



**GLOBAL CLIMATE  
OBSERVING SYSTEM**



GCOS SC-31

INF. 6.1

(11.VI.2024)

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## **GCOS STEERING COMMITTEE THIRTY FIRST SESSION**

GCOS SC-31, 2–5 July 2024  
WMO, Geneva, Switzerland

## **GCOS Activities**

### **1. Overview**

GCOS collaborates with the WMO Integrated Observing System (WIGOS), the Global Ocean Observing System (GOOS) and all the other relevant global observing systems to ensure that the needs for climate data are addressed and as much as possible with no duplication of monitoring: “one measurement, many uses”. GCOS determines observational requirements considering existing monitoring capabilities, reviews the adequacy of monitoring systems and proposes actions to address any deficiencies. Uses of climate data range across improving scientific understanding, supporting policy development, providing climate projections, underpinning responses to climate change and public information.

The 2022 GCOS Implementation Plan , adopted by UNFCCC, WMO Congress and IOC General Assembly, provides a list of actions necessary to improve and develop the system of global climate observations. Many of the actions in the 2022 GCOS Implementation Plan, should be performed by a wide range of actors (e.g. space agencies, academia, National Meteorological and Hydrological Services NMHS, the GOOS) and the role of GCOS is to monitor progress and report on overall improvements. Other actions need to be performed by the GCOS panels supported by the GCOS Secretariat or by the GCOS secretariat itself. There are also activities resulting from other relevant initiatives. GCOS secretariat workplan follows from these actions and from the GCOS IP actions. Many of the activities were started in 2023. A full report of those activities can be found in Annex 1.

Whether directly involved or monitoring progress, GCOS Secretariat workplan is to a great extent guided by the GCOS IP. Furthermore, the Secretariat workplan includes other activities which are the continuation of other relevant initiatives that run in 2023 (a full report of those can be found in Annex 1). Finally, the workplan includes a third type of activities that are intrinsic part of its operation such as outreach and communication, liaison with GCOS partners, or support to GCOS networks, amongst others. We will describe now the main activities that will be part of GCOS Secretariat workplan in 2024 and will indicate a timeline for them.

## 2. GCOS Activities in 2024

### 1. Specific actions from the GCOS IP (to be performed by GCOS panels).

The actions listed in this section were addressed by all three panels using the same approach. To ensure consistency, a proforma was created to collect information and results were summarized by the secretariat. The process for the three actions is at different stages.

#### 1. **Action A1- Ensure necessary level of long-term funding support for in situ networks, from observations to data delivery**

Activity 1 - Undertake assessment of current levels of funding for in-situ networks: Assessment across the three domains is completed and summary produced. Priority networks to be supported have been identified and selection will be confirmed during the Steering Committee meeting.

Activity 2 - Identify entities that can provide support for the networks identified as at risk in Activity 1: For the networks identified in A1.1, entities and strategy will be discussed at the Steering Committee meeting.

#### 2. **Action C1: Develop monitoring standards, guidance and best practices for each ECV**

Activity 1 - Review existing monitoring standards, guidance and best practices for each ECV, ensuring these reflect current state-of-the-art. Maintain a repository of this guidance for ECVs: The proforma has been completed by the panels and the secretariat will now produce a final summary with the aim of identifying the gaps, which will then be addressed starting in 2025.

#### 3. **Action D2: Ensure Global Climate Data Centres exists for all in situ observations of ECVs**

Activity 1 - Identify ECVs for which adequate global centres do not exist or are insufficiently supported and facilitate and support the creation or improvement of global data centres for these ECVs: Assessment across the three domains is completed and a summary is being produced. An analysis of the results will be done in the second half of 2024 and will help identifying the gaps, which will be addressed in 2025, taking into account the progress of other actions of the GCOS IP.

## 2. GCOS Networks: GRUAN, GUAN, GSN and GSRN

The GCOS Secretariat provides support to the Working Group GRUAN (GCOS Reference Upper Air Network) and monitors the GCOS Surface Network (GSN) and the GCOS Upper-Air Network (GUAN).

The GCOS Surface Reference Network (GSRN) Task Team, a joint WMO and GCOS task team, is working to implement the GCOS Surface Reference Network and is supported by the GCOS Secretariat. In its initial phase the GSRN will provide high-quality observations for temperature and precipitation. The Lead Center is hosted by the Chinese Meteorological Administration (CMA). Work in 2024 will mainly consist in the implementation of the pilot phase of the GSRN, with metadata and initial dataflow expected by the end of the year.

