ARCTIC CIRCLE

DATA ACTIVITIES FOR ARCTIC INFORMATION SERVICE AND SUSTANABLE DEVELOPMENT

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UNITED NATIONS SUSTAINABLE DEVELOPMENT GOALS (UN SDGS)

IPCC AR6 Global Warming

United Nations Framework Convention on Climate Change COP26/27

Mitigation | **Adaptation**

Funds | **Cooperation**

Seeking mitigation and adaptation

SUSTAINABLE DEVELOPMENT GOALS
17 GOALS TO TRANSFORM OUR WORLD

SDG 13 Urgent action to tackle climate change and its impacts

Global and National Policy Objectives

Paris Agreement and UNFCCC

- Global warming, and the rise in temperature shall be constrained within 1.5 degrees
- Countries have adopted carbon neutrality goal as national strategies - Achieving net-zero emissions by 2050.

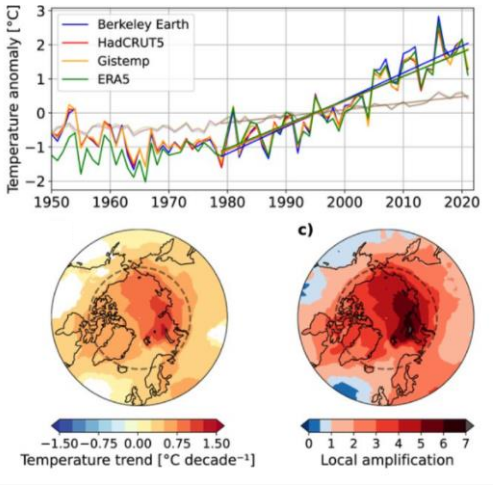
Emission reduction, forest and land use, technological innovation, capacity building, cropping, nature, agriculture, energy, transportation, etc.

CLIMATE ACTION AND THE ENVIRONMENT

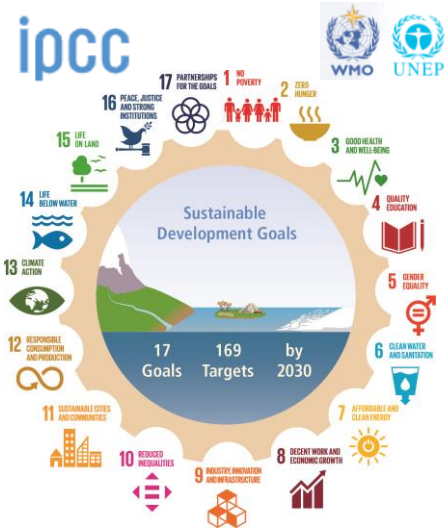
ARCTIC SUSTAINABLE DEVELOPMENT GOALS (SDG13) - CLIMATE ACTION

Arctic temperatures are increasing four times faster than global warming[1]

In Arctic, the Investment without enviroment concern will not successed.



Arctic had warmed 0.75C per decade, nearly four times quicker than the rest of the planet.



The ocean and cryosphere affect meeting the Sustainable Development Goals.

GUGGENHEIM

Shipping

By 2030, over 5% of total world trade could be routed along the Northern Sea Route.

Energy

While Arctic oil production could double by 2050 under some projections, the Arctic holds vast renewable potential: wind, hydro, tidal, geothermal, solar, and biomass are all promising areas

Ocean Resources

Fishery catches in the region could increase by up to 70% over the next 40 years, with even greater potential in aquaculture and the "blue economy".

Environmental Protection

The Arctic is warming twice as fast the rest of the world, a warning for the rest of the world but an opportunity for climate science and other research.

