

## **Draft Report of GEO-XIII**

*This Document is submitted to the GEO-XIV Plenary for decision.*



---

## **Draft Report of GEO-XIII**

### **9-10 November 2016**

### **Saint Petersburg, Russian Federation**

#### **Wednesday, 9 November 2016**

*Meeting convened at 09:00 am at the Pribaltiyskaya Park Inn Hotel, Blue Room 3.*

#### **1 SESSION: OPENING SESSION**

Chair: Philemon Mjwara, Director-General, Department of Science and Technology, Republic of South Africa.

##### **1.1 Welcome from the Russian Federation**

As the Plenary opener, a welcome video was shown from the International Space Station, in which the cosmonauts observed it is easy to understand the interconnected nature of the planet from space. Space technologies help to understand Earth's complicated processes and problems. Humankind is facing global challenges today, and international cooperation plays a crucial role in tackling these issues. The work of GEO makes Earth observations more widely available and meaningful, for the benefit of humanity.

Vasily Valentinovich Asmus, Director, State Research Center for Space Hydrometeorology PLANETA, Russian Federal Service for Hydrometeorology and Environmental Monitoring (Roshydromet).

Mr Asmus gave a warm welcome to the GEO-XIII Plenary, noting that it was the first time that GEO convened a Plenary in Russia. He commented that GEO is recognized as an intergovernmental entity, with representatives from space agencies, environmental monitoring and the commercial sector present. The Russian Federation wishes the GEO Plenary an open dialog, one that advances principles for open data sharing, for the benefit of global community. He further emphasized that this Plenary meeting represents an opportunity to promote Earth observations for a variety of issues facing society today. All of the GEO Societal Benefit Areas (SBAs) are related to the work of Roshydromet. Saint Petersburg is an appropriate place to host the GEO-XIII Plenary. Since we are close to the Arctic, this region has a special, long history of Arctic research and exploration, and the Russian Federation has plans to launch satellites on elliptical orbits to observe the Arctic. Both Roshydromet and Roscosmos (Russian Space Agency) are present at the Plenary, in addition to representatives from other Russian agencies, and their intention over the coming years is to develop a common approach to the management of Earth observations. Delegates are encouraged to visit and explore this wonderful city. Thanks are expressed to all delegates and to the Secretariat for efforts to promote the importance of Earth observations among the world's nations.

Mikhail Khailov, Deputy Head of Roscosmos, (Russian Space Agency).

On behalf of Roscosmos, Mr Khailov welcomed the participants of the GEO-XIII Plenary. He noted that both Roscosmos and Roshydromet were happy to host the Plenary and work towards furthering the work of GEO, having been actively involved in GEO since its inception. He informed the Plenary that the Russian orbital constellation is constantly being updated with new satellites, and observed that Russian efforts in developing ground infrastructure, especially in the Arctic, will allow Russia to

contribute more fully to GEO activities. He invited participants to visit the exhibition over the next two days, which highlighted Russian accomplishments. He finished by thanking the Secretariat and Russian organizing teams for their close collaboration, which ensured that the highest standards for such an important gathering would be maintained. He also encouraged all participants to find time to visit the beautiful city of Saint Petersburg.

Mr S. Talnishnikh, Deputy Chair of Industrial Policies and Innovations Committee, Representative from St Petersburg

Mr Talnishnikh noted that Saint Petersburg was a good place to hold the GEO Plenary as it has a tradition of hosting major international meetings. Saint Petersburg has long been supportive of the space industry, and has also been a leader in industry devoted to design and exploitation of Earth observations, being able to draw on a large scientific and technical expertise in connection with remote sensing. He wished everyone a successful Plenary, with results that contribute to societal benefits for all participants.

## 1.2 Opening Remarks

Co-Chair and Chair of the Session, Philemon Mjwara, Republic of South Africa, thanked the Russian Federation for the very warm reception GEO had received. He recognized Pengde Li as the GEO Co-Chair representing China, noting that he had served as co-chair of the GEO Programme Board (PB) since the beginning of the year. He also recognized Stephen Volz as the GEO Co-Chair representing the United States, and Robert-Jan Smits, the GEO Co-Chair representing the European Commission (EC). He expressed pleasure at seeing many new faces at Plenary, and thanked everyone for their willingness to support GEOSS implementation. He noted that this GEO Work Programme (GWP) will launch a new era for GEO, and, in keeping with this, the design of the Plenary agenda was also new. He wanted to ensure that GEO continues to focus on its Vision, in which data are being used to further decision-making. He reiterated the benefits of having access to Earth observation data as an “enabling resource that allows us to begin addressing the Water-Food-Energy nexus, and other nexus, as a stepping stone to clearly understand how the Earth’s systems work, and ultimately realizing GEOSS”. He also welcomed the restructured focus of the Societal Benefit Areas (SBAs), and looked forward to the deliberations over the next couple of days that would pave the way for a brighter future.

Co-Chair Pengde Li, Deputy Director General National Administration of Surveying, Mapping and Geoinformation of China, People’s Republic of China, expressed sincere gratitude to the Russian Federation for hosting the GEO-XIII Plenary, and extended his greetings to all on behalf of China. He briefly introduced China’s progress in GEO over the past year, which included enhanced coordination of 19 Chinese ministries, led by the Ministry of Science and Technology. He also informed the group that the coordination of China GEO had been established through the joint efforts of the Chinese Meteorological Agency (CMA), the Chinese Academy of Sciences (CAS) and the Chinese National Administration of Surveying, Mapping and Geoinformation. He noted that China is contributing to various Flagships and Initiatives of the GWP, such as GEOGLAM and AO-GEOSS, and will continue to actively support activities of the WP in the future. Other highlights included sustainable development and mutually beneficial strategies featured in the 4<sup>th</sup> Global Ecological Environment Observation for the Annual Report of China (GEO ARC), including an atlas of ecosystem analysis globally. China GEO has also demonstrated drought monitoring and early warning systems through regional space applications for development. He also indicated his hope that the relationship between GEO and the United Nations Committee of Experts on Global Geospatial Information Management (UN-GGIM) can continue to be strengthened. He concluded his remarks by stating that “Downscaling implementation of GEOSS at national and regional level has become extremely important to ensure broad engagement and sufficient resources to realize our ambitious vision. Fortunately, we see more and more Members start establishing national inter-ministerial coordination and using regional initiatives as a vehicle for broad engagement”. He wished the Plenary full success.

Co-Chair Robert-Jan Smits, Director-General, Research and Innovation, European Commission (EC), welcomed delegates to the GEO-XIII Plenary and thanked the Russian hosts for their gracious hospitality. He recalled that the European Commission has supported GEO since it was first suggested in 2003. On the occasion of this GEO Plenary meeting he wished to reiterate the EC's full commitment to GEO as a unique international partnership for the benefit of humankind. The "Space Strategy for Europe" which had been released by the European Commission the previous week (26 October) confirmed the EC's commitment to GEO stating that: "the Commission will use EU space programmes to contribute to and benefit from international efforts through initiatives such as the Global Earth Observation System of Systems (GEOSS) and the Committee on Earth Observation Satellites (CEOS) with Copernicus". He emphasised that the EC is particularly concerned that the benefits of GEO should be shared widely and not confined to a few. He noted that in their Declaration last year, GEO Ministers resolved to strengthen and facilitate the active participation of developing countries in GEO and the GEOSS. He urged all GEO participants to bear this in mind and make a concerted effort to realise this aim in particular. He expressed the particular satisfaction of the EC at GEO's real progress towards closer cooperation with the commercial sector. The EC has long recognized that this is critical for the implementation of GEOSS and for the exploitation of GEOSS assets and particularly welcomed therefore the organisation of a commercial sector session at this Plenary meeting.

