Session Report of the AOGEO TG 7 Environmental Monitoring and Protection

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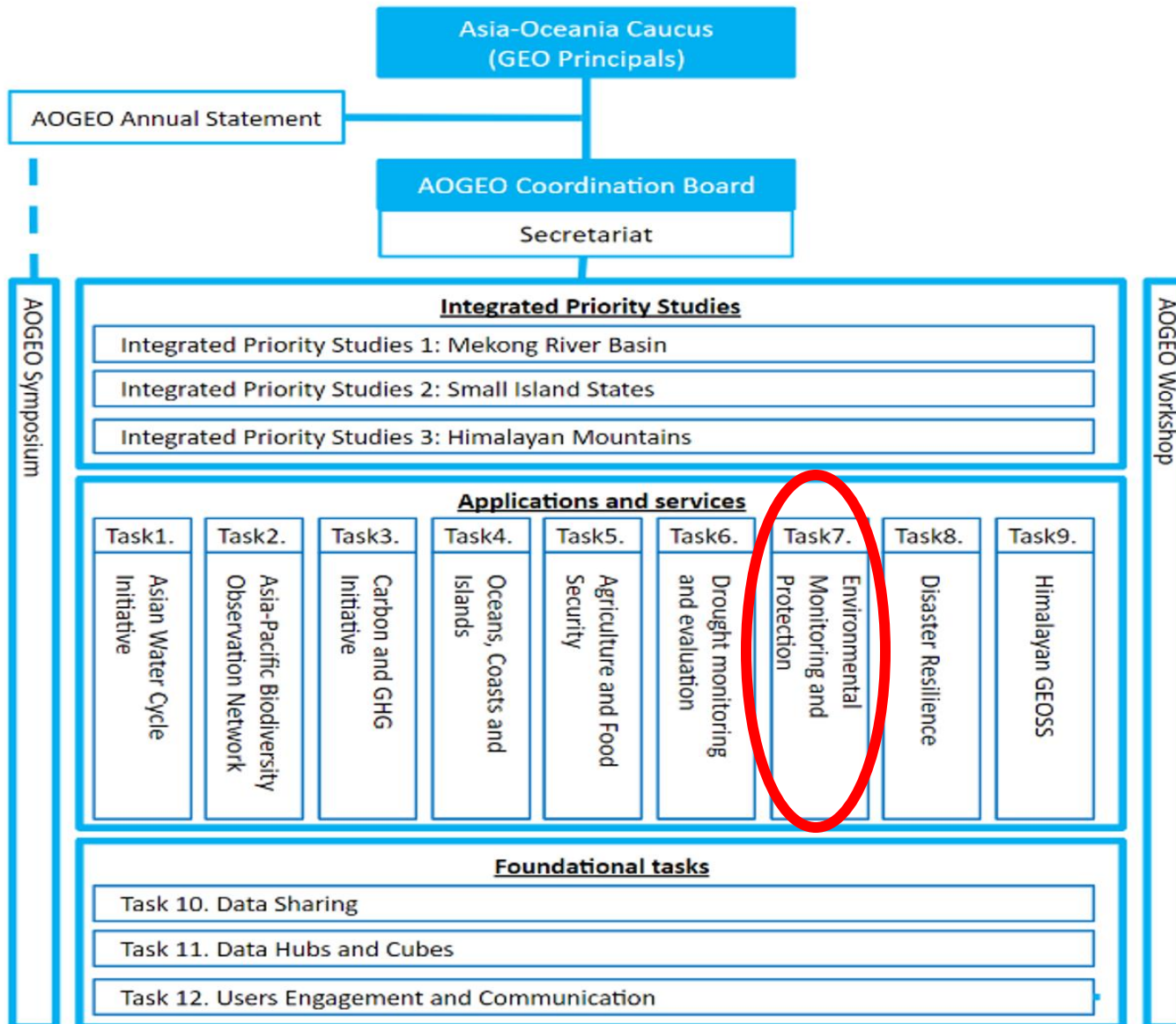
September 5, 2024
Tokyo, Japan

TG -7: Environmental Monitoring and Protection (EMP)

Outline

1. **Overview of AOGEO TG-7**

2. Achievements

3. Ongoing Issues

4. Way forward for post-2025

AO
GEO
Earth Observations
for Asia-Oceania

Task group 7—Environmental Monitoring and Protection

- ✓ Advocate Analysis-Ready Open Data, by integrating multiple EO data to generate common products for EMP

- ✓ Promote cooperation for regional monitoring and assessment of ecosystem status and environmental quality

- ✓ Provide knowledge-based decision support for human well-being and environmental protection