Limited Opportunities, Important Responsibilities (cited online)

1. Petr Chylek, Chris Folland, James D. Klett, Muyin Wang, Nick Hengartner, Glen Lesins, Manvendra K. Dubey. **Annual Mean Arctic Amplification 1970–2020: Observed and Simulated by CMIP6 Climate Models**. *Geophysical Research Letters*, 2022; 49 (13) DOI: 10.1029/2022GL099371

TECHNOLOGY FACILITATION MECHANISM (TFM) FACILITATES UN SDGS

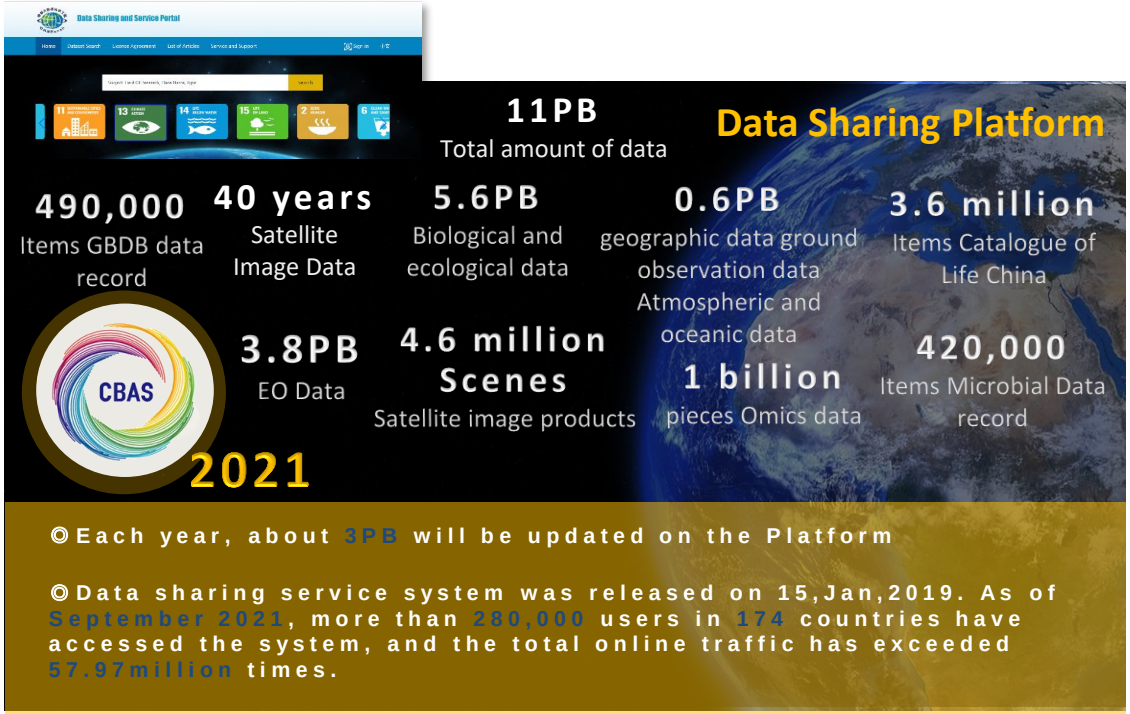
Science, Technology, and Innovation (STI) for SDGs

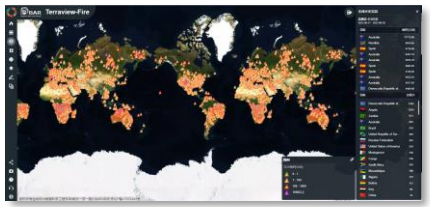
- **Many SDGs Targets are related to STI progress** (14 directly, 34 relatively, and 121 indirectly).
- Emphasize **important role of STI in SDGs** (Technology Facilitation Mechanism).
- Emphasize key role of the STI community in SDGs (provide **data, expertise, evidence**).

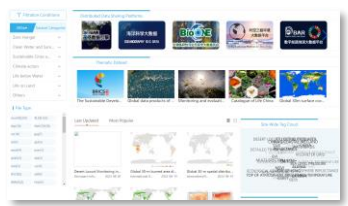
TECHNOLOGY FACILITATION MECHANISM | SUSTAINABLE DEVELOPMENT GOALS

A technology facilitation mechanism (TFM) was adopted to facilitate the development of 2030 agenda.

