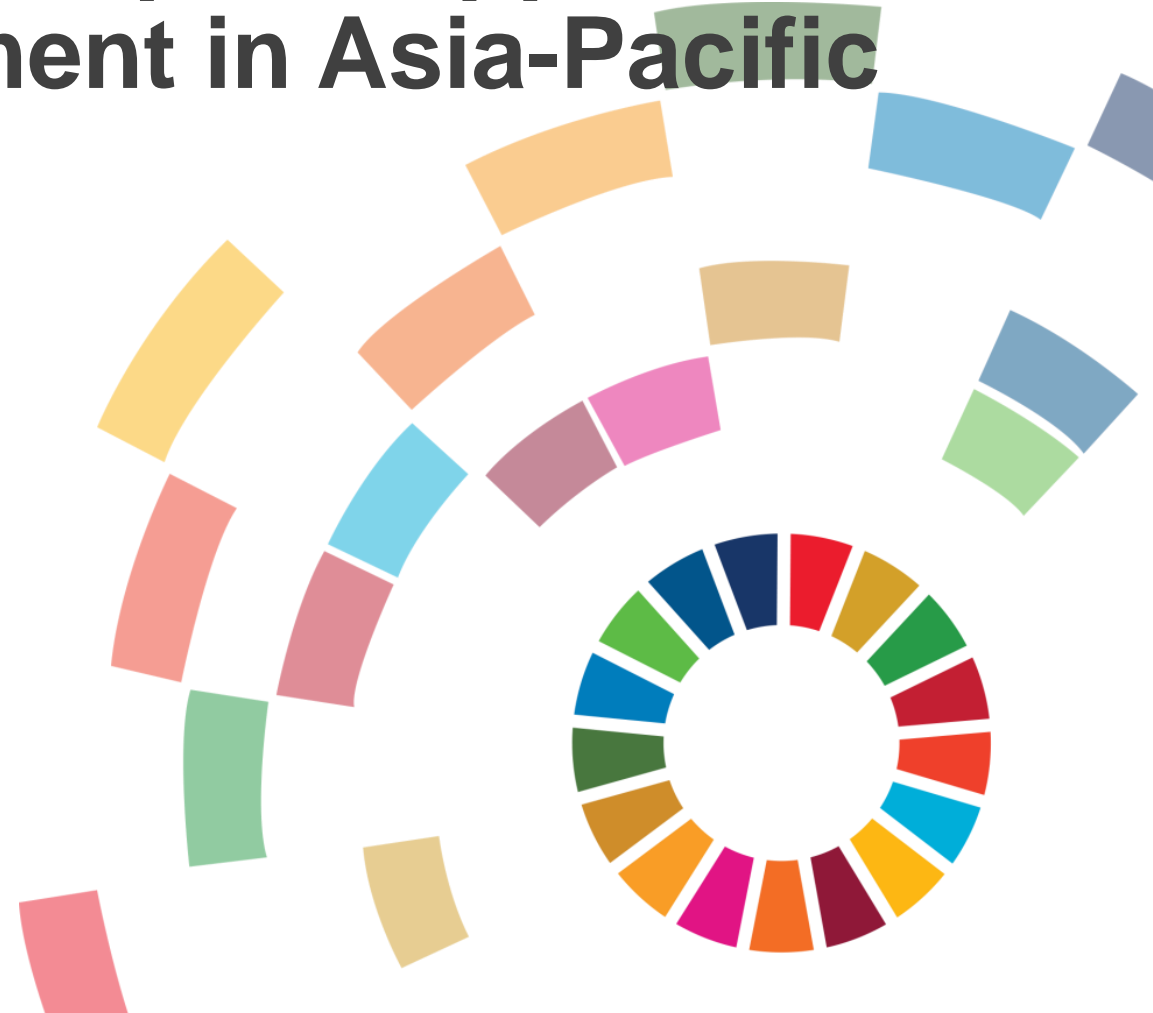


# Status and Contributions on Space Applications for Sustainable Development in Asia-Pacific

China



# Contents

- ❑ Brief introduction of NRSCC**
- ❑ The status of implementation of Asia-Pacific Plan of Action on Space Applications for Sustainable Development (2018-2030) in China**
  - ❑ Disaster risk reduction and resilience
  - ❑ Management of natural resources
  - ❑ Connectivity for the 2030 Agenda for Sustainable Development
  - ❑ Social development
  - ❑ Energy
  - ❑ Climate change
  - ❑ Activities cutting across all thematic areas
- ❑ Contributions of China**
- ❑ Good practice in combating covid-19 and lessons learnt in China**

# □ Brief introduction of NRSCC



**National Remote Sensing Center of China (NRSCC)** was **established in 1981**, is a professional government agency affiliated to Ministry of Science and Technology (**MOST**). Our mission is to **promote the global collaboration** with government institutions, academy and universities, businesses sector, professionals and experts, and to **support the R&D** in the fields of **earth observation, satellite navigation, and deep space exploration**.

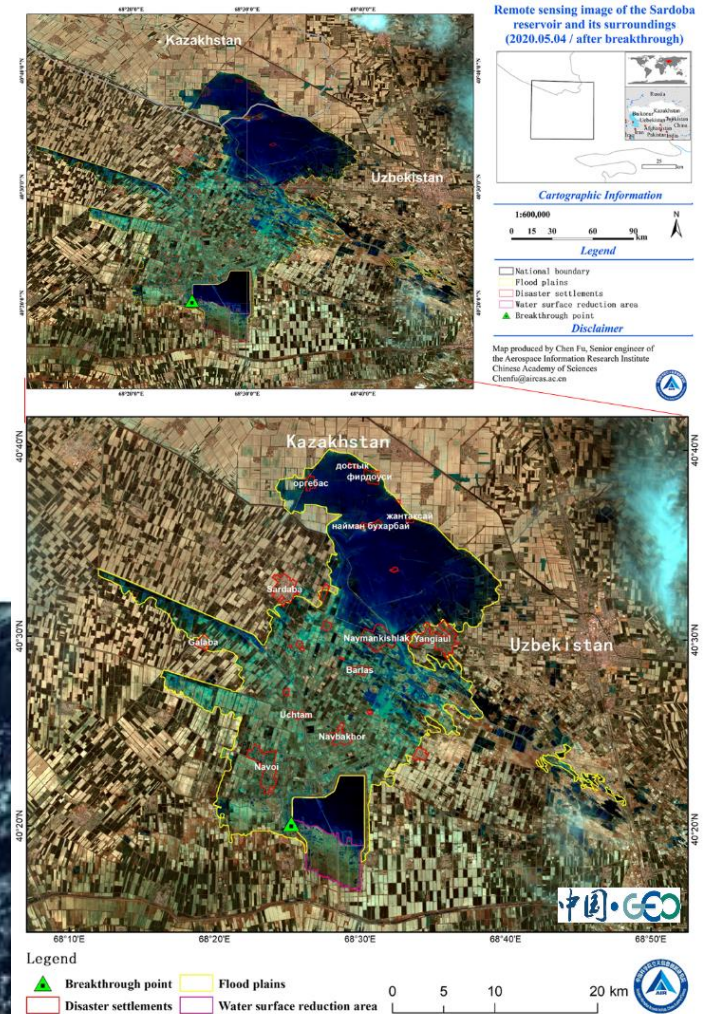


As the National Focal Point of UNESCAP RESAP, NRSCC has been promoting the participation of relevant domestic institutions in RESAP on behalf of the Chinese government.

