

## Information on Earth Information Day 2022

### Note by the Chair of the SBSTA

25 October 2022

#### I. Introduction

1. The systematic observation community has a vital but undervalued role in supporting the UNFCCC and the Paris Agreement. Understanding, monitoring and prediction of weather and climate ultimately relies on observations. Systematic observation is therefore the foundation of a climate services value chain that connects observations to decision making in order to both understand climate change and support decisions on climate change action and sustainable development. Through this value chain, systematic observations provide the data that underpins climate models, forecasts on various timescales, tailored products and services, and early warning systems.
2. We know that systematic observation has not met its full potential. In the Earth Information Day 2021,<sup>1</sup> which took place in conjunction with the Glasgow Climate Conference, Parties and members of the systematic observation community underlined a number of key messages, including the need to close gaps in coverage, enhance current observations, and provide open access to and sustained recording of climate records. Furthermore, at the event, the IPCC Working Group I emphasised, amongst other things, the progress that could be made by making past historical observations available and filling gaps in monitoring networks, highlighting the necessity to do so in particular to further the study of extreme event attribution in the global South.
3. In response to the findings of the 2021 GCOS Status Report, as well as the implications arising from the IPCC 6th assessment report and recent scientific studies on the climate cycles, the 2022 GCOS Implementation Plan specifies the climate observations required across all domains - the atmosphere, ocean, land, cryosphere and biosphere - to inform science, services and society.
4. Sustaining and strengthening Earth observation systems, through fully implementing the GCOS implementation plan will support the value chain of information required not only to fully understand the state of the global climate and climate change impacts and risks, but also to provide the information needed for risk and vulnerability assessments, decision making on mitigation and adaptation action and for national reporting of adaptation, mitigation and GHG emissions.
5. The benefits of climate observations far exceed their cost. While no complete and comprehensive cost-benefit analysis of the global climate observing system has been conducted, analysis of its component parts shows its extensive benefits. Investing in global climate observations means investing in our future.
6. Earth Information Day 2022 will explore key challenges, solutions and ways forward for Earth observations to support the Convention and the Paris Agreement including: updates on the observation system; and observations to support integrated planning and management of mitigation, adaptation and early warning systems as well as reporting of mitigation, GHG emissions and adaptation.
7. The event will take place on Wednesday 9 November 2022, in conjunction with the Sharm el-Sheikh Climate Change Conference.
8. This note provides an overview of the Earth Information Day 2022, including information on its organization and themes (section II), with background information also provided on activities under the Convention (section III) and activities by relevant programmes and organizations (section IV). All information on the Earth Information Day 2022, including a detailed programme, will be made available online.<sup>2</sup>
9. I encourage Parties to carry the key messages from Earth Information Day with them into the informal consultations on Research and Systematic Observation and work together to strengthen the global observing system and its support to implement the Convention and Paris Agreement.
10. I will prepare an informal summary report which will be available in advance of SBSTA 58.

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<sup>1</sup> See <https://unfccc.int/sites/default/files/resource/EarthInformationDay.2021.SummaryReport.pdf>.

<sup>2</sup> See <https://unfccc.int/event/earth-information-day-2022>.

## II. Organization and themes

11. The Earth Information Day will consist of an in-person 3-hour dialogue session and an in-person 90-minute poster Q&A at the poster exhibition.

12. The dialogue session, consisting of oral presentations and panel discussions, will take place from 13.00–16.00.

13. Posters will be displayed **during the entire period** of the Conference physically and online via the Earth Information Day webpage. Attendees will be able to participate in the poster session discussion with poster presenters from 11:00–12:30.

14. Responding to the 8 submissions received by the secretariat from Parties and non-Party stakeholders,<sup>3</sup> and in consideration of the mandates, agenda for the session and the wider context of ongoing work under the UNFCCC, as well as the publication of the GCOS implementation plan requested by Parties under the UNFCCC, I identified three themes for the Earth Information Day:

- 1) **Updates on the state of the climate and the global climate observing system**
- 2) **Earth Observations for Mitigation**
- 3) **Earth Observations for Adaptation and Early Warning Systems**

15. I propose below the following guiding questions that are intended to help to focus presentations, discussions and posters. Suggested guiding questions are:

Overarching question:

- How can the provision of climate information, based on Earth observations, better inform decision making under the UNFCCC and Paris Agreement now and in the future to support understanding and implementation of mitigation and adaptation action and national reporting?

