

Information on Earth Information Day 2020

Note by the Chair of the SBSTA

16 November 2020

I. Introduction

1. The Earth Information Day is a valuable opportunity for exchanging information on the state of the global climate system and developments in systematic observation.¹ Data, services and information on the state of the global climate system are vital for informing decision making on mitigation and adaptation.
2. The Earth Information Day 2020 will take place on Monday 30 November 2020, in conjunction with the UNFCCC Climate Dialogues.
3. This note provides an overview of the Earth Information Day 2020, including information on its organization and themes (section II), background information on activities under the Convention (section III), and activities by relevant programmes and organizations (section IV).
4. All information on the Earth Information Day 2020, including a detailed programme, will be made available online.²
5. I will prepare an informal summary report which will be available in advance of SBSTA 52.

II. Organization and themes

6. The Earth Information Day will take place on 30 November 2020. It will consist of a 2.5 hour dialogue session and online poster exhibition.
7. The dialogue session will consist of oral presentations and panel discussions and will take place from 10.00-12.30 (CET).
8. Posters will be available online **throughout** the Climate Change Dialogues.
9. Participants registered for the Earth Information Day will be able to participate in live audio-visual Q&A sessions with poster presenters at the following times 08:30-09:30 (CET) and/or 17:00-18:00 (CET).
10. Responding to the three submissions received by the secretariat from Parties,³ and in consideration of the mandates and the wider context of ongoing work under the UNFCCC, I identified two themes for the Earth Information Day:
 - Theme 1. **Updates on the state of the global climate and its observation.**
 - Theme 2. **Recent advances in Earth observation technology and data processing to support decision making**
11. I proposed below the following guiding questions for the two themes that are intended to help to focus presentations and discussions.
12. Suggested guiding questions on theme 1 are:
 - What is the latest knowledge on the state of the global climate system: the atmosphere, hydrosphere, biosphere and geosphere and their interactions?
 - What is the latest knowledge on the impacts of climate change and associated projected risks?
 - What is the status of the global climate observing system?
13. Suggested guiding questions on theme 2 are:

¹ FCCC/SBSTA/2019/2 para. 58.

² <https://unfccc.int/event/earth-information-day-2020>.

³ Submissions were received from the Bhutan on behalf of the Least Developed Countries Group, Germany and the European Commission on behalf of the European Union and its Member States, and Japan. See: <https://www4.unfccc.int/sites/submissionsstaging/Pages/Home.aspx>.

- What are the recent advances in Earth observation technology and data processing to support decision making on **mitigation**? How do we ensure quality, consistency, enable collaboration and respond to user requirements?
- What are the recent advances in Earth observation technology and data processing to support decision making on **adaptation and national adaptation plans (NAPs)**?

14. I invite Parties to come prepared to participate actively in the Earth Information Day dialogue and poster Q&A. It is important that this event be an active dialogue in which Parties and other users of information have an opportunity to express their needs and exchange with those programmes and systems that are providing it. I also encourage Parties to use the information in those discussions to inform their continued activities on systematic observation to support work under the Paris Agreement and Convention.

15. An indicative programme for the Earth information day is shown below (all times shown in CET).

Earth information day 2020		
08:30-09:30	Poster Q&A between registered participants and poster contributors	<i>Contributors TBC</i> <i>PLEASE NOTE: Posters available throughout the CC Dialogues</i>
10:00-12:30 (CET)	Dialogue Theme 1: Updates on the state of the global climate and its observation Theme 2: Recent advances in Earth observation technology and data processing to support decision making - On mitigation - On adaptation	<i>Chair: SBSTA Chair</i> <i>Potential contributors include representatives from: CEOS/CGMS, WGClimate, Copernicus, Future Earth, GCOS/GOOS, GCP/UNEP, GFCS, GFOI, GEO, Mercator Ocean International, WMO</i>
17:00-18:00	Poster Q&A between registered participants and poster contributors (Repeated)	<i>Contributors TBC</i>

III. Background information

A. Relevant activities under the UNFCCC

16. This section provides the latest updates on some of the relevant activities being undertaken under the UNFCCC.

17. The SBSTA Chair organised on 8 June 2020 an information event with the scientific community to discuss the impacts that the COVID-19 pandemic has on science⁴. The discussion considered the impacts of COVID-19 on: greenhouse gas emissions and the climate system, observation of the climate, and the scientific community. Options and opportunities to enable scientific support for a sustainable recovery and for knowledge were discussed.

