

GEO Climate Change Working Group Roadmap

This document is submitted by the Climate Change Working Group to the Programme Board for information.

1 INTRODUCTION

A Roadmap is proposed to guide the work of the Climate Change Working Group (CC-WG) and prioritize action based on the approved [Terms of Reference](#). The Roadmap will also outline the way in which members will engage and contribute to the objectives of the CC-WG.

The Roadmap assumes that all activities will endeavour to establishing and maintaining relationships with national, international and intergovernmental bodies engaged in climate action, as well as considerations around the [Canberra Declaration](#).

2 WORKING ARRANGEMENTS

2.1 Co-chairs

Four co-chairs are elected, selected by and from the CC-WG members, representing a balance of gender, geography, and generation. Each co-chair leads a designated subgroup and is supported by deputy chairs in their role.

2.2 Co-chairs' role

In collaboration with the GEO Secretariat CC-WG coordinator, the co-chairs:

- Prepare CC-WG meeting agendas;
- Chair CC-WG meetings;
- Review documents prior to distribution to CC-WG members;
- Formulate issues for discussion within the CC-WG;
- Propose ways of implementing the activities of the CC-WG (such as work plans, subgroups, etc.);
- Lead the respective subgroup activities and chair subgroup meetings;
- Represent the subgroup to the CC-WG;
- Represent the CC-WG to other groups within GEO and to outside organizations; and
- Report to the GEO Programme Board and other GEO governance bodies.

2.3 Deputy chairs' role

Under each established subgroup, the deputy chairs:

- Assist the co-chairs in the preparation of subgroup meeting agendas;
- Assist the co-chairs in chairing subgroup meetings;
- Review documents prior to distribution to subgroup members;
- Formulate issues for discussion within the subgroup;

- Propose ways of implementing the activities of the subgroup; and
- Implement key subgroup tasks.

2.4 Subgroups

Four subgroups are established, as follows:

- Subgroup 1: Coordination of climate issues across the GEO Work Programme & synergies with key partners (including WMO);
- Subgroup 2: Engagement with UNFCCC and IPCC;
- Subgroup 3: Enhancing the use of Earth observations for Mitigation; and
- Subgroup 4: Enhancing the use of Earth observations for Adaptation and Loss & Damage.

2.5 Relationships with other GEO Working Groups

The CC-WG will coordinate with other GEO WG as appropriate, in particular with the Disaster Risk Reduction Working Group (DRR-WG) and its established subgroup on Coordination with GEO Engagement Priorities (Climate Change and Sustainable Development Goals).

2.6 Meetings

Work is conducted mainly through conference calls and emails as determined by the CC-WG members:

- One CC-WG call every 3 months;
- Subgroups calls on an ad hoc basis;
- One physical meeting/workshop per year; and
- Additional meetings at GEO Week / UNFCCC / IPCC events.

WG members are also encouraged to share information and ideas via mailing list.

The CC-WG will provide periodic (at least annual) reports on its activities to the Programme Board as part of GEO Work Programme monitoring. It may also bring specific issues to the Programme Board as needed.

Administrative support to CC-WG will be provided by the GEO Secretariat; currently Sara Venturini, Climate Coordinator: sventurini@geosec.org.

2.7 Duration

The Terms of Reference will remain in effect for the period of the 2020-2022 GEO Work Programme. They may be revised with the approval of the Programme Board.

2.8 Deliverables, Milestones and Timeline

Priority deliverables, milestones and the working timeline are identified for the CC-WG (see table below). Additional details are contained in the work plan of each subgroup (see Annex B).

While the CC-WG activities are outlined for the 2020-2022 period, some have an ongoing nature and are intended to be continued beyond the first term.

Table 1. Timeline of CC-WG’s deliverables and milestones throughout the period 2020-2022