Panel Questions:

- What are the latest updates on observations and understanding of the climate system, including key uncertainties and challenges?
- How can the observing system be used and further enhanced to i) support global understanding of the climate system and ii) inform decision making and national reporting?
- How can the value chain, from monitoring to climate services be used and enhanced to support national action and national communications? What are current and potential approaches, good practices and tools?

16. I invite Parties to come prepared to participate actively in the Earth Information Day dialogue and poster Q&A session. I encourage Parties to view the presentations and posters in advance. 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 discussions to inform their continued activities on research and systematic observation to support work under the Paris Agreement and Convention.

17. An indicative programme for the Earth information day is shown below. The event will start with opening keynotes from the SBSTA Chair, WMO Secretary General, UNESCO-IOC Executive Secretary and UNFCCC secretariat Deputy Executive Secretary. This will be followed by three discussion panels which will have moderated presentations, discussion and Q&A (45-50 minutes each). The moderators will then provide a sum up of key messages and ways forward based on the overarching question.

18. The final agenda will be published on the Earth Information Day 2022 webpage in advance of the event.<sup>2</sup>

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<sup>3</sup> Submissions were received from the Antigua and Barbuda on behalf of the Alliance of Small Island States, the Czech Republic and the European Commission on behalf of the European Union, Japan, Senegal on behalf of the Least Developed Countries Group, Switzerland, the United States of America, and the Global Carbon Project. See: <https://www4.unfccc.int/sites/submissionsstaging/Pages/Home.aspx> (search “earth”, see SBSTA 57).

Earth information day 2022		
11.00-12.30 (EGY)	<b>Poster Session and Q&amp;A</b> between registered participants and poster contributors to take place in the virtual Poster Gallery	<i>See Earth Information Day webpage for a full list of poster presenters</i>
13:00-16:00	<b>Dialogue</b> <b>Panel 1: Updates on the state of the climate and the global climate observing system</b> <b>Panel 2: Earth Observations for Mitigation</b> <b>Panel 3: Earth Observations for Adaptation and Early Warning Systems</b>	<i>Chair: SBSTA Chair</i> <i>Contributors include representatives from: IPCC, CEOS/CGMS WGClimate, GCOS, GEO, GOOS, IOC-UNESCO, WMO</i> <i>See Earth Information Day webpage for a full list of panellists and further details</i>
08 Nov-18 Nov	<b>Poster Gallery</b> displaying all posters for this event	

### III. Background information

#### A. Update on linked activities under the UNFCCC

19. As highlighted in the introduction above, systematic observation information supports decision making and processes across the UNFCCC. Some of the latest relevant activities are provided here.

20. The Adaptation Committee (AC) has released an addendum to its draft supplementary guidance for voluntary use by Parties in communicating information in accordance with the possible elements of an adaptation communication. This supplementary guidance provides an overview of the guidelines for adaptation communications and related arrangements, including those relevant to monitoring and observations, and suggestions for applying the guidelines and for benefiting from the links between these communications and other adaptation-related reporting arrangements under the Convention and the Paris Agreement.

21. The Glasgow–Sharm el-Sheikh work programme on the global goal on adaptation (GGA) has released a *Compilation and synthesis of indicators, approaches and metrics for reviewing overall progress in achieving the global goal on adaptation*.<sup>4</sup> This technical paper compiles and synthesises information and explores ideas and examples of indicators, approaches, targets and metrics relevant to the GGA. It further offers possible questions for future consideration of the topic, including at the upcoming third workshop under the Glasgow–Sharm el-Sheikh work programme on methodologies, indicators, data and metrics, monitoring and evaluation.<sup>5</sup>

22. To support the global stocktake, the systematic observation community, including CEOS and CGMS, WMO, GEO, and other agencies, contributed to the report *The Role of Systematic Earth Observations in Global Stocktake* on systematic observations underlining the vital role of the observation community for the global stocktake and additional UNFCCC goals.<sup>6</sup> The report also describes the substantial support systematic observations can play in the future. It was submitted to the global stocktake by ESA in March 2022 on behalf of the observation community.