18. The UNFCCC secretariat held the second NAP Champions webinar of this year on 14 October 2020 on how to enhance climate risk management through the formulation and implementation of National Adaptation Plans (NAPs).⁵ The webinar provided insights on how developing countries, particularly Least Developed Countries (LDCs) and Small Island Developing States (SIDS), can best apply available science and frontier technologies such as satellite Earth Observations to transform the development of their plans. It was noted that the use of readily available data and tools has been suppressed by the lack of buy-in to the products, compounded by limited capacity to use and interpret the underlying data.

⁴ Full event listing here: <https://unfccc.int/event/sbsta-chair-information-event-with-the-scientific-community>

⁵ See <https://unfccc.int/event/nap-champions-webinar-advancing-adaptation-through-national-adaptation-plans>.

19. The Adaptation Committee, as part of its workplan 2019–2021, prepared a technical paper on data for adaptation at different spatial and temporal scales.⁶ The paper is currently being converted into a user-friendly publication.

B. Brief update of information and activities by UN and other relevant programmes and organizations

20. This section provides the latest updates on some of the relevant ongoing activities by the systematic observation community. It is a non-exhaustive list of activities by relevant programmes and organizations provided in alphabetical order.

Joint Committee on Earth Observation Satellites and Coordination Group for Meteorological Satellites working group on climate

21. The third version of the web-based Inventory of existing and planned climate data records of GCOS Essential Climate Variables (ECV) observable from space was published in July 2020. The annually updated inventory contains information for 1,137 data records. This version covers contributions to 35 of the 37 ECVs for which information is accessible from space. It fills previously identified gaps, as space agencies have started to address data records for lightning, sea-surface salinity, above ground biomass, and permafrost. The latter two having significance for the analysis of the Earth's carbon cycle. Additional agencies have initiated a contribution process to the inventory, raising hopes to have further improvements for version 4 in 2021. The Joint CEOS/CGMS Working Group on Climate (WGClimate) continuously analyses the inventory and space agencies use this resource to inform their planning for both mission and product generation to limit measurement gaps in Earth observation in the future. The ongoing 2020 analysis is focused on ECVs for which GCOS has identified issues in their long-term provision, thus providing substantial input to the 4th GCOS status report in 2021.

22. Based on a whitepaper endorsed by CEOS and CGMS in 2018 and noted by SBSTA,⁷ CEOS and CGMS endorsed a Greenhouse Gas Roadmap in 2020 to implement an operational atmospheric CO₂ and CH₄ monitoring system to maximize contributions to the Transparency Framework and the development and validation of Nationally Determined Contributions and for stocktaking. The first prototype system is based on available space-based assets and could inform the first global stocktake in 2023. Using the lessons learned from this activity, a pre-operational system should support the second global stocktake in 2028. CEOS and CGMS welcome Parties, and their technical agencies, to start engaging with CEOS and CGMS agencies prior to the first Global Stocktake to ensure that the products and services provided are fit-for-purpose.

23. Space agencies continue to coordinate annual global coverage of the world's forested areas to ensure the necessary data in support of national reporting processes of the Global Forest Observations Initiative (GFOI), and the Global Observation of Forest Cover and Land Dynamics (GOFC-GOLD) effort. GOFC-GOLD and GFOI are providing regional training in coordination with national agencies on the use of these data. In 2019, CEOS began an effort to coordinate the use of multiple satellite missions to derive above ground biomass. In 2020, this effort was expanded to begin the development of a CEOS Roadmap for Agriculture, Forest and Other Land Use (AFOLU) observations to complement the Greenhouse Gas roadmap.