# □1. The status of implementation of Asia-Pacific Plan of Action on Space Applications for Sustainable Development (2018-2030) in China

## ➤1.1 Disaster risk reduction and resilience

- ✓ Disaster prevention and mitigation emergency support mechanism flood monitoring
- ✓ Typhoon and hurricane monitoring
- ✓ Seismic monitoring
- ✓ Fire monitoring
- ✓ Volcano monitoring
- ✓ Dust monitoring
- ✓ Drought monitoring

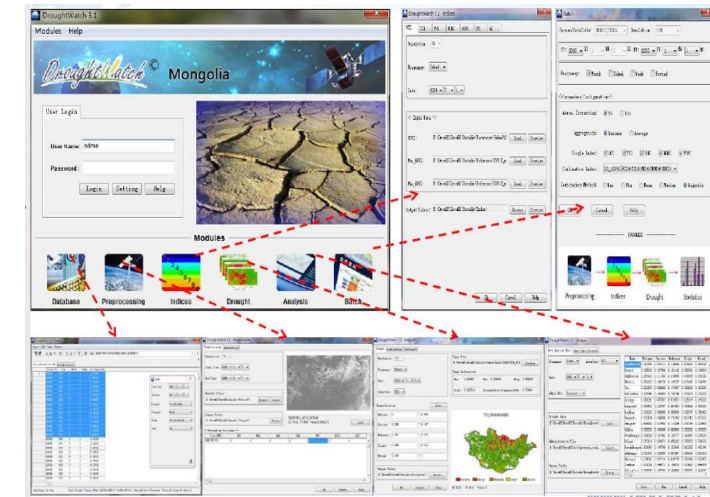




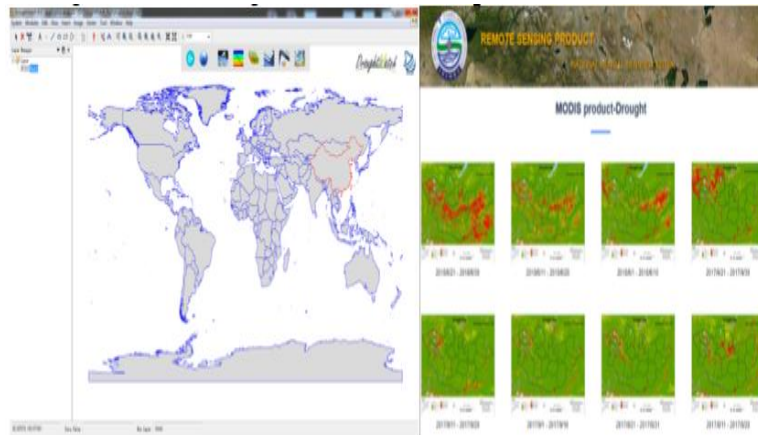
# Case 1 DroughtWatch: Drought Monitoring for Mongolia

## Customized drought monitoring system for Mongolia

- Technical training in Mongolia and China (2014-2018, 2-3times/year)
- Field works (1 time/year)
- DroughtWatch system
- Technical training in China (2019-2020, 2times)
- Filed works (2019 August)



Customized System: DroughtWatch-Mongolia



DroughtWatch-Mongolia interface and products release ([www.icc.mn](http://www.icc.mn))

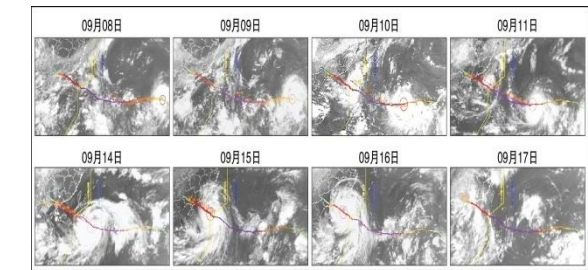
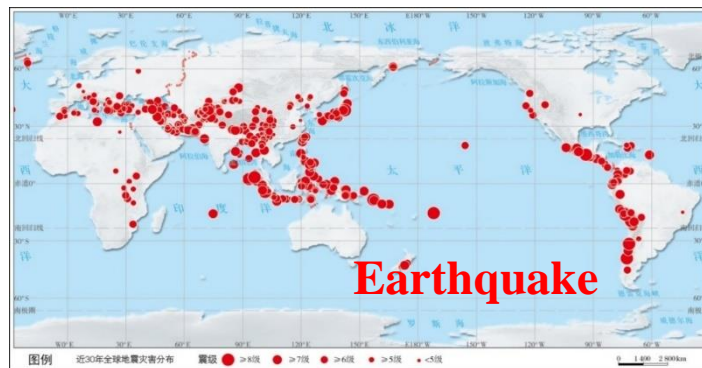
On-job training in April and November, 2019



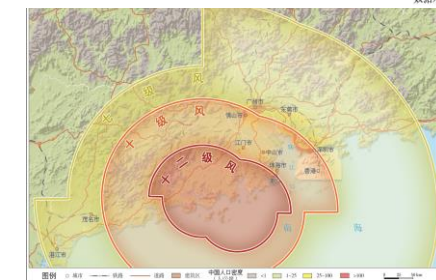
Field work on August, 2019

# Case 2 Disaster Reduction

According to the scale of 2018-2019 major natural disasters, the number of deaths, economic losses, scope of influence and social impact, 14 typical cases were screened for impact analysis.

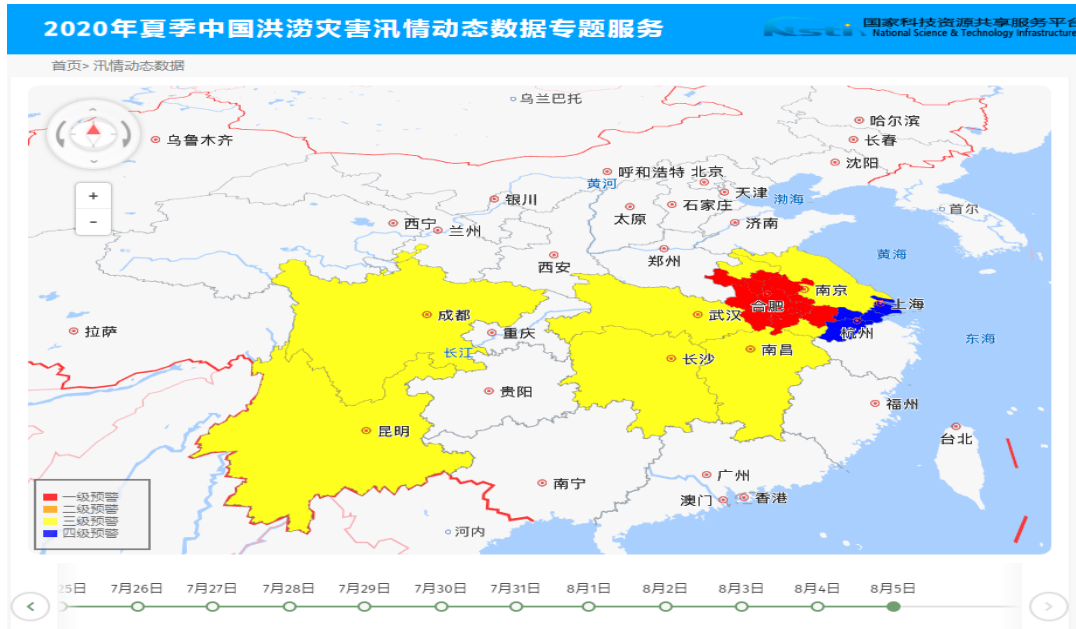


数据来源: 风云卫星

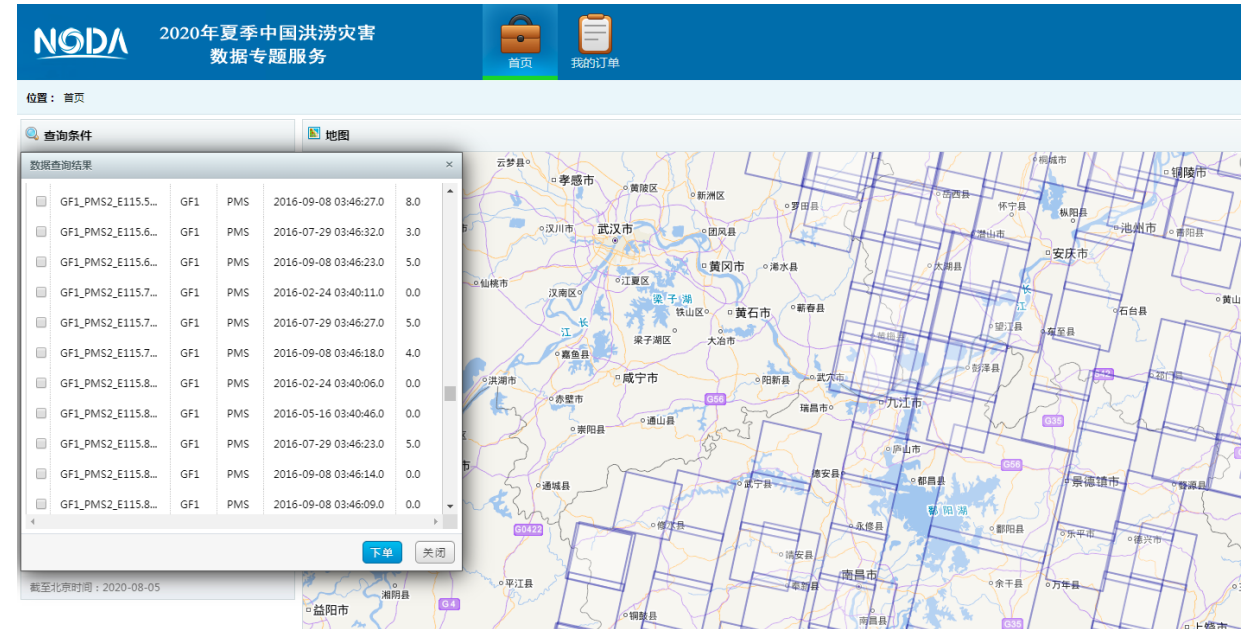




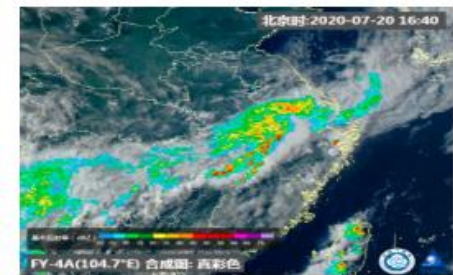
# Case 3 Space technology supports the space-born data for China summer floods