- ✓ Release Annual Reports for ecosystem and environmental monitoring to support the GEO priorities

- ✓ Facilitate capacity building for the Integrated Priority Studies

3

TG7 EMP Contributes to GEO's Engagement Priorities

SDGs
Sustainable Development Goals 2030: EMP directly addresses the issues of SDG 3, 6, 7, 11, 13, 14, 15 and 17 to support evidence-based decision making for environmental protection.
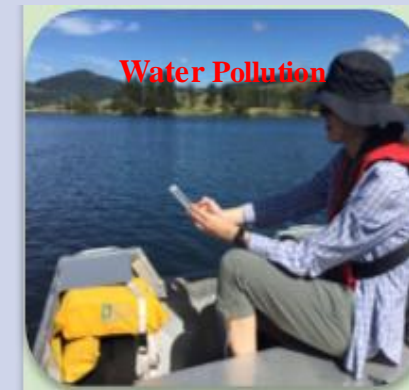
Climate Change:
The Paris Agreement within UNFCCC: EMP analyzes the variability of terrestrial ecosystem status, atmospheric and inland water qualities, and evaluate the environmental impacts and feedbacks to climate changes.

Desertification

Air Pollution

Ecosystem deterioration

Water Pollution

1) SDG3: Good Health and Well-being
2) SDG6: Clean Water and Sanitation
3) SDG7: Affordable and Clean Energy
4) SDG9: Industry, Innovation and Infrastructure
5) SDG11: Sustainable Cities and Communities
6) SDG13: Climate Action
7) SDG14: Life below Water
8) SDG15: Life on land
9) SDG17: Partnership for the Goals
......

AOGEO-TG7 Activities

Organize or participant **25 activities**, Participants 10000+ , The participating countries 20+

AOGEO 2024
- • **2024.9 TG7 sectorial meeting, 16th AOGEO Symposium, Tokyo, Japan, onsite/online**

AOGEO 2023
- • **2023.6 6th AOGEO workshop, Macao, China, onsite/online**

AOGEO 2022
- • 2022.6 5th AOGEO workshop, Beijing, China, online
- • 2022.9 TG7 sectorial meeting, 15th AOGEO Symposium, online

AOGEO 2021

2021.2 13th AOGEO Symposium, TG7 sectorial meeting, online
2021.6 GEO virtual symposium, online
2021.7 4th AOGEO workshop, Beijing, China
2021.11 14th AOGEO Symposium, GEO week, GEOARC side event, online

AOGEO 2020

2020.6 GEO virtual symposium, online

2020.10 3rd AOGEO workshop, Changzhou, China

AOGEO 2019

2019.11 12th AOGEO Symposium, Canberra, Australia

2019.11 GEO week, AOGEO-EuroGEO side event, Idea stage, Canberra, Australia

AOGEO 2018
- • 2018.5 AO GEOSS workshop, Deqing, China
- • 2018.10 AOGEO symposium, GEO-XV and GEO week, GEOARC side event, Kyoto, Japan

AOGEOSS 2017

2017.10 GEO week, GEOARC side event released Belt & Road, AOGEOSS progress, Washington D.C. USA

AOGEOSS 2016

2016.4 AOGEOSS initiative work group
2016.11 AOGEOSS TG-7 established, St. Petersburg, Russia

TG7 session on Sep. 4

- **9 Speakers** from **China, Australia, Pakistan, Thailand, Bangladesh and Cambodia.**
- 50+ Participants on site and online together.

- Asia-Oceania Environmental Monitoring Platform (AOEM) with advanced monitoringb and analysis techniques.

- Developed 16 thematic Products and several advanced algorithms

- 16m LULC (Global) produced by Chinese satellites (1,6) with an overall accuracy of 89% based on MuSyQ system
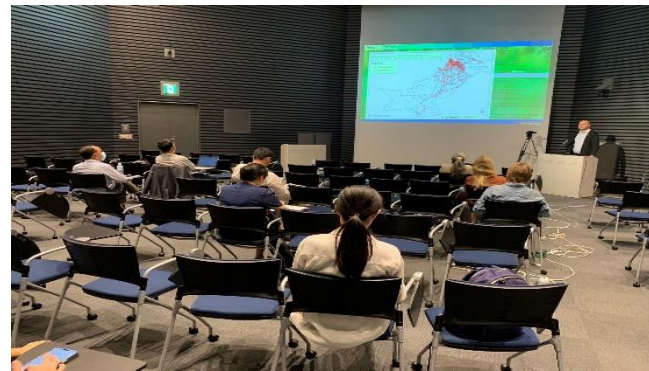
- **A wide range of topics were covered, Including**
Global LULC Change, **AOEM platform**, Climate policies in Pakistan, Air Quality monitoring over Malaysia, Use of Geostationary data, Mangrove Forest Change in Thailand, Cambodia National Forest Monitoring, Environmental monitoring over Bangladesh, and Global environmental changes in major deserts