24. CEOS and CGMS will actively contribute to the Global Stocktake process via an integrated approach combining processes documented in the GHG and AFOLU roadmaps. These processes include engaging key user communities to understand their requirements, developing pilot GHG and AFOLU inventory products to support of the first Global Stocktake and using lessons learned from these activities to coordinate the development of a more capable operational GHG monitoring system to support Global Stocktake 2 and beyond.

Copernicus EU

25. The Copernicus Climate Change Service (C3S) and the Copernicus Atmosphere Monitoring Service (CAMS) are two of the six thematic information services⁸ provided by the Copernicus Earth Observation Programme⁹ of the European Union. Copernicus is an operational programme building on existing research infrastructures and knowledge available in Europe and elsewhere. Both services are implemented by the European Centre for Medium-Range Weather Forecasts (ECMWF)¹⁰ on behalf of the European Commission. ECMWF is an

⁶ AC18/TP/7B, <https://unfccc.int/documents/254566>.

⁷ FCCC/SBSTA/2019/5 para. 40.

⁸ <https://www.copernicus.eu/en/services>.

⁹ <https://www.copernicus.eu/en/about-copernicus>.

¹⁰ <https://www.ecmwf.int/>.

independent intergovernmental organisation serving its Member and Co-operating States and the broader community.

26. C3S relies on climate research carried out within the World Climate Research Programme (WCRP) and responds to user requirements defined by the Global Climate Observing System (GCOS). C3S provides an important resource to the Global Framework for Climate Services (GFCS). The programme is built around the provision of quality-controlled data about the past, the present and the future climate. In its first five years of operations the programme focussed on improving data interoperability, standardisation, and the characterisation of data quality attributes. C3S also developed tailored applications and case-studies for numerous policy-relevant areas.

27. One of the key assets of the programme is the ability to instantly generate global maps of essential climate variables (such as for example temperature or precipitations) without gaps and in near real-time. These are then used to monitor the evolution of the climate and provide an important contribution to the State of the Climate reports.

Future Earth

28. The series of reports 10 New Insights in Climate Science, led by Future Earth, outline advances in scientific knowledge across a series of disciplines of climate research. Every year, this report synthesises the latest and most essential research findings related to the interrelationships between climate, the weather and the biosphere. The reports are key in translating scientific knowledge into actionable evidence for decision-making.

29. As part of the work of Future Earth, the Global Research Project ‘Surface Ocean-Lower Atmosphere Study’ (SOLAS) is an international research initiative aiming to understand the key biogeochemical-physical interactions and feedbacks between the ocean and the atmosphere. The Biogeochemical Exchange Processes at Sea-Ice Interfaces (BEPsII) research community, co-sponsored by SOLAS, the WCRP core project on Climate and Cryosphere (CliC), and the Scientific Committee on Antarctic Research (SCAR), recently published in the leading journal Nature Climate Change a publication on the future of Arctic sea-ice biogeochemistry and ice-associated ecosystems.

Global Carbon Project (GCP)

30. Accurate assessment of anthropogenic carbon dioxide (CO₂) emissions and their redistribution among the atmosphere, ocean, and terrestrial biosphere in a changing climate – the ‘global carbon budget’ – is vital to better understand the global carbon cycle, support the development of climate policies, and project future climate change.

31. The Global Carbon Project (GCP)¹¹ coordinates a cooperative community effort to provide our best assessment of the global carbon budget on an annual basis since 2005.

32. The 2020 Global Carbon Budget will be released mid-December. For the last decade (2010-2019), GCP estimate fossil fuel emissions to amount 9.4 ± 0.5 GtC per year and emissions from land use changes to amount 1.6 ± 0.7 GtC per year. The atmospheric CO₂ increased by 2.4 ppm per year. Together, the land ecosystems and the oceans absorbed about 6 GtC per year, more than 50% of the anthropogenic emissions.