Co-Chair Stephen Volz, Assistant Administrator for Satellite & Information Services, Oceans and Atmosphere, Department of Commerce, United States of America, welcomed all participants and thanked the Russian hosts for inviting everyone to the elegant city of Saint Petersburg. He stated his pleasure at leading the US delegation and conveyed the regrets of Ms Kathryn Sullivan (US GEO Principal) who was unable to join this year's GEO Plenary. He emphasized that the mission of many agencies of the United States was similar to that of GEO – to further the sharing and use of Earth observations for informed decision-making – and highlighted some of the contributions the US had made, in particular through the National Oceanic and Atmospheric Administration (NOAA). He congratulated all for the tremendous progress made over the past year, but noted that there is still much work to accomplish in terms of responding to major issues, such as food security and sustainable development, as referenced in the Mexico City Declaration. He commented on the need for the GEO community to get into a more "relaxed mode", and noted that the day's agenda would feature panel exchanges with several segments of the GEO community. He concluded by observing that we live in a changing world, and therefore GEO must continually adapt to new circumstances as it strives to do the right thing on behalf of humankind. He wished everyone a successful Plenary.

Secretariat Director Barbara Ryan, GEO Secretariat, welcomed Plenary participants and thanked the Russian Federation for hosting all of the events of the week, noting that this was one of the best attended Plenaries not associated with a GEO Ministerial meeting. She also commented that, in response to numerous requests, Side-Events had been reduced in number compared to previous years. She noted a few differences were in store for this year's Plenary, such as interactive panel discussions, and the absence of formal statement readings which would instead be accessible throughout the meeting duration. In this regard, she thanked Secretariat members Rik Baeyens and Katy Anderson for putting a touch screen system in place for viewing statements in real time. She also introduced the new Senior External Relations Manager, Steven Ramage. She concluded her remarks by expressing her hope that the GEO community can put aside any differences as it focuses on Earth observations and their importance for humankind.

### 1.3 Approval of Agenda

**Outcome: The agenda was approved, with no modifications.**

### 1.4 Approval of Draft Report of GEO-XII

**Outcome: The draft report was approved, with no modifications.**

Barbara Ryan then introduced the Members, Participating Organizations, and Observers joining GEO over the course of 2016:

#### Members

- 101<sup>st</sup> Member: Eastern Republic of Uruguay, effective 10 November 2015;
- 102<sup>nd</sup> Member: United Arab Emirates, effective 24 November 2015; and
- 103<sup>rd</sup> Member: Mongolia, effective 3 May 2016.

#### Participating Organizations

Approved at the 36<sup>th</sup> Session of the Executive Committee, 8-9 March 2016:

- European Association of Remote Sensing Companies (EARSC);
- Joint Board of Geospatial Information Societies (JBGIS); and
- Mountain Research Initiative (MRI).

Approved at the 37<sup>th</sup> Session of the Executive Committee, 6-7 July 2016:

- Association of Geospatial Industries (AGI);
- African Regional Centre for Space Science and Technology Education-English (ARCSSTEE);
- Arab States Research and Education Network (ASREN);
- Global Flood Partnership (GFP);
- Humanitarian OpenStreetMap Team (HOT) ;
- Integrated Carbon Observation System (ICOS);
- World Health Organization (WHO), and
- World Ocean Council (WOC); and

Approved at the 38<sup>th</sup> Session of the Executive Committee, 7 November 2016:

- International Long Term Ecological Research (ILTER);
- Logistic Management Institute (LMI); and
- Sahara and Sahel Observatory (OSS).

#### Observers

- The Government of Guatemala joined GEO as an Observer on 9 May 2016, and
- The Asia-Pacific Regional Space Agency Forum (APRSAF), approved at the 36<sup>th</sup> Session of the Executive Committee, 8-9 March 2016.

## **2 SESSION: ADVANCING THE VISION OF GEO**

### **2.1 Introduction to Session**

Barbara Ryan introduced the Session, which featured panel discussions designed to be interactive, covering a range of topics from activities of the GWP to the latest developments of the GEOSS Common Infrastructure (GCI). In her remarks she emphasized several points pertaining to GEO in general, which included:

- The need to keep the distinction between GEO and GEOSS (the former refers to the people and institutions; the latter to the system of systems being built by GEO).
- A reminder of key points of the Mexico City Ministerial Declaration:
  - Calls for broad engagement, including commercial sector;
  - Reaffirms support for Sustainable Development Goals (SDGs);

- Resolves to pursue Data Sharing Principles (DSP) and Data Management Principles (DMP); and
  - Resolves to strengthen and facilitate regional initiatives.
- Must not lose sight of the fact that GEO activities should be designed to meet the needs of users.

## 2.2 Panel 1: User and policy-driven initiatives

This Panel included representatives from GEO Initiatives and Flagships covering the full spectrum of actors from policy and decision makers, to those involved in advisory and implementation roles.

The panelists included:

- GEOGLAM, Sergey Bartalev, Russian Federation;
- GEO Cold Regions, Hannele Savela, Finland;
- GEO Carbon and GHG Initiative, Stephen Briggs, ESA;
- EO4EA, John Matuszak, USA; and
- GEO and SDGs: Lawrence Friedl, USA.

Moderator: Dominique Marbouty, France.

Each panelist addressed challenges and opportunities in the development and implementation of the activity, including: addressing volatility of agricultural commodities through the GEOGLAM Flagship; responding to recent policy mandates in ecologically sensitive areas of the Arctic region with observations and scientific information (White House Arctic Science Ministerial, and Sustaining Arctic Observing Networks [SAON]); how to bring together disparate Earth observing platforms in order to accurately monitor the full carbon cycle; supporting the UN System of Environmental-Economic Accounting (UN SEEA) with Earth observations and designing improved products for decision-making and environmental accounting; and supplementing efforts of national statistics offices with Earth observations and information, in order to achieve effective, efficient, and equitable evaluations of progress towards the Sustainable Development Goals (SDGs).

In response to a question from the moderator regarding the specific challenges, including technical, that have to be overcome and addressed by each of the activities, Hannele Savela commented that, in order to provide meaningful services and products, understanding users and inviting them to co-design those products was essential; yet users are sometimes difficult to identify in the cold regions of the globe. Stephen Briggs commented that the question of carbon in the environment is complex, requiring the work of different observing communities and the need for integration across disparate platforms.

The UK wanted to know whether GEOGLAM is making an impact on developing countries on the ground, if it is making a difference at the policy level. Sergey Bartalev replied that, although it is clear the main user of GEOGLAM products globally is currently the Agricultural Market Information System (AMIS), the use of Earth observations is still quite limited at the moment. Thus, a challenge for GEOGLAM would be the development of new products that could satisfy users at local levels. India added that, as one of the largest producers of grain in the world, it would like to see more user-oriented, precise and detailed information from GEOGLAM. The establishment of regional nodes could provide more accurate information, which would be useful at both the local (farmer) and government levels.