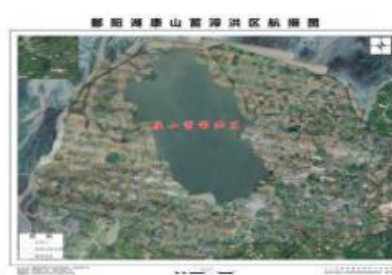
Daily Floods Warning Map in 2020



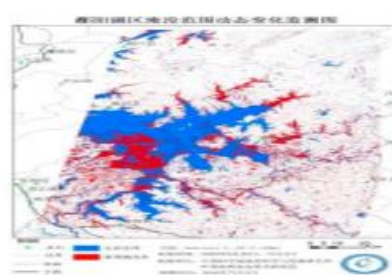
Post-event satellite imagery with coverage of Poyang Lake (<http://www.chinageoss.cn/cddr>)



FY-4A静止气象卫星真彩色云图雷达叠加图



无人机7月13-14日拍摄康山蓄滞洪区航摄影图

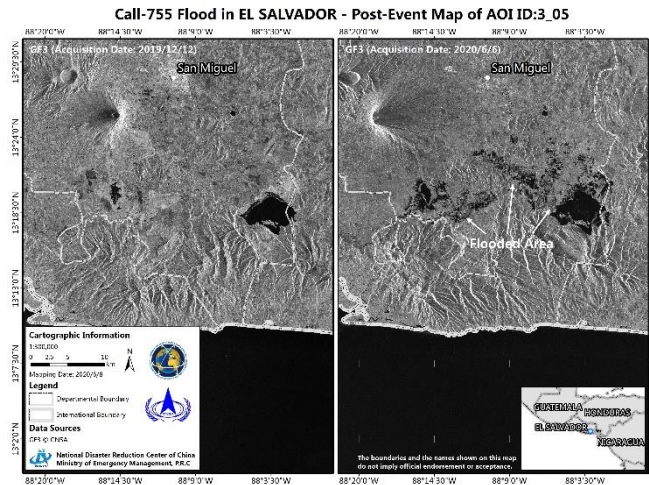


鄱阳湖区淹没范围动态变化监测图1

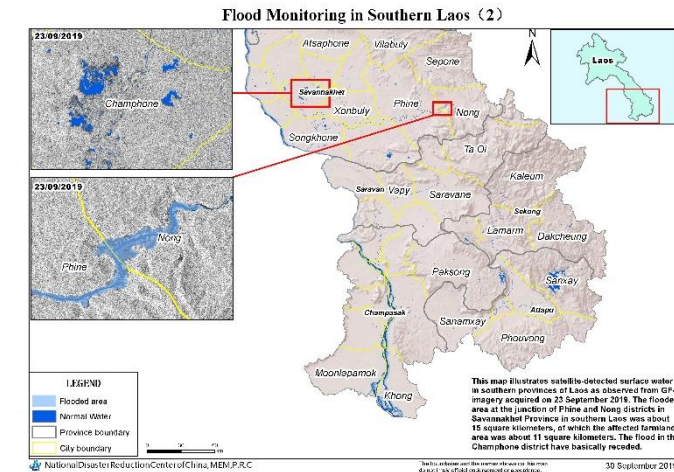
Flood loss mapping supported by shared datasets

Organized by the National Earth Observation Data Center and China GEOSS Data Sharing Network, more than 60 basic geographic datasets and hundreds of GF1/GF3/GF4/GF6 imageries have been free provided to all users. More than 150 disaster teams have worked on such datasets.

# Case 4 Space technology supports on international major disaster responses



**GF-3, a Chinese SAR satellite, was used on the Flood monitoring in El Salvador under the CHARTER mechanism in June, 2020 (NDRCC was the PM)**



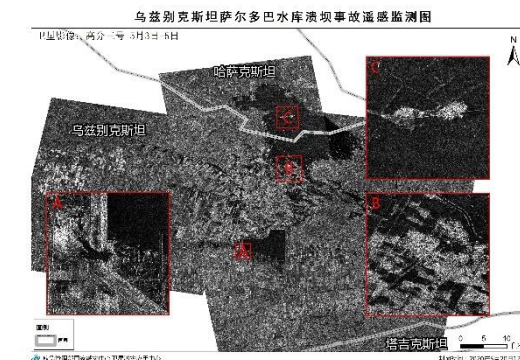
**Flood monitoring in Laos in Sep. 2019, which has been provided to the MoST, Lao P.D.R.**



**Wildfire in Australia (Nov., 2019)**



**Wildfire in Ukraine (April, 2020)**



**Sardoba dam collapsed in Uzbekistan in May, 2020**



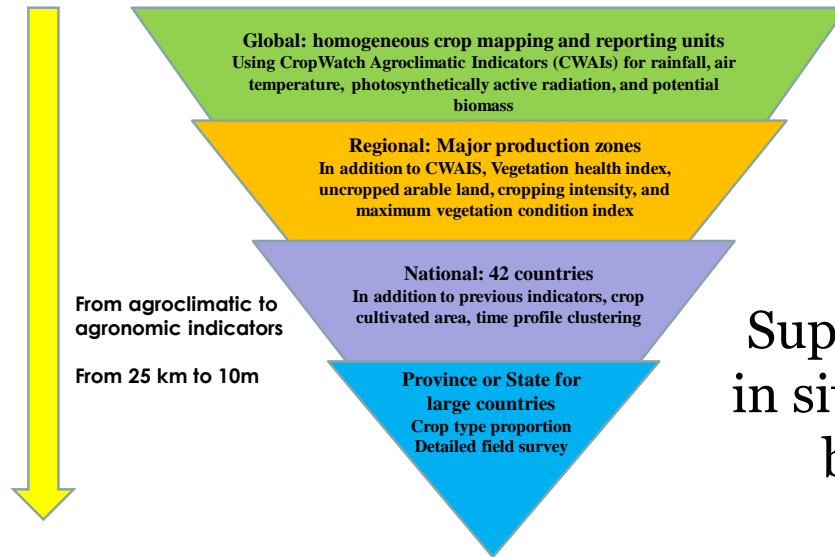
## ➤ 1.2 Management of natural resources