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Achievements— Multi-source Synergized Quantitative Remote Sensing Products (GEOMUSYQ) System

More than 20 types of Chinese and foreign satellite remote sensing data;

More than 20 global quantitative remote sensing products.
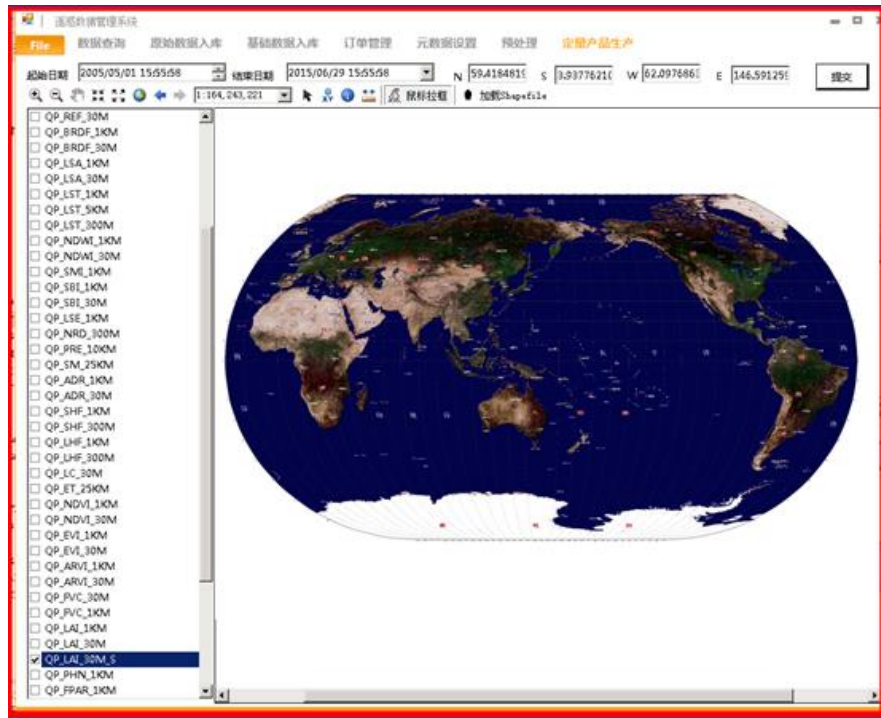
- Multi-source data Synergized Quantitative remote sensing production system (MuSyQ) independently developed by AIRCAS.

Achievements—Global LULC

- Developed a global LULC product at 16m resolution using Chinese satellite data (GF1/6) based on MuSyQ system.

2013

2013

2013
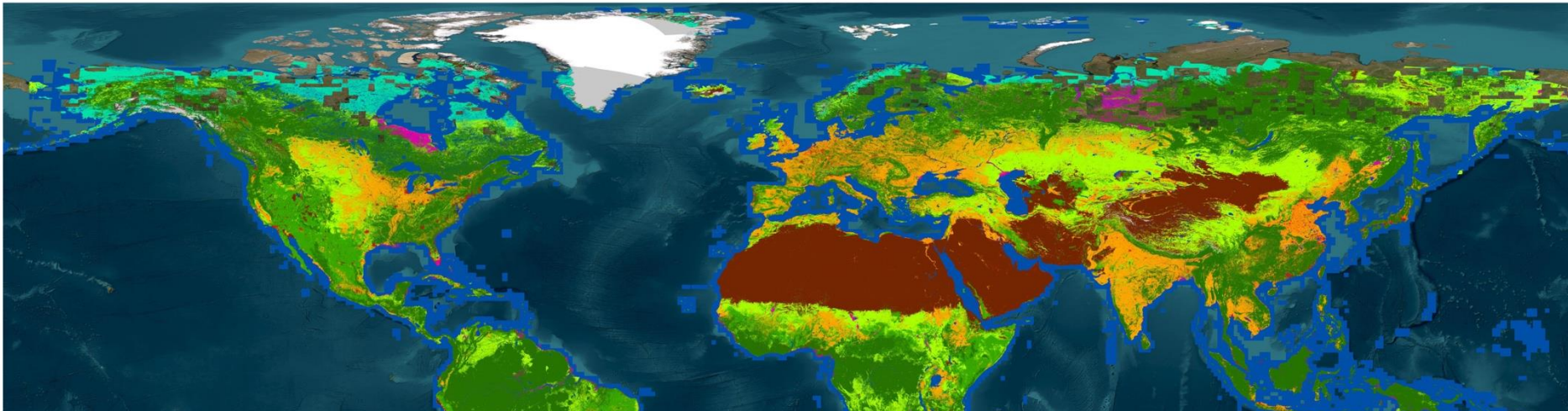
- ARD does help to improve the landcover mapping accuracy
- Longer time series of ARD are better for temporal consistency
- Yearly landcover can captures the subtle variations for knowledge discovering
- Complementary validation required
- Samples and validation for easy confused land covers from end users are encouraged and better to be collected by a public platform.

