

2024 AOGEO Statement

3rd – 5th September, 2024

The 16th Asia-Oceania Group on Earth Observations (AOGEO) Symposium was held in Tokyo, Japan from the 3rd to 5th September 2024. The Symposium was hosted by the Ministry of Education, Culture, Sports, Science and Technology-Japan (MEXT) with support from the GEO Secretariat and brought together 294 participants and 24 countries in total.

Earth observation plays a key role in enabling a more resilient future and the AOGEO Symposium serves as a crucial platform, bringing together experts and stakeholders from various countries in the Asia Oceania region. It promotes the exchange of knowledge and best practices, which, in turn, enhance the capabilities of Earth observation technologies.

This is the first time the Asia Oceania community has convened since the adoption of the GEO Post-2025 Strategy in November 2023. As the new Strategy emphasizes the theme of “Earth Intelligence for All,” this Symposium was designed with the theme of “Creating Earth Intelligence with the Asia Oceania Society” to align with and develop the Implementation Plan to execute the new Strategy in the context of the Asia Oceania region.

To highlight the theme of “Earth Intelligence for All”, this Symposium began with an introduction to the new Strategy and the process of developing the Post-2025 Strategy Implementation Plan. The challenges that require the creation of Earth Intelligence (EI) were identified, discussed, and summarized through the GEO Members’ country reports, Special Sessions, meetings of thematic Task Groups (TGs) and their respective outcome reports.

I. Key Discussions and Findings

Co-creating Earth Intelligence for addressing challenges - Findings from Special Session

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1. The session stressed the importance of identifying the needs of countries and users to utilize EI to address regional challenges and of creating and widely sharing successful practices to prevent, address and mitigate disaster risk. Countries often still lack basic infrastructure and data coverage, which can be only partially addressed with satellite or remote sensing data.

2. There is a need to develop and strengthen collaborative relationships in the AOGEO and the broader GEO community, through scaling up existing GEO activities that target specific countries' and users' needs.
3. The significance of EI-based solutions to contribute to national efforts to establish multi-hazards early warning systems was recognized, in the context of international initiatives, notably the Early Warnings for All (EW4All), in the Asia Oceania region. This should consider shifting emphasis from prediction to impact, for example, "from what the weather will be, to what the weather will do".

Engagement of Early-Careers and Policy Impact - Findings from Special Session 2-

4. We recognize the significance of the diversity of the Earth observation community, especially the involvement of younger generations in creating EI.
5. We share the importance and potential of EI from the perspective of young generations.
6. We need to nurture the young generations in order to gain fresh perspectives and to inherit experience and expertise to support the development of EI (including Earth observations) in response to rapid environmental and societal changes including disaster risk.

Task Group Achievements, Ongoing Issues and Future Directions for Post-2025

7. Each thematic TG held sectorial meetings and reaffirmed the significant strides they have made in advancing Earth observations. Their achievements not only exemplify scientific progress but also pave the way for societal applications. We outline their achievements, ongoing issues and objectives for post 2025, emphasizing collaboration with regional societies to foster the creation of EI (refer to Annex).
 - i. **Asian Water Cycle Initiative (AWCI)**, since 2005, has developed key functions of data archiving, data and model integration, early warning, climate change impact assessment, and water-food-energy nexus in collaboration with its member countries based on the Data Integration and Analysis System (DIAS). AWCI has also promoted cross-sectoral coordination by supporting the

"Platform on Water Resilience and Disasters (Platform)" activities. Based on its experience, AWCI will further expand the scope of the cross-cutting and consolidated Platform and promote transdisciplinary collaboration among water-related disaster risk reduction, sanitation, poverty, health, and peace to achieve resilience, sustainability, and inclusiveness.