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

23. This section provides brief 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 presenting at the Earth information day.

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<sup>4</sup> See <https://unfccc.int/documents/613843>

<sup>5</sup> See <https://unfccc.int/topics/adaptation-and-resilience/workstreams/glasgow-sharm-el-sheikh-WP-GGGA>

<sup>6</sup> See <https://www4.unfccc.int/sites/SubmissionsStaging/Documents/202203012343---SO-in-GST-2022-final.pdf>

**Committee on Earth Observation Satellites and Coordination Group for Meteorological Satellites Joint Working Group on Climate (CEOS/CGMS WGClimate)**

24. The Joint CEOS/CGMS Working Group on Climate (WGClimate) published version 4 of its web-based Inventory of existing and planned climate data records of GCOS Essential Climate Variables (ECV) observable from space in November 2021.<sup>7</sup> The updated version contains information for about 1100 data records, covering 36 of the 37 ECVs observable from space, including carbon cycle variables, and filling previously identified gaps. WGClimate and member agencies use the Inventory to identify and mitigate potential gaps in future satellite missions and product generation. Carbon data records also support the enhanced transparency framework and contribute to the first global stocktake. WGClimate has provided a draft review of the new GCOS Implementation Plan in support of long-term sustained systematic observations.

25. Space agencies continue to coordinate annual global observation of the world's forested areas to ensure availability of data needed to 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.<sup>8</sup> 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. It has expanded this effort to begin development of a CEOS Roadmap for Agriculture, Forest and Other Land Use (AFOLU) observations to complement the Greenhouse Gas Roadmap supporting the global stocktake.

26. Going forward, CEOS and CGMS will contribute to the global stocktake process via an integrated approach combining processes documented in the GHG and AFOLU roadmaps. This will include engaging key user communities to understand their observing requirements, building upon the pilot GHG and AFOLU inventory products provided for the first Stocktake, and using lessons learned from these activities to coordinate the development of a more capable pre-operational GHG monitoring system to support global stocktakes in the future. CEOS and CGMS welcome Parties, and their technical agencies, to engage member agencies in this development to ensure that the space architecture, products and services are fit-for-purpose.

**Copernicus Earth Observation Programme**

27. The Copernicus Climate Change Service (C3S) and the Copernicus Atmosphere Monitoring Service (CAMS) are provided by the Copernicus Earth Observation Programme<sup>9</sup> of the European Union. Both services are implemented by the European Centre for Medium-Range Weather Forecasts (ECMWF)<sup>10</sup> on behalf of the European Commission (EC). In 2021, the EC and ECMWF have signed a Contribution Agreement, ensuring the enhanced continuation of C3S and CAMS services during the 2021–2028 Copernicus 2.0 period.

28. C3S continues to publish its annual European State of the Climate (ESoTC)<sup>11</sup> and will extend its ERA5 reanalysis further back in time to 1940 and possibly to 1925. ERA5 data are fundamental for climate model development and verification but also represent an important source of information to support a wide range of practical climate applications.<sup>12</sup> Plans are also underway to operationalize a C3S prototype extreme event attribution service in 2023.

29. CAMS is coordinating the development and operational implementation of the new Copernicus anthropogenic CO<sub>2</sub> emissions Monitoring and Verification Support capacity,<sup>13</sup> leveraging existing capabilities as well as scientific developments from a number of EU Horizon 2020 and Horizon Europe research efforts, such as CoCO<sub>2</sub><sup>14</sup> led by ECMWF to develop the prototype systems. As part of CoCO<sub>2</sub>, first results from the prototype systems are being submitted to the UNFCCC in support of the first Global Stocktake. In addition, CAMS is already contributing to the national inventory reporting of some EU member states and in discussion with others to support observation-based emission monitoring plans at national scale.

30. Both C3S and CAMS strongly support and contribute to international coordination activities, such as those under GEO, GCOS, CEOS, UNEP, and WMO frameworks.