N.	Deliverables / Milestones	Timeline (start – end dates)	Lead Subgroup	Supporting Subgroups	2020				2021				2022			
					Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
1	Reporting to PB (Quarterly)	Q3 2020; Q1, Q2, Q3 2021; Q1, Q2, Q3 2022	All				X		X	X	X		X	X	X	
2	Mapping of GEO WP activities including review of IP and developing a catalogue of activities according to contribution to thematic areas for climate action as well as contribution to key partners' work	Q4 2020 - Q2 2021	S1	S3, S4						X						
3	GEO's contribution to the GFCS process, including the 2020 Status of Climate Services Report	Q4 2020; Q4 2021; Q4 2022	S1					X				X				X
4	Preparation of GEO's contribution to the Global Stocktake via ad hoc coordination group of Systematic Observation community and SBSTA	Q3 2020 – ongoing	S2	S3, S4												
5	Work with the WMO to identify a primary point of contact on climate issues for the CC-WG	Q4 2020 - ongoing	S1													
6	Development of supplementary technical guidance for integrating EO into NAPs, including through a stakeholder validation workshop and a call for good practices (for second iteration)	Q1 2021 (first draft) – Q3 2021 (validation workshop) - Q4 2021 (launch at COP26); Q2 2022 (call for good practices in view to second iteration)	S4	S2					X		X	X		X		
7	Information note providing an overview of the emerging needs for reporting obligations under the Paris Agreement and their timing, for adaptation and mitigation	Q1 2021	S3, S4	S2					X							
8	Organisation of Second GEO Climate Workshop - and preparation of workshop report	Q4 2020 – Q3 2021	S1	S2, S3, S4							X					
9	Organisation of GEO Climate Finance Workshop - and preparation of workshop report	Q4 2020 - Q1 2021	S1					X								
10	List of "Twinning" of GEO and UNFCCC Party representatives for the Research and Systematic Observation (RSO) subgroup of SBSTA	Q2 2021 - ongoing	S2						X							
11	Preparation of annual briefing as a debrief in advance of COP on the work of GEO and the broader EO/SO community	Q3 - Q4 2021; Q3 - Q4 2022	S2	S3, S4								X				X
12	Participation in UNFCCC SBs, COP26, SBSTA Earth Information Day, and organisation of side-events	Q2 – Q4 2021; Q2 - Q4 2022	S2	S3, S4					X		X		X	X	X	X
13	Contribution to a planned Copernicus/CEOS Workshop bringing together GHG and AFOLU EO Communities, and workshop report	Q1-Q3 2021	S2	S3							X					
14	Participation in/Organisation of dedicated session in GEO Symposium	Q2 2021; Q2 2022	S1	S2, S3, S4					X				X			
15	Participation in/Organisation of GEO Week side events including Plenary session on Climate Action	Q2 2021 – Q4 2021 (November) and Q2 2022 – Q4 2022 (November)	S1	S2, S3, S4								X				X
16	GEO's participation in GCOS 2nd Climate Observation Conference	Q4 2021 (12-14 October)	S1	S2, S3, S4								X				
17	Preparation of GEO's response on EO gaps identified by IPCC Special Reports / AR6	Q1 2021 – Q4 2021	S2	S3, S4								X				
18	Organisation of joint GEO-IPCC Expert meeting on the topics of land representation, the role of remote sensing and field measurements, and uncertainty - and workshop report	Q1 - Q2 2021	S3	S2						X						
19	Definition of application specific EO requirement addressing all aspects of the UNFCCC, including through a stakeholder workshop/series of webinars on the use of EO for mitigation and adaptation - and workshop report	Q1 2021 - Q2 2022	S3, S4	S2										X		
20	Report on gaps and way forward	Q2 2022	S1	S3, S4										X		
21	Call for expression of interest to feed in GEO 2023-2025 Work Programme	Q4 2022	S1	S3, S4												X

Annex A

Current governance of the Climate Change Working Group

Subgroup 1: Coordination of climate issues across the GEO Work Programme & Synergies with key partners (including WMO)

- Co-chair: Virginia BURKETT (USGS - United States)
- Deputy chairs: Diofantos G. HADJIMITSIS (Cyprus), Kamila KABO-BAH (Ghana), Rabia SA'ID (ACCREC)

Subgroup 2: Engagement with UNFCCC and IPCC

- Co-chair: Mark DOWELL (JRC - European Commission)
- Deputy chairs: Armen ASRYAN (Armenia), Nura JIBO (ACCREC)

Subgroup 3: Enhancing the use of Earth observations for Mitigation

- Co-chair: Lucia PERUGINI (CMCC – Italy)
- Deputy chairs: Akinola BABATUNDE (Nigeria), Ramesh P. SINGH (United States)

Subgroup 4: Enhancing the use of Earth observations for Adaptation and Loss & Damage

- Co-chair: Angel Alberto VALDIVIEZO AJILA (National Service for Disaster Risk Reduction and Emergencies – Ecuador)
- Deputy chairs: Gayane FAYE (Senegal), Gensuo JIA (China)

Annex B

Subgroup work plans

SUBGROUP 1: COORDINATION OF CLIMATE ISSUES ACROSS THE GEO WORK PROGRAMME AND SYNERGIES WITH KEY PARTNERS (INCLUDING WMO)

WORK PLAN

Version 05/01/2021

Subgroup Purpose

This subgroup will focus on enhancing coordination of climate-related activities across the GEO Work Programme to promote an effective response to the needs of key partners such as the UN Framework Convention on Climate Change (UNFCCC) and the Intergovernmental Panel on Climate Change (IPCC), and to ensure complementarity of efforts with other data providers in the Earth observation community including the World Meteorological Organization (WMO) and the Committee on Earth Observation Satellites (CEOS). This will be undertaken through a mapping of relevant GEO Work Programme activities aimed at identifying existing gaps and synergies; the establishment of close dialogue with partners; the facilitation of communication within the GEO Work Programme including through dedicated meetings and workshops; with a view to proposing a way forward and possible opportunities for collaboration. These efforts will help ensure that national, regional, and global climate action efforts are implemented in a sustainable manner for the benefit of the society.

