



<http://gcos.wmo.int>



ICSU
International Council for Science



WORLD
METEOROLOGICAL
ORGANIZATION

INTERGOVERNMENTAL
OCEANOGRAPHIC
COMMISSION

**REPORT OF THE TWENTY-FIFTH SESSION OF THE
WMO-IOC-UNEP-ICSU
STEERING COMMITTEE
FOR GCOS**

**Hangzhou, China
26–28 September 2017**

GCOS-210

UNITED NATIONS
ENVIRONMENT
PROGRAMME

INTERNATIONAL COUNCIL
FOR SCIENCE

© World Meteorological Organization, 2017

The right of publication in print, electronic and any other form and in any language is reserved by WMO. Short extracts from WMO publications may be reproduced without authorization, provided that the complete source is clearly indicated. Editorial correspondence and requests to publish, reproduce or translate this publication in part or in whole should be addressed to:

Chair, Publications Board
World Meteorological Organization (WMO)
7 bis, avenue de la Paix Tel.: +41 (0) 22 730 84 03
P.O. Box 2300 Fax: +41 (0) 22 730 80 40
CH-1211 Geneva 2, Switzerland E-mail: Publications@wmo.int

NOTE

The designations employed in WMO publications and the presentation of material in this publication do not imply the expression of any opinion whatsoever on the part of the Secretariat of WMO concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.

Opinions expressed in WMO publications are those of the authors and do not necessarily reflect those of WMO. The mention of specific companies or products does not imply that they are endorsed or recommended by WMO in preference to others of a similar nature which are not mentioned or advertised.

This document (or report) is not an official publication of WMO and has not been subjected to its standard editorial procedures. The views expressed herein do not necessarily have the endorsement of the Organization.

This publication has been issued without formal editing.

Contents

Part 1	Management and Work of Panels	4
1.	Opening of the Session	4
2.	Chairman’s Introduction and View	4
3.	Director’s Report	5
4.	Process of revisiting the GCOS Memorandum of Understanding (MoU) and the engagement of the sponsoring organizations	6
5.	World Climate Research Programme (WCRP) Review	7
6.	Sponsors Views on their expectations with regard to the future of GCOS programme	7
6.1	IOC.....	7
6.2	UNEP.....	7
6.3	ICSU	8
7.	Discussion	8
8.	Feedback from GCOS Science Day	9
9.	Terrestrial Observation Panel for Climate - TOPC	10
10.	Ocean Observations Panel for Climate – OOPC	10
11.	Atmospheric Observation Panel for Climate – AOPC	10
12.	Discussion	11
Part 2	Global Stocktake/ Climate Indicators/ Regional Workshops, GCOS Cooperation	
	Mechanism – all these issues are encouraged by the UNFCCC COP Decision 19/CP.22	13
13.	How can GCOS contribute to the Global Stocktake?	13
14.	Climate Indicators	14
15.	Regional Workshops	15
16.	GCOS Cooperation Mechanism	16
17.	Partnerships	17
17.1	WMO Technical Commission for Basic Systems (CBS)	17
17.2	WMO Integrated Global Observing System - WIGOS	17
17.3	WMO Technical Commission for Climatology (CCI)	17
17.4	WCRP / WCRP Data Advisory Council	18
17.5	Copernicus Climate Change Service (C3S).....	18
17.6	Global Ocean Observing System - GOOS (A. Fischer).....	18
17.7	Discussion.....	19
18.	GCOS strategy	19
19.	Communication Strategy	20
20.	Budget	20
21.	Decisions on next meeting: (Date and Place)	20
22.	General Steering Committee Membership and Related Issues – In Camera Session	21
23.	Close of the Session	21
	Appendix 1 Participant List.....	22
	Appendix 2 Agenda.....	26
	Appendix 3 Consolidated List of Actions	31
	Appendix 4 List of Acronyms and Abbreviations.....	37
	Appendix 5 New ECV: Evaporation from Land	39

Part 1 Management and Work of Panels

1. Opening of the Session

The meeting was opened by Stephen Briggs, Chairman of the Steering Committee (SC), who welcomed the participants to Hangzhou, China, and thanked the host, the Chinese Meteorological Administration (CMA) and its Beijing Climate Centre, represented by Steering Committee member, Ms Qingchen Chao.

Qingchen Chao welcomed the participants, and commented about the GCOS Science Day that had taken place the previous day, noting that this had offered a great opportunity for younger scientists to learn more about GCOS.

The participants (Annex 1) introduced themselves.

The agenda (Annex 2) was approved without comments.

Finally, Carolin Richter, Director for the GCOS Secretariat, welcomed the candidate members of the Steering Committee, Sue Barrell, Michael Zemp and Amos Kabo-Bah. She also pointed out that this is the silver anniversary meeting of the GCOS programme, as its Memorandum of Understanding had been signed in April 1992, after the instigation of GCOS at the 2nd World Climate Conference in 1990.

2. Chairman's Introduction and View

In 2016 GCOS had delivered its new Implementation Plan (IP). The IP recognizes the increasing role of GCOS in the community, presents new Essential Climate Variables (ECVs) and for the first time includes material on adaptation, mitigation and climate indicators. Now that the Implementation Plan has been delivered, the SC needs to reflect on the role of GCOS with respect to the research and user communities. An important part of the future work of GCOS is to ensure the implementation of the actions in the IP. Beyond this, GCOS also has a clear role in ensuring that observations are accessible to the communities. GCOS has been very successful and its future relevance and performance depend on the actions taken at the present.

The space agencies have already responded to the IP and an action plan has been developed by the joint working group on climate (WG Climate) of the Coordination Group for Meteorological Satellites (CGMS) and the Committee on Earth Observation Satellites (CEOS), to address the space related actions in the IP. An ECV inventory containing a detailed analysis of Climate Data Records (CDR) has also been developed and will be valuable to the assessment of what GCOS is delivering. For now, the inventory only includes CDRs from satellites, but in the future it will be expanded to also include CDRs from other sources. Surface based monitoring of CO₂ has been taking place for decades, but now for the first time we have satellite observations of column CO₂ from the atmosphere by USA, China and Japan and there are concrete plans from the European Union (EU) to increase the amount and quality of this kind of observations. The Copernicus program will provide additional atmospheric chemistry and air quality data through the range of Sentinel satellites. This represents a long-term commitment to the goals of GCOS.