- ii. **Asia-Pacific Biodiversity Observation Network (APBON)** will continue collective efforts to create Earth Intelligence to contribute to global goals and targets such as SDGs and the CBD Kunming-Montreal Global Biodiversity Framework. APBON further acts as a platform for improving data accessibility at regional and national levels for a comprehensive assessment of the state and trend of biodiversity, planning of effective conservation measures, and facilitating effective science-policy dialogue.
- iii. **Asia-Oceania Greenhouse Gas Initiative (AO-GHG)** harmonizes various observation platforms for GHGs, toward reducing uncertainties in sources and sinks, and cooperates among relevant institutes/agencies to support reporting GHG budgets for the Global Stocktake of the Paris Agreement.
- iv. **Oceans, Coasts, and Islands (OCI)** has adopted a new strategy to develop a new Earth observation-based platform to address pressing environmental issues in Asian coastal oceans. This platform, known as the Asia Coastal Ocean Portal (A-COP), will provide accessible and usable Earth observation data and information to support sustainable development. To achieve this, OCI is focusing on research and development of models and algorithms for monitoring and assessing biogeophysical variables. By integrating these tools into the A-COP, OCI aims to provide near-real-time monitoring capabilities and contribute to addressing ongoing environmental issues in the coastal oceans.
- v. **Agriculture and Food Security (Asia-RiCE)** successfully provided earth observation to monitor rice and provide agro-meteorological information. There is a need for research on rice water management, damage assessment, and yield estimation, especially with respect to capacity building of early career researchers.
- vi. **Environmental Monitoring and Protection (EMP)** developed the Multi-source Synergized Quantitative Remote Sensing Production System (MuSyQ) and

advocated Analysis-Ready Open Data. The first 16m global LULC and the Essential Environmental Variables (EEV) products have been generated from the Chinese satellite (GF1/6) data. An integrated Asia-Oceania Environmental Monitoring platform (AOEM) has been established to serve for the regional countries, such as the Cambodia and Pakistan. EMP will explore the cutting-edge technologies such as EI, to continuously improve the EEVs products qualities, and enhance the regional countries' decision-making capabilities to better serve climate change responses, biodiversity conservation and environmental quality governance.

II. Conclusion

8. The discussions at this Symposium reaffirm the necessity of creating user-driven, interdisciplinary, integrated, inclusive and innovative EI, extending beyond Earth observations to address the diverse challenges in the Asia Oceania region. We have committed to leveraging the expertise accumulated for the creation of EI and its application in solving regional challenges effectively.
9. Expanding the Earth observation community to incorporate diverse perspectives, including experts in early career stages, is essential for the successful creation and utilization of EI.
10. Addressing regional challenges, which are closely linked to the multiple global environmental crises such as disaster risk, requires enhanced collaboration between the regional AOGEO community, the global GEO community, and other international frameworks. This collective effort is crucial for effectively addressing these challenges through the development of EI, such as the Early Warnings for All initiative.

III. Recommendations from the AOGEO community

11. Inspire ownership of GEO Member countries and engage them to contribute to developing the GEO Post-2025 Strategy Implementation Plan, with a focus on enabling the GEO community to collect, validate, process and curate reliable Earth observation data and other information to provide action-ready EI for all.
12. In doing so, emphasize human-centric and community-centric approaches to

address the specific regional challenges through localized EI-based solutions.

13. Also, recognize the roles of the Regional GEOs and facilitate liaison among them in order to streamline the regional activities and incorporate them into the new GEO Work Programme.
14. Catalyze Earth Observation communities in identifying needs and challenges to utilize EI, supporting the development of policies regarding EI, and implementing appropriate EI-based solutions.

IV. Way forward

15. We reaffirm AOGEO's vision and the need for continuous efforts to achieve a sustainable and resilient Asia Oceania region underpinned by Earth observation and EI. We resolve to continue working together to tackle the challenges outlined in this Statement.
16. Finally, we express our gratitude to all participants and organizers for dedicating resources, time, and expertise to a successful Symposium and eagerly anticipate our next gathering.