☐ 16 m spatial resolution

☐ Only the Chinese GF data are used

☐ Accuracy over 85%

☐ Higher frequency for updating：once a year

☐ Better temporal consistency

☐ high efficiency for producing
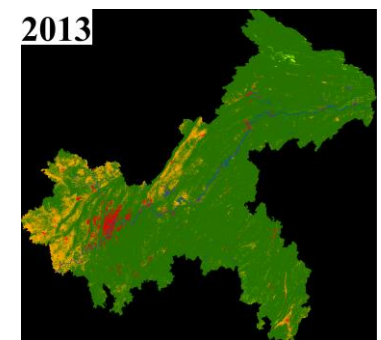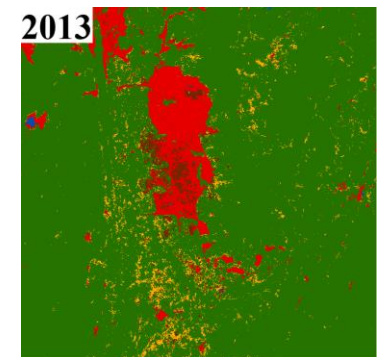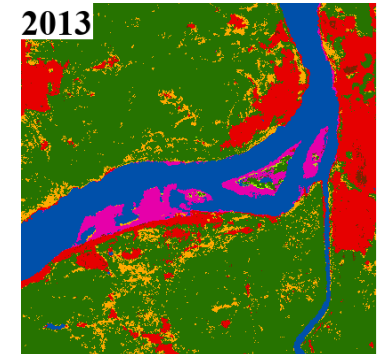
Achievements—Essential Environmental Variables products