The IP was well received by the United Nations Framework Convention on Climate Change (UNFCCC) and GCOS is now preparing for the 23rd session of the Conference of the Parties to the UNFCCC (COP 23), where its participation in side events will be important. Various space agencies are also planning side events relevant to GCOS, and GCOS will strive to ensure the messages delivered are consistent with each other. The importance of two themes addressed in GCOS IP, climate indicators and global cycles, have

also been identified by the Intergovernmental Panel on Climate Change (IPCC) in the outline of the sixth Assessment Report (AR6). In the future, GCOS will concentrate on strengthening its collaboration with IPCC.

A last point was made about the changes being made to the internal structure of WMO. It was pointed out that this could have implication on the GCOS SC, however it was seen as positive and constructive way with regard to the governance by GCOS' sponsor organizations.

3. Director's Report

Carolin Richter explained that the most significant achievement for GCOS was the publication of the new IP, which has been adopted by the 22nd session of the COP, in Decision 19, (19/CP.22). The IP plays an important role, as Parties to the UNFCCC and UN Members can draw on the actions specified by the IP. Due to the high cost of the translation, the IP is currently available in French and English only. However, if the SC wishes to have it translated into other UN languages, additional resources will have to be made available.

Carolin presented the GCOS programme activities. First, the activities of the three science panels, Atmospheric Observation Panel for Climate (AOPC), Ocean Observations Panel for Climate (OOPC) and Terrestrial Observation Panel for Climate (TOPC) were outlined, including the cooperation of the panels with the broader community. All three panels are jointly sponsored and coordinated with the World Climate Research Programme (WCRP). In particular it should be noted that the OOPC is a tri-partite panel, jointly with WCRP and Global Ocean Observing System (GOOS). It was stressed that the panels do not work separately and that cross links between panels are increasingly important, for instance around the topics of coastal zones (OOPC and TOPC), ocean heat fluxes (OOPC, AOPC), GCOS Surface reference network (AOPC, TOPC), and ECV requirements and review.

Other main activities include GCOS's support to UNFCCC, contribution to the Portal of the Group on Earth Observations (GEO) in providing information on available ECVs, attendance at meetings of the Global Framework for Climate Services (GFCS) and engagement with IPCC through the involvement of one of the GCOS staff as lead author of the "Elaboration of the 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories". Cooperation with the space agencies is also ongoing, with GCOS staff attending several CEOS and CGMS meetings as well as being involved in the ESA "Climate Change Initiative " and its tender evaluation process.

Carolin Richter presented cooperation with partner programmes, including both meeting attendance of WCRP and Copernicus Climate Change Service (C3S) meetings and regional activities such as the planned Joint GCOS-WIGOS Workshop for Pacific Small Island Developing States (SIDS) in Fiji, October 2017. Additional regional meetings had been planned for 2017, but had to be postponed to 2018.

In summary, GCOS provides guidance and advice on climate observing systems and requirements, and space agencies are using this guidance to plan for their climate monitoring missions. As GCOS has maintained close relationship with the research community, the science behind drafting the GCOS plan is based on a robust understanding of what is required with regard to observational needs.

GCOS has strengthened its partnerships with Intergovernmental Oceanographic Commission (IOC of United Nations Educational, Scientific and Cultural Organization, UNESCO), United Nations Environment program (UN Environment) and International Council for Science (ICSU), and the GCOS programme is considered to be working well and appropriately structured. This was confirmed by a review led by GCOS sponsoring organizations in 2014. There are still challenges remaining, such as the need to strengthen collaboration with WMO and the high dependency on voluntary contributions.

Key activities planned for 2018 include initiating the development of a GCOS Strategic plan, developing a regional workshop programme to identify needs to improve climate observing systems on a regional and local scale; engaging corresponding activities in WMO and IOC, discussing programmatic strategic priorities and alignment with GOOS (also developing a forward strategy), providing expertise with respect to cross-panel activities and cross-calibration issues, complementing ECV product requirements, identifying observation requirements for adaptation needs.

During the subsequent discussion, it was pointed out that there is a need for GCOS to be more active in the IPCC review process, and that this could be achieved by engaging panel members in the review process. It was also noted that the IPCC report is lacking strong statements on missing data sets, and GCOS was asked to increase the visibility of the “white spots” on the map.

The issue of including “adaptation” in the GCOS work plan was discussed. The logical sequence is to first establish requirements and then define the minimum observation system needed to satisfy them. When the existing capabilities fall short of meeting the requirements, GCOS can then advocate for additional capabilities not only for monitoring but also for adaptation. However, it was noted that there is currently no expertise on adaptation in the panels, and that in order to succeed in this task, socio-economic experts need to be included also on the SC.

Number	Action	Notes	Responsibility
SC-25/1	Engage in a larger and broader value chain: IPCC WG I IOC regional levels IPCC WG II on regions		D/GCOS Carolyn Richter
SC-25/2	Be more active in the IPCC review process: GCOS review on IPCC special reports (on panel level, by individuals. Panel members to sign in actively in the review process and capture gaps and misquotations. GCOS to submit as a group relevant information, someone will need to collect these comments.	Discussion in the panel meeting in March	GCOS Sec with Panel Chairpersons. Valentin Aich to keep track on deadlines for reviews.

4. Process of revisiting the GCOS Memorandum of Understanding (MoU) and the engagement of the sponsoring organizations

A new MoU was drafted in 2014 as the result of a recommendation from the GCOS Program Review Board. Currently, the requested updates have been submitted to WMO executive management and after the approval they will be presented to the other sponsors.

5. World Climate Research Programme (WCRP) Review

ICSU's Vice-President, Jinghai Li, informed on the process of the WCRP review, which is organized by ICSU. Due to a delay, the report will be ready only in November 2017. Following the results of the review, GCOS will consider the outcome and will address any actions resulting from it.

6. Sponsors Views on their expectations with regard to the future of GCOS programme

6.1 IOC

The activities of IOC were presented by Albert Fischer, Head, Ocean Observations and Services Section and [GOOS Project Office](#). There is an emerging contradiction between ocean governance and underlying science. The governance is becoming more legally binding, stronger, while the science is not sustainable, based on relatively arbitrary funding streams. IOC has a role in getting these two worlds closer. Albert Fischer recalled that IOC is sponsoring not only the GCOS programme, but also GOOS, WCRP and jointly with the World Meteorological Organization (WMO) its Technical Commission on Oceanography and Marine Meteorology (JCOMM).