Terms of Reference

Most relevant duties in the CC-WG Terms of Reference for Subgroup 1:

- Review the implementation plans of all GEO Work Programme activities relevant to climate change to identify potential disconnect and synergy opportunities among them to be addressed;
- Assess from these GEO Work Programme activities where GEO is best placed to act and recommend actions to be taken by GEO/activity leads in relation to key issues, e.g., climate modelling/science, mitigation, adaptation, and other relevant areas of the UNFCCC/Paris Agreement;
- Facilitate communication between the leads and participants of these GEO Work Programme activities and between them and relevant partners, including through the organization of dedicated meetings and workshops;
- Stimulate the initiation of projects and case studies involving participants from multiple GEO Work Programme activities to enhance collaboration across GEO and to address identified disconnect, opportunities, or actions in relation to key issues;
- Assess how GEO can work with its member countries and partners to advance the collection and use of Earth observations, particularly in situ, that are needed to support countries' and international organizations' work on climate science and assessments, reduce uncertainty in climate modelling, and enhance societal response strategies;
- Identify efficient forms of mutually beneficial collaboration between GEO and WMO in the areas of climate change, including the Global Framework for Climate Services (GFCS), the Global Climate Observing System (GCOS) and the Global Atmosphere Watch (GAW).

Subgroup activities

- I. Review the current GEO Work Programme (2020-2022) and identify activities that are responsive to GEO's climate change engagement priority and the 2019 Canberra Declaration, which calls for GEO to be more proactive in addressing GEO Members' needs for EO to support climate action. This scouting of the GEO flagships, initiatives and community activities will aim to identify potential disconnect and synergy opportunities among them and will build upon a preliminary matrix of GEO activity linkages to the Paris Agreement conducted in 2018 and the indications contained in the Discussion Paper on Action on Climate Change submitted to the 2019 GEO-XVI Plenary. The work will be conducted in close coordination with the Disaster Risk Reduction Working Group and will entail the following steps:
 - A. The preparation of a survey targeting GEO Work Programme activity leads, starting in Q4 2020. The survey will be preceded by short preparatory interviews with GEO activity leads, and also build on Programme Board Engagement Teams interviews when possible.
 - B. A review and characterization of the implementation plans of each relevant Work Programme element with respect to climate change, starting in Q1 2021,
 - C. The cataloguing of relevant Work Programme elements in a spreadsheet format that can be periodically updated, to be finalized by Q2 2021. The catalogue will identify Work Programme activities' contribution to thematic areas for climate action as well as contribution to key partners' work (e.g., GCOS, GFCS...).
 - D. Developing a dashboard based on the results of the survey, including a GIS-based mapping if possible, to show the origin/geography/connections/relevance of the work being undertaken across the GEO Work Programme.
- II. Establish an ongoing, close dialogue with WMO and its partners on climate services, climate observations and Earth system modeling.
 - A. Work with the WMO to identify a primary point of contact on climate issues for the CC-WG, starting in Q4 2020.
 - B. Coordinate GEO's contribution encompassing providers outside of the scope of the traditional NMHS community to the GFCS process, including to the annual Status of Climate Services Report (due in Q4 2020; Q4 2021; Q4 2022) mandated by the Conference of the Parties serving as the meeting of the Parties to the Paris Agreement at the 24th Conference of the Parties to the United Nations Framework Convention on Climate Change (UNFCCC).
 - C. Strengthen collaboration with GCOS, including the planning and organisation of GEO's participation in GCOS 2nd Climate Observation Conference (Q4 2021), and explore possible contribution of the GEO Work Programme to provide added value to GCOS, in collaboration with Subgroup 3 and 4.
- III. Facilitate communication between the leads and participants of relevant GEO Work Programme activities and between them and relevant partners, mainly through the engagement with the liaison person and the organization of dedicated meetings and workshops:
 - A. Plan and host the second GEO Climate Workshop in Q3 2021. The first "GEO Climate Workshop" was held in June 2018. The focus of the 2021 event should be determined through interaction with other CC WG Subgroups. The Discussion

Paper on Climate Action presented at the Canberra Plenary in 2019 suggested that the second Climate workshop involve a broader policy-relevant audience.