Finland, also representing SAON at this Plenary was very interested in Arctic data. The power of GEO is to find other actors, not necessarily targeting the same actions, but doing similar activities and leverage synergies. Thus, if a regional effort such as an Arctic GEOSS were to be established, what should it look like? John Matuszak commented that merging environmental information along with socio-economic data would be powerful for the Arctic, an integration that was being done in the

EO4EA Initiative. Stephen Briggs observed that observations in the Arctic are extremely important since impacts of climate change are greater there than elsewhere, and thus it was especially important to understand how carbon works in the Arctic system. Lawrence Friedl noted that, currently, the focus with respect to SDGs has been on the indicators, to use them to help understand progress. However, this is only a first step, and once a trend is identified, the next questions will be how to improve it, what products and services are needed to support delivery of change wanted. Achievement of SDGs in the region will need the collaboration of all countries that form part of the Arctic.

Germany observed that, in dealing with UN frameworks, such as the UN Framework Convention on Climate Change (UNFCCC) or the Global Framework for Climate Services (GFCS), it was important to move quickly, to have more engagement from the GEO Principals to help define win-win-situations. Also, defining a clear branding strategy will be important to avoid conflicts with the UN.

Switzerland stated the need for more focused engagement with users and specific products for them, both for the individual farmer on the one hand, and at the government level on the other. Pilot projects centred on the SDGs would be a way to accomplish this, so it is essential that GEO ensure the results of pilots are distributed and approved, and used. Lawrence Friedl responded that a federated approach to knowledge sharing should be encouraged, involving UN structures such as the geospatial working group and sustainable development networks. Another potential partner would include the commercial sector. John Matuszak added that pilot projects were already underway in the context of the Wealth Accounting and Valuation of Ecosystem Services (WAVES) programme, involving Australia, Canada, Mexico and South Africa, and that a document compiling their experiences would be produced. Hannele Savela suggested that feedback loops with users of products developed from pilot projects would be a critical element for improving and expanding the knowledge gained.

### 2.3 Panel 2: GEOSS Implementation

This Panel included representatives of the teams currently involved in the foundational components of GEOSS, including coordination of Earth observations; data sharing; and development of tools to improve delivery and use of Earth observation data and information.

The panelists included:

- Coordination of space-based observations, Frank Kelly, CEOS;
- Coordination of *in-situ* observations, Joan Masó, Connecting GEOSS;
- Coordination of Global Observing Systems, Wenjian Zhang, WMO;
- Data Sharing, Michel Schoupe, European Commission; and
- GEOSS Infrastructure, including Data Management, GCI and GEONETCast Development and Operations, Ivan DeLoatch, USA.

Moderator: Stuart Minchin, Australia

Each panelist addressed challenges and opportunities in the development and implementation of the activity, including: the work of CEOS to provide analysis-ready data for land cover and use as well as CEOS data cube pilot projects in Australia, US, Colombia and the Mekong Delta; the large, complex picture of cross-domain coordination of *in-situ* observations requires a concerted effort from GEO Members and Participating Organizations to consider appointing participants to develop a coordination framework; the need to establish a close working relationship between the WMO Integrated Global Observing System (WIGOS) and GEOSS in several domains, such as data sharing, big data, cold regions, disaster risk reduction, marine observations and food security; open data maturity and impacts call for establishment of national policies aligned with the GEOSS Data Sharing Principles (DSP) and Data Management Principles (DMP) of the GEO Strategic Plan, by setting up national coordination mechanisms; and orienting the GCI towards supporting the GEO Implementation Mechanisms through capacity building, engaging users and delivering solutions.

In connection with the comment of how the GEOSS DSP should influence national data policies, a quick poll of the Plenary by the moderator indicated that this was the case for only roughly 20% of the participants, and thus there was still a great need for “selling” open data policies to governments. ESIP noted that, even where DSP have been adopted as national policy, in the absence of dedicated implementation plans, it was difficult to translate DSP policy into practice. The moderator observed that Australia has moved down the economic benefit path to make arguments for opening up access to data, citing the Landsat example. Michel Schouppe responded that more examples of this type were needed to defend open access to data before public authorities. Joan Masó noted that the ConnectingGEOSS project had been able to show that sharing data does indeed provide economic benefit.

Guinea commented that there was a special need for sharing data in Africa, and therefore would expect the EC, EUMETSAT, and other European partners to increase their help. A critical issue is dissemination of data and information beyond the capitals out to the end users and local communities, for which the urgent need was for installation of infrastructure to receive and use Earth observations. Frank Kelly commented that, although CEOS had tried to deliver data so that a person on the receiving end knows how to use it, applications of data still need to be developed, and that spatial and temporal needs for data needs to be better understood – areas that CEOS is actively involved in currently.

In response to a question raised by the moderator, asking whether the *in-situ* community recognized the value of improved efficiency and value by sharing their data, Wenjian Zhang responded that, from over 50 years of experience providing prediction services in the WMO, it was important to find complementary relationships between *in-situ* and space-based observations, in order to enhance value and facilitate their integration. The US suggested that coordination of *in-situ* observations might best be handled by focusing on essential variables in the context of Flagships, such as GEO BON (and associated Marine BON). Ivan Deloatch commented that, given the enormous number of *in-situ* observing systems in existence, a new approach was needed, one that perhaps focussed on thematic areas such as the AmeriGEOSS and Blue Planet Initiatives have done. Joan Masó observed that, although domain-specific coordination has indeed met with some success, cross-domain and cross-border issues require a different level of cooperation across political boundaries, something that remains a challenge.

To a final question posed by the moderator to the panel, “If you had a magic wand, what would be the one thing that would advance data GEOSS implementation?” each panelist replied:

- Ivan Deloatch: Having real time data and info at my fingertips would be the ideal; this is what we should be aiming for, however lots of complicated machinery is needed to make this happen;
- Michel Schouppe: The need to share data that is the best possible, for quality and utility over quantity; a starting point for doing this would be to identify user needs for open data by inventorying across the Flagships and Initiatives of the GEO Work Programme;
- Wenjian Zhang: The greatest concern is to work together for improved forecasting capabilities, for climate and weather, on a monthly timescale;
- Joan Masó: What is needed is a framework for identifying essential variables extended to all domains, to solve cross-disciplinary issues; this would imply deriving datasets at different spatial and temporal scales; and
- Frank Kelly: The uneven level of capabilities across some countries is hampering success. What is needed is to provide better training, and develop a killer application that makes everything work correctly.

## 2.4 Conclusion of Panel Sessions

The “take-home” messages of the panel discussions, were delivered by each of the moderators:

Panel 1 messages:

- Need to engage with users' institutions: importance of co-design with users of data and information;
- Need to engage with institutions to leverage GEO's convening power; and
- Importance of the role of GEO Principals, in particular to engage with national statistical agencies, inform of importance of EO and GEO.

Panel 2 messages

- Need to sell benefits of open data to governments;
- Need to work to lower the technical barriers to utilize EO; and
- Focussing on common variables will improve data quality and usability.

## 2.5 Demonstration of GEOSS Portal

Guido Colangeli (ESA) provided participants a live demonstration of the new version of the GEOSS Portal ([www.geoportal.org](http://www.geoportal.org)).

## 3 SESSION: COMMERCIAL SECTOR SESSION

This Panel included representatives from the Commercial Sector, including data providers, providers of value-added services and downstream-user sectors.

The panelists included:

- Olga Gershenzon, Co-founder, Strategic Officer, RBC Signals;
- Jeanne Foust, Global Manager Standards and Interoperability, Esri;
- Geoff Sawyer, Secretary-General EARSC (European Association of Remote Sensing Companies);
- Rob Postma, Airbus Group;
- Xu Liping, General Manager, Beijing Space View Technology Co. Ltd; and
- Sanjay Kumar, CEO Geospatial Media & Communications.

Moderator: Steven Ramage, GEO Secretariat

The panel represented a broad spectrum of companies dealing with the provision and use of Earth observation data, information and products/services, as well as organisations working globally and involved in public private partnerships (PPP).