GCOS plays an important role within IOC. First, GCOS has been important in raising the profile of observations, and in providing, thanks to the GCOS-IOC sponsorship, the needed link between ocean observations and meteorological services.

GCOS provides the framework of evaluation and communications for GOOS, the engagement in a larger and broader value chain and is involved in scientific analysis and in the assessment to societal benefit. The GCOS program is recognized as having established a good communication with UNFCCC. 2021-2030 is the Decade of Ocean science for sustainable development, and GCOS can play a role in helping to define and develop the ocean science to serve the users. In terms of capacity development, it was noted that GCOS cooperation mechanism is not focussed around ocean/building, and that GOOS is able to assist working with regional structures.

Albert Fischer also discussed what would change if IOC would lose the status of a sponsor to the GCOS program, and became a "partner", which alludes to the fact that the financial commitments were weakened. He pointed out that with the IOC sponsorship the programme representatives would be able to talk directly to IOC members, but that this mechanism would be lost if the relationship would turn into a partnership.

Number	Action	Notes	Responsibility
SC-25/3	Specific from IOC: GCOS to help designing the UN Decade of ocean Science for sustainable development 2021–2030		IOC GOOS Director with D/GCOS – Carolin Richter

6.2 UNEP

In order to secure funding for GCOS, it is essential to raise the visibility of GCOS and through examples show the importance of observations to climate monitoring and climate research.

Jian Liu, Director for Sciences, representative of UNEP, gave the example of the Montreal Protocol and its existence for the past 30 years, which relates to the importance of observations: this story should be told and raised to higher levels. He also drew the attention of the participants to the fact that observations can

be gathered through several entry points. One of them is the Global Environmental Outlook of UNEP, which is brought to the attention of 190 Ministers of the Environment. A second example is UN Environment Live, which is a service including support to integrated environmental assessment processes by making accessible global, regional and national data and knowledge flows. Thirdly, there is a correlation between the clean air act and climate and UNEP's contact to this issue was his UNEP colleague Valentin Fortescu in the Paris office. As a fourth point, Jian Liu mentioned the emission reports which should make a reference to the GCOS observations. As a fifth and final point, he pointed to the Programme of Research on Climate Change Vulnerability, Impacts and Adaptation (PROVIA) program, which may be renamed into "World Science Adaptation program". PROVIA has previously discussed the lack of data information in developing countries for adaptation activities.

Jian Liu announced that, as a sponsor, UNEP will support GCOS through the allocation of one half FTE staff located in the office of Nairobi to work on GCOS matters. GCOS Director is asked to include this new staff in next year planning and to make optimal use of this expertise for the benefit of GCOS.

Number	Action	Notes	Responsibility
SC-25/4	Follow-up on the UNEP offer of a staff to work with GCOS		D/GCOS – Carolin Richter

6.3 ICSU

Jinghai Li noted that as the Sustainable Development Goals (SDGs) rely on the global observation system, there is a need for integration that can happen by breaking the boundary between the different disciplines. He pointed to the paradigm shift in science and technology which are starting to focus more now on social sciences.

7. Discussion

The view expressed in all presentations from the sponsors' representatives was that GCOS should remain a co-sponsored program. GCOS provides useful information to the scientific communities and advice to the policy makers, and it should also continue to deliver assessment reports regarding the state of the observing system to inform decision makers.

There is a need to improve our understanding of the regional observational requirements related to adaptation. This could be facilitated through dedicated regional workshops. Support for this initiative might be obtained through organizations such as the Green Climate Fund (GCF). GCOS should consider submitting a proposal for this to GCF on behalf of all four sponsors, which might strengthen its chances.

GCOS should inform policy makers about the core services and deliverables it generates, and in particular communicate about the impact of its activities at the global, regional and national level. This action, coupled with concrete examples from case studies should increase the likelihood of unlocking complementary funding.

Finally, to increase possibility of access to funds, every year the work plan of GCOS should be reviewed after the COP.

The SC agreed that better support for observations at the national level for adaptation is dearly needed. WIGOS is about integrating observations and is developing guidance and partnership for national

observations. GCOS can be a key partner in this effort by contributing to the guidance material, keeping in mind that GCOS's mandate is to not provide observations but to set the requirements on the observations.

Number	Action	Notes	Responsibility
SC-25/5	Green Climate Fund – follow up. GCOS should submit on behalf of all 4 sponsors, which might be a big strength.	Valentin Aich to contact WMO focal point for GCF	D/GCOS in cooperation with sponsors.
SC-25/6	WIGOS: develop guidance material for countries for national observation, have GCOS looking at it. GCOS as a key partner.		GCOS Sec with WIGOS PO Caterina Tassone
SC-25/7	UNFCCC adaptation fund: Check on possibility whether every year the GCOS state should be reviewed during the UNFCCC conference.	Assess if feasible	GCOS Sec with UNFCCC Sec Carolin Richter, Simon Eggleston
SC-25/8	Recommendation to build upon bilateral cooperation. GCOS to develop Guidance according to the GCOS guidelines.	Within the drafting and development of Regional Workshop plans? Grouping partner that are alike and foster cooperation	D/GCOS Carolin Richter
SC-25/9	Consider what are the high key impacts products of GCOS and how it could deliver. How to impress policy makers? What are the core services that this program can provide? Have case studies, and have it run through all levels.	GCOS Sec. to draft a list, draft a case study and run it through the SC (base reference from COP 22)	GCOS Sec

8. Feedback from GCOS Science Day

Qingchen Chao was thanked for the organization of the Science Day, during which a very comprehensive range of activities undertaken by the Chinese scientific communities was presented.

It was suggested that it would be useful for the Secretariat to record how China benefitted from GCOS so that other countries will be able to learn from it. It was decided that a national GCOS science day should continue to be organized by the host of the SC, but focused on a limited number of topics.

Number	Action	Notes	Responsibility
SC-25/10	Continue to motivate host for SC to organize a national GCOS Science Day.		D/GCOS – Carolin Richter
	Record how China benefitted from GCOS and how GCOS helped on a political level.		

9. Terrestrial Observation Panel for Climate - TOPC

The chairperson of TOPC, Wolfgang Wagner, presented the main activities of TOPC. On the question about how to deal with adaptation, it was noted that the TOPC has only limited expertise on adaptation on its panel.