- B. Plan and host the first GEO Climate Finance (virtual) Workshop in Q1 2021. As suggested by the Discussion Paper on Climate Action presented at the Canberra Plenary in 2019, this is intended to broaden the Earth observations' remit and public understanding to contribute to public and private investment decisions on climate resilience.
 - C. Participation in/organization of dedicated sessions in GEO Symposium 2021 (Q2 2021) and 2022 (Q2 2022) as relevant and appropriate.
 - D. Participation in/organization of GEO Week 2021 (Q4 2021) and 2022 (Q4 2022) side events, including supporting the organisation of the Plenary session on Climate Action as relevant and appropriate.
 - E. Reporting to Programme Board on subgroup activities (Q3 2020; Q1, Q2, Q3, 2021; Q1, Q2, Q3, 2022)
- IV. Identification of gaps/synergies and proposal for a way forward, in collaboration with Subgroups 3 and 4:
- A. Identify gaps and shortcomings as well as possible synergies in the use of EO data identified in the current initiatives/Flagships taking into consideration also capacity building needs and resources gaps, based on the outcomes of the mapping exercise and the information gained at meetings and workshops, and propose a way forward. A SWOT analysis should be used for this purpose. A report on gaps and a way forward as an input to the next GEO Work Programme will be developed by Q2 2022.
 - B. Identify projects and case studies to enhance collaboration across the GEO Work Programme and to address identified disconnect, opportunities, or actions in relation to key issues, if relevant and appropriate, including through a call for expressions of interest to feed into the 2023-2025 GEO Work Programme in Q4 2022.

Working Arrangements

- A dedicated MStTeams channel has been created to coordinate the work of the subgroup.
- Work is conducted mainly through conference calls and emails.
- The entire CC-WG will hold meetings quarterly. Subgroup 1 will determine the frequency of virtual meetings in relation to the whole WG schedule.
- Where possible online documents/shared drive, calendar and resources will be used so that all subgroup members remain informed of progress being made and tasks expected of them.

SUBGROUP 2: ENGAGEMENT WITH UNFCCC AND IPCC**WORK PLAN**

Version 05/01/2021

Subgroup Purpose

This subgroup will ensure effective interface of GEO Work Programme activities to the work of United Nations Framework Convention on Climate Change (UNFCCC) and the Intergovernmental Panel on Climate Change (IPCC), including by addressing the key pillars of the Paris Agreement. The subgroup will undertake this by: establishing a responsive working relation on Systematic Observations with the UNFCCC Secretariat, IPCC Secretariat and WG chairs as well as bilateral dialogues with the relevant Party delegates. Further, the subgroup will undertake targeted initiatives in coordination with other GEO CC-WG subgroups and relevant activities in the GEO Work Programme to address impactful EO initiatives on adaptation and mitigation.

2.9 Terms of Reference

Most relevant duties from the CC-WG Terms of Reference for Subgroup 2:

- Assess how GEO can support countries in the submission of reports and other communications under the UNFCCC/Paris Agreement through the enhanced use of Earth observations, including, as applicable, nationally determined contributions (NDCs), national communications, adaptation communications, and biennial transparency reports (BTRs);
- Assess how GEO can support countries in their National Adaptation Plan (NAP) process and approaches to avert, minimize and address loss and damage, including formulating supplementary guidance on the use and potential of Earth observations for the monitoring and assessment of climate change impacts, vulnerability, risks and adaptation responses over multiple sectors and scales;
- Assess how GEO can support countries in the improvement of national greenhouse gas inventories over time through the enhanced use of Earth observations, consistent with the 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories;
- Identify gaps in terms of Earth observations that are requisite to the work of the IPCC and others conducting climate assessments, and leverage GEO partnerships and resources to provide the additional Earth observations needed to support decision making. Support the IPCC in its Sixth Assessment Cycle, particularly by participating in the expert reviews in preparation of the IPCC's Sixth Assessment Report due to be published in 2021-2022.

Subgroup activities

- I. Establish clear interface between GEO and UNFCCC, as well as support to the GEO members Parties on EO aspects, with an emphasis on the uptake of EO in all aspects of the Convention and the Paris Agreement, including: the Global Stocktake, Mitigation, Adaptation, and Loss and Damage.

- A. Engaging the UNFCCC Secretariat, and creating linkages with the relevant elements of the GEO Work Programme. Organize participation at COP and SBs sessions including SBSTA's Earth Information Day (Q2-Q4 2021; then Q2-Q4 2022).
 - B. Contribute to the UNFCCC Secretariat ad hoc coordination group on Systematic Observation for the Global Stocktake Process, focusing on GEO's unique contributions, starting in Q3 2020.
 - C. Individual Subgroup 2 members (and in principle all GEO CC-WG members) should establish contacts/twinning with their national representatives in the UNFCCC Party delegations for the Research and Systematic Observation (RSO) negotiations under the SBSTA. This will entail establishing a GEO network to UNFCCC Party representatives. First list of "twinning" will be developed by Q2 2021 and will be kept regularly updated.
 - D. An annual briefing should be prepared (first for Q4 2021) as a debrief in advance of COP on the work of GEO and the broader EO/SO community in collaboration with Subgroups 3 and 4. This should be done with the relevant GEO Participating Organizations (e.g., CEOS) and GEO Work Programme activities (e.g. GFOI). The default briefing could/should be tailored to the individual Party representative with additional information of relevance for specific regions.
- II. Strengthen the relations with IPCC and in particular:
- A. Increase engagement with IPCC with a specific focus on WGII and WGIII and in enhancing the use of EO data for the biosphere aspects of impacts, adaptation, and mitigation, thus identifying GEO's added value with respect to other global programmes.
 - B. Prepare a report documenting GEO's response on EO gaps identified by IPCC Special Reports and AR6, also involving relevant programmes and partners (i.e., WCRP, ESA CCI, CEOS) (Q4 2021).
 - C. Support Subgroup 3 to organise a joint GEO-IPCC Expert meeting (Q2 2021) on the topics of land representation for GHG inventories, the role of remote sensing and field measurements, and uncertainty, in collaboration with the IPCC Task Force on National GHG Inventories (TFI).
- III. On adaptation, support Subgroup 4 to develop supplementary technical guidance for the integration of EO data to enhance NAPs (validation workshop in Q3 2021, launch at COP26 in Q4 2021).
- IV. On mitigation, in collaboration with Subgroup 3, establish a framework for holistic EO support combining synergistically both GHG emission and AFOLU EO support to the Parties reporting obligations to the Convention and Global Stocktake process. This will entail contributing to a planned joint Copernicus/CEOS Workshop bringing together GHG and AFOLU EO Communities, contributing with GEO's broad capabilities and representation (Q3 2021).