### ✓ For sustainable development

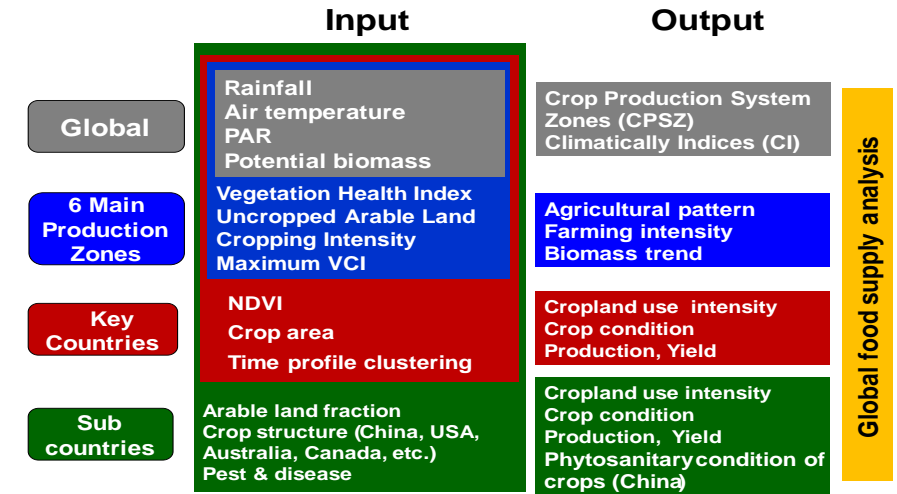
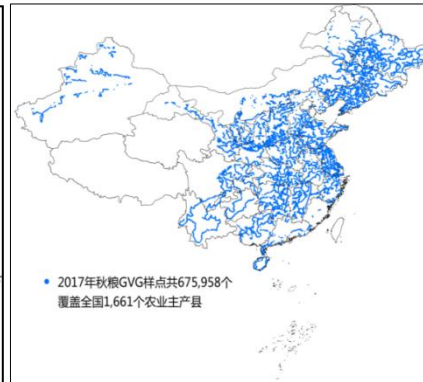
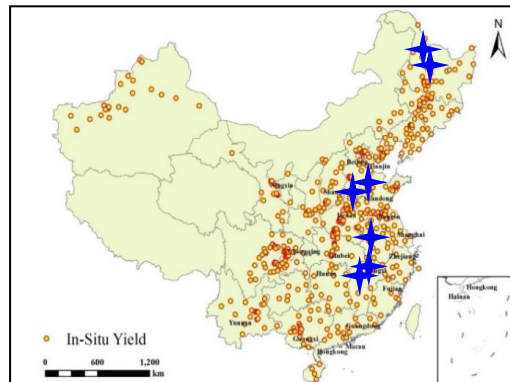
- Promote the sustainable development of the Belt and Road and the ecological environment
- Promote the transparency of global agricultural monitoring information and implement the goal of zero hunger
- Support the construction of sustainable cities and communities
- Sustainable approach to managing natural resources
- Conservation and sustainable use of marine and marine resources



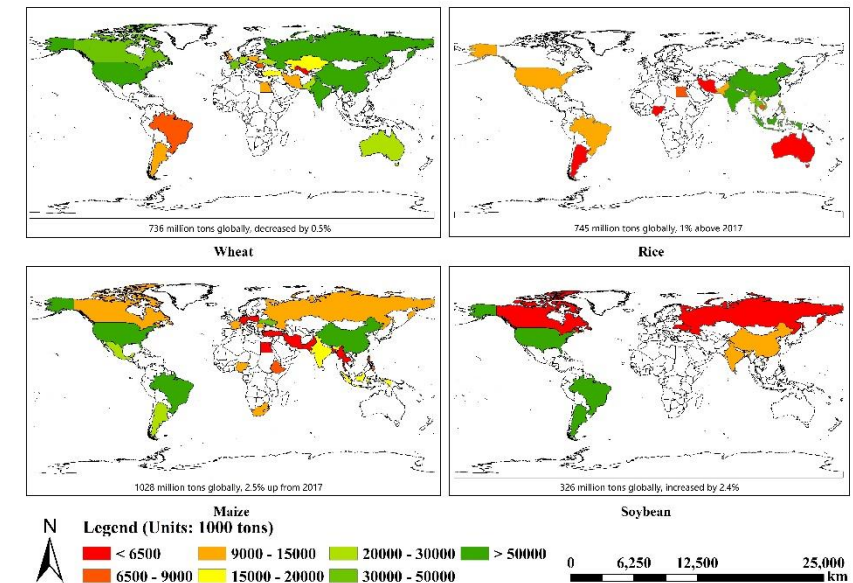
# ✓ Hierarchical approach for global agriculture monitoring



Supported by millions of in situ measurements and big data analytical techniques



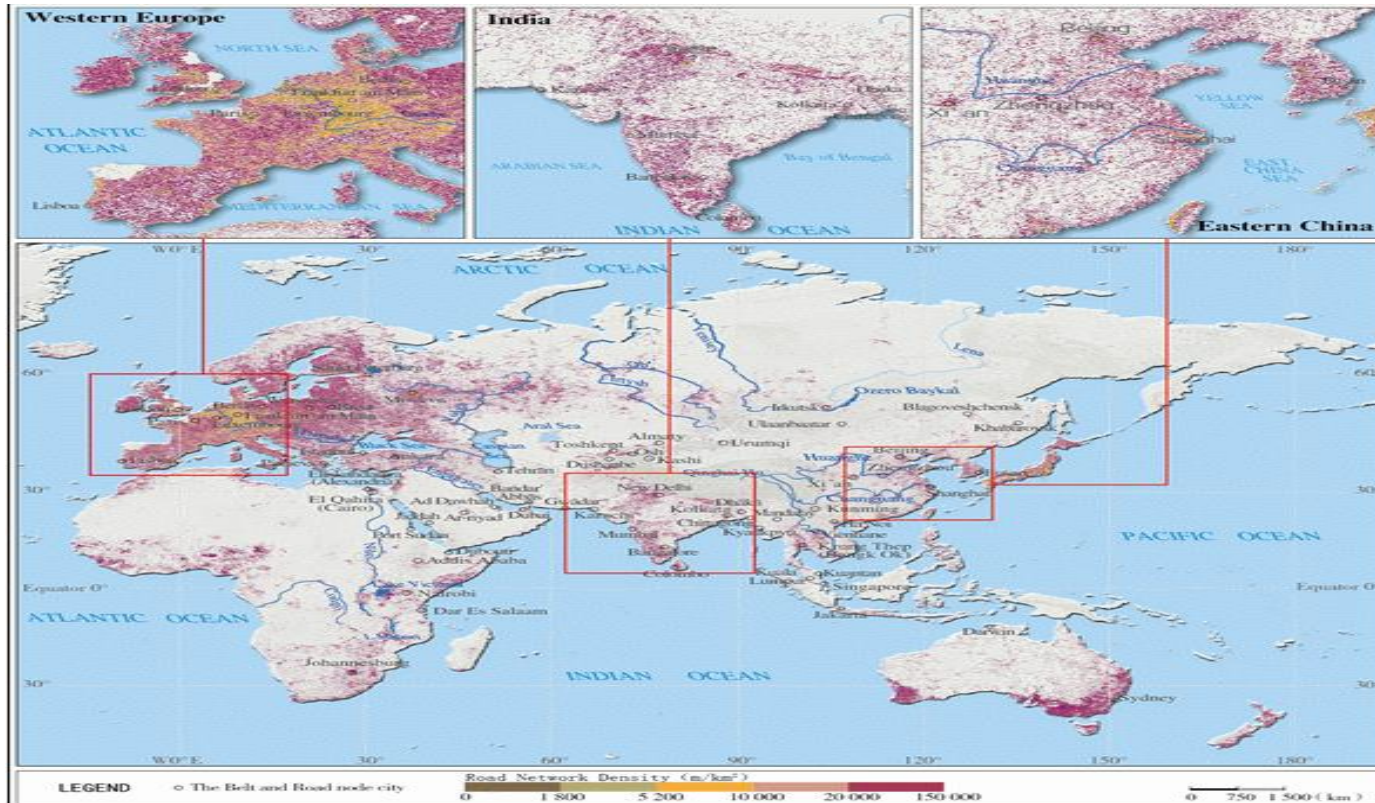
## Global Production for 2018





## ➤ 1.3 Connectivity for the 2030 Agenda for Sustainable Development

- ✓ Road network density distribution and road capacity
- ✓ Road accessibility of economic corridors
- ✓ Impact of road on landscape pattern

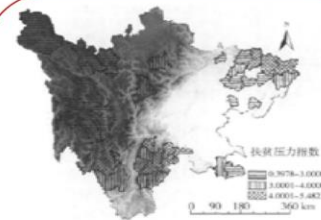


Distribution of road connectivity conditions in monitoring area

# ➤ 1.4 Social development

## ✓ GeoSpatial Technology in poverty alleviation

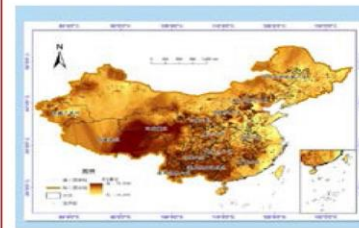
**Distribution and Causes of poverty Analysis**



(Li et.al, 2005)

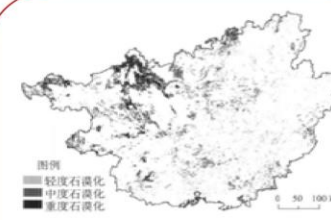


(Wang, 2012)