全国2019年1-2月高分地表反射率合成图

全国2020年1月地表反照率产品图

2019年第一季度中国植被覆盖度分布图

2020年第一季度中国叶面积指数分布图

2020年第一季度中国叶面积指数分布图
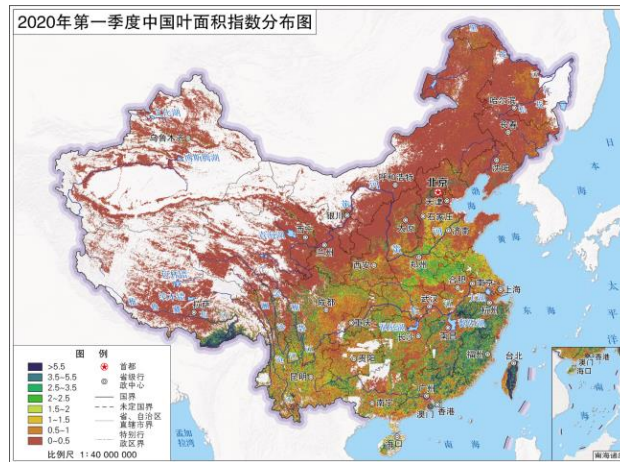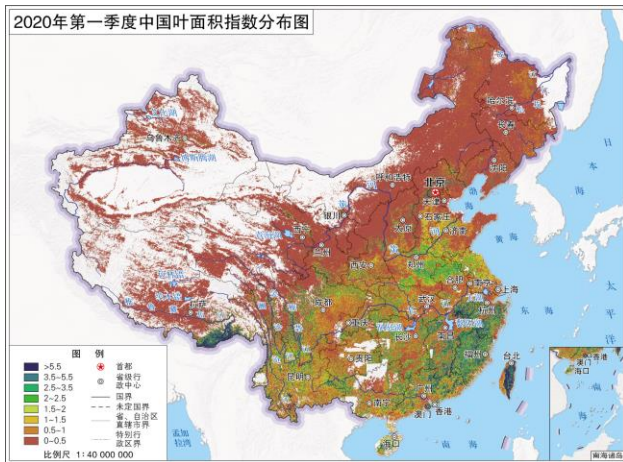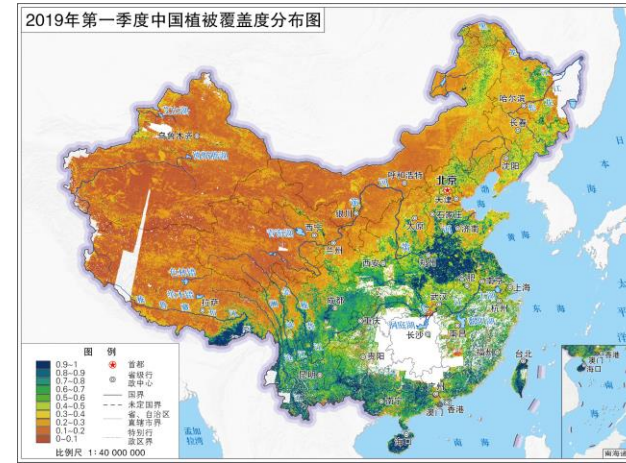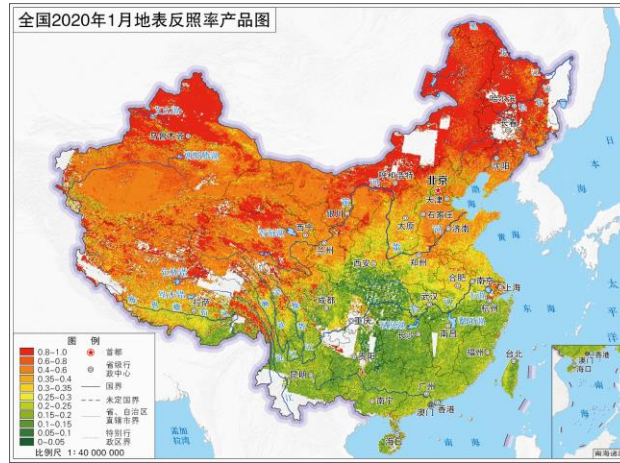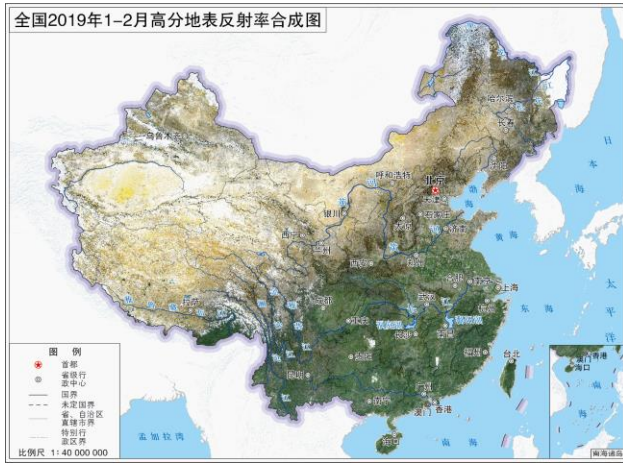
The first set of Gaofen series generic products was released on April 24, 2021, National Space Day

☐ Quantitative remote sensing products have been applied in many ministries and commissions (natural resources, national disaster reduction, ecological environment, etc.) and national tasks (three adjustment, national ecological environment assessment), and supported IPS.