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<sup>7</sup> See <https://climatemonitoring.info/ecvinventory/>

<sup>8</sup> See <http://www.gofcgold.wur.nl/>

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

<sup>10</sup> See <https://www.ecmwf.int>

<sup>11</sup> See <https://climate.copernicus.eu/esotc/2021>

<sup>12</sup> See <https://cds.climate.copernicus.eu/cdsapp#!/search?type=application>

<sup>13</sup> See <https://atmosphere.copernicus.eu/ghg-services>

<sup>14</sup> See <https://coco2-project.eu/>

**Global Climate Observing System**

31. GCOS has published the GCOS Implementation Plan (GCOS-IP 2022<sup>15</sup>) alongside the *2022 GCOS ECVs Requirements* for the Essential Climate Variables (ECVs).<sup>16</sup> Both documents have been submitted to the SBSTA for its consideration.

32. The GCOS Implementation Plan addresses existing gaps and provides actions for the improvement of Earth Observations. The new IP highlights key areas for the improvement of our observation capability. Sustained funding is essential to ensure the continuity and expansion needed for many observations of the ECVs. Many of them are still supported through limited-term funding, and the climate observing system remains fragile. Key gaps in networks for ECVs have been identified in different components of the observing system, from the atmosphere to the ocean, from the cryosphere to the biosphere. Priority areas for improvement are regions over parts of Africa, South America, Southeast Asia, the deep ocean, and polar regions.

33. The IP highlights critical areas for action. Many climate observations are currently underexploited because of the lack of consistency in their processing, interoperability and usability. The report provides pathways to enhance these, outlining the increased effort required to ensure that the data can be readily used in reanalysis and is fit for purpose. To understand and address climate change, the longest possible time series need to be preserved and made available long term. Climate data must be made available through global data repositories, and their access must be free and open.

34. Climate information needs are changing and are recognised in the new IP. Support for adaptation and mitigation action is enhanced by identifying these needs, such as for an increased frequency of observations. The global climate observing system must evolve in response to such stakeholders needs. The definition of a "global goal on observation" under the UNFCCC, could assist the coordination of efforts by international and national stakeholders and raise awareness of observation needs to support climate mitigation and adaptation.

35. This implementation plan will be followed by the publication of a series of supplements focusing on each of these constituencies providing guidance on the actions that they can implement.

**Group on Earth Observations**

36. GEO activities, including GEOGLAM, GEOGLoWS, GEO Blue Planet, and Digital Earth Africa, highlighted their operational or quasi-operational services that support adaptation nationally and regionally at the NAP Expo, in Gaborone, Botswana (22-26 August 2022). The GEO supplement to the UNFCCC NAP Technical Guidelines to help countries set up Earth observation-based crop monitors for NAP implementation was presented with positive feedback from the delegates and the LEG.<sup>17</sup> It was officially released at a dedicated session at GEO Week 2022 in Accra, Ghana (31 October-2 November 2022). It will be followed by GEO guidance on other sectors relevant to NAPs.

37. The new Earth Observations Risk Toolkit<sup>18</sup> was presented at the 7th Session of the Global Platform for Disaster Risk Reduction in Bali, Indonesia (23-28 May 2022), developed by GEO in collaboration with UNDRR. The toolkit provides users with direct access to open-source Earth observation tools, services and methodologies, as well as technical guidance, to fill knowledge gaps on hazards, vulnerabilities and exposure at country level. It also provides use cases, services and methodologies that governments have used to address hazards and assess options to deal with them.

38. GEO activities, including GEO Blue Planet and Marine Biodiversity Observation Network (MBON), participated in the 2022 UN Ocean Conference in Lisbon, Portugal (27 June-1 July 2022). They promoted the importance of ocean observations in tackling environmental challenges with solutions involving the deployment of new technology and the use of Earth observation data and information, notably to address ocean acidification and the loss of habitats and biodiversity due to climate change, marine litter and pollution, and illegal, unreported and unregulated fishing.