It was highlighted that the GEO community and the commercial sector already work across common areas and often together. It was described that the commercial sector can offer advice on technology and innovation, and the GEO community can provide valuable input in terms of policy and governance. However, ultimately, it is about the users, and the commercial sector can bring their users to the GEO community. At the same time, the commercial sector can benefit from accessing the existing GEO users. The goal should be to broaden the GEO community globally and increase the use of open EO data through the GEOSS Portal.

It was agreed by panelists that both sets of parties can learn from each other and share knowledge/wisdom for action. One conclusion was that it's a transformative period for both business models and technology and so collaboration through PPP and other approaches is essential.

The outcomes were:

- To ask the GEO EXCOM Commercial Sector Subgroup, to continue its dialogue with the Commercial sector and prepare appropriate engagement model

- Subgroup to be chaired by Steven Ramage from the GEO Secretariat, and including members from the GEO community and the commercial sector;
- To use the Subgroup as a temporary forum for dialogue between the GEO community and the commercial sector in view of future arrangement to be submitted at GEO XIV

The feedback from the panel was positive and it provided some useful insights for attendees, as well an opportunity to help guide and define good practices for commercial sector collaboration with the global GEO community.

*Meeting adjourned at 6:00 pm.*

### **Thursday, 10 November 2016**

*Meeting convened at 09:00 am at the Pribaltiyskaya Park Inn Hotel, Blue Room 3.*

Prior to the start of the Session, the Chair recapped discussions from the panels of the previous day noting:

Their goals:

- to take stock of progress made to date; identify potential gaps; to deepen commitments to the Mexico City Ministerial Declaration; and
- to strengthen dialogue with the commercial sector.

He then informed the participants that the Executive Committee would value opinions on how the panel sessions worked and therefore asked for feedback with respect to any suggested changes in the content or format.

The Chair further informed Plenary that, as part of changes being introduced, in order to increase continuity and efficiency of its operations, the Executive Committee would name one lead Co-Chair each year. The Co-Chair from the EC, Robert-Jan Smits, will serve as the lead Co-Chair for 2017.

## **4 SESSION: STRENGTHENING STAKEHOLDER ENGAGEMENT**

### **4.1 Engagement Strategy**

#### **Outcome: The GEO Engagement Strategy was approved**

Yana Gevorgyan (US) presented the work of the Engagement Strategy Subgroup (EC, US, and CEOS) which had been mandated by the Executive Committee to develop an Engagement Strategy. Noting that “The mission of GEO can only be achieved through strong and coherent engagement with stakeholder communities”, she presented the five priorities developed by the GEO Engagement Strategy Subgroup for endorsement by the Executive Committee. These priorities are to act as drivers for key engagement actions to be articulated in the 2017-2019 Multiannual Implementation Plan, while serving to demonstrate what GEO is delivering tangibly with respect to the Mexico City Declaration commitments by the time the Ministers next meet in 2019. The proposed priorities are:

- 1) 2030 Agenda for Sustainable Development;
- 2) Climate Change – Greenhouse Gas Monitoring;
- 3) Disaster Risk Reduction;
- 4) Resilient cities and human settlements; and
- 5) Ecosystem accounting.

She explained the criteria used to identify the priorities were: political relevance building on well-established, recent or upcoming international agreements, as called for in the Mexico City Ministerial Declaration; strong and active communities and activities in GEO; and potential to secure resources.

She noted that the Executive Committee welcomed the Subgroup’s recommendations on engagement priorities. Nevertheless, the Committee reserved its endorsement for the first three priorities (2030 Agenda for Sustainable Development; Climate Change – Greenhouse Gas Monitoring; and Disaster Risk Reduction). The Committee further suggested that while priorities 4 (Resilient cities and human settlements) and 5 (Ecosystem accounting) were recognized as important, the level of GEO engagement is different from the first three, and therefore the more detailed implementation plan for these two priorities should come later.

Yana Gevorgyan then posed three questions to Plenary for feedback:

- 1) Does this strategy framework resonate with you, and can you support it with your activities and contributions?
- 2) Do you agree with priority areas?
- 3) Do you have any insights or advice for engaging in these priority areas? Do you have partners you can mention?

Canada responded with compliments to the Subgroup for fine work and a strong endorsement of the strategy, indicating its support of the priorities as outlined. Canada pointed out the need to be consistent in supporting what Ministers have tasked GEO with. Canada wished to emphasize three points: 1) many organizations are working in these priority areas, so GEO needs to be mindful of not tripping over them; 2) in Canada, there would be budgetary funds to support this, so GEO should consider a special trust fund in the Secretariat to which pledges can be made if GEO wants this to be successful; and 3) Canada can fully be counted on for support, either in-kind or financial, as it wants to see this strategy succeed.

Germany appreciated the paper, noting clear suggestions for improving GEO's engagement with stakeholders. However, a few points for consideration: 1) more details on engagement with those outside GEO is needed; 2) more clarity on relationship between various GEO bodies is needed; and 3) the strategy should be clear that GEO will rely on its Co-Chairs as the most efficient way to apply leverage for engagement.

The UK called for clarity in terms of identifying deliverables of the strategy. The UK has set up a GEO office for coordination, and it would be helpful identifying what the key deliverables are when engaging with external stakeholders.

China appreciated the report and expressed its strong agreement with the three priorities as endorsed by the Executive Committee. China indicated it will make greater efforts to coordinate and attract more support for GEO nationally, noting that already 19 of its departments were engaged in GEO. As co-chair of AOGEOSS, China will work with all countries across Asia and Oceania to foster interest (recently has had talks with Sri Lanka about potential Membership in GEO). Finally, China will work with all Members and Participating Organizations to help them develop their capacity, solve challenges across developing countries, and support workshops to this end.

France indicated its strong support of the three priorities endorsed by the Executive Committee, and seconded the comments by Canada and Germany. GEO needs to clarify its role vis-à-vis all other bodies working in these priority areas so that GEO is not seen as grabbing attention or shadowing others, but working in partnership.

UNOOSA highlighted that the UNISPACE+50 Roadmap defined concrete deliverables for remote sensing applications in priority thematic areas such as health. UNOOSA will be organizing three high-level fora in this context, and requested GEO's support for these, in order to establish greater synergies.

COSPAR commented that the *Climate Change – Greenhouse Gas Monitoring* priority required clarification. GEO should be interested in climate change at the global level as this integrates many domains, and suggested additional themes as corollaries to climate change, such as ocean acidification and ocean heat storage.

IUGG noted there are various modes of engagement, such as inter-, multi-, or trans- disciplinary. IUGG believes GEO is at the multi-disciplinary stage, and how to truly engage all Participating Organizations in GEO activities alongside Members needs to be elaborated.

The US agreed with the strategic approach as outlined, noting that Flagships such as GEOGLAM have seen positive results from a focus on tangible deliverables. Thus US agreed with the three priorities endorsed by the Executive Committee, yet wants to underscore that the work of GEO should not be

limited. The Blue Planet Initiatives could serve as a good arena in which the strategic principles could be tested as it pursues its work.

Secretariat Director B. Ryan drew the attention of the participants to the leaflets on Flagship and Initiative “opportunities to help” contained in the Plenary document packet, and she encouraged everyone to consult them when looking for ways to engage. Additionally, she reminded the Principals that they serve as representatives of their respective governments, and GEO needed their support to work with various entities such as UNGGIM and Future Earth to ensure that GEO doesn’t encounter “scope creep”, and vice-versa.