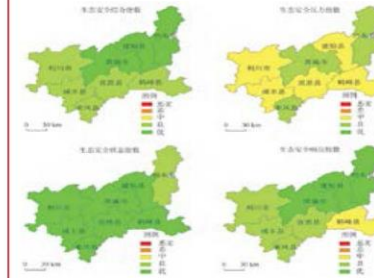


(Wang, 2015)  
National Science and Technology Support Program

**Resources, Environment and Natural Disasters Assessment in Poverty-stricken Areas**

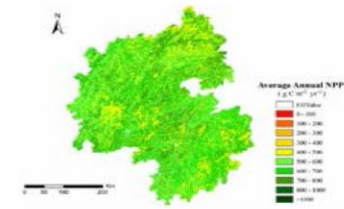


(Hu et.al, 2009)



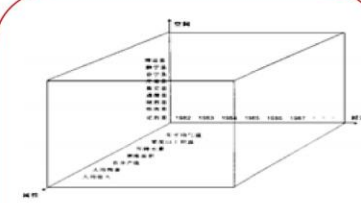
(Zhang, 2014)

National Science and Technology Support Program



(Sun, 2015)  
National Science and Technology Support Program

**Spatial Decision Support System for Poverty Reduction**



(Xu et.al,1999)



(Ge, 2015)  
National Science and Technology Support Program



(Hou, 2017)

spot

Landsat

DEM

Night light

China Earth Resource Satellite Images

UVA

**Seven-year Priority Poverty Reduction Program (1994-2000)**

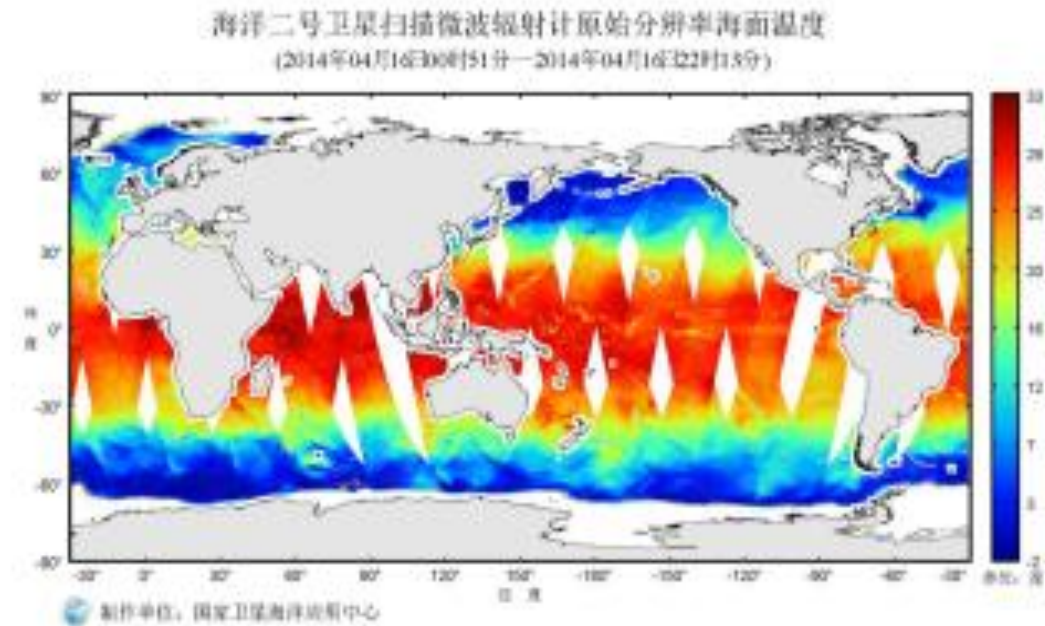
**Outline for Poverty Reduction and Development for China's Rural Areas(2001-2010)**

**Outline for Poverty Reduction and Development for China's Rural Areas(2001-2010)**



## ➤ 1.5 Climate change

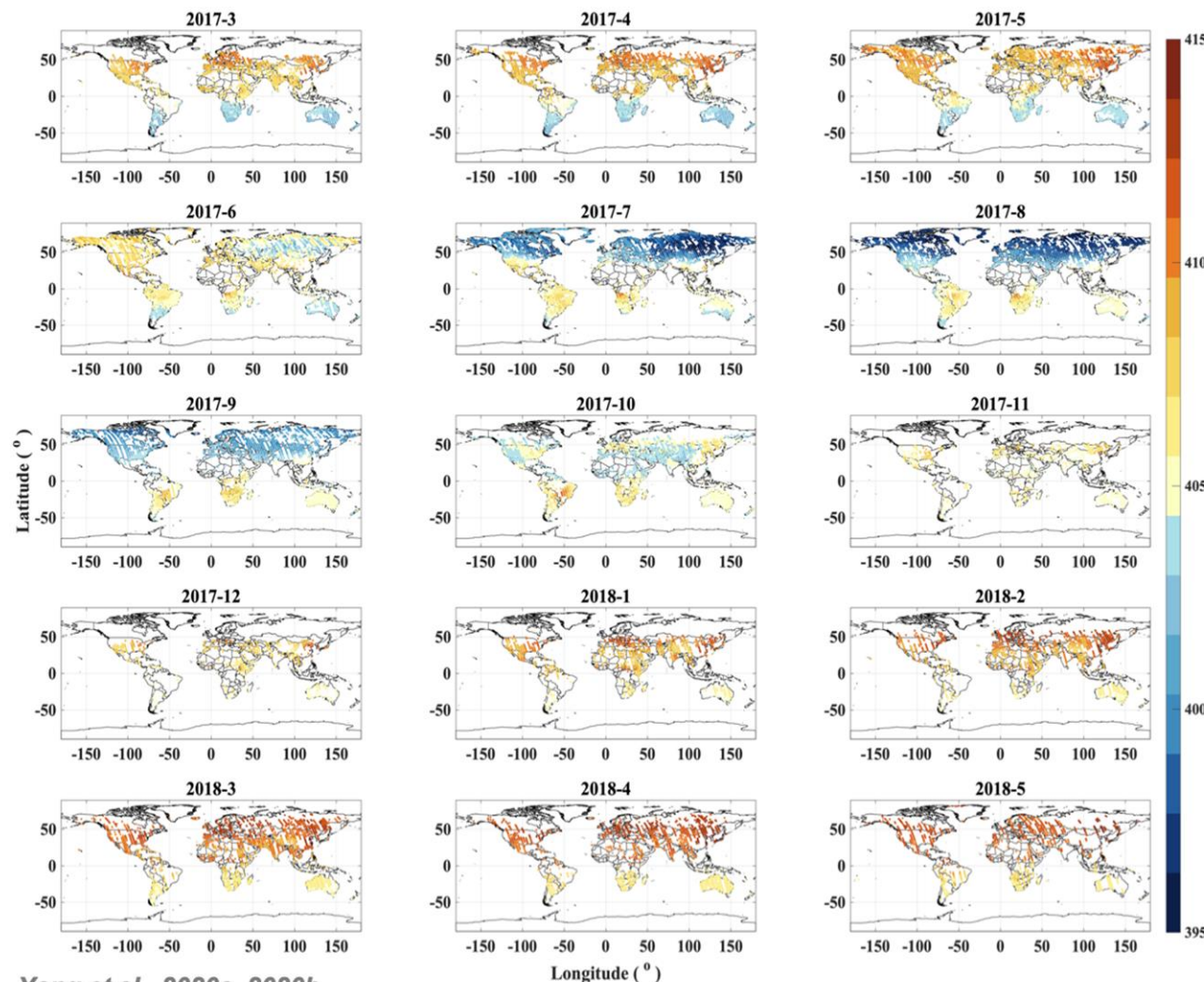
- ✓ Strengthen atmospheric environmental monitoring to support global climate change research
- ✓ Strengthen ground-based carbon dioxide observation capability and support long-term climate change analysis
- ✓ Conduct comprehensive observations of environmental changes in cold regions and fully understand the key processes of global change
- ✓ Conducting marine environmental monitoring to serve the interaction between climate change and the ocean
- ✓ Strengthening extreme weather monitoring to address the effects of climate change