39. As of 2022, the GEO Secretariat has launched more than 60 cloud credits projects addressing climate action, disaster risk reduction and sustainable development in LDCs and other developing countries. These projects are funded in collaboration with global technology providers such as Amazon Web Services, Google Earth Engine and Microsoft Planetary Computer, through dedicated programs providing free licenses, grants, technical and financial support, following a competitive call for proposals. The projects are moving along rapidly with

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<sup>15</sup> See [https://www4.unfccc.int/sites/SubmissionsStaging/Documents/202209121405---GCOS-244\\_2022\\_GCOS\\_Implementation\\_Plan.pdf](https://www4.unfccc.int/sites/SubmissionsStaging/Documents/202209121405---GCOS-244_2022_GCOS_Implementation_Plan.pdf)

<sup>16</sup> See [https://www4.unfccc.int/sites/SubmissionsStaging/Documents/202209121405---GCOS-245\\_2022\\_GCOS\\_ECVs\\_Requirements.pdf](https://www4.unfccc.int/sites/SubmissionsStaging/Documents/202209121405---GCOS-245_2022_GCOS_ECVs_Requirements.pdf)

<sup>17</sup> See [https://earthobservations.org/documents/cc\\_wg/GEO\\_NAP\\_Supplement\\_final.pdf](https://earthobservations.org/documents/cc_wg/GEO_NAP_Supplement_final.pdf)

<sup>18</sup> See <https://earth-observation-risk-toolkit-undrr.hub.arcgis.com/>

impressive results, demonstrating that it is feasible for LDCs to successfully leverage big Earth observation data and cloud computing platforms for application development. Once they have ended, the goal is to bring some of the outputs and outcomes into the GEO work programme for continuity. New projects will also address sustainable urbanisation.

### **Intergovernmental Panel on Climate Change (IPCC)**

40. The IPCC has published the contributions of Working Group I, II and III to the Sixth Assessment report.<sup>19</sup> The IPCC is now completing work under its Sixth Assessment Cycle with the finalisation of the AR6 Synthesis Report in the first quarter of 2023.<sup>20</sup>

41. Some very brief information from the IPCC AR6 report that may be relevant for the Earth information day is provided here.

42. The IPCC AR6 report highlights how Earth system observations are an essential driver of progress in our understanding of climate change. Observational capabilities of the climate have continued to improve and expand overall since AR5. The WGI component of AR6 was structured with a new approach that combined multiple lines of evidence. It highlighted how changes are occurring throughout the climate system with recent changes in the climate being widespread, rapid, and intensifying. This state of knowledge is the result of high quality, well characterized measurements, accounting for instrument transitions to homogenise records; increasing use of reanalysis and Earth observation products; reliance on reference networks and building and integrating composite products; and sustained measurements over multiple decades. The scale of the observed changes in the atmosphere, ocean, cryosphere and biosphere and across the climate system as a whole is unprecedented over many centuries to many thousands of years. Recent changes in the climate are widespread, rapid, and intensifying and many recent extreme events would have been extremely unlikely to occur without human-induced climate change.

43. The WGII component of AR6 draws on a diverse set of qualitative and quantitative observations, from remote sensing, long-term in situ observations and monitoring efforts, and local knowledge. The number of studies reporting observed changes attributed to climate change has grown substantially since AR5, generally leading to higher confidence levels in attributing the causes of specific impacts. New studies include observed changes in socioeconomic indicators, such as economic damages, the occurrence of heat-related human mortality and economic inequality

44. However, the IPCC also identify that, even for some most essential climate variables such as precipitation, many regions, particularly in developing countries, have limited observational data and there is a need to develop basic meteorological records. There are also spatial data gaps in areas of high vulnerability limiting event attribution studies that are needed to quantify losses and damages. Air-sea flux observations are needed to understand marine lower boundary layer fluxes, as well as improved near-surface air temperature observations over the oceans for consistency in the assessment of surface flux changes and global surface temperature changes. There are limitations in observations in the coastal and shallow ocean, polar regions, the marine biosphere, ocean biogeochemical characteristics and the deep ocean.

45. Sustaining and strengthening observations would also assist decision making such as for ecosystem adaptive management which requires enhancing of the coastal monitoring network; early warning, cascading interactions, recovery, and management interventions; observation of habitat forming species, keystone species, ecosystem thresholds and tipping points; and observation-supported restoration of carbon- and species-rich ecosystems

46. In regards to the WGIII component of AR6, the report includes the identification of the need for strengthened observations to assess collective progress in emissions reductions: i) global observation of concentrations are important to constrain regional emission databases; ii) observing the state of biospheric carbon sinks on land and the ocean are needed to assess whether natural sinks are taking up human-caused emissions; iii) there is also significant potential to improve regional/national emission estimates of non-CO<sub>2</sub> emissions by observations (satellite and regional flux networks).