## 3. Cross-Panel activities started

During the Joint Panel Meeting in 2023, six cross-panel groups started work of cross-cutting activities. Work on the following groups has been brought forward during 2023 and continued in 2024.

### 1. *ECV Rationalization*

Decision 29/1 from the Steering Committee 29 tasked the GCOS Secretariat, in consultation with the panels chairs, to propose a new grouping of ECVs (rationalization). This was further discussed by the GCOS Steering Committee 30, which adopted a workplan to undertake this rationalization through the Decision 30/3. discussed by a cross-panel group of experts at the Joint Panel Meeting and the GCOS ECVs Rationalization Task Team was established, with three members from each panel and three external members. The final goal is to ensure transparency, consistency and fitness for purpose of the ECV list. In 2024 the Task Team has worked on:

1. Defining the governance of the process that must be followed for adoption of ECVs and ECV products/quantities.
2. Revising the concept and definition for both an “ECV” and an “ECV quantity”.
3. Producing a proposed new set of ECVs and ECV quantities in view of 1. and 2.

## *2. Climate Data Centers*

During the Joint Panel Meeting in 2023, a cross-panel group started working on the GCOS IP action D1, which calls for drafting requirements for the activities of Global Climate Data Centres and identifying the relevant internationally agreed standards. The group, which includes members from the three panels and stakeholders, is now looking at the possibility of using the CoreTrustSeal certification, noting that however this is not straight forward especially for smaller data centers. Work within this group for 2024 will include identifying the difficulties in applying the CoreTrustSeal requirements and grouping these requirements in different categories. Following that, GCOS will consider whether to set up a GCOS recognition process for data centers. At the same time, the GCOS Secretariat and AOPC panel members are working closely with the WMO Infrastructure Department on issues related with climate data management and requirements for the global climate data centers. GCOS is continuing the advisory role in the Copernicus Climate Change Service (C3S) activity that aims to provide access to a comprehensive archive of historical surface observations, with support to data rescue.

## *3. Air-Sea and Land-Air Fluxes*

This topic addresses GCOS IP action B9 to improve estimates of latent and sensible heat fluxes and wind stress. In 2024, two experts from AOPC, one from OOPC and one from TOPC are working together to produce the outline of a report specifying the gaps in the observing system and including a proposal on how to address these gaps.

## *4. Earth's cycles*

This topic addresses GCOS IP action B10 (Identify gaps in Earth Cycles). GCOS supports the scientific community in the periodic review of observations of the Earth's energy, water, carbon cycles to identify gaps and areas of high uncertainty. A group of experts from WCRP and GCOS are now working at a paper on the global integrals, a first step to address the recommendations from the workshop held together with WCRP in 2023<sup>1</sup>. A strategy on how to move forward together with WCRP will be discussed during 2024.

## *5. Indicators*

During the Joint Panel Meeting in 2023, a cross-panel group started working on the request of GCOS Steering Committee 30 to explore the adoption of additional climate indicators that should cover new domains, reflect the earth cycles, and/or address extremes. The following indicators were proposed as possible candidates: Earth energy imbalance, Ecosystem drought, and Terrestrial carbon storage. GCOS is supporting the preparation of factsheets for the proposed indicators for further evaluation and discussion. The WMO Climate Services Branch will be involved in the discussion.

## **4. GCOS Engagement with countries**

Theme E of the GCOS Implementation Plan calls for improving GCOS engagement at regional and national levels. As a first step, the ToR for the GCOS National Coordinators were revised in 2023. The GCOS Secretariat is now working to address action E2 (Encourage the development of national coordination of climate observations and collect annual reports of these reports; increase nomination of National GCOS Coordinators), by holding a series of interviews with the GCOS National Coordinators of Germany, Ireland and Switzerland. The aim of these interviews is to understand how these GCOS National Programmes work, what are the benefits for the countries to have them and how to improve collaboration with GCOS. Information collected during these interviews will help the GCOS Secretariat to gain a better knowledge on

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<sup>1</sup> [WCRP-GCOS workshop on Earth's energy, water and carbon cycles and budgets \(wmo.int\)](https://wmo.int)

how to engage with countries where a GCOS National programme does not exist. In the second half on 2024, the GCOS Secretariat will start contacting few selected countries to reestablish contact or to encourage them to instigate a GCOS National Programme if it does not exist. By the end of 2024, the GCOS Secretariat will organize an online forum between the GCOS National Coordinators.