10

Achievements—Environmental Monitoring platform

- Developed Asia-Oceania Environmental Monitoring platform (AOEM), to promote the international sharing and provide convenient information services in Asia-Oceania.
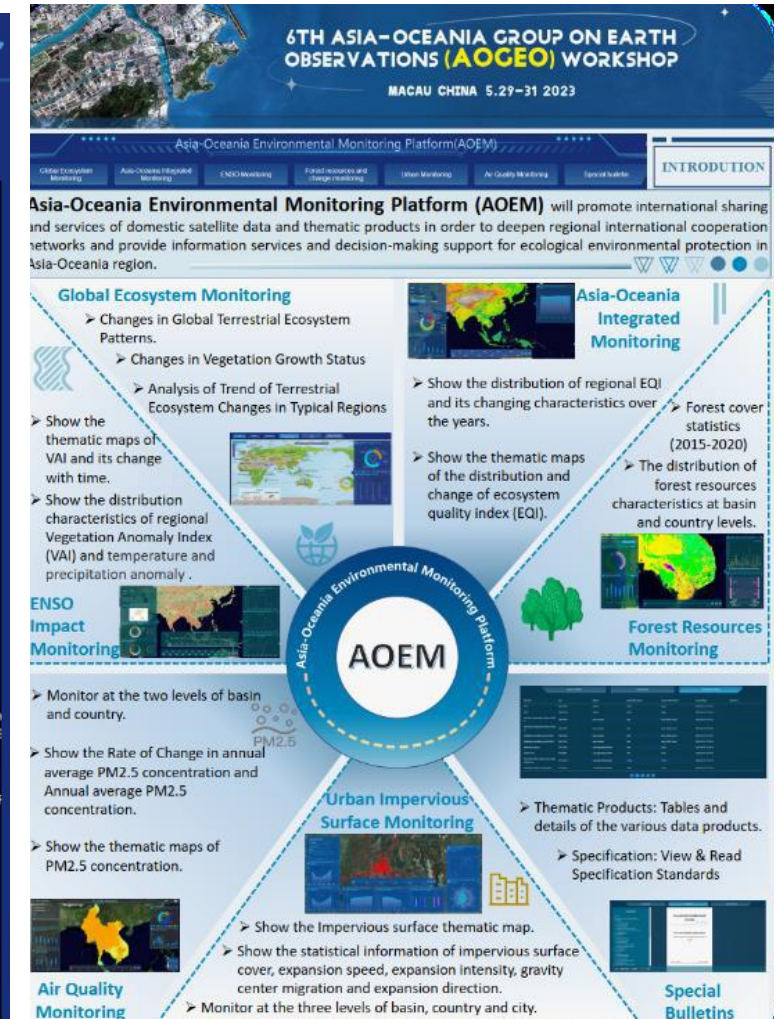
Achievements—Environmental Monitoring platform

- AOEM offers monitoring results including ENSO impact, Forest resources, Urban expansion, Air quality and Ecosystem quality, release the monitoring reports and products.

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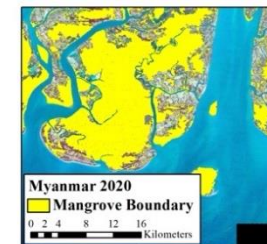Earth Observations
for Asia-Oceania

Application and cooperation

A great deal of ecosystem researches have been done under TG7, such as the air quality in Malaysia, heat wave, climate change and deforestation monitoring in Pakistan, the mangrove mapping in Thailand, flood and city monitoring in Bangladesh, forest change and detection in Cambodia, Global environmental changes and human activity in major deserts, and so on.

- Multi Sensor Satellite Observation for Particulate Matters Monitoring in Malaysia

32,000 avoidable deaths in Malaysia annually due to air pollution (Centre for Research on Energy and Clean Air and Greenpeace Malaysia, 2023)

- Spatial and Temporal Patterns of Mangrove Forest Change in the Mekong Region Over Four Decades Based on Remote Sensing Data-Driven Approach
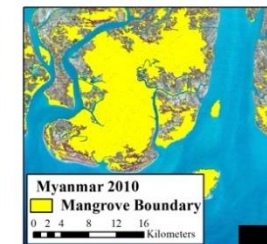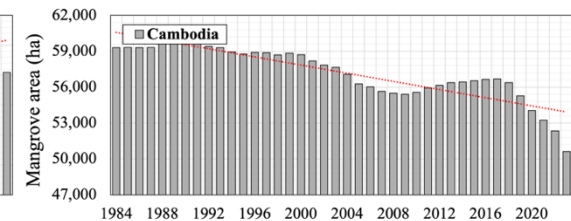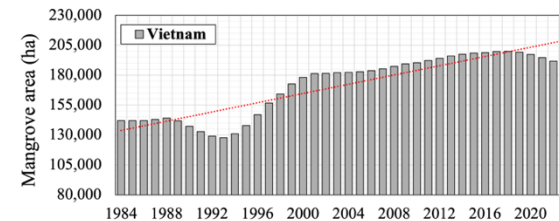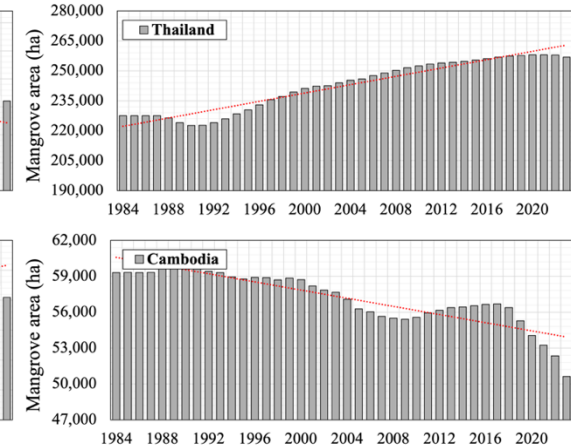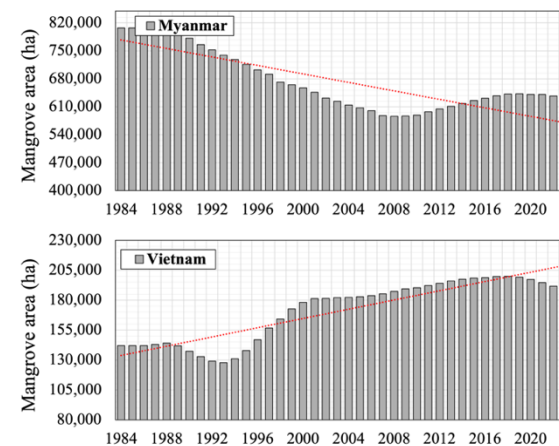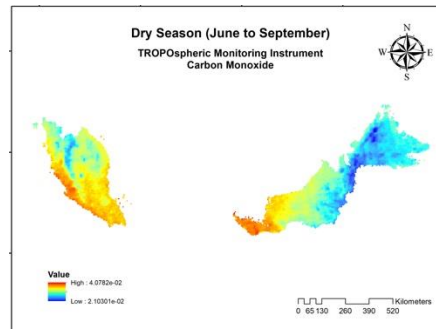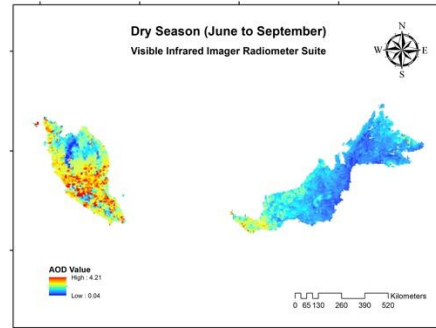
Application and cooperation