#### **4.2 Engagement Priorities 2017-2019**

**Outcome:** Plenary approved the Engagement Priorities for the period 2017-2019. In particular, Plenary agreed that the focus should be on priorities 1-3 (2030 Agenda for Sustainable Development; Climate Change – Greenhouse Gas Monitoring; and Disaster Risk Reduction). The GEO Secretariat will prepare a detailed engagement implementation plan for the period 2017-19, noting that more work remains to be done for Resilient Cities and human settlements (#4 and Ecosystem account (#5)

The Plenary noted that

- Clarification of GEO’s role vis-à-vis other international organizations working in major policy arenas was needed;
- Principals serve as ambassadors for GEO, particularly for engagement with national agencies/institutions; and
- Additional contributions could be earmarked to support engagement efforts.

### **5 SESSION: GEO WORK PROGRAMME**

#### **5.1 Report of the Programme Board 2016**

Pengde Li (PB co-chair, China) presented the work of the Programme Board over the course of the year, noting that the GEO 2016 PB met 3 times in 2016 (2-3 February, 5-6 May, and 7-8 September). Each of the meetings established a number of Subgroups that looked at issues such as prioritization of Foundational Tasks ; reviewing candidate GEO Initiative proposals and implementation plans for inclusion in the GEO 2017-2019 Work Programme; reviewing candidate GEO Initiatives seeking Flagship status for inclusion in the GWP; reviewing the status of Science & Technology (S&T) across the 2016 GWP in reference to the S&T Roadmap developed by the former GEO Science and Technology Committee (STC); defining PB interactions with the GEO Community Activities; Monitoring and Evaluation of the GWP; revising the PB Terms of Reference ; compiling “lessons learned” to deliver to the 2017-2019 PB; and mapping activities of the GWP to support for the United Nations 2030 Agenda for Sustainable Development, including the Sustainable Development Goals (SDGs).

Pengde Li went on to explain that, with respect to the candidate Initiatives and Flagships, the evaluation process that was put in place involved review panels of three PB members who provided an initial assessment of each of the Initiative/Flagships implementation plans to the authors during the summer months. In most cases, requests were made for clarification or supplemental information, which the authors were invited to respond to. Final decisions regarding inclusion in the 2017-2019 GWP were made at the September PB meeting.

He concluded by highlighting a few of the lessons learned compiled by the PB over the course of the year, including:

- The single Board entity has proven to be relevant, effective and useful;

- The mix of Board members drawn from Participating Organizations and Members is working well;
- Having three co-chairs with at least one from a Member country and one from a Participating Organization is a strength;
- Having PO-nominated Board members sit as observers in the Executive Committee has been beneficial;
- The GWP review process worked well, though a few adjustments are needed;
- Effective chairing of PB requires substantial preparation by both chairs and the Secretariat for difficult topics;
- PB members, including the co-chairs, realize that a large amount of sustained intercessional work is required for the PB to accomplish its activities effectively and efficiently;
- More work needs to be done to strengthen some of the proposals in the areas of user engagement, capacity building, deliverables and policy relevance; and
- The PB should not become perceived as the one and only body to solve all GWP issues; a balanced approach is needed.

## 5.2 Presentation of the GEO 2017-2019 Work Programme

Tim Haigh (PB co-chair, EEA) thanked the members of the PB, the PB co-chairs, the Secretariat and the GEO community for all the work involved in putting together the GWP, and appreciated the characteristic of GEO that has permitted a dialogue between science and policy that has informed so many discussions.

He introduced the GWP, noting that, though it is amendable, it is a document that will guide GEO for the next for next three years. He observed that we are now at the “Consolidation phase” of the GWP, wherein the GWP has undergone review and alignment in order to make sure the resources are there to deliver, and as such the GWP can be aspirational. The GWP spells out what GEO is going to do, as well as what it is not going to do. In particular, resourcing of GWP activities has become much more robust than in previous years.

Tim Haigh noted that the GWP contains a large number of topical elements from Community Activities (CAs) to Flagships, all touching on policy initiatives to varying degrees. He highlighted the need for vigilance to make sure that products and outputs coming from the activities of the GWP arrive in the right places, in the right shape and format, and in time to influence decisions. In particular, the GEO Flagships promise much as they respond to policy, and as such will require much continued support.

He concluded by noting that what has changed over the past 100 years is the wealth of information available. The abundance of Earth observations is a vast, sophisticated resource, and it is GEO’s responsibility to ensure this resource is used to inform decision making. Citing the example of cholera deaths related to the use of water pumps in 19<sup>th</sup> Century London, observations can help to show cause and effect, thus permitting the establishment of precautionary measures for the benefit of society. GEO must remain alert to both opportunities and challenges as it seeks to inform decision-making with Earth observations.

## 5.3 Supporting the Sustainable Development Goals

Stephen Briggs (CEOS) presented the work of the PB in response to the request by the Executive Committee to analyse the degree to which the GWP supported achievement of the Sustainable Development Goals (SDGs), as called for by the Mexico City Declaration. He outlined the results of the preliminary analysis, noting that 26 out of 31 Community Activities, and all Initiatives and Flagships contributed in some manner to achievement of the SDGs. Several of the Initiatives and all Flagships identified specific SDG targets and/or indicators that were supported by their activities.

He summarized the present and future work of the PB by highlighting:

I. The short term analysis based on existing Community Activities, Initiatives and Flagships, identifying where and how each activity may contribute to the overall SDGs had been completed. The results of the mapping exercise showed that 26 out of 31 Community Activities contribute to the SDGs (eight identify specific targets); all 22 Initiatives contribute to SDGs (10 identified specific targets and/or indicators); and all four Flagships contributed to specific targets of the SDGs;

II. The next phase involves a longer term analysis, employing a more direct approach that commences with the SDGs and addresses all targets and indicators systematically, to identify where Earth observations (EO) and geospatial data can contribute to achieving the SDGs. End result: action plan to identify/define complementary WP tasks in relation to SDGs. (2017-2018), and the necessary resources; and

III. The GEO Initiative EO in Service of the 2030 Agenda For Sustainable Development forms a complementary tool in analysis as it explores methodologies and processes needed to support the SDGs within the UN system, and at the national level.

Stephen Briggs concluded by noting the Executive Committee to recommend to Plenary that the GWP should be informed by major policy initiatives (e.g. the Sustainable Development Goals -SDGs).

The Chair summarized by noting Plenary supports a policy-driven formulation of the GWP, recognizing the importance of science and technology advancements.

#### **5.4 Presentation of the Proposed GEO 2017 Trust Fund Budget**

John Matuszak (US) representing the Budget Working Group (BWG) presented the proposed 2017 Budget. He noted projected cash contributions to the GEO Trust Fund for 2017 were CHF 3.5 M, and in-kind contributions for 2017 were anticipated to be just under CHF 1 M, figures that are more conservative compared with the budget for 2016. He commented that the 2016 budget approved by Plenary in Mexico City had been optimistic and aspirational, with the hope that the endorsement of the new Strategic Plan would lead to a higher level of voluntary contributions from GEO Members and Participating Organizations. This did not materialize and, consequently the Secretariat has had to manage expenditure to a much lower level in keeping with available resources. This has led to a significant difference in some cases between budgeted and actual expenditure in key categories where discretionary spending could be readily adjusted (e.g. staff travel, supplies and consumables).