Additionally, work is ongoing to use the GCOS Cooperation Mechanism for supporting hydrological observations (and linking with Actions B5 and E3). A pilot project, in the frame of some German ongoing initiatives, will be developed for the GBON expansion in underrepresented regions, possibly in Uzbekistan. Financial support should be used for establishing or enhancing a field site (instrumentation) and/or training, capacity building.

## 5. Adaptation

GCOS has now been working on adaptation for many years. In 2024, the main activities have been the finalization on a paper on the use of ECV Fire for adaptation, and the drafting of a paper, in collaboration with experts of C3S, on the role of reanalysis for adaptation. During the GCOS Steering Committee in July 2024, a dedicated session on adaptation is being organized to identify concrete proposals on how GCOS can work on adaptation, including resourcing.

## 6. Coordination with and support to WMO

There are several links to WMO activities that the GCOS Secretariat follows, such as:

1. Preparation for the third session of the Commission for Observation, Infrastructure, and Information Systems (INFCOM-3): the following documents were prepared by the GCOS Secretariat for INFCOM-3: Decision 9.1 on the relation of INFCOM with the United Nations and other partner organizations, update of the GCOS Climate Monitoring principles (part of WIGOS manual update); update of the CBS-GCOS Lead Centre ToR in WIGOS Manual.
2. WMO Data Policy: work together with the Focus group on the implementation of the Data Policy to include guidance for members and regulatory material for the exchange of climate and historical data.
3. Climate Data Management: work together with Infrastructure and Services to define requirements for climate data centers and establishment of these centers.
4. The Global Basic Observing Network (GBON)<sup>2</sup> and the Systematic Observations Financing Facility (SOFF)<sup>3</sup>: participate to new Infrastructure Expert Team on Surface Observation Networks (ET-SON); collaborate with SOFF Secretariat to include climate networks in SOFF's scope. As part of this, GCOS is now interacting with the SOFF Secretariat to have a GCOS representative in the SOFF Advisory Board.
5. Expansion of GBON: within the TT EarthHydroNet, contribute to the GBON expansion to hydrological ECVs for climate applications, starting with key components of the water cycle, like soil moisture, evaporation, and river discharge. A concept document is under preparation (updated draft: Q2-Q3). This activity is partially linked to the GCOS Cooperation Mechanism (see point 4 above). OOPC experts have collaborated in the development of guidance for GBON compliance in the marine domain.
6. Tiered Network: Following the workshop on the development of an approach for the tiered networks, held in Geneva in 2023, WMO is now in the process of establishing a task team with the ToR produced during the workshop. GCOS Secretariat is actively participating in the discussion within INFCOM on the best approach to move this activity forward.
7. Update of the Rolling Review of Requirements (RRR) with GCOS Requirements: The GCOS Secretariat is working with JET-EOSDE to include the GCOS IP ECV requirements into OSCAR/RRR.

<sup>2</sup> <https://community.wmo.int/en/activity-areas/wigos/gbon>

<sup>3</sup> <https://www.un-soff.org/>

8. Participation in co-sponsors Constituent Bodies meetings.

## **7. Renewal of the MoU**

The Joint Study Group on GCOS, which finished its mandate in 2022 ([GCOS-246](#)), recommended to renew the MoU, which is several years old, and proposed a draft. GCOS Secretariat has been working with the sponsors to agree on a final version of the MoU, which has been presented at WMO Congress and at IOC Assembly in 2023. Furthermore, several meetings have taken place between the Directors of GCOS, UNEP and ISC. Once the MoU are approved by WMO Executive Council and by IOC Executive Council, it will be possible to finalize the agreement between all co-sponsors.

## **8. Liaise with UNFCCC**

GCOS participated and gave a statement at SBSTA 60 (June 2024). GCOS plans also to participate in the Earth Information Day and at COP 29 (November 2024). GCOS is now working to have the updated GCOS Climate Monitoring Principles considered at SBSTA 61 (November 2024).