Climate change heat wave, and deforestation monitoring in Pakistan

Validation network
Platform of Algorithm Test of Remote Sensing Products(RESVAT)

Algorithm test and product validation are at the two ends of the common products generating process. Its service platform are of great importance for quality controlling in the generating of remote sensing common products, which **have 45 algorithms test and 25 common products validation capabilities** under a unified environment.
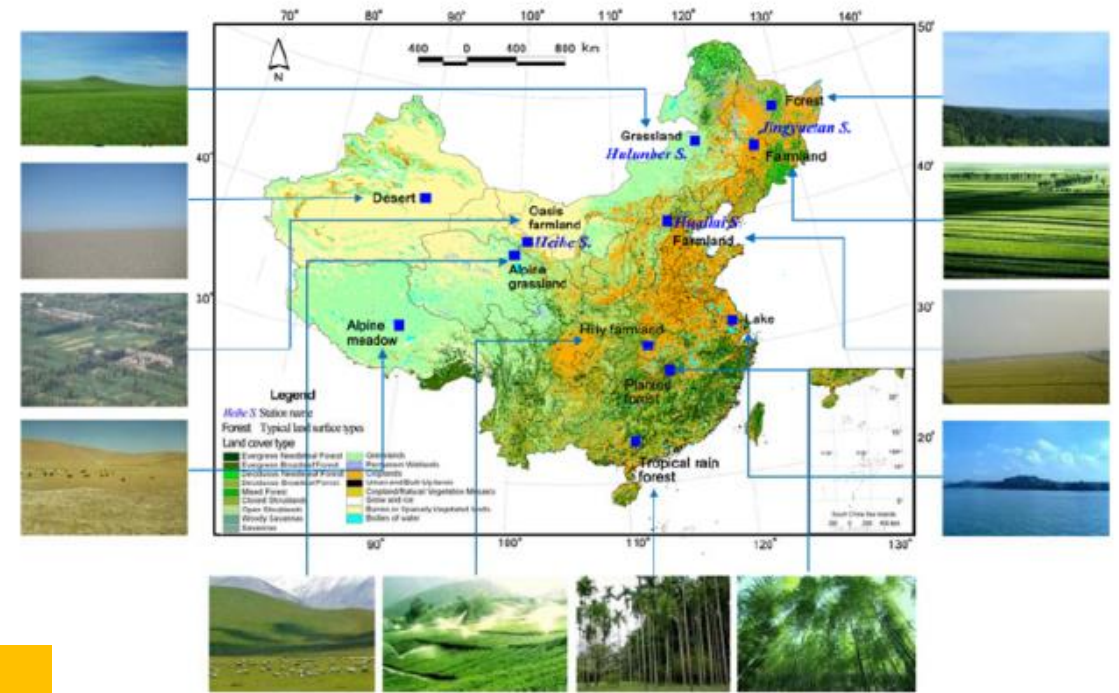
International validation network needs more efforts to build.