He also noted that in July the BWG had recommended that letters go to every GEO Principal from the Co-Chairs, requesting payment and pledging of resources to the GEO Trust Fund. It was also brought to their attention that many GEO Members do not currently contribute anything to the GEO Trust Fund. The BWG thus reiterated this request, asking that all GEO Member Countries pledge their contribution to the GEO Trust Fund for 2017 as soon as possible, preferably at Plenary during the budget papers discussion.

He concluded by stating the BWG supported the Secretariat's strategy of planning on the basis of a more conservative budget for 2017, but noting that this will likely result in sub-optimal implementation of the GEO Strategic Plan.

#### **5.5 2017-2019 Work Programme Discussion**

The EC welcomed the opportunity to discuss the GWP which is a core document in the implementation of GEOSS. The EC commented that remarkable progress has been made in terms of the organization, structure, and balance between resources, and it particularly appreciated the restructuring of the Foundational Tasks (FTs). The EC views the GWP as a communication and promotional tool for GEO, and thus it should avoid becoming too technical. It would like to see future versions highlight complementary activities. In terms of resources, the EC believes that further work is needed on the analysis of FTs and their support, in particular critical elements such as the GCI which

is essential for the functioning of GEOSS. The EC would like to see increased support from GEO Members and Participating Organizations in support of the GCI so that it does not rely on the GEO Trust Fund alone.

IOC commented that revisions will be forthcoming with respect to the *GEOSS In-situ Earth Observation Resources* FT on *in-situ* observations, taking a more systems approach that involves different levels of coordination while ensuring that consistency is achieved in levels of information provided with respect to remote and *in-situ* systems. IOC was pleased to see acceptance of the *Oceans and Society: Blue Planet* Initiative into the GWP.

Australia found the new GWP very clear and congratulated the PB and Secretariat on the work accomplished. Australia wished to demonstrate its strong support of GEO with a pledge of AUD 85,000 to the GEO Trust Fund for 2017, and would like to encourage all Members and Participating Organizations to do make pledges as well. Australia wished to highlight in particular its full support for the AOGEOSS Initiative.

Germany expressed its appreciation for the GWP. Noting that it is a living document, Germany would like to see a future version that contains a preamble, driven by relevant political issues, to improve readability. In addition, an illustration examining the relationships between different components of the GWP would be helpful. Germany was pleased to make a €100,000 pledge to the Trust Fund for 2017.

POGO wished to highlight a major milestone of the Oceans and Society: Blue Planet Initiative with the establishment of a dedicated, distributed secretariat (NOAA, CSIRO). POGO also expressed appreciation to the PB for its feedback while developing the Initiative's implementation plan.

Colombia stated its appreciation for the work of the PB and Secretariat on development of the GWP. Forest monitoring is of great importance to the Colombian government, and it has moved to support the establishment of a GEO data cube with the collaboration of CSIRO, Australia, which has allowed Colombia to improve storage and handling of large volumes of observational data.

Sweden thanked the presenters for explaining the PB's work and GWP, and expressed its wish to see the *Earth Observations in Service of the 2030 Agenda For Sustainable Development* Initiative mature to become a Flagship. Sweden also indicated it will be making a contribution to the GEO Trust Fund for 2017.

Japan thanked the PB for preparing the GWP and noted its strong support for the Flagships and several of the Initiatives. In particular, Japan will work with China and Australia in support of the AOGEOSS Initiative. Japan also indicated it will be making a contribution to the GEO Trust Fund for 2017.

Italy thanked the PB co-chairs, and PB in general, for rising to meet the great challenges with which it was presented. Italy was pleased to see the analysis of how the GWP aligns with the support of achieving the SDGs. Italy expressed its approval of the GWP, as well as the proposed 2017 budget. Italy thanked the Secretariat Director and staff for all the tangible outcomes of their work.

Argentina thanks the presenters for their excellent work and confirmed that it will continue contribute to the GEO Trust Fund in 2017.

CEOS welcomed this first edition of the three-year GWP, which helps CEOS organize its work. CEOS has been exploring how both experts and non-experts can apply space-observed data to decision-making, and will be shifting internal activities to leveraging the convening power of GEO. In particular, CEOS will be scaling up the CEOS datacube, an open-source tool to enable users to access data, from local to global scales. The technology will be available for free download, as CEOS seeks to engage with those in the GEO community who wish to co-create an open resource that will not only exploit open data, but also a growing number of tools that will allow the exploitation of remotely-sensed data from a variety of observing platforms.

IEEE thanked the PB for the development of an impressive GWP, and expressed its support for the GWP and 2017 budget. IEEE wished to make a US \$5000 pledge to the GEO Trust Fund. IEEE also stated it will continue its presence on the PB, and fully supports the *Earth Observations in Service of the 2030 Agenda For Sustainable Development* and *Oceans and Society: Blue Planet* Initiatives.

The US echoed all the congratulations expressed for the GWP, and stated it was pleased to contribute to a majority of its activities. The US announced it will pledge the same amount to the 2017 Trust Fund as in the current year.

China congratulated the work of the PB and noted the GWP is critical to the implementation of the GEO SP. China expressed its full support of the GWP, and the AOGEOSS Initiative in particular. China announced it will be providing resources to complete this and other WP activities, as well as increasing its pledge to the Trust Fund for 2017.

FAO joined its colleagues in thanking the Russian Federation for hosting the GEO-XIII Plenary, as well as the Secretariat for its tremendous work. The FAO noted that GFOI will benefit from being in GWP. GFOI has been largely successful in achieving its goals, and will be focusing its efforts in the coming year on capacity building for forest monitoring, particularly for developing nations. The FAO called on GEO Members to continue to provide EO in support of GFOI, as well as to provide assistance to developing nations for improving access to Earth observations, to inform decision-makers.

Switzerland welcomed the GWP and thanked the PB and Secretariat for excellent work. Switzerland noted that, for the future, it will be important that GEO Principals keep an eye on the engagement strategy and the implementation of Flagships. Switzerland supports the budget for 2017, and pledged to make a contribution to the Trust Fund for 2017, as well as consider maintaining a secondment to the Secretariat.

South Africa commended the PB and Secretariat on the GWP, citing the great progress that has been made compared to years past. South Africa will continue to provide strong support for the AfriGEOSS Initiative, as well as activities related to food security and agriculture, sustainable forest management, and urban planning. South Africa pledged to maintain its contribution to the GEO Trust Fund for 2017 at the same level as currently. It also noted it will be hosting the 37<sup>th</sup> International Symposium for Remote Sensing of the Environment (ISRSE) in May 2017, and, strongly recommended a co-location of the GEO Work Programme Symposium.

Mexico thanked the presenters for their explanations, as well as the PB, Executive Committee and BWG. Mexico was pleased to see the GWP reflecting the spirit of the Mexico City Declaration and wished to express its strong support for both it and the 2017 budget. Mexico thanked the Russian Federation for its hospitality, and stated it looked forward to expanding its support of GEO in the coming year.

India congratulated the PB for its good work and noted the large number of Indian satellites that are providing openly available data, an indication of its commitment to integrated Earth observation programs. India looked forward to supporting in particular the *Oceans and Society: Blue Planet* Initiative, and the GEOGLAM Flagship.

EC announced it was pleased to make a pledge of €800,000 to the GEO Trust Fund for 2017, on behalf of the 28 European Union countries. The EC noted that, although this amount represented a direct contribution, it also independently contributed to a number of GEO tasks through H2020 and Copernicus programmes. Additionally, countries outside the EU but participating in H2020 projects were also making in-kind contributions.

**Outcome: The Chair concluded by declaring that, based on the Plenary discussions:**

- The GEO 2017-2019 Work Programme was approved; and
- The GEO 2017 Trust Fund Budget was approved.