DATA SHARING FOR THE UN SDGs







CASEarth-Data Sharing and Service Portal

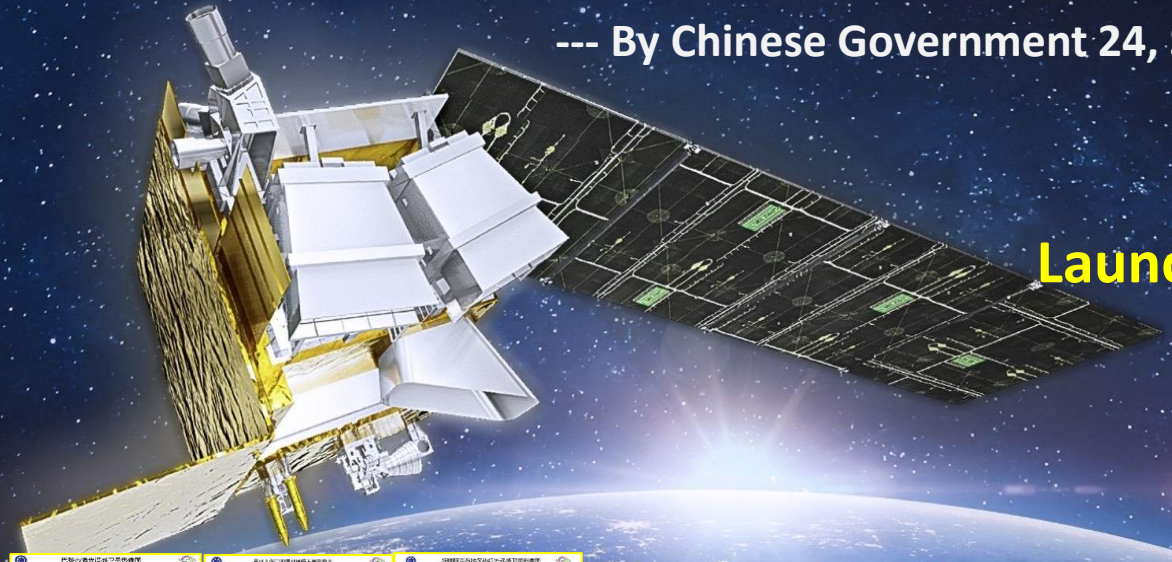
- Data mining models (classification, keyword search, tag cloud filtering, and association rules).
- Multiple data acquisition patterns (online downloading and API access).
- Online services for customized multiple data formats
- Advanced functions Data evaluation, validation, download, and cloud analysis for customized needs

Opens Satellite Data from SDGSAT-1 to the World

--- By Chinese Government 24, Sept., 2022

CBAS

SDGSAT-1
可持续发展科学卫星



SDGSAT-1 Satellite

Launched on 5 November 2021

- Thermal infrared + nighttime-light + multi-spectral
- Wide scale (300 km)
- High-resolution (10 m)

- Glimmer image of Paris /40m
- Multispectral image of entry of Yellow River /10m
- Thermal infrared image of Aqsu in Xinjiang Uygur Autonomous Region /30m

SDGSAT-1 Open Science Program

SDGSAT for UN Sustainable Development Goals

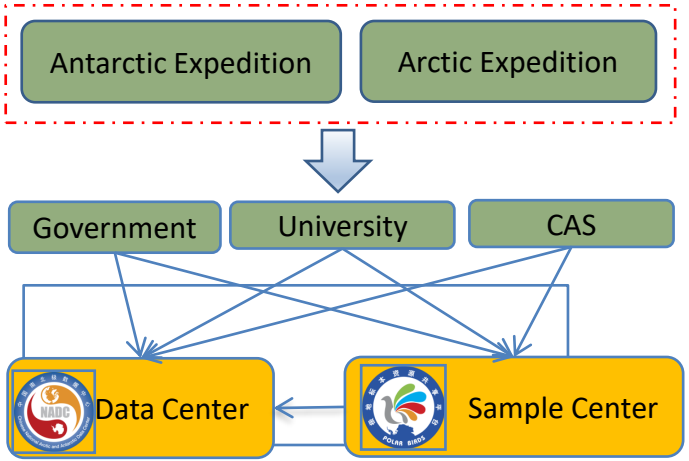
Explore new methods to sense Earth's environment