## **9. Liaise with other partners and sponsors**

GCOS needs to liaise with sponsors and partners by participating to partner activities and reporting to partners. Partners include all GCOS co-sponsors (WMO, IOC, ISC and UNEP), United Nations Framework Convention for Climate Change (UNFCCC), Intergovernmental Panel on Climate Change (IPCC), World Climate Research Programme (WCRP); Global Earth Observing System of Systems (GEOSS), Group on Earth Observations (GEO), Committee on Earth Observation Satellites (CEOS) and the Coordination Group for Meteorological Satellites (CGMS), Copernicus Climate Services (C3S), and GCOS national coordination bodies in Germany and Switzerland. These activities will mostly consist in attending some of their meetings, either by the Secretariat or by some experts. Additionally, the GCOS Secretariat and GCOS experts are collaborating with WGClimate on the Space Agencies response to the GCOS IP in an iterative process where experts both from GCOS and WGClimate are involved. The GCOS Secretariat has regular meetings with the chairs of WGClimate.

## **10. Panels and Steering Committee**

In addition, there are specific tasks of the panels, including addressing the IP actions specific to each panel and panel task teams, as well as organizing panels meetings. Each panel meets online approximately every three months. AOPC and TOPC will meet in person in the 4th quarter of 2024, while OOPC will meet in the first half of 2025.

Support to the GCOS Steering Committee includes renewal of membership, planning, running and follow up of the Steering Committee meetings, both in person and online. The GCOS SC-31 is the first in person meeting since 2019, with the new GCOS Steering Committee Chair and 5 new members. Therefore, the organization of this meeting requires special support by the Secretariat.

## **11. Communication**

GCOS website will be migrated under the WMO website, thus special effort is required for this migration, including update of the content and design. Additionally, some of the outreach material should be updated.

## **12. EU Project**

Following a call for an EU project that would ensure additional resources to GCOS, the GCOS Secretariat is working in collaboration with colleagues of WMO and GEO to prepare the application due in summer 2024. This requires significant work both in terms of coordination (attending meetings) and of writing of the different work packages under GCOS responsibility.

### 13. Meeting and travel

In 2024 GCOS has organized the following in-person meetings:

- GRUAN Implementation Coordination Meeting 15 – Bern (Switzerland) 11-15 March 2024
- ECV Rationalization Task Team – Potsdam (Germany) – 28-30 May 2024
- GCOS Steering Committee – Geneva (Switzerland) – 2-5 Jul 2024
- AOPC Panel Meeting – Asheville (USA) – 17-20 September 2024
- GSRN-TT-3 Meeting – Xi' An (China) – 14-18 October 2024
- TOPC Panel Meeting – Rome (FAO HQ) – 9-10 October 2024

Members of the Secretariat also participated to key missions needed to the implementation of the activities described in sections 1-12 and the general running of the GCOS Secretariat and its panels.

### 3. Summary and Timeline

The table below shows a summary of the activities that have been concluded in Q1-Q2. In bracket the reference to the workplan item above. Activities that are ongoing or underway are presented in table 2 of doc-11.1.

#	Activity	Objective	Deliverable	Timeline 2024, Q1-Q2
1.	Assessment of current levels of funding support for global in situ networks (1.1)	Ensure continuity and development of long-term time-series needed for climate monitoring	Report providing a health snapshot of financial support for the networks and selection of those who need support	Q1-Q2 2024
2.	Interviews with GCOS National Coordinators (Germany, Switzerland, Ireland) (4.)	Raising GCOS profile, learning about climate needs, fundraising	Initiate communication with identified national coordinators; Online forum	Q1-Q2 2024
3.	Organize a dedicated session on adaptation for Steering Committee Meeting (5.)		Concrete proposals on how GCOS can work on adaptation, including resourcing	Q2 2024
4.	Preparation of INFCOM-3 documents (6.1)	Update of CBS-LC TOR and GCOS Climate Monitoring Principles in WIGOS Manual: Better understanding of relation with WMO	Updated WIGOS Manual Decision 9.1 endorsed	Q1 2024
5.	Preparation of Decision for WMO Executive Council and IOC Executive Council			

6.	GCOS and SOFF (6.4)	Support to climate observations	GCOS rep in SOFF Advisory Board;	Q1-Q2 2024
7.	Participate in SBSTA 60 (8.)	Communication strategy - importance of global climate observations	GCOS Statement delivered	Q2 2024
8.	Renewal of GCOS Steering Committee members	Renewed and functional SC	New members identified, approved by sponsors and invited to join SC	Q1-Q2 2024
9.	Organization of GCOS Steering Committee Meeting (10.)	To get guidance and decisions from SC	Agenda and meeting organized	Q1-Q2 2024