**SST from microwave sensor in Ocean 2 satellite**

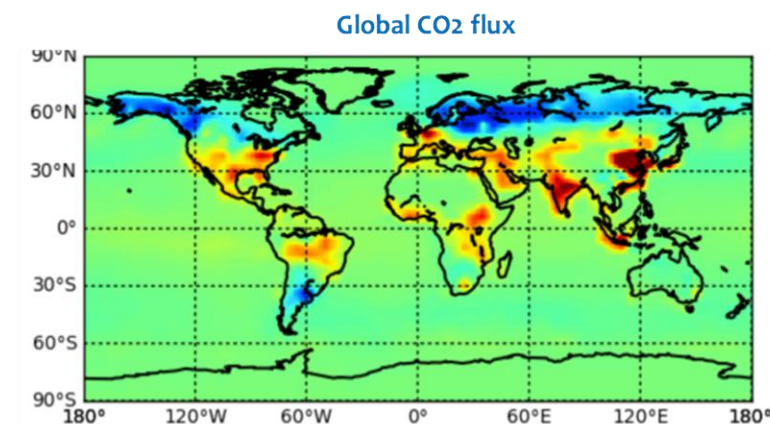
# Case 1 China carbon monitoring satellite mission, TanSat, **XCO<sub>2</sub> data product v2**

Launched  
in Dec 2016

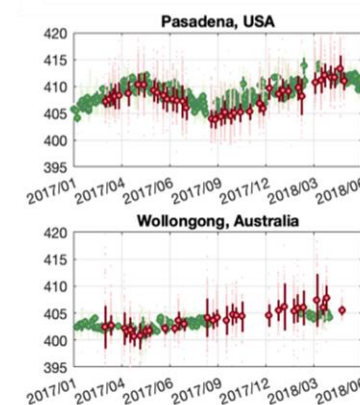


Yang et al., 2020a, 2020b

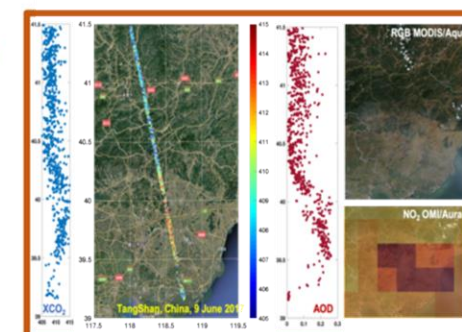
IAP Carbon dioxide retrieval Algorithm for Satellite observation



Validation



Emission study



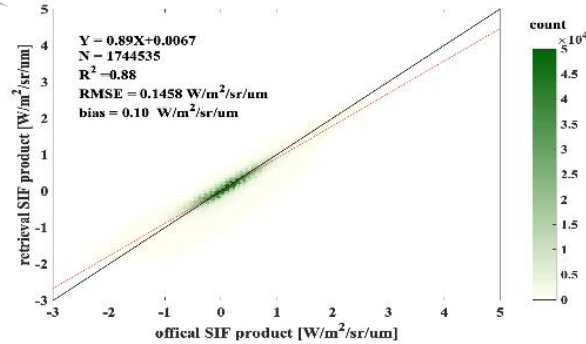
China GEO TanSat data service, [www.chinageoss.org/tansat](http://www.chinageoss.org/tansat)



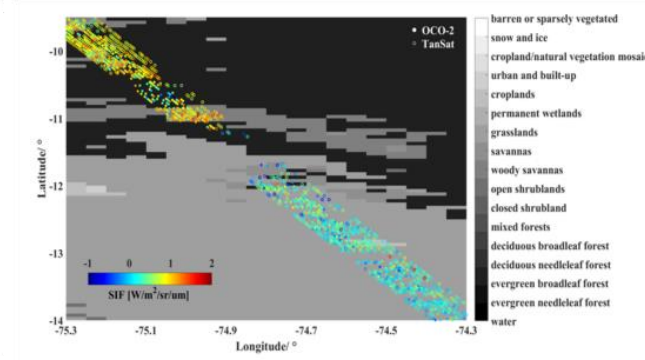
# Case 2 China carbon monitoring satellite mission, TanSat, **Solar-induced chlorophyll fluorescence (SIF) data product**



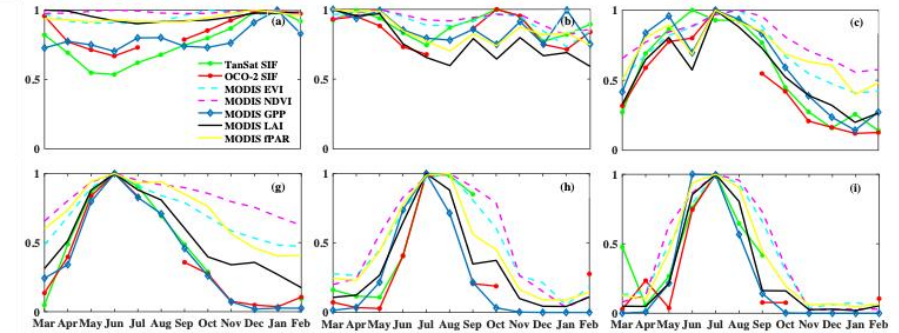
Verification



Comparison



Seasonal variation



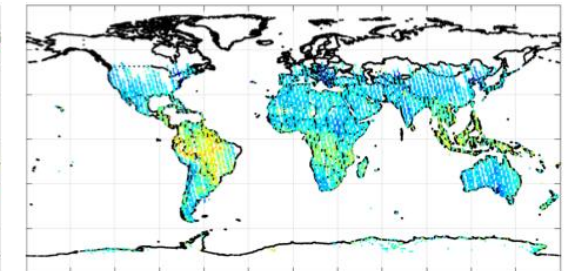
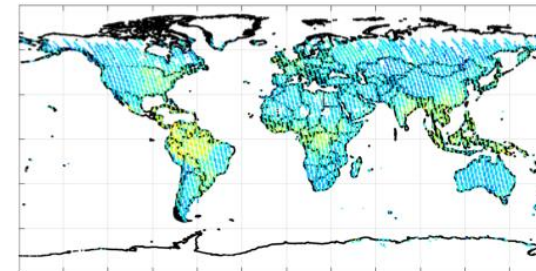
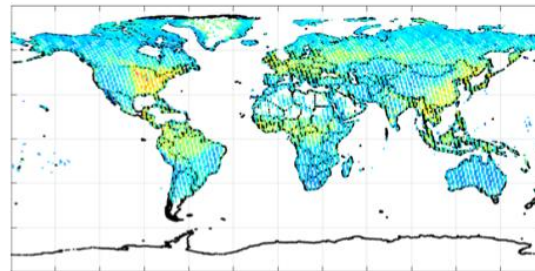
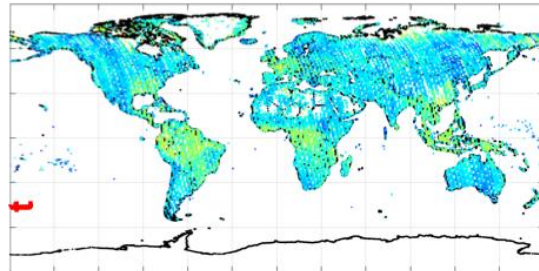
Spring

Summer

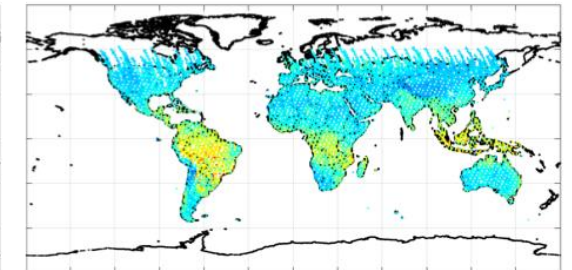
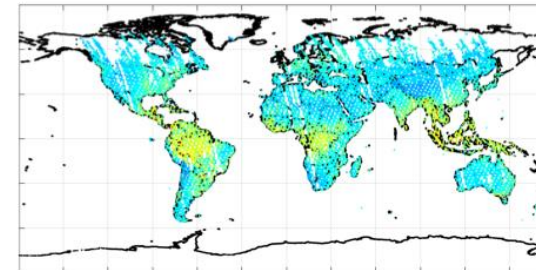
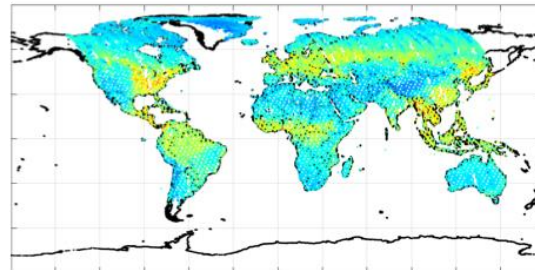
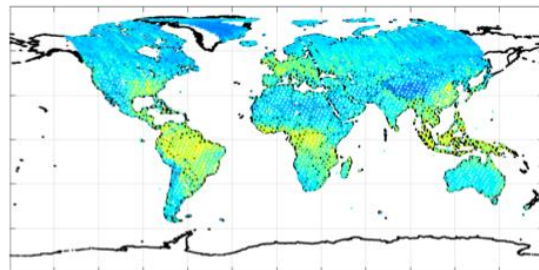
Autumn