The SC approved the new ECV, “Evaporation”. It will include two products, latent and sensible heat flux. The TOPC panel was asked to provide specifications and requirements for evaporation. It will be published in the next IP, but will at the moment be included in the official list of ECVs and on the web. Details on this new ECV Evaporation can be found in Appendix 5.

The TOPC chairman stressed that a dedicated TOPC web site and discussion forum are under development. He also would like to see that the GCOS secretariat is to be strengthened and that the next panel meeting is more focused on technical work and not so much on programmatic priorities as this was the case in the previous meeting, due to the preparation for and delivery of the new IP.

Number	Action	Notes	Responsibility
SC-25/11	Approved new ECV, Evaporation.	TOPC to Prepare an appendix to SC report.	GCOS Sec TOPC
	Community to be informed on web page, where online version can be found. Record on SC report.		Simon Eggleston

10. Ocean Observations Panel for Climate – OOPC

The co-chairperson of OOPC, Bernadette Sloyan, informed the SC of the main activities of the panel. OOPC plays a dual role for GOOS and GCOS and there is a Task Team that currently works on clarifying how OOPC can best deliver to both GOOS and GCOS.

She also noted that there is significant overlap between the AOPC and the OOPC on the topic of heat fluxes, and between TOPC and OOPC with regard to coastal observations and river flow and river run-off. Regarding the management of the various data repositories, the OOPC co-chairperson replied that most of the data is received in a timely manner, and that the communication to the data providers is facilitated through the OCG, which is the Observations Coordination Group of the JCOMM.

11. Atmospheric Observation Panel for Climate – AOPC

The chairperson of AOPC, Ken Holmlund, informed the SC of the main activities of the panel.

The current situation of GRUAN was discussed. For historical reasons, one of the co-chairs of GCOS Reference Upper-Air Network (GRUAN) had to withdraw due to lack of funding. It was agreed that a system of having rotating chairs would be best.

12. Discussion

In the discussion that followed the presentations of the three science panels, some common issues were identified. There is a general problem with the gender and geographical balance of the panels, especially for AOPC and TOPC. It is proposed to contact the International Global Atmospheric Chemistry (IGAC) for suggestions of possible candidates, to talk to the head of institution about nominating women and to use the peer approach, where each panel member is asked to nominate three experts in the required expertise field with attention to gender and geographical balance. The SC decided that Ph. D. students and Postdoc could also be invited as experts at the panel meetings.

The panel chairpersons hoped to improve the interactions with panel members and to task them more specifically, in particular when it comes to better connect with the scientific community. The SC also suggested that a steward should be appointed for the individual ECVs which would facilitate reporting on the panels' work at its annual meetings.

It was decided to produce a fact sheet for each ECV. The fact sheet will be a single page including a definition, a description, a picture, the requirements with an explanatory text. Existing fact sheets for Essential Ocean Variables (EOVs) might serve as examples or templates for other variables.

The panels requested guidance from the SC regarding the approach for dealing with the Observation System Capabilities and Review tool (OSCAR) and the Rolling Review of Requirements (RRR), and the use the WIGOS metadata standards across the three different domains of the panels.

It was decided that the GCOS secretariat will be responsible for the interaction with WMO, and will get back to the panels to discuss possible issues arising from these questions. Regarding the WIGOS metadata, it was noted that much of the work for the ocean is done through JCOMM, while for the atmosphere using the WIGOS metadata standards is the obvious choice. However, in order to guarantee a consistent approach across the panels, each panel is invited to appoint a member and form a joint working group on metadata standards.

Finally, the SC is asked to outline an approach on how to deal with data provided by the private sector, for example for sunshine, radiation and lightning. As WIGOS is working to extend the reach of observations, and is now developing regulation on data partnerships, including with the private sector, the GCOS secretariat is urged to review this new material and to interact with WIGOS on these matter.

No decision was reached about the systematic collection of parallel measurements, which consist of overlap periods of measurements of the same ECVs either at the same or proximal locations over a period of time.

Number	Action	Notes	Responsibility
SC-25/12	Produce 54 fact sheets, one for each ECVs		GCOS Sec with new UNEP staff.

Number	Action	Notes	Responsibility
SC-25/13	<p>ECV Requirement Definitions: Panels to be able to explain why this number has been chosen. The panels have different approaches to the ECV requirements.</p> <p>Add this information to the on-line version of the table where a better definition is made available. Panel chairpersons to check if this description is clear.</p>		GCOS Sec with all Panels
SC-25/14	<p>On membership:</p> <p>Review criteria for calling in new members: Bending criteria in order to make the panel fit.</p> <p>Open up to PhD and post docs for subject matter experts.</p> <p>Identify the active technical experts.</p> <p>Encourage Panel members to nominate people (say 3 names); they should Contact IGAC for suggestions on gender and geographic diversity search out in the community. Turn to GCOS focal points and GOS coordinators.</p>	Make clear that the routine of program membership and cycling off a panel is part of it.	GCOS Sec with all Panels Chairpersons.
SC-25/15	<p>Working with OSCAR: Can the implementation of the three panel requirements in OSCAR be harmonised?</p> <p>GCOS panel representatives (from GCOS Secretariat) who can speak across the panel; provide guidance from OSCAR back to panels.</p>	GCOS Sec resolve all OSCAR issues they can. Check OSCAR requirements against IP. When needed refer back to panel chairs.	GCOS Sec to look for such a representative.
SC-25/16	<p>Joint TT on Metadata use of WIGOS.</p> <p>Invite a nominee of each of the panels to consider that.</p>		GCOS Sec with Panel Chairpersons
SC-25/17	<p>TT on investigating the ToRs of OOPC with regard to delivering the physics to GOOS, but the more complex, and all-encompassing climate observations to GCOS:</p>		GCOS secretariat with GOOS office, OOPC co-chairs

Part 2 Global Stocktake/ Climate Indicators/ Regional Workshops, GCOS Cooperation Mechanism – all these issues are encouraged by the UNFCCC COP Decision 19/CP.22

13. How can GCOS contribute to the Global Stocktake?

An extensive overview of the UNFCCC process was presented to the SC by Florin Vladu.

In this context, noting that UNFCCC is the beneficiary of GCOS, it is important to define where GCOS is able to make a contribution. This would also include plans to better engage in the adaptation scheme to support the countries in the implementation of the adaptation.