47. In regards to reporting of national greenhouse gas emissions and removals, data needs to improve national GHG inventories include: GHG fluxes -i.e. those actually considered anthropogenic by IPCC – with direct measurements as verification (and potential refinement) of NGHGI estimates; and timeseries of land cover/land use area data across time (since land-cover/land-use changes are the main driver of GHG emissions/removals in land). Large uncertainties in both the emissions and sinks of CH<sub>4</sub> has made it challenging to accurately quantify

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<sup>19</sup> See <https://www.ipcc.ch/reports/>

<sup>20</sup> See <https://www.ipcc.ch/report/sixth-assessment-report-cycle/>

the methane budget. There is also the need for consistency in terminology and classifications of sources/sinks and associated natural and anthropogenic GHG fluxes to find a common understanding of consistency and differences in atmospheric observation data and GHG inventory estimates. Comparisons with atmospheric measurements are not established as a standard tool for verification to be applied by an inventory compiler.

48. The WGIII report has shown that in every sector there are options available now that can at least halve emissions by 2030 and keep open the possibility of limiting warming to 1.5°C. Observations are needed to provide: i) improved quantification of anthropogenic and natural greenhouse gas fluxes and emissions modelling; ii) better understanding of the impacts of climate change on the mitigation potential and permanence; iii) improved (real time and cheap) measurement, reporting and verification; iv) monitoring in light of net zero - observation is needed to support identification of the achievement of “peaking” and “net zero” - be it CO<sub>2</sub> or GHG.

### **IOC-UNESCO and the Global Ocean Observing System**

49. The UN Decade of Ocean Science for Sustainable Development (the Ocean Decade) has already endorsed over 230 global ocean science programmes and projects. These programmes address the ten Ocean Decade Challenges, including several new global programmes focusing on the ocean-climate nexus and blue carbon, and demonstrate strong geographic diversity in terms of implementation. 102 endorsed Decade programmes and projects are working on aspects of ocean observations. The fourth Call for Decade Actions No. 04/2022 was launched on 15 October 2022 and is soliciting major global or regional programmes focusing on coastal resilience and ocean data sharing and management.<sup>21</sup>

50. With the launch of the Decade two IOC co-lead Ocean Decade programmes, the Ocean Acidification Research for Sustainability (OARS) and the Global Ocean Oxygen Decade (GOOD) are now directly addressing two Essential Climate Variables (ECVs) – inorganic carbon and oxygen, highlighting the need for a global goal for observing including ocean variables.

51. An overview of the status of the ocean observing system is available in this year’s edition of the Global Ocean Observing System (GOOS) Report Card.<sup>22</sup> Over the past year the GOOS community has worked to restore pre-pandemic levels of in situ observations. Most activities are returning to normal and continued automation is supporting increased data delivery. However, based on OceanOPS monitoring, a few regions and networks remain affected and GOOS is catalysing discussions to address these needs. For instance, the vital Argo profiling float array is providing 15% less data as compared to pre-pandemic levels and has seen a decrease in deployments across the last 4 years. Similarly, only half of the global tropical moored buoy array is operational in the Atlantic, 75% in the Pacific and only 10% in the Indian Ocean, affecting the ability to monitor tropical variability. Efficiently delivering critical ocean observations remains a fundamental challenge and aim of the observing community. Ship-based multidisciplinary observations, increased use of multi-sensor autonomous platforms, animal borne ocean sensors and instrumented ‘smart’ telecommunications cables represent exciting opportunities to enhance the GOOS.

52. GOOS is leading three programmes at the heart of the Ocean Decade. Ocean Observing Co-Design is working to transform ocean observing system assessment and design processes. CoastPredict is focused on Global Coastal Ocean observing and forecasting. Observing Together is focused on meeting stakeholder needs and making every observation count through enhanced support to both new and existing community-scale projects. Designed to meet immediate, urgent needs and accelerate GOOS development, these programmes will integrate with each other and other Decade programmes and will help support a broader set of climate goals in global prediction and mitigation, local adaptation, and capacity development.

