

23rd Session of the GCOS/WCRP Terrestrial Observation Panel for Climate (TOPC-23)

Due to the COVID-19 pandemic, TOPC did not hold a single in-person meeting but instead held several shorter teleconferences. The main meetings of the whole panel were on the 19 February, 22 February and the 16 April. The following topics were considered:

- New TOPC Co-Chair
- Outcomes of the 28th GCOS Steering Committee
- Global Terrestrial Networks
- Data Centres
- Future Developments

New TOPC Co-Chair

Martin Herold has agreed to be a co-chair of TOPC to support Thelma Krug. The secretariat and panel welcomed him and thanked him for assuming this task.

28th Session of the GCOS Steering Committee

TOPC reviewed the outcomes of the last GCOS Steering Committee and Identified actions for the panel:

- Task Team: Steering committee support for raising additional funds for the GCOS trust fund. Thelma is a member of this group;

***ACTION 1.** Thelma Krug will contribute to the Task Team: Steering committee support for raising additional funds.*

- Task Team: Broadening GCOS Cooperation Mechanism and funding, participation to be decided later by the TOPC Co-Chairs when this group is established;

***ACTION 2.** Participation in the Task Team: Broadening GCOS Cooperation Mechanism and funding to be decided by the co-chairs when group is established.*

- Task Team: Climate Cycles – Wouter Dorigo will participate in this group;

***ACTION 3.** Wouter Dorigo will participate in the climate cycles task team.*

- Task Team: Adaptation – Nigel Tapper will be the chair of this group with TOPC co-chairs Thelma and Martin participating;

***ACTION 4.** Nigel Tapper will be the chair of this Adaptation task team with Thelma Krug and Martin Herold participating.*

- Implementation Plan Writing Team, the co-chairs will represent TOPC;

***ACTION 5.** the co-chairs will represent TOPC on the Implementation Plan Writing Team.*

- ECV requirements the panel members agreed to work on refining the requirements, based on the public consultation, until the end of May 2021;

***ACTION 6.** The ECV Stewards will work on finalizing the ECV requirements, based on the public consultation*

- Total Water Storage should be an ECV, Stephan Dietrich will report back on if there are any implications or overlaps for other hydrological ECV;

***ACTION 7.** Stephan Dietrich will check Total Water Storage ECV to see if there are any implications or overlaps for other hydrological ECV.*

- TOPC shall review its relationship with Global Terrestrial Networks (see below).

***ACTION 8.** The Secretariat will draft a recommendation on the GTN for the GCOS Steering Committee. This will be approved by the panel before going to the Steering Committee.*

Global Terrestrial Networks

The panel discussed the status of the Global Terrestrial Networks. Overall, the main aim of the Global Terrestrial Networks (GTN) is to assure the long-term sustainability of climate observations networks and associated data centres that contribute to the Global Climate Observing System.

In general, observing networks lie between two extremes:

Operational networks with long-term funding committed by governments. However, with differing data policies and national priorities, that may limit or even prevent the free exchange of data to non-commercial applications. Most of those networks collect national quality-assured data sets only, at the expense of timeliness requirements in the value chain.

Research networks. These usually have only short-term, project-based, funding and no long-term commitment to maintain sustainable data centres, which can struggle to survive, even while their data is being used. On the other hand, the data is more usually exchanged freely, maybe with some delay, and data policies are not a restriction.

These issues are not unique to the GTN but to many observations (e.g. ocean observations).

Many of these networks can have multiple uses, not just for GCOS and climate monitoring.

There is considerable interest in the future development of the GBON and SOFF to support terrestrial observations, especially hydrological networks. It was noted the ICOS, as a research framework has been able to secure the long-term support of some sites, however, this not an option for other measurements.

Data centres are described often as being under the auspices of UN bodies, such as WMO, FAO, UNESCO or UNEP. GTN-H is a joint effort of the World Meteorological Organization (WMO) and the Global Climate Observing System. However, it is funded by the German Government and hosted by the International Centre for Water Resources and Global Change (ICWRGC) and the Federal Institute of Hydrology in Koblenz, Germany. This pattern of an international organization taken patronage of a data centre but the financial support coming from the national government is often repeated, e.g. the GPCC hosted by DWD and the GRDC hosted by BfG both funded by Germany, the GGMN hosted by IGRAC both funded by the Netherlands, and HYDOLARE hosted by ROSHYDROMET and funded by Russia but all associated with WMO¹.

It is not clear exactly what "under the auspices of" a UN body may mean.

The amount of support needed for data management is not large, often amounting to one or two persons fulltime. The computing resources needed generally are not large for these in situ networks. These networks have a forum where consistency and comparability can be maintained. However, additional human resources are needed for data acquisition and for public relations and capacity development, as well as for contributions to define standards for data exchange and reuse. Other data centres have no such support and have a high risk of failing. The Permafrost data centre (GTN-P) was moved to the arctic portal because of funding issues, then the arctic portal itself was nearly bankrupt.

Two specific issues were raised. In both these cases the aim was to use the status of WMO and GCOS to encourage the submission of data but WMO has not really helped. (The GCOS secretariat will follow up on both of these.)

HYDROLARE used to send out questionnaires to collect lakes data. While not completely successful they did collect data, however this has now changed with WMO including this in their questionnaire, now HYDROLARE is not getting any data.

GGMN asked WMO to send out requests for data. WMO may have done this but only to the regular points of contact in the countries, not to the relevant people with groundwater data.