The logical sequence would be to unpack the UNFCCC process and look at each part to see where GCOS can contribute and what expertise is needed. The SC agreed to create a task force to do this. The Task Force will also develop a plan for adaptation and investigate how to support mitigation. It might lead to the formation of a future GCOS panel on adaptation. The Task Force is given three months to develop a short position paper and will report back to the panel meetings in March 2018.

After further discussion, a charge for the task team was agreed:

- Answer SC-25 point on support to Global Stocktake. Base the analysis on the text of the Paris agreement and on the presentation of Florin Vladu at that meeting;
- Identify where existing and future observations for climate can support the ambitions of the Paris Agreement and subsequent COP decisions in relation to global stocktake, but also consider adaptation, mitigation, loss and damage as well as means of implementation (and any other relevant areas);
- Identify within each of these areas the necessary actions for GCOS community together with identification of relevant timelines;
- Propose initial actions which would respond to highest priority and feasibility;
- Taking into account that many final deliverables will be through the medium of climate services, and identifying which basic observations are needed for these;
- Identify potential funding sources through, e.g. GCF and partnerships, including with Member States, in any proposal
- Report to GCOS Panels in March 2018 on progress and actions identified to date;
- Report to SC-26 in 2018 on the proposed way forward.

The following SC members agreed on taking part of the Task Force:

Sybil Seitzinger, Florin Vladu (as expert), Youba Sokona, Qinchen Chao, Stephen Briggs, Han Dolman, Michel Verstraete.

GCOS Director agreed to be the coordinator on the GCOS Secretariat side.

Other points discussed were:

- The need for synchronization between the GCOS planning cycle and global stocktake (2023). In 2021 there should be an update of the IP and then another in 10 years;
- Earth Information Day is an important opportunity to optimize engagement and connect information and requirements between the observations and modelling communities;

- Observing requirements need to be defined for monitoring anthropogenic emissions, in support of mitigation. While satellite technology seems promising, satellite observations currently do not provide the required accuracy, and only after 2023 it may be possible for satellite observations to achieve this.

It was decided that the GCOS Secretariat should make a statement to the Subsidiary Body on Scientific and Technological Advice (SBSTA) and to report back to the SBSTA chair with information on GCOS achievements and plans, including the instigation of this task force.

Number	Action	Notes	Responsibility
SC-25/18	Establish a Task Force on Observations for Adaptation: analyse the UNFCCC process Identify events to which we can contribute and at which can be called upon to explain GCOS input. Discussion on future climate indicators Possible output could be a special report as an input for – or an initial draft of – a formal climate indicator paper Members: Sybil Seitzinger, Florin Vladu (as expert), Youba Sokona, Qinchen Chao, Stephen Briggs, Han Dolman, Michel Verstraete, Rodney Martinez (who has been nominated in his absence as he is the chair of the CCI working group on societal benefits) Draft charge for this group	First status report by March 2018	SC Chairman / D/GCOS
SC-25/19	Draft GCOS Statement to SBSTA 47		D/GCOS Carolyn Richter

14. Climate Indicators

GCOS climate indicators should be seen as a tool to communicate climate change to the non-scientific public and should not be used for political decisions. For this purpose, the SC agreed on the following list of indicators:

- Surface Temperature
- Ocean Heat
- Atmospheric CO₂
- Sea Level
- Ocean Acidification

- Arctic and Antarctic Sea Ice Extent
- Glacier Change.

Extremes were not included in this list as they are more likely to be misinterpreted by the general public. GCOS will prepare a short document for its website explaining the indicators. At first, Copernicus data will contribute to all indicators except ocean acidification, for which GOOS will provide documentation.

Future indicators are meant to provide information helpful to policy makers enabling them to understand the impact of the actions taken in terms of UNFCCC. Defining future indicators is a complex endeavour which will be taken on by the new Task Force.

Number	Action	Notes	Responsibility
SC-25/20	List of indicators agreed by SC25:	GCOS Sec publish on web site; communicate to WMO State of the Climate to take into account in future statements.	GCOS Secretariat.
	1. Surface Temperature		Carolin to communicate to WMO; Valentin to work on the website and infograph
	2. Ocean Heat		
	3. Atmosphere CO2		
	4. Sea Level		
	5. Ocean Acidification		
	6. Arctic (6a) and Antarctic (6b) Sea Ice Extent	Showcase climate indicators: produce an infograph; publish on website	
7. Glacier Change			

15. Regional Workshops

GCOS has been requested by the UNFCCC and SBSTA to organize regional workshops, an activity which is already reflected in the IP. Valentin Aich from the GCOS Secretariat discussed the status of the planning process. The aim of regional workshops is to enable parties to the UNFCCC to enhance their climate observing capacity in ways that lead to cost effective improvements to their national adaptation plans. Helping countries understand which observations are needed for operational monitoring and if necessary update their adaptation plans, requires collaboration with the owners of the national adaptation plans of the country. GCOS will contact this community through UNFCCC and invite them to or if possible co-organize regional workshops with them. The upcoming COP can be used to establish contacts.

Regional workshops could also be used to strengthen GCOS national coordinators.

The upcoming Joint GCOS-WIGOS Workshop on Pacific SIDS, to be held in Nadi, Fiji, from 9 to 12 October 2017, was presented. This meeting will serve as a pilot for the following workshops. It is suggested that two workshops should be organized in Africa, one for the French speaking and one for English speaking countries.

The regional workshops could be GCOS and partner workshops, which would involve for example IPCC, GFCS, and the UN Development Program (UNDP).

The following points of contact and actions were proposed to increase visibility for the regional workshops:

- African Adaptation Initiative (launched at the COP 21 in Paris);
- African ministerial conference on environment (yearly conference, side event-technical meetings);
- GCF program: contacts with some of countries (Latin American for ex. on regional programs of GCF);

- Interact with the chair of the African Climate Change Centre;
- Inform and ask for advice the chair of LEG, the LDC (least developed countries) Expert Group;
- EUMETSAT Africa Users' forum, held annually, could host a GCOS side event;
- Present a paper on behalf of GCOS at the Asia Oceania Meteorological Satellite Users Conference;
- AfriGEOSS.