33. Fossil fuel emissions declined in 2020, due to the COVID-19 pandemics and the associated confinements. GCP estimate a decrease of up to -26% for individual countries at the peak of confinements, with a global decline of 4 to 7% for the whole year.

Group on Earth Observations

34. The updated GEO Work Programme 2020–2022¹² comprises over 60 activities encompassing Earth observations in agriculture, forestry, land use, water, biodiversity and other key areas for the Paris Agreement. In 2020, GEO launched a new community activity on Climate Change Impacts on World Heritage Cities, in cooperation with the United Nations Educational, Scientific and Cultural Organization (UNESCO). This activity will draw on the GEO community’s rich expertise to realize the untapped potential of Earth observations to monitor and enable specific mitigation and adaptation strategies to shield urban cultural heritage from climate change risks. More information on the developments under the GEO Work Programme can be found in the GEO Highlights Report 2020.

35. A new Climate Change Working Group (CC-WG) was established in March 2020 with the mandate to advance the use of Earth observations in support of climate action.¹³ Through the CC-WG, almost 100 Earth observation experts from multiple disciplines, policy makers from developed and developing countries, and private

¹¹ <https://www.globalcarbonproject.org/>.

¹² https://www.earthobservations.org/geoss_wp.php.

¹³ http://earthobservations.org/documents/gwp20_22/geo_wp_cd_wg_tor.pdf.

sector representatives are committed to improve coordination across GEO climate-related activities, drive GEO's engagement with the UNFCCC and the IPCC, and enhance the use of Earth observations for mitigation and adaptation. Among the planned activities, a twinning programme is envisaged between GEO and UNFCCC national delegations; and, supplementary technical guidance for the integration of Earth observation data to enhance National Adaptation Plans is to be developed. GEO is focusing on its unique contributions to support the Global Stocktake process alongside the systematic observation community.

36. Last year during COP25, GEO and Google Earth Engine (GEE) announced a call to action for Earth observations projects monitoring the pulse of the planet.¹⁴ In July 2020, GEO and GEE announced 32 projects from 22 countries that were awarded 3 million USD towards production licenses and 1 million USD in technical support from EO data science to tackle some of the world's greatest challenges using open Earth data. The GEO-GEE Programme is also supporting projects with the United Nations Environment Programme (UNEP) and the United Nations Economic and Social Commission for Western Asia (UNESCWA) to use GEE to support climate change and disaster monitoring activities over the next two years. The winning projects are responding to a wide range of environmental and social challenges using real-time Earth observation data coupled with cloud computing, some of which include: mapping poverty data and vulnerable settlements, deforestation and land degradation, flood warnings, marine coasts, ice shelf monitoring, environment and climate stress, food and agriculture and many more.¹⁵

Global Climate Observing System

37. GCOS is currently preparing the GCOS Status Report to be published in 2021. This report brings together in situ and satellite observations over all Earth domains: atmosphere, ocean and terrestrial. The GCOS Panels have reviewed the status and progress of the global observing system and have highlighted some main points. In general, observations of ECVs have improved across all the domains with many significant improvements. Many of the terrestrial biosphere related ECV are now observed annually and the resolution of land use and biomass estimates has improved. The ocean drifter network (Argo) is operating at its designed capacity.

38. However, there are still areas for improvement. While satellite observations across all the domains have improved significantly and satellite agencies have developed methods to validate and assess accuracy, they still need to be fully implemented. There remain some gaps in the coverage including the arctic regions, Southern ocean and parts of Africa. Observations in some countries including Africa and the Pacific need support. The future of data centres is sometimes precarious. They are needed to ensure long-term archives of historic time series.

39. GCOS is working with WMO to develop a GCOS Surface Reference Network that will provide the highest quality observing networks with robust metrological traceability and uncertainty quantification leading to improvements in quality and stability of all the surface networks and thus long-term climate records.