Achievements, Ongoing Issues and Way Forward for Post-2025 AOGEO Task Groups

1. TG1 Asian Water Cycle Initiative (AWCI)

Achievements

Asian Water Cycle Initiative (AWCI) has continued to advocate the importance of developing the "Online Synthesis System for Sustainability and Resilience (OSS-SR)", fostering "Facilitators", and accelerating the "End-to-End Approach" based on the activities of the "Platform on Water Resilience and Disasters (Platform)", such as in the Philippines, Sri Lanka, and Indonesia. These key directions have been fully endorsed at a series of globally important events related to water management, including the 4th Asia-Pacific Water Summit held in Kumamoto in April 2022, the 9th International Conference on Flood Management (ICFM9) held in Tsukuba in February 2023, the UN Water Conference held in New York in March 2023, and the 10th World Water Forum and the Bandung Spirit Water Summit held as part of the Forum in Bali in May 2024. Accordingly, the Platform initiatives have been adopted in the UN Water Action Agenda as the "Water Cycle Integrator (WCI)", which integrates knowledge, capacities, and processes related to water management.

Ongoing Issues

AWCI has deployed activities of the Platform on Water Resilience and Disasters to other areas in the country and has ripple effects on other countries; Thailand has officially launched the Platform, Vietnam is moving forward with establishing the Platform, and Pakistan is starting the discussion to renew suspended efforts. Through the activities on the OSS-SR development and Facilitator fostering, the Platforms have reaffirmed the importance of;

- local ground data for bias correction of global datasets and satellite data
- filling the gap between scientific approach and real-world socio-economic issues
- generating ownership of multi-stakeholders and local communities,

including young generation and Indigenous people, for the social disaster risk reduction

- value chains of actionable insights in the water-food-energy nexus and evidence-informed decisions in water disaster risk management.

Way forward for post-2025

Through DIAS, AWCI will advance the activities it has undertaken since its inception in 2005, including data archiving, data and model integration, early warning, climate change impact assessment, and the water-food-energy nexus. To achieve resilience, sustainability, and inclusiveness, AWCI will further accelerate the implementation of WCI with Earth Intelligence in the cross-cutting and consolidated Platforms. As the future objective, AWCI will evolve its scope to collaborate with sanitation, poverty, health, and peace, as highlighted in the Bandung Spirits Water Summit. The innovation brought by locally implemented Earth Intelligence will contribute to future prosperity by creating value chains that make ordinary and extraordinary seamless.

2. TG2 Asia-Pacific Biodiversity Observation Network (APBON)

Achievements

The Asia-Pacific Biodiversity Observation Network (APBON) is continuing its cooperation in capacity building, and data and knowledge sharing through a webinar series and workshops. APBON has assessed gaps and needs for biodiversity data and knowledge throughout the region to meet the requirements of the Convention of Biological Diversity Kunming-Montreal Global Biodiversity Framework and other relevant assessments. Noteworthy national activities include restarting the Japan BON, publication of biodiversity data (ASEAN, Thailand), intensive monitoring of fish in the Mekong and Tonle Sap Rivers (Cambodia), and a census on biodiversity data across the AP region.

Ongoing Issues

APBON continues to assess needs and accessibility for data obtained by local and national biodiversity observation networks. APBON is planning to develop Essential Biodiversity Variables (EBVs) for national and regional scales by

combining existing *in-situ* data with satellite data and species distribution models, but EBVs are still challenging for APBON due to lack of accessibility of *in-situ* data. Another key challenge is aligning APBON's activities with the National Biodiversity Strategies and Action Plans (NBSAPs) in each country to enhance cooperation between science and policy for biodiversity conservation. Further coordination should be pursued through engagement activities of APBON, national BONs, and AOGEO, and other relevant communities globally.