Interactions between in-situ networks and EO organizations have been improved (e.g. through the current setup of ECV stewards)

Possible actions:

- GCOS to identify that the Global Terrestrial Networks are of fundamental importance to climate monitoring and, together with their associated Data Centres, should have commitment and sustained resources for their long-term operation.
- GCOS to make clear that data centres and free an open access to data should be seen as a fundamental part of observations and the global climate observing system.
- GCOS to advocate for support to networks, including networks of networks, noting this is a particular challenge in developing countries, particularly with sustainable, long-term resources and planning. GCOS could promote the extension of GBON/SOFF capabilities beyond meteorological observations to other climate observation networks through the INFCOM bodies JSG-GCOS and SC-ON although this will be a long-term activity.
- Highlight the role of GTNs in any GCOS reference network
- Support Data Exchange and Reuse capabilities
- Consider how long-term observations could be supported by infrastructures such as ICOS, eLTER, NEON, AmeriFlux, TERN, CERN etc.
- Give more guidance around user requirements, including:
 - Necessity for open data policies;
 - Lack of timeliness;
 - Alignment with WMO activities where possible;
 - Continually to improve interactions between in-situ networks and EO organizations have been already improved (e.g. current setup of ECV stewards), through cross-panel exchanges and during Joint Panel Meetings: evaluate the value chain from in-situ and EO to modelling.

Next Steps:

***ACTION 9.** The Secretariat will draft a recommendation to and implement the above actions for the GCOS Steering Committee. This will be approved by the panel before going to the Steering Committee*

Data Centres and Networks

Improving Data Centres is very important for TOPC

- How can TOPC/GCOS establish/support existing data centres and support data acquisition?
- Ensure a clear data policy: free, open and easily accessible;
- Ideally data centres should also include all kind of data for the same ECV (in-situ, satellite, UAV, citizen science) and provide them free, open and easily accessible (common licences);

- Increase the speed of delivery of data and information (to make it more climate action oriented), in addition to having long-term consistent ECV time series;
- Work with existing Data Centres – no duplication.

TOPC will report this discussion to the Joint Panel Meeting 2021 and contribute to the development of Global Climate Data Centres.

Status Report and Implementation Plan

The panel agreed to address the comments on the Status Report received in the public review by the end of May 2021. The panel accepted the plans for the report to be finally approved by the writing team and GCOS Steering committee.

The panel briefly discussed the plans for the next GCOS Implementation Plan and welcomed plans to recruit a lead author. They agreed to help draft the report in the second half of 2021.

***ACTION 10.** ECV Stewards and Panel Co-Chairs to address the comments on the Status Report received in the public review by the end of May 2021.*

***ACTION 11.** Panel and ECV Stewards to contribute to the drafting of the next GCOS Implementation Plan.*

***ACTION 12.** Panel and ECV Stewards to contribute to the review, and finalization of the next GCOS Implementation Plan.*

New Developments

The panel considered what new developments are needed to improve terrestrial climate observations. The discussion identified the following:

- Integrating observations from individual ECVs for more data driven synthesis on issues such as:
 - GHG Fluxes e.g. provide information on anthropogenic versus natural GHG fluxes (incl. the consideration of inter-annual variability and extremes); GHG Fluxes e.g. provide information on anthropogenic versus natural GHG fluxes (incl. the consideration of inter-annual variability and extremes)
 - AFOLU
 - Biosphere indicator (the panel noted that phenology of natural forests shows encouraging results)
- Increase the speed of delivery of data and information (to make it more climate action oriented), in addition to having long-term consistent ECV time series
- Improve inputs into specific international policy and assessment processes such as:
 - UNFCCC/Paris Agreement, i.e. Global Stocktake, Adaptation & Mitigation
 - IPCC – how to link ECV observing system/networks to upcoming IPCC assessments
 - Consider overlaps with other Multilateral Environmental Agreements (MEA)
- Develop relationship with GBON and SOFF. If this is successful, this may give a long-term solution to issues such as support for networks, data access and availability, data quality

These ideas were reported to the plenary session of the 2021 Joint Panel Meeting and will be taken up in the development of the new 2022 GCOS Implementation Plan.

Summary of Actions

Action		Who	When
TOPC-23/1	Task Team: Steering committee support for raising additional funds for the GCOS trust fund.	Thelma Krug will contribute	As needed
TOPC-23/2	Task Team: Broadening GCOS Cooperation Mechanism and funding	Participation to be decided by the co-chairs when group is established	As needed
TOPC-23/3	Task Team: Climate Cycles	Wouter Dorigo will participate	As needed
TOPC-23/4	GCOS Task Team: Adaptation	Nigel Tapper will be the chair of this group with Thelma Krug and Martin Herold participating	As needed
TOPC-23/5	Implementation Plan Writing Team	the co-chairs will represent TOPC	As needed
TOPC-23/6	Finalize the ECV requirements, based on the public consultation	ECV Stewards	End May 2021
TOPC-23/7	Check Total Water Storage ECV to see if there are any implications or overlaps for other hydrological ECV	Stephan Dietrich	End May 2021
TOPC-23/8	The Secretariat will draft a recommendation on the GTN for the GCOS Steering Committee. This will be approved by the panel before going to the Steering Committee.	Secretariat	End June 2021
TOPC-23/9	TOPC will report its view on Global Climate Data Centres to the Joint Panel Meeting 2021 and contribute to the GCOS development of Global Climate Data Centres.	Thelma Krug reported this top the JPM. Further participation to be decided by the co-chairs.	
TOPC-23/10	Address the comments on the Status Report received in the public review by the end of May 2021	ECV Stewards, Panel CO-Chairs	End May 2021
TOPC-23/11	Contribute to the drafting of the next GCOS Implementation Plan	Panel and ECV Stewards	Second half of 2021
TOPC-23/12	Contribute to the review, and finalization of the next GCOS Implementation Plan	Panel and ECV Stewards	First half of 2022