## Annex 1

### Report of the Global Climate Observing System (GCOS) activities in 2023

#### Overview:

GCOS works towards climate observations being enhanced and sustained into the future to provide the evidence needed to understand and predict the evolution of the climate, to guide mitigation and adaptation measures, to assess risks and enable attribution of climatic events to underlie causes, and to underpin climate services. GCOS advocates for, and coordinates observing systems that support evidence-based policy making and risk management across a range of climate related issues and sustainable development and multilateral environmental agreements. GCOS reports to the United Nations Framework Convention on Climate Change (UNFCCC) and supports its Paris Agreement. In turn, the UNFCCC encourages Parties and international organizations to support GCOS and undertake its implementation plan.

The Global Climate Observing System (GCOS) is co-sponsored by the World Meteorological Organization (WMO), the Intergovernmental Oceanographic Commission of the United Nations Educational, Scientific and Cultural Organization (IOC-UNESCO), the United Nations Environment Programme (UNEP), and the International Science Council (ISC). GCOS works through three panels of experts, the Atmospheric Observation Panel for Climate (AOPC), the Ocean Observations Physics and Climate Panel (OOPC) and the Terrestrial Observation Panel for Climate (TOPC), which address atmospheric, ocean and terrestrial observations respectively.

#### GCOS Activities in 2023:

In 2022, GCOS published the 2022 GCOS Implementation Plan<sup>4</sup> and the 2022 GCOS ECVs Requirements<sup>5</sup>. The 2022 GCOS implementation plan (IP) provides a list of actions necessary to improve and advance the system of global climate observations. Many of the actions of the GCOS IP should be performed by a wide range of actors (e.g. satellite agencies, academia, NMHS) and the role of GCOS is to monitor progress and report on overall improvements. Other actions need to be performed by one of the panels supported by the GCOS Secretariat. Additionally, there are many actions that need to be addressed collaboratively by the three

<sup>4</sup> [The 2022 GCOS Implementation Plan \(GCOS-244\) \(wmo.int\)](https://www.wmo.int/en/our-work/observing-systems/gcos/gcos-244)

<sup>5</sup> [The 2022 GCOS ECVs Requirements \(GCOS 245\) \(wmo.int\)](https://www.wmo.int/en/our-work/observing-systems/gcos/gcos-245)

panels. Many of the activities of the GCOS Secretariat in 2023 have focused in addressing the actions of the GCOS IP.

Major tasks carried out in 2023 are listed below.

1. **Joint Panel Meeting:** The GCOS Secretariat organized a joint panel meeting with the three GCOS panels in Bonn, hosted by ECMWF. The aim of the meeting was to start addressing selected cross-cutting actions from the Implementation Plan. The meeting included individual panels meetings and 6 cross-panel groups. Work on the following groups has been brought forward during 2023 and is meant to continue in 2024: ECV Rationalization, Climate Data Centers, Air-Sea and Land-Air fluxes, Earth Cycles, Indicators (see points below).
2. **ECV Rationalization:** The GCOS Steering Committee has tasked the GCOS Secretariat, in consultation with the panels' chairs, to propose a new grouping of ECVs. The GCOS ECVs Rationalization Task Team was established, with three members from each panel and three external members and they kicked off in November 2023. The work of the task team will comprise refining the current definitions of ECV and ECV product, clarifying the process and requirements to include new variables in the list, and a critical review of the current list in view of the above. The outcome of this process will be reviewed by several stakeholders.
3. **Climate Data Centers:** GCOS is undertaking promotion, and facilitation of the establishment and maintenance of data repositories with open access to all climate data, through key stakeholders, such as the CEOS/CGMS WGClimate's ECV inventory and the EU's Copernicus Programme. GCOS also provides advice in the C3S activity that aims to provide access to a comprehensive archive of historical surface observations, with support to data rescue (C3S2311\_Lot1) and is working together with WMO Infrastructure Department to define requirements for climate data centers and establishment of these centers. As part of this activity, during the Joint Panel Meeting a cross-panel group started working on the task of defining governance and requirements for Global Climate Data Centres, using the CoreTrustSeal requirements/process as a reference.
4. **Air-Sea and Land-Air Fluxes:** This topic addresses GCOS IP action B9 to improve estimates of latent and sensible heat fluxes and wind stress. A group of experts from the three panels started working on a GCOS report describing tiered networks for flux relevant ECVs, including the ones with co-located direct flux measurements over both land and ocean. The report will also include a list of the existing efforts and best practices; identify commonalities across communities (land, ocean, metrology) and identify implementors/partners (GOOS networks, FluxNet, GCOS Surface Reference Network, data centers).
5. **Earth's cycles:** Starting from 2016, GCOS has supported the scientific community in the periodic review of observations of the Earth's energy, water, carbon cycles to identify gaps and areas of high uncertainty. In June 2023, GCOS and WCRP convened a joint workshop to assess the current state of knowledge of the Earth system cycles of energy, water, and carbon. The aims were to identify challenges for research, modelling and observing system capabilities; to identify key indicators for measuring, monitoring and modelling the cycles and indicate how they can be used in global assessment frameworks; and to identify key processes that need to be better understood to improve the monitoring of the cycles. The workshop<sup>6</sup> identified several recommendations that will be now brought forward by GCOS and WCRP together through the establishment of a joint task team.
6. **Indicators:** The experts revisited the GCOS climate indicator definition and criteria, which had been established in 2017 and consolidated a definition for a global climate indicator, followed by a refinement of their criteria. New indicators were proposed, and the following ones were considered as preliminary priority subject to further review: Ecosystem drought, terrestrial carbon storage and earth energy imbalance. Next steps are to synthesize the outcomes of this session in a short report and present the findings and proposals to WMO Services for their consideration.