Number	Action	Notes	Responsibility
SC-25/21	<ul style="list-style-type: none"> • Build partnerships with relevant partners for regional workshops and synchronize with other workshops of partners like IPCC, GFCS, UNDP • Share experience from early Workshops • Strengthen the national coordinators • Contact the group of negotiators, chair is from Mali. • Committee African Climate Change. • UNDP is waiting for scientific support. • Establish at upcoming COP a contact. • Contact Chair of the African Climate Change Centre • Inform Chair of LEG and ask for advice • Contact EUMETSATs UFA • Contact Asia-Oceanic User Satellite Conference 		GCOS Secretariat Simon Eggleston

16. GCOS Cooperation Mechanism

The GCOS Network Manager, Tim Oakley, delivered a presentation on the GCOS Cooperation Mechanism, and on the attempt to solicit funds through Advancing National Adaptation through Climate information (ANACI), so far unsuccessful. Subsequently the question of whether the GCM is still fit for purpose, how to increase the funding and how to increase the remit of the GCM across the three domains were discussed by the SC.

It is recognized that the GCM is still a good process, however, due to lack of funding it is not working as intended.

To improve the financial situation, it was suggested that the African adaptation funds could be targeted, and that participation in larger projects (e.g. UNDP) with other partners should be pursued as well. Another important activity is to inform the Member States of the value of observations, including for non-traditional application, e.g. in the health sector. The task force is charged with looking for skills which will enable GCOS to submit the right project proposals to gain access to funds.

Number	Action	Notes	Responsibility
SC-25/22	Look for skills which enables GCOS to submit the right project proposals.		GCOS Secretariat Tim Oakley Task Force

17. Partnerships

17.1 WMO Technical Commission for Basic Systems (CBS)

The Vice-president of CBS, Ms Meiyao Jao, reported that CBS Decision 23 (CBS-16) asks WMO to support the new GCOS IP, recognizing the need for coordinated observations. Some 53 (out of a total of 201) actions in the IP are relevant to CBS and are taken into account in the Open Program Area Group of the Integrated Observing System (OPAG-IOS) work plans. CBS and GCOS have a seamless path of collaboration through the World Weather Watch (WWW), the OPAG-IOS, Global Data-processing and Forecasting System (GDPFS), reanalysis and possible impact on climate variables.

17.2 WMO Integrated Global Observing System - WIGOS

The concept of WMO Integrated Global Observing System (WIGOS) was explained to the SC by Sue Barrell in her capacity as co-chair of the inter-commission team for WIGOS. WIGOS is about integrating all observations and not only the ones of the National Meteorological and Hydrological Services NMHS. GCOS benefits from WIGOS, and the fact that the concept of reference networks is already part of the WIGOS manual constitutes a solid example of how the cooperation between GCOS and WIGOS is very useful for both parties. It is suggested that GCOS reports on the meeting of the SC and refers on the connection between GCOS and WIGOS in the upcoming WIGOS newsletter.

Number	Action	Notes	Responsibility
SC-25/23	WIGOS newsletter: GCOS article on the SC meeting		SC chairman and GCOS Secretariat

17.3 WMO Technical Commission for Climatology (CCI)

Main activities of CCI were presented by the President of CCI, Thomas Peterson. CCI is asked by the UNFCCC representative to prepare a yearly rolling 5-years average global temperature report, as these will allow policy makers to see the trends in a clearer way. The SC asks this request to be presented at the next meeting at WMO on the preparation of the climate statement. It is also suggested that having an UNFCCC representative at this meeting could be beneficial.

Number	Action	Notes	Responsibility
SC-25/24	CCI: 9-10 October 2017 @WMO, meeting on the statement of climate: ensure attendance Raise issue of having a UNFCCC representative at the meeting in future?		GCOS Secretariat

17.4 WCRP / WCRP Data Advisory Council

The role of WCRP and WDAC was presented by J.-N. Thépaut, in his capacity as vice-chair of the WCRP Data Advisory Council (WDAC).

GCOS oversees the observation networks for the WCRP. It is proposed to WCRP to send experts representative of their programs to the joint GCOS/WCRP science panel meetings. As of now, it has been announced that due to budget cuts, this would not be possible for the upcoming GCOS/WCRP panel meetings. However, this is important as it would allow for real collaboration between GCOS and WCRP. Any further recommendation will have to wait until results of the WCRP review are made public.

17.5 Copernicus Climate Change Service (C3S)

The main questions C3S is tasked to answer are how the climate is changing (domain of observations, GCOS), how will it change (projection, modelled, forecasted) and what is its impact (Climate Services).

GCOS is very important for C3S, as stated by J.-N. Thépaut, now in his capacity as Head, Copernicus Climate Change Service, as GCOS requirements are taken as a firm baseline. At the same time, by providing access to many of the GCOS ECVS, C3S is going to fulfil some of the actions of the IP.

17.6 Global Ocean Observing System - GOOS (A. Fischer)

Albert Fischer recapped on the structure of GOOS, which includes three panels, one for scientific purposes, shared with GCOS, one for observations coordination and one for project development. GOOS tries to deliver for climate, for real time services and for ocean health, understanding human impact on ocean life.

GCOS is asked to provide input to the GOOS strategy.

There is a need to discuss the interface between GCOS and GOOS and how to meet strategic priorities of both institutions. Suggestions include separating the functions of the panel, which will imply having a panel focusing on the climate task rather than the panel having a dual function.

There is also the request to engage with the Ocean Obs19 conference, Han Dolman will be the GCOS SC focal point.

Number	Action	Notes	Responsibility
SC-25/25	GOOS: GOOS Strategy: GCOS will asked to provide input to the GOOS strategy:		Michael Zemp, Sybil Seitzinger, Sue Barrell, Johnny Johanessen
SC-25/26	Ocean Obs19: Engage with committees		Han Dolman
SC-25/27	Interface GCOS and GOOS	GCOS SC engagement is needed	D/GCOS

17.7 Discussion

Work done by the space agencies in relation to GCOS was presented. This includes an ECV inventory, that covers 30-35 of the current ECV and will be published in October, and the response to the GCOS IP, that is currently being reviewed and is going to be submitted to SBSTA. As AOPC has decided to rely on the Joint CEOS-CGMS Working Group for Climate, WGClimate, for the satellite component of the IP actions, it is decided that the chairs of AOPC, TOPC and OOPC review the report before its presentation to the COP. Their comments will be delivered to the AOPC chair who will act as a coordinator and convey the message to the group working on the report.

In the future, it is suggested that the SC should report to the WGClimate: this will allow the SC to benefit from regular updates on the climate relevant activities of the satellite agencies.