The *in situ* data is global-coverage, including China Validation Network (CVN) data.

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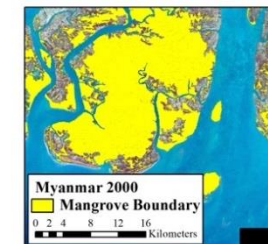2. Achievements

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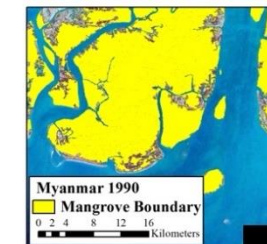Earth Observations
for Asia-Oceania

Way forward for post-2025

TG7-1 Land Cover/Use
Zhong Bo , Yule, Ping Tang, Thomas Corpetti, Jean-Louis, Roujean…

TG7-2 Ecosystem Environment
Jing LI and Alfredo HUETE, Xiaoping Xin, Jiaguo Qi…

TG7-3 Inland Water Quality
Qi Zhang, John Melack, Jeffrey Walker, Biswas…

TG7-4 Atmospheric Quality
Guohong, Li Wang, Martin Rudbeck Jepsen, Rachhpal Jassal…

Cooperate with TG2 Asia-Pacific Biodiversity Observation Network and TG3 GEO Carbon and GHG Initiative or other task groups

High Quality EEVs Products and integrated Analyses based EI

Cooperate with other GEO activities: GEOARC, GEO4SDG, ……

Support GEO engagement priorities: SDGs, Climate Change, Disaster Risk Reduction, Resilient Cities

Global Ecosystems Atlas

AO GEO
Earth Observations for Asia-Oceania

How contribute to GEA or AOEA?

AOGEO TG 7 have continuously carried out global ecosystems and environment monitoring, which will undoubtedly provide robust methodologies, open datasets, pubic knowledge, useful tools and collaboration network for the Global Ecosystems Atlas.

The challenge issues for GE Atlas or AOE Atlas include:

- **user orientation: How to fill the gap between the GEO society and the users**
- **integration and collaboration: different LULC classification systems; the gap between RS and In situ observation; the inconsistent scales and accuracy of EBV products......**
- **open knowledge: How to fill the gap among data-information-knowledge**
- **Operationalization: Fund，manpower, platform, mechanism...**

Cooperation and collaboration Mechanism

COP-15
GBF23

ARD-EBVs

MuSyQ

GEOARC

Integration and validation for atlas and EBVs.

Utilizing the advantages of multi source high resolution data, develop ecosystems atlas and EEVs

China BON

EMA-AO Verification Network

AOGEO

GEOBON

GEOBON

AP BON

GEAs

GBF-Evaluation System

AOGEO-TGs

TG2: APBON\ TG7: EMP)

Analyze and evaluate the typical ecosystem service functions, stress mechanisms for global ecosystems protection and biodiversity conservation

Convention on Biological Diversity

CBD

UNFCCC

United Nations Framework Convention on Climate Change

UNEP

Ramsar Convention on Wetlands

Wetlands

UN SDGs

Users

United Nations Convention to Combat Desertification

UNCCD

United Nations ESCAP

Call for Participation

AOGEO-TG7 welcomes all participants:

➤ **GEO Members** and countries in AO region

Australia, Bangladesh, China, India, Japan, Korea, Laos, Mongolia, Myanmar, Nepal, Pakistan, Vietnam, Cambodia, Bangladesh, Uzbekistan, Kazakhstan, Thailand, North Korea, South Korea, Philippines, Malaysia, Brunei, Singapore, Indonesia, Timor-Leste, Nepal, Bhutan, Sri Lanka, Maldives, Afghanistan , Iraq, Iran, Syria, Jordan, Lebanon, Israel, Palestine, Saudi Arabia, Bahrain, Qatar, Kuwait, United Arab Emirates, Oman, Yemen, Georgia, Armenia, Azerbaijan, Turkey, Cyprus, Palau, Nauru, Fiji, Tonga, Tuvalu, Samoa, New Zealand, Vanuatu, Kiribati, Solomon Islands, Marshall Islands, Papua New Guinea, Federated States of Micronesia.......

➤ **POs and other Societies:**

UNEP-IEMP, UNESCO-HIST, WMO, UNESCAP, CEOS, ICSU/Future Earth, ICSU/IRDR, ICIMOD, POGO, ISDE, ISPRS, GRSS, APSCO, UUCCD, FAO, IPCC, AIIB, ...

Thanks a lot for your attention !