Winter

TanSa



OCO-2



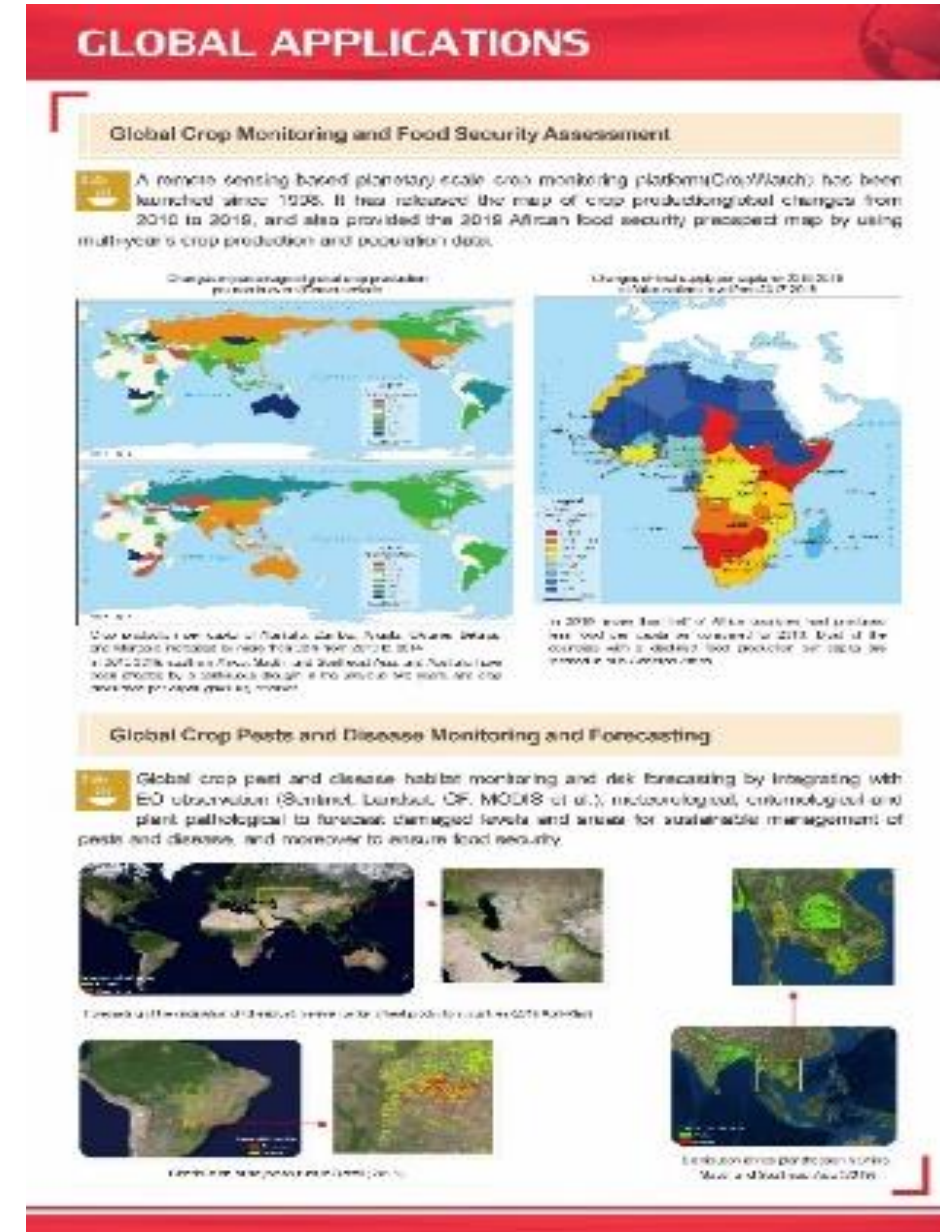
China GEO TanSat data service, [www.chinageoss.org/tansat](http://www.chinageoss.org/tansat)



## ➤ 1.6 Activities cutting across all thematic areas

### ✓ Global Ecological Environment Remote Sensing Monitoring Annual Report

- Land degradation
- Major global disasters
- The ecological environment of the Belt and Road Initiative
- Bulk grain and oil crops
- .....





# □2 Contributions of China

## ➤2.1 Data share

### ✓ National Integrated Earth Observation Data Sharing Platform(DSNet)

- DSNet is a national data sharing platform, constructed by the whole Chinese earth observation communities, provides one-step earth observation data sharing to national and global users.
- Through DSNet, China has provided 5TB with 2.38 million remote sensing data and scientific datasets to GEOSS portal, including FengYun、Gaofen、HuanJing、CBERS、ZhangHeng、TanSat、TripleSat、JiLin-1 and Super View.



Chinese Portal, <http://www.chinageoss.org>



International Portal  
<http://www.chinageoss.org/en/index.html>



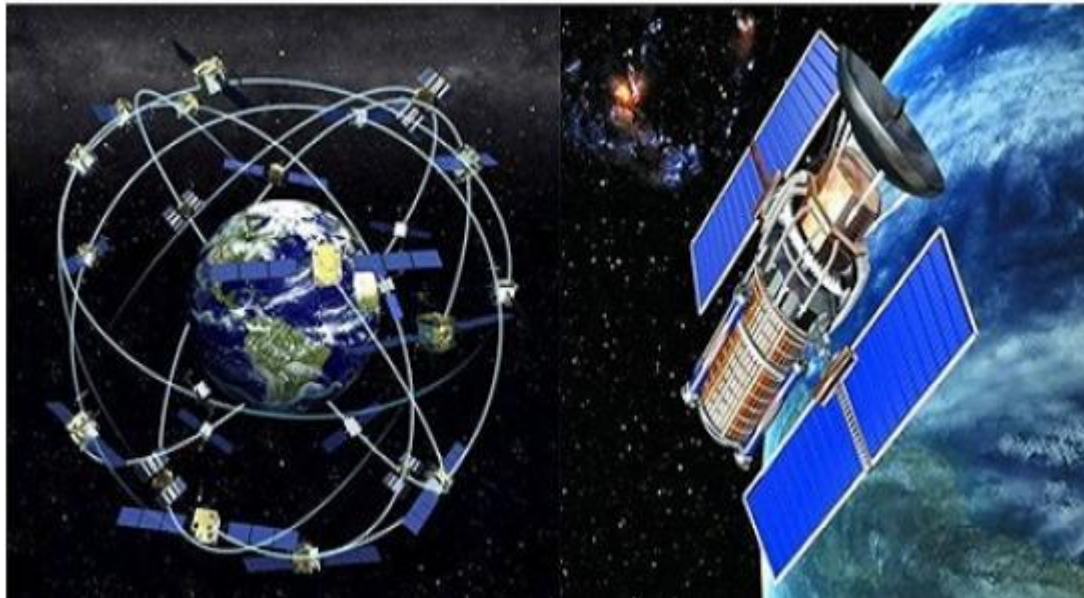
GEOARC Portal  
<http://www.chinageoss.org/geoar/en/index.html>



