK
Swansea University , UK
University of Stirling, UK
University of Helsinki, Finland
NTNU, Norway

Africa (6)

EGIFTT, Democratic Republic of Congo
PAGGW, Mauritania
University of Ghana , Ghana
AARSE, South Africa
AWHF, South Africa
UNZA, Zambia

A Short Video at UN

Joining Hands to Harness Digital Technology for Global Sustainable Development

CBAS

AIT Asian Institute of Technology

UN HABITAT FOR A BETTER URBAN FUTURE

慶應義塾大学 Keio University Tokyo, Japan

ICIMOD

HELSINGIN YLIOPISTO HELSINGFORS UNIVERSITET UNIVERSITY OF HELSINKI

imaa National Research Council of Italy Institute of Methodologies for Environmental Analysis

UNIVERSITY of STIRLING

GREAT GREEN WALL

UN environment programme

中国科学院空天信息创新研究院 Aerospace Information Research Institute, Chinese Academy of Sciences AIR

GEO

FAO FIAT PANIS

United Nations Convention to Combat Desertification

twas unesco The World Academy of Sciences

unitar United Nations Institute for Training and Research

UNOSAT United Nations Satellite Centre

UNESCO 联合国教育、科学及文化组织

HIST 联合国教科文组织国际自然与文化遗产空间技术中心

SDIM

BAR Digital Belt and Road

IRDR Integrated Research on Disaster Risk

ISDE

ANSO Alliance of International Science Organizations

COMMITTEE ON DATA CODATA INTERNATIONAL SCIENCE COUNCIL

CPDRC

NANJING UNIVERSITY 1902

CHINA UNIVERSITY OF GEOSCIENCES

SAPIENTIA·ET·VIRTUS

NANJING NORMAL UNIVERSITY 1902

PEKING UNIVERSITY 1898

EAST CHINA NORMAL UNIVERSITY

The 5th International Forum on Big Data for Sustainable Development Goals (FBAS 2025)

Theme — Digital Intelligence Driving Sustainable Development: The 10th anniversary of the 2030 Agenda

Host — Chinese Academy of Sciences

Organizers — International Research Center of Big Data for Sustainable Development Goals; Aerospace Information Research Institute, Chinese Academy of Sciences

September 6-8, 2025

Beijing, China

Participants	Institutions	Countries
3000+	500+	80+

International Forum on Big Data for Sustainable Development Goals has been successfully held for four sessions from 2021 to 2024. It brings together more than 3,000 experts and scholars from more than 80 countries and 500 domestic and foreign institutions. The 5th International Forum on Big Data for Sustainable Development Goals will be held in Beijing from September 6th to 8th, 2025.

Topics

- Big Data Technology Serving Global Sustainable Development
- AI Empowering Sustainable development
- Policy and Digital Intelligence Industry Promoting Regional Sustainable Development
- Development of Global Partnership Facilitating the Implementation of SDGs
- Youth Innovation: Sharing for the Future

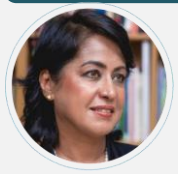
Keynote Speakers

(Alphabetical order by last name)

Quarraisha Abdool Karim
President of the World Academy of Sciences

Johannes Cullmann
Scientific Advisor to the 77th President of the UN General Assembly

GUO Huadong
Director General of the International Research Center of Big Data for Sustainable Development Goals



Ameenah Gurib-Fakim
Former President of the Republic of Mauritius

Csaba Kőrösi
77th President of the UN General Assembly

Ibrahim Thiaw
Under-Secretary-General and Executive Secretary of the UNCCD

Danilo Türk
Former President of the Republic of Slovenia

WANG Jian
Director of Zhejiang Laboratory, Founder of Alibaba Cloud

For more information, please visit official website:
https://www.fbas.org.cn/fbas2025/web/index/index.html

Supporting organizations

DESA, UNDP, UNEP, UNOOSA, FAO, UN-HABITAT, twas, unesco

International Partners

United Nations Office for South-South Cooperation, GEO, CODATA, ANSO, ICIMOD, ISDE, IRDR, unesco, BAR Digital Belt and Road, SDIM


THANKS
可持续发展大数据国际研究中心
INTERNATIONAL RESEARCH CENTER OF BIG DATA
FOR SUSTAINABLE DEVELOPMENT GOALS
Website： www.cbas.ac.cn/en/
E-mail： cooperation@cbas.ac.cn
Telephone： +86 (010) 82177122