Data has been opened via : www.sdgsat.ac.cn

NATIONAL ARCTIC AND ANTARCTIC DATA CENTER

National Arctic and Antarctic Research Expeditions

- 35 National Antarctic research expeditions since 1984.
- 10 National Arctic Ocean cruises conducted since 1999

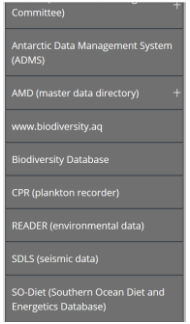


International Connections and Contribution

ANTARCTIC MASTER DIRECTORY

SCAR

Standing Committee on Antarctic Data Management (SCADM)



SOOS
SOUTHERN OCEAN OBSERVING SYSTEM

NADC

中国极地研究中心
Polar Research Institute of China

Chinese National Arctic and Antarctic Research Expeditions

SAON
SUSTAINING ARCTIC OBSERVING NETWORKS

IASC

International Arctic Science Committee
Arctic Data Committee

Data Center

Archives management → **Data Sharing** → **Data Publish**

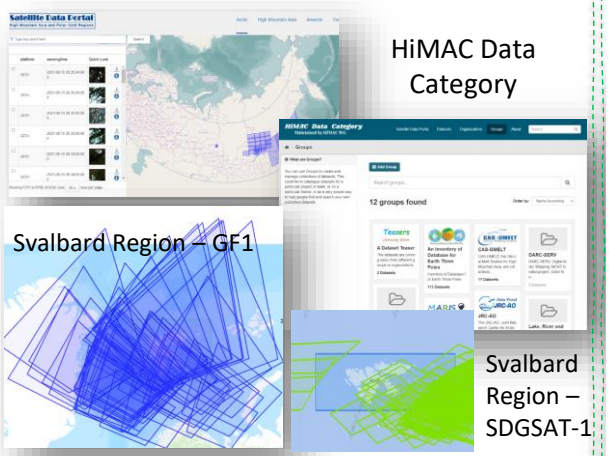
- Database
- Information system

http://www.chinare.org.cn/en/index/

DATA FOR DIGITAL ARCTIC ENVIROMENT

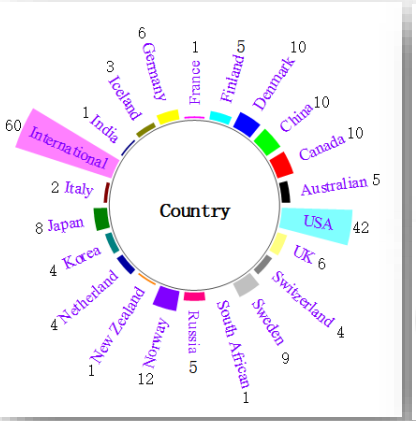
Earth Observations

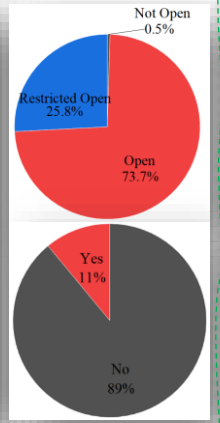
e.g. Gaofen Series for the Arctic Region



Data Sharing

Data Sharing and Data Policy for Earth Three Poles (Inventory)