TanSat Portal  
<http://www.chinageoss.org/tansat/index.html>

## ✓ Beidou satellite navigation system completes global networking

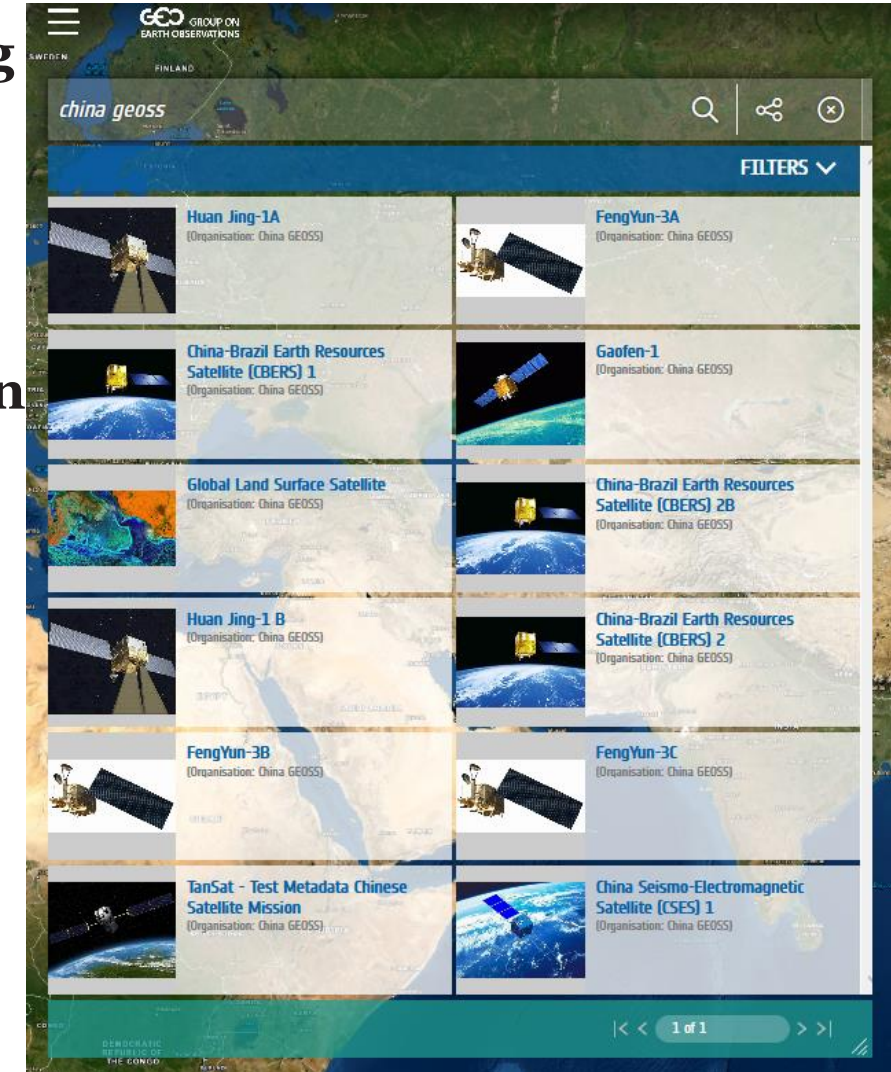
- On July 31, 2020, the Beidou-3 global satellite navigation system completed the global networking and officially opened. It has 5 important functions: real-time navigation, fast positioning, precise punctuality, position report, short message communication
- Since the Beidou system provides services, it has been widely used in the fields of transportation, agriculture, forestry and fishery, hydrological monitoring, weather forecasting, communication timing, power dispatch, disaster relief and mitigation, and public security.





## ➤ 2.2 China provides services to the international community

- ✓ Strengthen global ecological environment monitoring
- ✓ Strengthen regional GEOSS capacity building
- ✓ Strengthen data sharing capacity building
- ✓ Continuous improvement of Earth observation capability
  - Fengyun meteorological satellites
  - CBERS resource satellites
  - Gaofen high-definition earth observation satellites
  - TanSat carbon dioxide observation satellite
  - LuoJia night-light satellite



## ➤ 2.3 Training work

- ✓ The China capacity improvement training course was successfully held in Nepal, Sri Lanka and Laos, and 120 trainees were trained since 2018.
- ✓ Through the Asia-Pacific Space Cooperation Organization platform, overseas training was conducted in Thailand, Pakistan, Turkey, Mongolia and Bangladesh, and a total of 220 foreign students were trained.
- ✓ In the Dunhuang satellite radiation calibration field, special training for satellite radiometric calibration technology was carried out for 20 students from Thailand, Pakistan, Turkey, Peru, Bangladesh and Mongolia.

**Nearly 120 young scholars from 21 countries in the AO region were financially supported**





# ✓ Drought Monitoring Training for AP countries

## ■ Advanced training on geospatial information applications for Drought Monitoring

- Feb 19-22th 2019; Nov 18-20th, 2019, Thailand;
- 6 staffs from Department of Meteorology and Hydrology (DMH), Myanmar
- 9 master's degree students from Sirindhorn Center for Geo-Informatics (SCGI)

## ■ DroughtWatch system training for Kyrgyzstan

- Nov. to Dec., 2019, Beijing
- 2 staffs from Agency of Hydrometeorology under the Ministry of Emergency Situations of Kyrgyz Republic



DroughtWatch training for Kyrgyzstan in AIR, Beijing



GVG training for DMH and SCGI in Thailand

# □3 Good practice in combating covid-19 and lessons learnt

## ➤ 3.1 National Remote Sensing Center of China response to COVID-19

At present, more than 15 agencies of China have made positive response, and carried out lots of contributions such as the emergency observing, data sharing, as well as decision support through spatial analysis, risk analysis, and social-economical impact analysis.

### COVID-19 and Resumption of Production in Beijing-Tianjin-Hebei Metropolitan Region

LIESMARS , Wuhan University



LIESMAR has carried out research on the resumption of Production in Beijing, Tianjin and Hebei region in the influence of COVID-19 since February 2020. Using nighttime light data, research on the nighttime activity in Beijing-Tianjin-Hebei metropolitan region. Monitor and analysis for a period of time, we found that the total nighttime light in this region gradually returns to the daily level before the Spring Festival. From the Spring Festival to the ninth week after that, the total nighttime light in the defined shutdown region returns to about 50%.

### Satellite Data Show: More Countries Pushed a Giant Pause Button

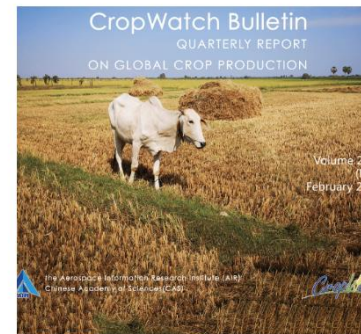
CRESDA



In the context that COVID-19 sweeps the world, China Centre for Resources Satellite Data and Application (CRESDA) applied the remote sensing satellites which shoots imageries from 600 thousand meters high, to conduct a quick impact survey on traffic flow around universities, parking lots and commercial hubs in the United States, France, Germany and Spain during 14-28 March 2020. Comparing with the imageries before the outbreak of the pandemic, it can be easily found that those four countries are almost empty after rigorous measures are taken by the government to restrict people's movement for the victory of fighting pandemic.

### COVID-19 and Crop Conditions in China

RADI-CropWatch Team



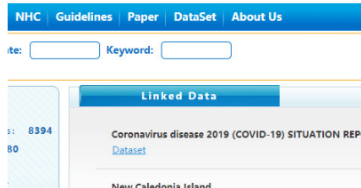
The CropWatch team used multi-source remote sensing data including Sentinel-2 and Landsat 8, together with the field survey data collected using the GVG Field Data Collector App (which is freely available at Google Play or iOS APP Store). Analyses based on big Earth data have revealed favourable crop conditions and yield for 2020 is expected to be above that of 2019 for the summer harvest. In general, limited impacts from COVID-19 were observed on winter crop greening-up and land preparation for early rice in China. These results have been published in the February CropWatch bulletin.

### COVID-19 Knowledge and Data Hub

CAST / IGSNRR

#### COVID-19 Knowledge & Data Hub

中国科协联合国咨商专委会  
新冠肺炎疫情知识与数据信息系统



The COVID-19 Knowledge and Data Hub (GCdataPR COVID-19 KDH) was launched a few hours after the WHO announced COVID-19 as a global public health emergency on 31 January 2020. The system is hosted by the Global Change Research Data Publishing and Repository of IGSNRR, CAS, the China GEO data publishing center. The HUB features daily situation reports and data from global and Chinese sources; publications from journals, including more than 6000 articles from more than 1000 journals published during the last two and a half months; and data attracted from the daily situation reports and articles including geographical data sets.



## ➤ 3.2 COVID-19 Outbreak Network Geographic Information System

- ✓ The spatial distribution of the COVID-19 epidemic data and the development trend over time are visually and visually represented in a graphical way, accompanied by relevant data charts, epidemic trend charts, etc.
- ✓ The results were released via the Internet for users to browse, Query etc.



## ➤ 3.3 Big data helps prevent and control COVID-19

- ✓ Since the outbreak of the COVID-19 epidemic, information related to the epidemic has exploded. Artificial intelligence, big data technology, and effective data processing and analysis methods have been used to extract valuable information from the ever-increasing mass of data and pass it on to the public.

# THANK YOU

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**Phone: +86-10-58881165 Fax: +86-10-58881167**

**<http://www.nrsc.gov.cn>**