It is also noted, that for land observations there is no link to data repository.

With regard to the discussion on where the data is held and which data repositories have a formal link to GCOS, it was recommended to strengthen the connection with ICSU's WDS (World data system). The panel chairs are asked to investigate their linkage to the major data repository and report back.

In addition to strengthening strategic partnerships, some members recommended to continue the discussion with the Global Terrestrial Network (GTNs) due to the failed Global Terrestrial Observing System structure and to pursue with the Group on Earth Observation (GEO) the next steps to implement a framework for terrestrial observations.

Number	Action	Notes	Responsibility
SC-25/28	Review space agencies' response to the GCOS IP	Deadline 13 October 2017	Chair AOPC to share the draft with OOPC and TOPC, deadline 13
SC-25/29	Address to WG Climate: nominate a rapporteur on space matters to the GCOS SC	Letter to be written by Carolin Richter	D/GCOS
SC-25/30	Land Obs System: what partnership should be covered on a strategic and what on working level?		SC Chair / DGCOS with SC members, by email

18. GCOS strategy

The GCOS Strategy can be built drawing from the IP, and from the MoU. It has to include a vision statement for the long term (2040) and the strategy that will realize this vision. The targeted audience includes currently sponsoring organization as well as new sponsors and NMHS.

Number	Action	Notes	Responsibility
SC-25/31	Prepare Strategy document	Aim for 6 pages: vision, system of systems, Target: for senior management. December 2017	DGCOS, Carolin Richter

19. Communication Strategy

The SC noted that the GCOS website is now improved. However, it is suggested to add to the website the description of GCOS link to the major stakeholders and to the sponsors.

It is also suggested to develop and adopt a tag line that highlights the significance of GCOS for climate science.

Number	Action	Notes	Responsibility
SC-25/32	Follow up on recommendation of communication strategy		GCOS Secretariat
SC-25/33	Web page: link into the major stakeholders and into the sponsors	Sponsors to provide a text on why they are sponsors.	GCOS Secretariat Valentin Aich
SC-25/34	Develop a Tag line	Organize a competition (Valentin Aich)	GCOS Secretariat

20. Budget

GCOS director explained that the budget of GCOS is composed by the WMO regular Budget and Voluntary Contributions.

As contribution from the US is dropping and possibly could stop, GCOS could face a budgetary problem in 2019.

The lack of funding emphasizes the need for developing a good strategy and an effective communication plan.

Sources for potential funds are identified and include the Member States, external funds and specific funds such the GCF. However, the problem on how to make a more strategic application to the GCF requires a new approach that could include explaining the importance of GCOS for downstream services. The Task Force is asked to consider how elucidating the activities would help find funds for the future.

Number	Action	Notes	Responsibility
SC-25/35	Continue fundraising: members, agencies, GCF		D/GCOS Carolin Richter

21. Decisions on next meeting: (Date and Place)

The Steering Committee and the staff of the GCOS Secretariat thanked very much the local organizing team led by for all the arrangements.

Next meeting will be hosted by FMI in Helsinki, Finland, from 22 to 26 October 2018.

22. General Steering Committee Membership and Related Issues – In Camera Session

During the in-camera session, only Steering Committee Members, the GCOS Panel Chairpersons in their capacity as ex-officio member, the sponsors representatives, and the GCOS Secretariat were allowed and remained in the room. The closed meeting discussed:

- **Steering Committee Membership**

23. Close of the Session

The 25th Session of the GCOS Steering Committee was closed at 17:20 hrs, on Thursday, 28th September 2017.

Appendix 1 Participant List

Members of the GCOS Steering Committee:	
<p>Prof. Stephen BRIGGS (Chairman) European Space Agency (ESA)/ECSAT United Kingdom E-mail: Stephen.Briggs@esa.int</p>	<p>Prof. Qingchen CHAO (Host) Deputy Director General National Climate Center China Meteorological Administration China E-mail: chaoqc@cma.gov.cn</p>
<p>Prof. Albertus Johannes DOLMAN Department of Earth Sciences VU University Amsterdam The Netherlands E-mail: han.dolman@vu.nl</p>	<p>Dr Sybil SEITZINGER Director, Pacific Institute for Climate Solutions University of Victoria Canada E-mail: picsdir@uvic.ca</p>
<p>Dr Youba SOKONA Special Advisor on Sustainable Development South Centre Geneva Email: Ysokona@gmail.com</p>	<p>Mr Kazuto SUDA Director, Atmospheric Environment Division Global Environment and Marine Department Japan Meteorological Agency Japan E-mail: suda@met.kishou.go.jp</p>
<p>Prof. Michel VERSTRAETE The University of the Witwatersrand South Africa E-mail: MMVerstraete@gmail.com</p>	<p>Unable to attend with regrets: Rodney Martinez</p>
New Candidate Members for 2017	
<p>Dr Sue BARRELL Bureau of Meteorology Australia E-mail: sue.barrell@bom.gov.au</p>	<p>Dr Michael ZEMP World Glacier Monitoring Service (WGMS)/Department of Geography University of Zurich Switzerland E-mail: michael.zemp@geo.uzh.ch</p>
<p>Dr Amos KABO-BAH Department of Energy and Environmental Engineering, UENR Ghana E-mail: kabobah@yahoo.com amos.kabobah@uenr.edu.gh</p>	

Ex-officio Members	
<p>Dr Kenneth HOLMLUND (Chair, AOPC) Head, Remote Sensing and Products Division EUMETSAT Germany E-mail: Kenneth.holmlund@eumetsat.int</p>	<p>Prof. Wolfgang WAGNER (Chair, TOPC) Vienna University of Technology Centre for Water Resource Systems Austria E-mail: wolfgang.wagner@geo.tuwien.ac.at</p>
<p>Dr Bernadette SLOYAN (Co-Chair, OOPC) Research Scientist CSIRO Oceans and Atmosphere Flagship Australia E-mail: bernadette.sloyan@csiro.au</p>	
Invited Experts	
<p>WMO Commission for Basic Systems (CBS) Prof. Meiyao JIAO Vice-President, WMO Commission for Basic Systems China Meteorological Administration (CMA) China E-mail: jiaomy@cma.gov.cn</p>	<p>UNFCCC Mr Florin VLADU Adaptation Programme Climate Change Secretariat, UNFCCC Germany E-mail: FVladu@unfccc.int</p>
<p>WMO Commission for Climatology (CCI) Dr Thomas C. PETERSON President of CCI USA E-mail: thomas.carl.peterson@gmail.com</p>	<p>WCRP Dr Jean-Noël THÉPAUT Head, Copernicus Climate Change Service ECMWF United Kingdom E-mail: jean-noel.thepaut@ecmwf.int</p>
Sponsors	
<p>ICSU Prof. Jinghai LI International Council for Science (ICSU) Vice-President China E-mail: jhli@cashq.ac.cn</p>	<p>UNEP Dr Jian LIU UN Environment (UNEP) Kenya E-mail: Jian.Liu@unep.org</p>
<p>IOC/UNESCO (also representing GOOS) Dr Albert FISCHER Director, GOOS Project Office, Ocean Observations and Services Section Intergovernmental Oceanographic Commission of UNESCO France E-mail: a.fischer@unesco.org</p>	