Working Arrangements

- A dedicated MSTeams channel has been created to coordinate the work of the subgroup.
- Work is conducted mainly through conference calls and emails.

- The entire CC-WG will hold meetings quarterly. Subgroup 2 will organize meetings every 4-6 weeks, with the understanding that activities addressing specific tasks and activities may require additional calls on an ad hoc basis.
- Where possible online documents/shared drive, calendar and resources will be used so that all subgroup members remain informed of progress being made and tasks expected of them.

SUBGROUP 3: ENHANCING THE USE OF EO FOR MITIGATION

WORK PLAN

Version 05/01/2021

Subgroup Purpose

This subgroup will contribute to developing a comprehensive strategy to support climate change mitigation action through the enhanced use of Earth Observation (EO). In particular, it will facilitate the improvement of targeted EO data to assist countries with enhancing and monitoring their mitigation actions and better fulfil the current and forthcoming reporting obligations under the United Nations Framework Convention on Climate Change (UNFCCC) and the Paris Agreement. To this aim, the subgroup will identify GEO Work Programme activities that best fulfil the mitigation and reporting needs, reviewing the programme activities, assessing how and where they are best placed to serve the UNFCCC/Paris Agreement mitigation goals, facilitating the communication among them and with countries including through dedicated meetings and workshops, with a view to proposing a way forward and possible opportunities for collaboration. The subgroup will also aim at identifying how GEO can better serve the global stocktake process under the Paris Agreement, in relation to the assessment of the collective progress in the achievement of the mitigation target.

Terms of Reference

Most relevant duties in the CC-WG Terms of Reference for Subgroup 3:

- Review the implementation plans of all GEO Work Programme activities relevant to climate change to identify potential disconnect and synergy opportunities among them to be addressed;
- Assess from these GEO Work Programme activities where GEO is best placed to act and recommend actions to be taken by GEO/activity leads in relation to key issues, e.g., climate modelling/science, mitigation, adaptation, and other relevant areas of the UNFCCC/Paris Agreement;
- In relation to mitigation aspects, facilitate communication between the leads and participants of these GEO Work Programme activities and between them and relevant partners, including through the organization of dedicated meetings and workshops;
- Stimulate the initiation of projects and case studies involving participants from multiple GEO Work Programme activities to enhance collaboration across GEO and to address identified disconnect, opportunities, or actions in relation to key issues;
- Assess how GEO can work with its member countries and partners to advance the collection and use of Earth observations, particularly in situ, that are needed to support countries' and international organizations' work on climate science and assessments, reduce uncertainty in climate modeling, and enhance societal response strategies;
- Assess how GEO can support countries in the submission of reports and other communications under the UNFCCC/Paris Agreement through the enhanced use of Earth observations, including, as applicable, nationally determined contributions (NDCs), national communications, adaptation communications, and biennial transparency reports (BTRs);
- Assess how GEO can support countries in the improvement of national greenhouse gas inventories over time through the enhanced use of Earth observations, consistent with

the 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories.