Way forward for post-2025

Improving data accessibility at regional and national levels will be fundamental for a comprehensive assessment of the state of biodiversity, planning of effective conservation measures, and development of effective NBSAPs. Development of science and policy cooperation is a high priority in our region, as our countries contain many biodiversity hotspots impacted by rapid changes in climate, biodiversity, and society. APBON further acts as a platform for such cooperation in the region and collaborates with GEOBON and GEO community for harmonized actions to be taken at all scales.

3. TG3 Asia-Oceania Greenhouse Gas Initiative (AO-GHG)

Achievements

AO-GHG developed a multi-data integration system, harmonizing the increasing number of platforms, such as remote sensing, in-situ observations, and inventories, toward reducing uncertainties in GHG sources and sinks to support the ultimate goal of reaching net zero emission required by Paris Agreement. In particular, GHG observation satellites have been advanced to meet the requirement of accounting GHG budgets, and Earth observation satellites with high spatial resolution sensors and microwave sensors have improved carbon flux and stock estimations. Synthesis of multiple models and methods were advanced to obtain robust GHG budget estimation.

Ongoing Issues

AO-GHG has the following issues to achieve better estimation of greenhouse gas balances to meet the requirement of accounting GHG budgets, (1) improved accuracy and data availability of satellite-based GHG measurements, (2)

requirement of high spatial and temporal resolution satellite-sensors to identify point sources of GHG and hotspot of GHG budget changes, (3) refined separation of anthropogenic and natural carbon cycle processes, (4) coordination among agencies, (5) refinement of integration system, (6) low latency of in-situ measurements, (7) identification of key regions in Asia-Oceania.

Way forward for post-2025

AO-GHG will further refine the multi-data integration system, and harmonize the increasing number of platforms, such as remote sensing, in-situ observations, and inventories, to reduce uncertainties in the sources and sinks to support the ultimate goal of reaching net zero emission required by Paris Agreement. The system will be advanced to provide near-real time regional GHGs budgets and its changes not only to contribute the Global Stocktake Process, but also to identify hotspots of GHG sink and source for emission management purposes. Coordination across organizations, such as IPCC-TFI (Task Force on national GHG Inventory), WMO-Global Greenhouse Gas Watch (G3W) and CEOS-ACVC, are highly expected.

4. TG4 Oceans, Coasts, and Islands (OCI)

Achievements

In line with the adopted Post-2025 GEO Strategy, OCI (hereafter TG4) has successfully adopted a new strategy. This involves transitioning into the activities and development of a new Earth Observation (EO)-based platform. This platform is designed to provide timely, sustainable, accessible, and usable EO data and information. The goal is to serve not only researchers but also society and stakeholders in addressing regional emerging issues and supporting sustainable development. Particularly, TG4 has begun to develop a satellite remote sensing-based Asia Coastal Ocean Portal (A-COP) for observing and monitoring emerging issues in Asian coastal oceans.

Ongoing Issues

Climate change and human activities are putting significant pressure on Asian coastal oceans, leading to numerous ongoing environmental issues. These issues

include coastal water eutrophication, hypoxia, red tide outbreaks, marine plastic debris accumulation, ocean acidification, coral reef bleaching, and sea level rise. Global warming and population growth are expected to worsen these problems. Monitoring the changes in these variables is urgent, but conventional in-situ methods are expensive and have limited spatial and temporal coverage. Therefore, the development of a near-real-time EO-based monitoring system is being initiated as a new platform and core activity of TG4.

Way forward for post-2025

TG4 has started new activities to build a new EO-based platform as a new tool to provide accessible and usable EO data and information. The new strategy primarily consists of research and development of the A-COP, the prototype of which will be launched within the 2024 fiscal year. In line with the Post-2025 GEO Strategy, TG4 will reorient research activities to focus on the construction of models and algorithms to produce and assess the aforementioned biogeophysical variables. The constructed models and algorithms will then be introduced into the A-COP. Model/algorithm development, A-COP improvement, and implementation to gain socioeconomic benefits will be the way forward for post-2025.