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<sup>6</sup> [WCRP-GCOS workshop on Earth's energy, water and carbon cycles and budgets \(wmo.int\)](https://wmo.int)



7. **ECV Requirements:** Update of the OSCAR/Surface Rolling Review of Requirements database with the ECV requirements published in the 2022 ECV Requirements report. OSCAR/Surface requirements are used to produce high-level guidance to WMO Member States for the advancement of their observing systems to respond to different applications, including climate monitoring and adaptation.
8. **Adaptation:** The final report of the GCOS Adaptation Task Team (GATT) was presented at the GCOS Joint Panels Meeting. The main objective of the GATT was to explore the potential of global climate observations in support of adaptation. The GATT considered three main case studies to evaluate the suitability (in terms of spatial and temporal resolution) of existing GCOS ECVs for adaptation application (observations for and of adaptation) and concluded that many existing GCOS ECVs and products are relevant for adaptation. It also pointed out that reanalysis is an essential tool. Therefore, GCOS, in consultation with reanalysis experts, is now working on a paper on the utility of reanalysis for adaptation. The results of the work of the GATT were presented in various events, including the GFOI (Global Forest Observations Initiative) 2023 Plenary, FAO, Rome, Italy, 9-11 May 2023, and (online) the WCRP Open Conference, 23-27 October 2023, the ESA 13th Climate Change Initiative colocation CMUG Integration meetings 3-5 November 2023, ESA-ECSAT, Harwell, UK, 7-9 November 2023.
9. **WGClimate:** The GCOS Secretariat and GCOS experts are collaborating with WGClimate on the Space Agencies response to the GCOS IP in an iterative process where experts both from GCOS and WGClimate are involved. The GCOS Secretariat has regular meetings with the chairs of WGClimate and has participated in person in the last two WGClimate meetings.
10. **GCOS Surface Reference Network (GSRN):** The GCOS Secretariat supports the GSRN Task Team, a joint WMO and GCOS task team established to implement the GCOS Surface Reference Network. The main activities of the GSRN TT in 2023 were the selection of the stations for the pilot phase, the support to the establishment of the Lead Center, and the preparation of an implementation plan for the pilot phase of the GSRN.
11. **GCOS Networks:** The GCOS Secretariat provides support to the Working Group GRUAN (GCOS Reference Upper Air Network) for the full implementation of GRUAN. It also monitors the GCOS Surface Network (GSN) and the GCOS Upper-Air Network (GUAN).
12. **Tiered network:** GCOS took the lead to further progress with the WMO proposal of the development of a tiered network. A workshop was held with representatives of communities across domains to identify the best approach. During the meeting, it was recognized that distinct aspects of the maturity assessment and tiering are important for different application areas. Quality and suitability are two different aspects, and with the tiered approach as it is designed now, it is not possible to deliver a clear assessment of both. The assessment of the suitability will be added to the one of quality when performing an assessment of a network. The workshop delivered Terms of References for a task team that will be established in 2024 to implement the assessment of networks taking into account the two aspects of quality and suitability.
13. **CBS-GCOS Lead Centers<sup>7</sup>:** The 7th CBS-LC-GCOS workshop was held at WMO (Geneva) from 7th to 9th November 2023. The expected outcomes of the workshop were: Revised Terms of Reference for LC-GCOS; Renewed working practices for LC-GCOS for monitoring GCOS networks; And agreed coordination/integration with other centres (i.e. RWCs). A review of the work and benefit of the Lead Centres concluded that there was still a strong mandate for this activity to continue, from GCOS and the WMO commissions INFCOM and SECOM. The LC reports provide evidence of system-improvements and resolving incidents, and collaboration between DWD, JMA and NCEI, by comparing CLIMAT monitoring information, had identified, and resolved, a number of inconsistencies, an analysis which has led to improvements in data availability.