Subgroup activities

- I. Identify EO needs for GHG inventories and MRV of mitigation actions and GST considering the emerging obligations under the UNFCCC/Paris Agreement frameworks involving relevant stakeholder groups and IPCC TFI. Develop an information note in Q1 2021 including the following elements:
 - A. Overview of reporting needs and timing
 - B. GST data requirement for the stocktake mitigation target
 - C. Identification of key priority areas
 - D. Targeted needs for regional areas (group of parties)
- II. Support Subgroup 1 to review the current GEO Work Programme (2020-2022) and identify activities that are responsive to GEO's climate change engagement priority and the 2019 Canberra Declaration, which calls for GEO to be more proactive in addressing GEO Members' needs for EO to support climate action. This scouting of the GEO flagships, initiatives and community activities will aim to identify potential disconnect and synergy opportunities among them to be addressed on the basis of the needs and priority areas identified in action 1 above and will build upon a preliminary matrix of GEO activity linkages to the Paris Agreement conducted in 2018 and the indications contained in the Discussion Paper on Action on Climate Change submitted to the 2019 GEO-XVI Plenary. The work will be conducted in close coordination with the Disaster Risk Reduction Working Group and will entail the following steps:
 - A. The preparation of a survey targeting GEO Work Programme activity leads, starting in Q4 2020. The survey will be preceded by short preparatory interviews with GEO activity leads, and also build on Programme Board Engagement Teams interviews when possible.
 - B. A review and characterization of the implementation plans of each relevant Work Programme element with respect to climate change, starting in Q1 2021,
 - C. The cataloguing of relevant Work Programme elements in a spreadsheet format that can be periodically updated, to be finalized by Q2 2021. The catalogue will identify Work Programme activities' contribution to thematic areas for climate action as well as contribution to key partners' work (e.g. GCOS, GFCS...).
 - D. Developing a dashboard based on the results of the survey, including a GIS-based mapping if possible, to show the origin/geography/connections/relevance of the work being undertaken across the GEO Work Programme.
- III. Dissemination of EO data use and identifications of countries' needs – Providing information on the use of EO in support of mitigation in general and GEO initiatives specifically to UNFCCC Parties and stakeholders. Assess specific country needs and explore how GEO can work with its member countries and partners to advance the collection and use of Earth observations, in support of relevant countries' mitigation policies, reports and inventories under the UNFCCC/Paris Agreement and global stocktake. Actions under this activity:

- A. Preparatory meetings with relevant GEO initiatives leads on the AFOLU and land representation topics for webinar organization (see action III.D below) and mapping of activities (see action II above for the timing).
 - B. Support Subgroup 2 in contributing to a planned Copernicus/CEOS Workshop bringing together GHG and AFOLU EO Communities (Q3 2021).
 - C. Organization of joint GEO-IPCC Expert meeting on the topics of land representation for GHG inventories, the role of remote sensing and field measurements, and uncertainty, in collaboration with S2 (Q2 2021).
 - D. Definition of application specific EO requirement addressing all aspects of the UNFCCC, including through a stakeholder workshop/series of webinars in coordination with S2 aimed at understanding user needs targeting developing countries, with regional focus), on the use of EO for GHG mitigation actions, focusing on GEO activities, best practices and country needs (Q2 2022) also involving regional GEOs.
 - E. Support Subgroup 2 with the preparation of a short debrief on the use of EO in climate change mitigation and relevant GEO initiatives to be distributed to countries stakeholders (inventory agencies, government entities responsible of climate policy coordination, relevant research institutes) and in advance of COP (Q4 2021, Q4 2022).
 - F. Support Subgroup 2 with participation in UNFCCC SBs, COP, SBSTA Earth Information Day, and organization of side-events (Q2-Q4 2021, Q2-Q4 2022).
 - G. Support Subgroup 2 with the preparation of GEO's response on EO gaps identified by IPCC Special Reports / AR6 (Q4 2021).
- IV. Reporting and communication within GEO – In relation to climate mitigation aspects, facilitate communication between the leads and participants of relevant GEO Work Programme activities and between them and relevant partners, mainly through the engagement with the liaison person and the organization of dedicated meetings and workshops.
- A. Support Subgroup 1 to plan and host the second GEO Climate Workshop in Q3 2021. The first “GEO Climate Workshop” was held in June 2018. The focus of the 2021 event should be determined through interaction with other CC WG Subgroups.
 - B. Participation in/organization of dedicated sessions in GEO Symposium 2021 (Q2 2021) and 2022 (Q2 2022) as relevant and appropriate.
 - C. Participation in/organization of GEO Week 2021(Q4 2021) and 2022 (Q4 2022) side events, including supporting the organisation of the Plenary session on Climate Action as relevant and appropriate.
 - D. Reporting to Programme Board on subgroup activities (Q4 2020; Q1, Q2, Q3, 2021; Q1, Q2, Q3, 2022)
- V. Identification of gaps/synergies and proposal for a way forward with a focus on mitigation, in collaboration with Subgroup 1 and 4:
- A. Identify gaps and shortcomings as well as possible synergies in the use of EO data identified in the current initiatives/Flagships taking into consideration also capacity building needs and resources gaps, based on the outcomes of the

mapping exercise and the information gained at meetings and workshops, and propose a way forward. A SWOT analysis should be used for this purpose. A report on gaps and a way forward as an input to the next GEO Work Programme will be developed by Q2 2022.

- B. Identify projects and case studies to enhance collaboration across the GEO Work Programme and to address identified disconnect, opportunities, or actions in relation to key issues, if relevant and appropriate, including through a call for expressions of interest to feed into the 2023-2025 GEO Work Programme in Q4 2022.