Global Ocean Observing System

40. Following the publication of the GOOS 2030 strategy¹⁶ in 2019, GOOS launched a Roadmap¹⁷ for the Implementation Strategy. Under the 2030 Strategy, eleven Strategic Objectives provide guidance on priorities for the development of a more user-focused and integrated system, and this Roadmap is designed to provide a framework within which nations, partners and sponsors can envision actions towards achieving the strategy.

41. The United Nations Decade of Ocean Science for Sustainable Development¹⁸ is starting in 2021, and ocean observing is high on the Decade's agenda. GOOS is gearing up for taking a leading role in aligning priority actions on integrated observing system design, integrating observations towards the coast, and to connect to local stakeholder communities.

42. A good overview of the status of the ocean observing system is available in this year's edition of the Ocean Observing System Report Card.¹⁹ The Report Card highlights the value and need for sustained and integrated met-ocean observations, essential to predict the consequences of ocean and climate change, design mitigation and guide adaptation. The report card was prepared by the GOOS Observations Coordination Group together with OceanOPS (former JCOMMOPS). The report card highlights the newly endorsed Animal Borne Ocean Sensors (AniBOS) network that provides cost-effective and complementary observing capability to the GOOS.

¹⁴ <http://earthobservations.org/article.php?id=400>.

¹⁵ <http://www.earthobservations.org/article.php?id=447>.

¹⁶ https://www.goosocean.org/index.php?option=com_oe&task=viewDocumentRecord&docID=24590.

¹⁷ https://www.goosocean.org/index.php?option=com_oe&task=viewDocumentRecord&docID=26687.

¹⁸ <https://oceandecade.org/>.

¹⁹ <https://en.unesco.org/news/ocean-observing-system-report-card-2020>.

43. GOOS also note the positive development in the support of the biogeochemical Argo (GBC-Argo) network²⁰ – these are autonomous floats that regularly make observations of the top 2000 meters of the ocean. The BGC floats make climate relevant observations of up to 6 BGC variables, notably oxygen and pH (as a measure of ocean inorganic carbon content). Recently increased funding for BGC-Argo deployments is based on a number of successful projects, successfully demonstrating the utility and feasibility of this network.

44. One large challenge for the ocean observing system remains the funding structure. About 70% of the ocean observing activities are funded through short-term research grants which leads to fragility and inefficiency, features that are not compatible with the vital and increasingly operational role the observing systems plays in supplying ocean information for climate, weather forecast, hazard warning, and ocean health applications.

Global Forest Observations Initiative (GFOI)

45. The Global Forest Observations Initiative (GFOI) coordinates international support for improving forest monitoring capacity in developing countries. Through collaborative action, GFOI partners support countries to use Earth Observations in the development of their forest monitoring systems which inform their national decision making, international commitments, and track progress in climate action.

46. The GFOI's Methods and Guidance Documentation (MGD) provides guidance on the Integration of remote-sensing and ground-based observations for estimation of emissions and removals of greenhouse gases in forests. Specifically, the MGD provides user-friendly guidance for linking UNFCCC decisions related to REDD+ Measurement, Reporting, and Verification (MRV) with IPCC guidance. The MGD is developed through a collaborative process and by a large and diverse community of international experts from the GFOI community. It is underpinned by operational methods that emerge from GFOI's R&D and Data Components and is disseminated to countries via the Capacity Building Component

UNEP

47. The UNEP Emissions Gap report 2020 will be released mid-December. It relates that resource efficiency, including aspects of circularity and behavioural change, will be required alongside measures that sequester or remove carbon dioxide from the atmosphere to reach net-zero. The report further relates that a significant part of the options fall under nature-based solutions that are well proven, but often hampered by social or economic barriers.

World Meteorological Organisation (WMO)

48. The **United in Science report**²¹ is compiled by the World Meteorological Organization (WMO) under the direction of the United Nations Secretary-General to bring together the latest climate science related updates from a group of key global partner organizations – WMO, GCP, UNESCO Intergovernmental Oceanographic Commission (UNESCO-IOC), Intergovernmental Panel on Climate Change (IPCC), UNEP and the UK Met Office. The content of each chapter is attributable to each respective organization.