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<sup>7</sup> CBS Lead Centres for GCOS have been designated by the [World Meteorological Organization \(WMO\) Commission for Basic Systems \(CBS\)](#) as being responsible for monitoring performance of GCOS networks, in particular of the GCOS Surface and Upper Air Networks (GSN, GUAN), and to support any follow-up action in designated areas of responsibility (for all WMO Regional Associations)

- 14. Coordination with and support to WMO constituent and subsidiary bodies:** There are several links to WMO activities that the GCOS Secretariat regularly follows including:
- Preparation for WMO Executive council EC-76 and WMO Congress Cg-19: The Joint Study Group Report (see point 16) and the GCOS Implementation Plan recommendations were endorsed by Member States respectively at EC-76 and at Cg-19.
  - Update of WIGOS Manual and Guide with the updated GCOS Climate Monitoring principles.
  - Data Policy: collaborate with WMO (work together within the Focus group on the implementation of the Data Policy) to include guidance for members and regulatory material for the exchange of climate and historical data.
  - Global Basic Observing Network (GBON) initiative supported by the Systematic Observation Funding Facility (SOFF): collaborate with WMO & SOFF Secretariat to include climate networks in GBON (and hence in SOFF's scope).
  - Expansion of GBON: within the TT EarthHydroNet, contribute to the GBON expansion to hydrological ECVs for climate applications, starting with key components of the water cycle, like soil moisture, evaporation, and river discharge.
  - Global Greenhouse Gas Watch (G3W): ensure GCOS involvement in this activity by supporting two GCOS experts who are part of the G3W Study Group.
- 15. Panels and Steering Committee:** In addition to the above, the Secretariat supports the panels and the GCOS Steering Committee. This implies the organization and running of meetings and communications including agenda, background documents, decision documents, reporting and follow up.
- 16.** In 2023, the draft for the MOU proposed by the Joint Study Group was revised and prepared for the approval of GCOS sponsors. The Joint Study Group on GCOS was established to revise the governance and structure for GCOS. One of the outputs of the group was a draft Memorandum of Understanding for GCOS.
- 17. Reporting to the UNFCCC,** and its Subsidiary Body for Scientific and Technological Advice (SBSTA), on the status of global climate observations under its systematic observations agenda item. This year GCOS actively participated in the Earth Information Day and made a statement at the Plenary of SBSTA 59, both during COP28 in Dubai.
- 18. Meetings and travel:** GCOS has organized the following meetings:
- Joint GCOS/WCRP Meeting on Earth's cycles: Paris, 22-23 June
  - Joint GCOS Panels Meeting: Bonn (Germany), 26-30 June
  - GSRN-TT Meeting: Turin (Italy), 25-29 September
  - Workshop on the development of the tiered approach (in collaboration with WMO): Geneva (Switzerland). 24-26 October.
  - 7th CBS-LC-GCOS workshop: Geneva (Switzerland), 7-9 November
- Members of the Secretariat also participated to key missions needed to contribute to the implementation of the above-mentioned activities and the general running of the GCOS Secretariat and its panel. These meetings were organized or led by WMO, GOOS, WGClimate, GCOS Switzerland, ESA, Eumetnet, FAO, UNFCCC, and IPCC. The new GCOS approach is to balance between physical and virtual meetings, to minimize carbon emissions and optimize expenditure. Therefore, all the panels organized online meetings every two months and several online meetings were organized for the GSRN Task Team and the GRUAN Task Team.
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