## 5.6 2017-2019 Programme Board Slate

The Secretariat Director briefly presented the slate of nominees, noting that – in contrast to 2016 – the number approved by the Executive Committee reached the maximum of 32, as called for in the Rules of Procedure.

**Outcome: The Slate as recommended by the Executive Committee, containing representatives from 15 Members and 17 Participating Organizations for a total membership of 32, was approved.**

## 6 SESSION: OTHER BUSINESS, SESSION OUTCOMES AND CLOSING REMARKS

### 6.1 2015 Financial Statements and Audit Report

John Matuszak presented the statement and report. He noted that the cash reserves of the GEO Trust Fund at the close of 2015 amounted to CHF 2.3 M while there was an increase in total assets to CHF 3.7 M, with spending well within the 2015 budget. He also highlighted key points from the BWG report, including:

- Swiss National Auditors are commissioned to Audit GEO Financial Statements in conjunction with WMO contract;
- No specific recommendations were made to GEO, but requests to note recommendations to WMO. All recommendations were accepted by the WMO Secretary-General; and
- The Secretariat was thanked by the BWG for their support and transparency in preparing the papers and managing the expenditure of the Trust Fund. In particular, the BWG noted the audited Financial Statement for 2015 received a clean bill of health.

Additionally, he noted the Interim Report of Income and Expenditure for 2016 only contains expenditure and revenue up until the 30th September, and that there are still some significant costs to be accrued including Plenary travel and WMO overheads in the final quarter, resulting in higher expenditures than the averages for the previous three quarters.

**Outcome: The Financial Statement and Audit Report were approved.**

### 6.2 Update of Rules of Procedure

The Secretariat Director provided a brief overview of the document, noting that the proposed revisions were largely as follows: adding an Ethical Standards section; clarifying the roles and responsibilities of the GEO Principals and Alternates; and revising duties for the Programme Board.

**Outcome: The revised Rules of Procedure were approved.**

### 6.3 Slate of the 2017 Executive Committee

The 2017 Executive Committee will include the following Members:

- Africa: South Africa (Co-Chair), Senegal, Uganda;
- Americas: USA (Co-Chair), Colombia, Mexico;
- Asia-Oceania: China (Co-Chair), Australia, Japan, Republic of Korea;
- Commonwealth of Independent States (CIS): Armenia, Russian Federation; and
- Europe: European Commission (Co-Chair), Finland, France, United Kingdom.

### 6.4 GEO-XIV and GEO-XV Announcements

The Secretariat Director informed Plenary that she had received the following offers to host future GEO Plenaries:

- 2017 Washington DC, USA; and
- 2018 Japan.

A video for Washington DC and the 2017 Plenary was shown. Japan will inform Plenary when the 2018 dates and location have been finalized.

The Chair expressed appreciation for these offers.

### **6.5 Any Other Business**

None.

### **6.6 Session Outcomes**

The Secretariat Director highlighted the outcomes in a presentation.

### **6.7 Closing Remarks GEO Co-Chairs, the Russian Federation and GEO Director**

Vasily Valentinovich Asmus, the Russian Federation with GEO Secretariat had worked hard on putting the Plenary together, expressed gratitude to the organizing teams, the Plenary delegates as all have contributed to making the Plenary a success.

Barbara Ryan requested Organizations identify their external relations person for working with Steven Ramage; she issued another call for virtual secondments, encouraged the *in-situ* community to work with CEOS on Data Cubes to implement a GEO Data Cube and ended by thanking Russia and the Secretariat for all the hard work preparing for this week.

The China Co-Chair expressed appreciation for the active organization of the Russian Federation and the Secretariat. China also thanked the fellow GEO Co-Chairs, Members and Participating Organizations of Plenary for their contributions, and advocated greater engagement with the UNGGIM, noting that China is pleased to host the upcoming geospatial working group in 2017.

The EC Co-Chair thanked the Russian Federation for hosting the GEO-XII Plenary, in a beautiful city. The EC also thanked the Secretariat for organizing the Side-Events and Plenary, and for all the work to be done afterwards to conclude and bring forward Plenary's decisions. The EC thanked the US for offering to host the GEO-XIV Plenary, and Japan for GEO-XV in 2018. The EC is looking forward to seeing great progress in GEO, along with the results of the change in focus being implemented, and is pleased to serve as lead GEO Co-Chair for the next year.

The US Co-Chair thanked the Russian Federation for hosting the meeting, and made the observation that the new Plenary format has been a great experiment, based on 10 years of prior experience. The Plenary was interesting and dynamic, and the US is looking forward to hosting GEO-XIV in 2017. The US reminded participants to please provide feedback on the new Plenary agenda format.

The South Africa Co-chair expressed his thanks to the Russian Federation, and to Vasily Valentinovich Asmus. South Africa also thanked the Secretariat staff under the leadership of Barbara Ryan, and thanked the full GEO Plenary for having stayed the course over the past two transitional years.

*Meeting adjourned at 4:00 pm.*

**Draft List of Participants  
GEO-XIII  
9-10 November 2015  
Saint Petersburg, Russian Federation**

**MEMBERS**

**Argentina**

Ana Medico

**Armenia**

Armen Saghatelian  
Shushanik Asmaryan

**Australia**

Stuart Minchin  
Elizabeth McDonald  
Jonathon Ross

**Bangladesh**

Kazi Awal  
Shamsuddin Ahmed  
Farid Ahmed

**Brazil**

Hilc ea Ferreira

**Canada**

David Grimes  
Dilhari Fernando  
Michael Furlong  
Laura Mills

**Central African Republic**

Padou Lambert

**Chile**

Juan Eguiguren  
Luciano Parodi

**China**

Pengde Li  
Jiahong Li  
Yuqi Bai  
Zhongxin Chen  
Xingfa Gu  
Xiang Ji

Xiaohong Jiang

Lan Jin

Beibei Li

Zengyuan Li

Hui Lin

Chuang Liu

Jianqiang Liu

Ting Liu

Fuhu Ren

Dahai Sun

Xinming Tang

Yan Tang

Hongyan Wang

Zhigang Wang

Tingrui Wu

Hao Xu

Liping Xu

Wei Xu

Yuhong Xu

Dongmei Yan

Yaowu Yang

Fanghong Ye

Yinhu Ye

Yanhua Yu

Songmei Zhang

Xiaojun Zhang

Xingying Zhang

Xiang Zhou

**Colombia**

Omar Franco Torres

Diana Quimbay

**Denmark**

Morten Nordahl Moeller

**Estonia**

Reet Talkop

**European Commission**

Robert-Jan Smits

Jack Metthey

Richard Burger  
Eleni Christia  
Massimo Craglia  
Marine Duhamel  
Jonas Eberle  
Dina Eparkhina  
Sven Gilliams  
Christoph Haeuser  
Christopher Kyba  
Gilles Ollier  
Daniele Oxoli  
Noel Parmentier  
Jose Rubio Iglesias  
Hannu Saarenmaa  
Hannele Savela  
Geoffrey Sawyer  
Michel Schouppe  
Jane Shiel  
Andrea Tilche  
Alexia Tsouni  
Florian Wetzel

**Finland**

Mikko Strahlendorff  
Hannele Savela  
Heli Ursin

**France**

Dominique Marbouty  
Vincent Pircher  
Laure Capar  
Stéphane Chevrel  
Raphaele Heno  
Lionel Menard  
Richard Moreno  
Thierry Ranchin  
Pascale Ultré-Guérard