### **World Meteorological Organisation (WMO)**

53. The WMO will lead a new effort “Early Warnings for All” to ensure every person on Earth is protected by Early Warning Systems (EWS) within five years.<sup>23</sup> The initiative represents a major outcome in support of global climate adaptation actions and investment. The WMO will organize a high-level launch of the action plan during the World Leaders Summit at COP 27.

54. The WMO and the broader greenhouse gas community are collaborating to address the need to strengthen information on GHG for decision-making on climate mitigation by developing a framework for sustained, internationally coordinated global greenhouse gas monitoring.<sup>24</sup> This system will leverage synergies within existing frameworks such as the Global Atmospheric Watch (GAW) and the Integrated Global Greenhouse Gas Information System (IG3IS). The sustained routing outputs of the system will feed multiple applications on the

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<sup>21</sup> See <https://ioc.unesco.org/news/ocean-decade-launches-new-call-decade-actions-no-042022>

<sup>22</sup> See <https://www.ocean-ops.org/reportcard/>

<sup>23</sup> See [UN Global Early Warning for Adaptation Initiative](#) and related information document [EC-75/INF. 4\(2\)](#)

<sup>24</sup> See <https://maxidiscount.ch/product/beko-fss57100gw/>

scales from global to urban and will serve as a basis for the new generation of mitigation-related services for WMO Members. Within the framework of this infrastructure, WMO will engage and closely collaborate with both the broader scientific community and other United Nations agencies and international coordination entities involved in GHG monitoring activities, in particular with regard to land surface and ocean observation and modelling.

55. The 2022 edition of the WMO State of Climate Services report focuses on the issue of energy.<sup>25</sup> Reaching net zero by 2050 will mean a complete transformation of our global energy system. Access to reliable weather, water and climate information and services will be increasingly important to strengthen the resilience of energy infrastructure and meet rising demand. Using data, analysis, and a series of case studies, the report illustrates and explains how countries can improve their energy infrastructure, resilience and security through better climate services, supported by sustainable investments.

56. The WMO and GCF are collaborating on the Climate Science Information for Climate Action initiative. In July 2022, the GCF Board Decision recognised the results of the first phase of the WMO-GCF collaboration and acknowledged the importance of maintaining the suite of methods, tools and technical resources developed under the pilot phase.<sup>26</sup> The resource pack developed under the first phase is available.<sup>27</sup> During the second phase, the WMO-GCF collaboration will further increase the potential of climate adaptation proposals by strengthening the capacity of all stakeholders to access, synthesise, and incorporate relevant climate science information into climate action policies, plans and investments as well as enhancing the hydrological and meteorological systems and associated climate information services for low-carbon and climate-resilient development. Activities under the initiative are ongoing, including:

1) A Regional Training Workshop on Climate Science Information for Climate Action in South Africa on 12-16 September 2022. The workshop was attended by four countries in the region: Eswatini, Malawi, South Africa and Zambia;

2) The First Global Forum on Climate Science Information – Data, Tools and Methods - was held on 27–29 September 2022 to discuss the climate science information required for adaptation projects, evaluate and promote guidance on its use, identify gaps, and promote and coordinate authoritative information.<sup>28</sup> The Forum gathered more than 200 international, regional, national and sectoral expert users of climate science information. The Forum produced a set of key scientific and technical recommendations that will inform the preparation of peer-reviewed articles and technical policy briefs.

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<sup>25</sup> See [https://library.wmo.int/index.php?lvl=notice\\_display&id=22136](https://library.wmo.int/index.php?lvl=notice_display&id=22136)

<sup>26</sup> See <https://www.greenclimate.fund/document/gcf-b33-19>

<sup>27</sup> See [https://library.wmo.int/index.php?lvl=notice\\_display&id=21974#.Yg-pO5Yo9PY](https://library.wmo.int/index.php?lvl=notice_display&id=21974#.Yg-pO5Yo9PY)

<sup>28</sup> See <https://community.wmo.int/activity-areas/climate/meetings/first-wmo-gcf-global-forum-climate-science-information>