49. In the United in Science 2020 report, leading science organizations warn that greenhouse gas concentrations in the atmosphere are at record levels and continue to increase despite a temporary decline caused by the COVID-19 lockdown in the first half of this year. The report highlights rising global emissions and the irreversible impacts of climate change that negatively affect the ocean and seas, ecosystems and economies, water resources and human well-being and health. The report also outlines how the COVID-19 pandemic has impeded our ability to monitor these changes through the global observing system.

50. The WMO 2020 State of Climate Services Report on Risk Information and Early Warning Systems (EWS) highlights progress made in EWS implementation globally and identifies where and how governments can invest in effective EWS to strengthen countries' resilience to multiple weather, water, and climate-related hazards.²²

WMO Integrated Global Greenhouse Gas Information System (IG3IS)

51. The Integrated Global Greenhouse Gas Information System (IG3IS) noted by SBSTA²³ helps to target, guide and evaluate GHG emission-reduction actions in response to climate change. The IG³IS initiative seeks to enhance the capacity of nations, states, cities and industries to target emission reduction opportunities and track progress toward their goals. This initiative brings together an assembly of world leading climate and Earth scientists and their mature, peer-reviewed scientific methods that combine atmospheric concentration and emission inventory data with information simulating atmospheric motions to form a framework for more accurate and

²⁰ <https://biogeochemical-argo.org/>.

²¹ https://public.wmo.int/en/resources/united_in_science.

²² <https://public.wmo.int/en/media/press-release/state-of-climate-services-2020-report-move-from-early-warnings-early-action>.

²³ FCCC/SBSTA/2019/2, para. 59

consistent emissions estimates over a range of space-time scales useful in informing policies, their implementation and outcomes. Success depends on the availability of atmospheric measurements in key GHG source regions and relies on a multi-tiered observing strategy, involving satellite, aircraft, mobile and tower-based surface measurements.

52. Through IG3IS advocacy and work of IG3IS science team members, the government of New Zealand has funded a new project to employ atmospheric information in compiling its emission inventory. Other national projects are developing in Germany, China, Japan, South Korea and France.

WMO Global Framework for Climate Services (GFCS)

53. Decision 11/CMA.1 called on the WMO through its Global Framework for Climate Services (GFCS) to regularly report on the state of climate services with a view to facilitating the development and application of methodologies for assessing adaptation needs.

54. The 2019 State of Climate Services report, launched at COP25 in Madrid, focused on agriculture and food security, noting that agriculture is one of the top adaptation priorities of Parties to the UNFCCC.²⁴

55. The 2020 State of Climate Services²⁵ report focuses on disaster risk reduction (DRR), as according to separate 2019 analyses of Nationally Determined Contributions by both the WMO and FAO, the majority of countries highlighted DRR as one of the top priority sectors for climate change adaptation. Moreover, DRR is a top priority in all National Adaptation Plans submitted to date.

56. The report has a specific focus on early warning systems (EWS) as these constitute a prerequisite for effective disaster risk reduction and represent the bulk of current hydro-met investments. It makes six strategic recommendations to improve the implementation and effectiveness of EWSs worldwide: (1) Invest to fill the EWS capacity gaps, particularly in LDCs, in Africa and in SIDS; (2) Focus investment on turning early warning information into early action, through improved communication and preparedness planning; (3) Ensure sustainable financing of the global observing system that underpins early warnings, and ensure that financing covers all segments of the EWS value chain; (4) Track finance flows to improve understanding of where resources are being allocated in relation to EWS implementation needs; (5) Develop more consistency in monitoring and evaluation to better determine EWS effectiveness; and (6) Fill the data gaps particularly from SIDS, by improving countries' reporting on climate information and EWS capacity.

²⁴ https://library.wmo.int/index.php?lvl=notice_display&id=21609#.X7I9yyAo9Pb.

²⁵ <https://public.wmo.int/en/our-mandate/climate/state-of-climate-services-report>.