5. TG5 Agriculture and Food Security (Asia-RiCE)

Achievements

(1) Rice monitoring in Asia-Oceania region:

Implement platforms for sharing of open data with standard format such as CEOS ARD and tools is being established in Asia-RiCE, contributing to improved agricultural statistics, agricultural policy making and beyond.

(2) Multilateral network for agro-meteorological info and rice monitoring

Provision improved agromet information and rice crop monitoring to Asia Ocean region and promote regional cooperation on data and information sharing using available platform and knowledge sharing.

Ongoing Issues

(1) Provide earth intelligence using EO data with ground based data including automatic measurement by IoT for Asia Rice mentioned in above 1 and also following two topics.

(2) Satellite based water monitoring in paddy fields - CH4Rice:

Need to study water management of rice field using remote sensing and ground base data with AWD to reduce methane emission (CH4) from paddy fields

(3) Yield estimation and damage assessment:

Need to assess damages caused by climate change including floods, droughts, salinity intrusion, subsidence... and rice yield estimation and forecasting by integrating remote sensing and crop model with weather projections

(4) Derive adaptation and mitigation measures for stakeholders

Way forward for post-2025

To discuss EO for food security and climate adaptation/mitigation in Asia-Oceania region with

(1) Ongoing issues described in above 2 with define international guidelines, especially for carbon trading regarding methane emission from paddy fields

(2) Strengthen cross comparison on between different countries and sharing methodologies and validation results

(3) Promote collaboration with various stakeholders both public and private sectors for the operational use of these achievements

(4) Promote continue capacity building and field survey using available funds such as international donor and government etc.

6. TG7 Environmental Monitoring and Protection (EMP)

Achievements

- Algorithms and products: Some basic products from remote sensing at national scale and global scale have been produced by using the Chinese satellite data, such as land cover and vegetation parameters, NPP, FVC, LAI, NDVI, etc.

- National reports: A collection of national report have been published based on these products, i.e. Integrated Remote Sensing Monitoring of Ecosystems in Chinese, Cambodia, Laos and Thailand.
- Platform: Asia-Oceania Environmental Monitoring Platform (AOEM), which can monitor the ecological quality, forest resources, urban expansion and air quality in AO regions, and also release the monitoring reports and products.
- 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.

Ongoing Issues

The capability, in-situ measurements, and the common products from remote sensing are the basis for earth intelligence. The national reports will become a template that we are trying to make it as a routine job and we hope it will be good for the members of AOGEO and GEO. A comprehensive platform are encouraged to incorporate the field data from different members as a third validation of basic products and make these products more convincing. Furthermore, more cooperations are expected through the platform of AOGEO to gather more end users, scientists, and engineers. Many demands for remote sensing and common products have been raised and further cooperation under the AOGEO framework have been expected. Securing adequate resources and funding to support ongoing efforts and technological advancements is challenging.

Way forward for post-2025

Enhancing stakeholder engagement and coordination among governments, scientists, and local communities is vital for comprehensive monitoring. Additionally, addressing regional variability to meet specific local needs while

maintaining a global perspective is necessary for effective environmental protection. As we look ahead to the Post-2025, it is crucial to advance the development of a comprehensive GEO Implementation Plan that enhances our capabilities to collect, curate, and validate Earth Observation data. This plan should focus on delivering actionable Environmental Intelligence (EI) that can effectively support decision-making processes. Emphasizing human-control and community-focused approaches will be essential for addressing regional challenges more precisely and equitably. Strengthening the collaboration among regional GEOs will play a key role in ensuring that national GEOs are well-supported in identifying and meeting their specific needs. Effective communication and coordination among these entities will foster a more integrated and responsive global GEO network. By prioritizing these strategies, we can ensure that the GEO framework remains robust and adaptive, ready to meet the evolving demands of the future.