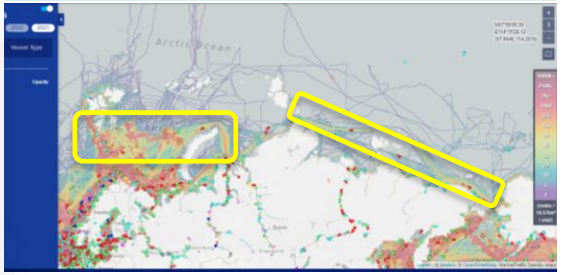




- 209 datasets found in 22 countries, Survey on the data policy, sharing principle and data management,
- Mainly in USA (42), Norway (12), China (10), Canada (10) and Denmark (10), etc.
- Far way to an opening data world

Adaption and Mitigation Services

Distribution map of ship density in the Northeast Passage in 2020 and 2021



(Extracted from Marine Traffic, 2022)

Arctic ice conditions

- Arctic navigation time is unstable
- Rapid changes and drifts in sea ice
- Sea ice redistributes and accumulates, blocking shipping route
- Frozen seas freeze again after melting

Collaborations Internationally

GEO GROUP ON EARTH OBSERVATIONS
www.geocri.org
HELSINGIN YLIOPISTO
SAON SUSTAINING ARCTIC OBSERVING NETWORKS
NERSC
NEXTGEOSS European Data Hub and Platform
INNISH METEOROLOGIC INSTITUTE
Pan-Eurasian Experiment PEEX

EXAMPLE : WHAT DIGITAL ARCTIC ENVIRONMENT FUNCTIONS SDG13 ADAPTION AND MITIGATION

Use spatial data service capabilities to build a data-driven digital arctic environmental service system for shipping environment

Emergency decision-making

- Real-time monitoring of rapidly changing ice, water, flow, atmosphere and other information to provide rapid digital services.

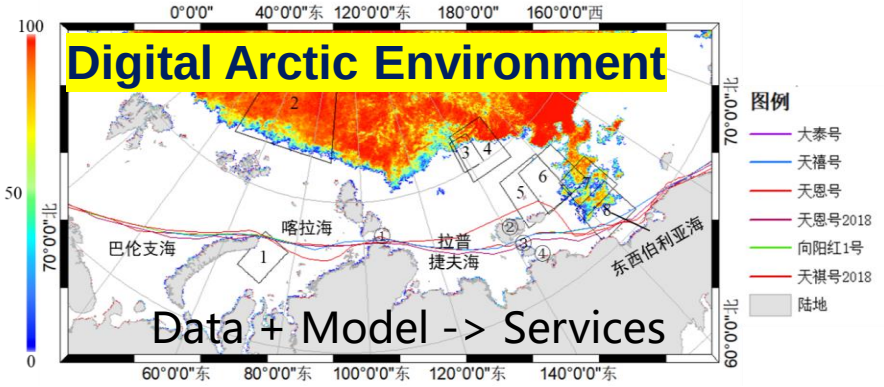
Shipping route planning at fiscal year

- Based on the climate and environmental data with the sea-ice-air basis, predicting the environmental changes of the shipping route on a weekly or monthly scale in the future.

Long-term climate change forecasting

- In the long run, carry out the strategic development of shipping between the seasons and provide scientific decision-making and analysis.

Connect multi-source spatial data, and develop a data-driven "data-computing integration" digital service system for Arctic shipping route



Schematic diagram of the Arctic Northeast Passage and commercial routes in 2018-2019 (①Vilikitsky Strait ②Novosibirsk Islands ③Sannikov Strait ④Dmitry Laptev Strait)

FOR THE FUTURE OF ARCTIC DATA ACTIVITIES INTERNATIONALLY

- Support SAON and continue to be engaged in the data activities.
- Support SAON's Roadmap for Arctic Observing and Data Systems (ROADS).
- Engage in the Group on Earth Observations (GEO), and its data and cold regions initiative (CRI)
- Connecting with EU NextGEOSS Data Hub.
- Continuing the collaboration openly with partners, and engaged in the international WGs.

CNARC

CBAS

Thanks!

Any questions?