Working Arrangements

- A dedicated MSTeams channel has been created to coordinate the work of the subgroup.
- Work is conducted mainly through conference calls and emails.
- The entire CC-WG will hold meetings quarterly. Subgroup 3 will meet monthly through teleconference (max 1 hr).
- Where possible online documents/shared drive, calendar and resources will be used so that all subgroup members remain informed of progress being made and tasks expected of them.

SUBGROUP 4: ENHANCING THE USE OF EO FOR ADAPTATION AND LOSS AND DAMAGE

WORK PLAN

Version 05/01/2021

Subgroup Purpose

This subgroup will contribute to developing a comprehensive strategy to support action on climate change adaptation and account of loss and damage through the enhanced use of Earth Observation (EO). In particular, it will facilitate the improvement of targeted EO data to assist countries with enhancing and monitoring their adaptation actions and better fulfil the current and forthcoming reporting obligations under the United Nations Framework Convention on Climate Change (UNFCCC) and the Paris Agreement. To this aim, the subgroup will identify GEO Work Programme activities that best fulfil the adaptation and reporting needs, reviewing the programme activities, assessing how and where they are best placed to serve the UNFCCC/Paris Agreement adaptation goal, facilitating the communication among them and with countries through dedicated meetings and workshops, with a view to proposing a way forward and possible opportunities for collaboration. The subgroup will also aim at identifying how GEO can better serve the global stocktake process under the Paris Agreement, in relation to the assessment of the collective progress in the achievement of the adaptation targets. It will also focus on supporting country action with the mainstreaming of EO into National Adaptation Plans.

Terms of Reference

Most relevant duties in the CC-WG Terms of Reference for Subgroup 4:

- Review the implementation plans of all GEO Work Programme activities relevant to climate change to identify potential disconnect and synergy opportunities among them to be addressed.
- Assess from these GEO Work Programme activities where GEO is best placed to act and recommend actions to be taken by GEO/activity leads in relation to key issues, e.g., climate modelling/science, mitigation, adaptation, and other relevant areas of the UNFCCC/Paris Agreement.
- In relation to adaptation aspects, facilitate communication between the leads and participants of these GEO Work Programme activities and between them and relevant partners, including through the organization of dedicated meetings and workshops.
- Stimulate the initiation of projects and case studies involving participants from multiple GEO Work Programme activities to enhance collaboration across GEO and to address identified disconnect, opportunities, or actions in relation to key issues.
- Assess how GEO can work with its member countries and partners to advance the collection and use of Earth observations, particularly in situ, that are needed to support countries' and international organizations' work on climate science and assessments, reduce uncertainty in climate modelling, and enhance societal response strategies.
- Assess how GEO can support countries in their National Adaptation Plan (NAP) process and approaches to avert, minimize and address loss and damage, including formulating supplementary guidance on the use and potential of Earth observations for the monitoring and assessment of climate change impacts, vulnerability, risks and adaptation responses over multiple sectors and scales.

Subgroup activities

- I. Identify EO needs for adaptation actions and global stocktake (GST) considering the emerging obligations under the UNFCCC/Paris Agreement frameworks involving relevant stakeholder groups. Develop an information note in Q1 2021 including the following elements:
 - A. Overview of reporting requirements and timing according to regional areas (group of Parties).
 - B. Identification of data and information requirements for the GST adaptation target.
 - C. Identification of key priority areas in which EO is required.
- II. Support Subgroup 1 to review the current GEO Work Programme (2020-2022) and identify activities that are responsive to GEO's climate change engagement priority and the 2019 Canberra Declaration, which calls for GEO to be more proactive in addressing GEO Members' needs for EO to support climate action. This scouting of the GEO flagships, initiatives and community activities will aim to identify potential disconnect and synergy opportunities among them to be addressed on the basis of the needs and priority areas identified in the activity above and will build upon a preliminary matrix of GEO activity linkages to the Paris Agreement conducted in 2018 and the indications contained in the Discussion Paper on Action on Climate Change submitted to the 2019 GEO-XVI Plenary. The work will be conducted in close coordination with the Disaster Risk Reduction Working Group and will entail the following steps:
 - A. The preparation of a survey targeting GEO Work Programme activity leads, starting in Q4 2020. The survey will be preceded by short preparatory interviews with GEO activity leads, and also build on Programme Board Engagement Teams interviews when possible.
 - B. A review and characterization of the implementation plans of each relevant Work Programme element with respect to climate change, starting in Q1 2021,
 - C. The cataloguing of relevant Work Programme elements in a spreadsheet format that can be periodically updated, to be finalized by Q2 2021. The catalogue will identify Work Programme activities' contribution to thematic areas for climate action as well as contribution to key partners' work (e.g., GCOS, GFCS...).
 - D. Developing a dashboard based on the results of the survey, including a GIS-based mapping if possible, to show the origin/geography/connections/relevance of the work being undertaken across the GEO Work Programme.
- III. Dissemination of EO data use and identifications of country's needs – Providing information on the use of EO in support of adaptation and impact assessment in general and GEO initiatives specifically to UNFCCC Parties and stakeholders. Assess specific country needs and explore how GEO can work with its member countries and partners to advance the collection and use of Earth observations, in support of relevant countries' adaptation policies, reports and inventories under the UNFCCC/Paris Agreement and GST. Actions under this activity:
 - A. Development of supplementary technical guidance for the integration of EO data to enhance NAPs, in collaboration with Subgroup 2 and 3, which is aimed at assisting Parties in improving national adaptation plan processes and ultimately supporting the contributions to the GST. This will entail the following:

- Developing an outline of the guidance document in Q1 2021. The guidance should include a reference document which establishes the approach and reviews the state of the art of EO, and a series of thematic chapters (e.g., agriculture, mountain areas, urban areas) encompassing case studies. The first guidance document will include one thematic chapter (agriculture).
 - Organizing a stakeholder workshop/webinar in Q3 2021 to discuss the draft guidance and the role of EO in implementing NAPs, particularly in developing countries, which will help validate the guidance document.
 - Launching the final guidance document in relevant UNFCCC meeting (e.g., NAP Expo, COP26, SBSTA Earth Information Day 2021), submission to the UNFCCC NAP Central (<https://www4.unfccc.int/sites/napc/Pages/Home.aspx>) and publication on GEO website, in Q4 2020.
 - For future iterations of the guidance document: a call for good practices on the use of EO data in adaptation to climate change through the different GEO Work Programme activities, national agencies, data providers and so on is to be launched to develop additional sectoral chapter(s) could be issued in Q2 2022.
- B. Definition of application specific EO requirement addressing all aspects of the UNFCCC, including through a stakeholder workshop/series of webinars in coordination with S2 targeting developing countries, with regional focus, on the use of EO for adaptation actions and impact assessment, focusing on GEO activities, best practices and country needs (Q2 2022) also involving regional GEOs.
- C. Support Subgroup 2 with the preparation of a short debrief on the use of EO in climate change adaptation and relevant GEO initiatives to be distributed to countries stakeholders (inventory agencies, government entities responsible of climate policy coordination, relevant research institutes) and in advance of COP (Q4 2021, Q4 2022).
- D. Support Subgroup 2 with the participation in UNFCCC SBs, COP, SBSTA Earth Information Day, and organization of side-events (Q2-Q4 2021, Q2-Q4 2022).
- E. Support Subgroup 2 with the preparation of GEO's response on EO gaps identified by IPCC Special Reports / AR6 (Q4 2021).
- IV. In relation to climate adaptation aspects, facilitate communication between the leads and participants of relevant GEO Work Programme activities and between them and relevant partners, mainly through the engagement with the liaison person and the organization of dedicated meetings and workshops.
- A. Support Subgroup 1 to plan and host the second GEO Climate Workshop in Q3 2021. The first "GEO Climate Workshop" was held in June 2018. The focus of the 2021 event should be determined through interaction with other CC WG Subgroups. The Discussion Paper on Climate Action presented at the Canberra Plenary in 2019 suggested that the second Climate workshop involve a broader policy-relevant audience.
- B. Participation in/Organization of dedicated sessions in GEO Symposium 2021 (Q2 2021) and 2022 (Q2 2022) as relevant and appropriate.

- C. Participation in/Organization of GEO Week 2021 (Q4 2021) and 2022 (Q4 2022), including supporting the organization of the Plenary session on Climate Action as relevant and appropriate.
- D. Reporting to Programme Board on subgroup activities (Q3 2020; Q1, Q2, Q3, 2021; Q1, Q2, Q3, 2022).
- V. Identification of gaps/synergies and proposal for a way forward with a focus on adaptation, in collaboration with Subgroup 1 and 3:
 - A. Identify gaps and shortcomings as well as possible synergies in the use of EO data identified in the current initiatives/Flagships taking into consideration also capacity building needs and resources gaps, based on the outcomes of the mapping exercise and the information gained at meetings and workshops, and propose a way forward. A SWOT analysis should be used for this purpose. A report on gaps and a way forward as an input to the next GEO Work Programme will be developed by Q2 2022.
 - B. Identify projects and case studies to enhance collaboration across the GEO Work Programme and to address identified disconnect, opportunities, or actions in relation to key issues, if relevant and appropriate, including through a call for expressions of interest to feed into the 2023-2025 GEO Work Programme in Q4 2022.

Working Arrangements

- A dedicated MSTEams channel has been created to coordinate the work of the subgroup.
- Work is conducted mainly through conference calls and emails.
- The entire CC-WG will hold meetings quarterly. Subgroup 4 will organize at least one meeting every month, with the understanding that activities addressing specific tasks and activities may require additional calls on an ad hoc basis.
- The length and date of the monthly meetings will be decided based on the subgroup workflow.
- Where possible online documents/shared drive, calendar and resources will be used so that all subgroup members remain informed of progress being made and tasks expected of them.