**Georgia**

Tamar Bagratia

**Germany**

Paul Becker  
Carsten Dettmann  
Thorsten Büßelberg  
Jörn Hoffmann  
Laetitia Navarro  
Gunter Schreier  
Helmut Staudenrausch  
Adrian Strauch

**Greece**

Christos Zerefos  
Evangelos Gerasopoulos  
Haris Kontoes

**Guinea**

Mamadou Bah

**India**

Prakash Chauhan

**Iran**

Reza Bayani

**Italy**

Nicola Pirrone  
Andrea Monti-Guarnieri  
Antonio Bombelli  
Alessandra Fino  
Paolo Mazzetti  
Stefano Nativi  
Stefano Salvi  
Mattia Santoro  
Fabio Volpe

**Japan**

Ryuichiro Shirama  
Shinichi Higuchi  
Koji Akiyama  
Masao Fukasawa  
Mariko Harada  
Katsunori Hirokane  
Naoto Kanehira  
Hibiki Muraoka  
Hiroyuki Muraoka  
Yuko Nakamura  
Mai Numano  
Ryosuke Shibasaki  
Chu-Ishida Watanabe  
Akiko Yamada

**Korea, Republic of**

O-Ung Kwon  
So Yun Jeong  
Hyun-Ok Kim

**Madagascar**

Frédéric Ramarolahivonjiana

**Mexico**

Rolando Ocampo  
Jose Eduardo De La Torre Barcena

**Moldova**

Valeriu Cazac

**Mongolia**

Erdenebat Eldevochir

**Nepal**

Krishna B.c.  
Anil Marasini

**Netherlands**

Ger Nieuwpoort  
Ruud Grim  
Frank Lantsheer

**Norway**

Øystein Nesje  
Bente Bye  
Per-Erik Skrøvseth

**Paraguay**

Angel Yanosky  
Fabiana Arevalos

**Portugal**

Victor Silva

**Romania**

Ion Nedelcu  
Marilena Doncuta

**Russian Federation**

Alexander Frolov  
Andrey Arakcheev  
Vasily Asmus  
Sergey Bartalev  
Konstantin Batagov  
Igor Blinov  
Valery Bondur  
Kirill Borisov  
Mikhail Burtsev  
Lev Desinov  
Ivan Gotyur  
Anatoly Grabovsky  
Alexander Harsov  
Alexander Ipatov  
Denis Ivanov  
Vladimir Kattsov  
Mikhail Khailov  
Vladimir Kiselev  
Alexander Konykhin

Gennady Kovalenko  
Iuliia Krasheninikova  
Evgeny Lupyan  
Ivan Ryabov  
Victor Selin  
Nina Tarasova  
Sergey Tassenko  
Andrey Tyulin  
Vladimir Udrish  
Natalya Vandysheva  
Leonid Vedeshin  
Maxim Volkov  
Valery Vuglinsky  
Valery Zaichko

**Slovenia**

Silvo Žlebir

**South Africa**

Philemon Mjwara  
Humbulani Mudau  
George Chirima  
Tumisang Sebitloane  
Lerato Senoko

**Spain**

José María Marcos Espinosa  
Joan Masó-Pau  
Ivette Serral Montoro

**Sweden**

Stefan Nilsson  
Esa Falkenroth

**Switzerland**

Karine Siegwart  
Alex Rubli  
José Romero

**Uganda**

Martin Owor  
Johnson Owaro  
Catherine Ahimbisibwe

**United Kingdom**

Farhana Amin  
Heiko Balzter  
Stuart Marsh

**United States**

Steve Volz  
Zdenka Willis

Matthew Connors  
James Crutchfield  
Ivan Deloatch  
Phillip Dickerson  
Lawrence Friedl  
Yana Gevorgyan  
Frank Kelly  
John Matuszak  
Nancy Searby

**Uzbekistan**

Natalya Shulgina

**Vietnam**

Tuan Vu

## **Participating Organizations (POs)**

### **AGI**

Sanjay Kumar

### **CEOS**

Frank Kelly  
Jonathon Ross

### **CODATA**

John Broome  
Alena Rybkina

### **COSPAR**

David Halpern

### **EARSC**

Geoffrey Sawyer  
Noel Parmentier  
Kamen Iliev

### **EARSeI**

Lena Halounova

### **ECMWF**

Jean-Noël Thepaut

### **EEA**

Tim Haigh

### **ESA**

Stephen Briggs  
Ivan Petiteville  
Mirko Albani  
Guido Colangeli  
Joost Van Bemmelen

### **ESIP**

Emily Law  
Erin Robinson

### **EU SatCen**

Sergio Albani

### **EUMETSAT**

Vincent Gabaglio

### **EuroGeoSurveys**

Luca Demicheli  
Veronika Kopačková  
Claudia Delfini

### **FAO**

John Latham

### **GOOS**

Albert Fischer  
Dina Eparkhina

### **GSDI**

Gabor Remetey-Fulopp  
Jeanne Foust  
Steve Kopp

### **i-BEC**

George Zalidis

### **IAG**

Gunter Stangl  
Matthias Madzak

### **ICIMOD**

Basanta Shrestha

### **ICOS**

Eija Juurola  
Jost Lavric  
Gorana Jerkovic

### **ICSU**

Michael Sideris

### **IEEE**

Hans-Peter Plag  
Elise Osenga

### **IHO**

Mustafa Iptes

**IIASA**

Ian McCallum  
Steffen Fritz

**ILTER**

Michael Mirtl

**IOC**

Albert Fischer

**ISDE**

Changlin Wang  
Hao Jiang  
Yubao Qiu  
Lizhe Wang

**ITC**

Freek Van Der Meer  
Chris Mannaerts

**IUGG**

Alik Ismail-Zadeh  
Michael Sideris

**MRI**

Gregory Greenwood

**OGC**

Jeanne Foust  
Ming-Chih Cheng  
Tien-Yin Chou  
Meixia Deng  
Liping Di  
Steven Hagen  
Chen-Yu How Hao  
Lucia Lovison-Golob

**POGO**

Sophie Seeyave  
Francisco Chavez

**RDA**

Kathleen Fontaine

**SAON**

Mikko Strahlendorff  
Hannele Savela

**SWF**

Krystal Wilson

**UNESCO**

Albert Fischer

**UNOOSA**

Shirish Ravan

**WDS**

Vasily Kopylov  
Robert Downs  
Natalia Sergeeva  
Vasily Sobolev

**WMO**

Wenjian Zhang  
Lars-Peter Riishojgaard

**OBSERVERS**

**APRSAF**

Akiko Suzuki  
Hitoshi Tsuruma

**APSCO**

Sharifee Mohammed Nur Hossain  
Byambasuren Erdenee

**Guatemala**

Kenset Rosales

**ISNET**

Imran Iqbal

**OECD**

Ivan Hascic

**GUESTS**

**Georgia Institute of Technology**

Mariel Borowitz

**GPSDD**

Aditya Agrawal

**ICORSE**

Per-Erik Skrøvseth

**MESA**

Robert Brown

**GEO Secretariat**

Barbara Ryan  
Vanessa Aellen  
Katherine Anderson  
Hendrik Baeyens  
Maria Chalakatevaki  
Wenbo Chu  
Douglas Cripe  
Paola De Salvo  
Michel Deshayes  
Patricia Geddes  
Gary Geller  
Sachiko Matsuura  
Andiswa Mlisa  
Andre Obregon  
Osamu Ochiai  
Steven Ramage  
Sofia Rodriguez  
Giovanni Rum  
Chloé Tiberghien  
Chao Xing