GCOS Secretariat Staff	
Dr Carolin RICHTER Director GCOS Secretariat	Tel.: +41 22 730 8275 Fax: +41 22 730 8052 E-mail: CRichter@wmo.int
Dr Caterina TASSONE Scientific Officer-AOPC GCOS Secretariat	Tel.: +41 22 730 8218 Fax: +41 22 730 8052 E-mail: CTassone@wmo.int
Dr Valentin AICH Junior Professional Officer GCOS Secretariat	Tel.: +41 22 730 8494 Fax: +41 22 730 8052 E-mail: VAich@wmo.int
Mr Tim OAKLEY Network Manager GCOS Secretariat Seconded Expert from UK Met Office	Tel.: +41 22 730 8999 Fax: +41 22 730 8052 E-mail: TOakley@wmo.int
Domestic Participants for GCOS Science Day	
Prof. Renhe ZHANG Academician of CAS Fudan University E-mail: rhzhang@fudan.edu.cn	Mr Dongfa WANG Deputy Director General Zhejiang Meteorological Bureau, CMA
Prof. Panmao ZHAI Co-Chair of IPCC WGI Deputy Director General of CAMS/CMA E-mail: pmzhai@cma.gov.cn	Prof. Peng ZHANG Deputy Director General National Satellite Meteorological Centre CMA E-mail: zhangp@cma.gov.cn
Ms Chong PEI Department of Integrated Observation CMA E-mail: pcaoc@cma.gov.cn	Mr Jun YU Department of Int'l Cooperation CMA E-mail: yj@cma.gov.cn
Mr Yan ZHUANG Department of Int'l Cooperation, CAS Email: zhuangyan@cashq.ac.cn	Mr Xiaochun ZHANG Meteorological Observation Centre of CMA E-mail: xczhang@cma.gov.cn
Dr Yong ZHANG Meteorological Observation Centre of CMA E-mail: y Zhang@cma.gov.cn	Prof. Zijiang ZHOU National Meteorological Information Centre/CMA E-mail: zzj@cma.gov.cn
Mr Lipeng JIANG National Meteorological Information Centre/CMA E-mail: jianglp@cma.gov.cn	Prof. Weidong YU National Marine Environmental Forecasting Center/MWR E-mail: wduyu@fio.org.cn

<p>Prof. Cunde XIAO Beijing Normal University E-mail: cdxiao@bnu.edu.cn</p>	<p>Prof. Tianjun ZHOU Institute of Atmospheric Sciences/CAS E-mail: zhoutj@lasg.iap.ac.cn</p>
<p>Dr Xi CHEN Institute of Atmospheric Sciences/CAS E-mail: chenxilageo@mail.iap.ac.cn</p>	<p>Prof. Shaoqiang WANG Institute of Geographic Sciences and Natural Resources Research/CAS E-mail: sqwang@igsrr.ac.cn</p>
<p>Prof. Xuebing GUO Institute of Geographic Sciences and Natural Resources Research/CAS E-mail: guoxb@igsrr.ac.cn</p>	<p>Mr Zhaohui QIAN Institute of Geographic Sciences and Natural Resources Research/CAS E-mail: qianzh.15s@igsrr.ac.cn</p>
<p>Prof. Li ZHANG Institute of Remote Sensing and Digital Earth/CAS E-mail: zhangli@radi.ac.cn</p>	<p>Dr Yubao QIU Institute of Remote Sensing and Digital Earth/CAS E-mail: qiuyb@radi.ac.cn</p>
<p>Prof. Yinlong XU Chinese Academy of Agricultural Sciences E-mail: xuyinlong@caas.cn</p>	<p>Mr Wenrong WU Observation and Network Division Zhejiang Meteorological Bureau, CMA E-mail: 1185172915@www.com</p>
<p>Dr Yiping YAO Zhejiang Climate Center, Zhejiang Meteorological Bureau, CMA E-mail: yyp96121@163.com</p>	<p>Dr Gaofeng FAN Zhejiang Climate Center, Zhejiang Meteorological Bureau, CMA E-mail: fangaofengcn@163.com</p>
<p>Dr Zhengquan LI Zhejiang Climate Center, Zhejiang Meteorological Bureau, CMA E-mail: 1zq110119@163.com</p>	<p>Dr Hao MA Zhejiang Climate Center, Zhejiang Meteorological Bureau, CMA E-mail: mahao20032003@yahoo.com.cn</p>
<p>Dr Chaohui SONG Zhejiang Climate Center, Zhejiang Meteorological Bureau, CMA E-mail: zjcc4021@126.com</p>	<p>Dr Yuwen NIU Zhejiang Institute of Meteorology, Zhejiang Meteorological Bureau, CMA E-mail: niuyw2003@163.com</p>
<p>Ms Yina HU General Office Zhejiang Meteorological Bureau, CMA E-mail: 13706718242@126.com</p>	<p>Ms Xiaoling WANG Editorial Office of Advances in Climate Change Research National Climate Center/CMA E-mail: xlwang@cma.gov.cn</p>
<p>Dr Pengling WANG National Climate Center/CMA E-mail: wangpl@cma.gov.cn</p>	<p>Mr Yuan SUN National Climate Center/CMA E-mail: sunyuan@cma.gov.cn</p>

Appendix 2 Agenda

Day 1 of the Steering Committee - Tuesday 26 September 2017		
	Agenda Item	Documents and Annotations
09:00	Management and Work of Panels	
	1. Opening of the Session	
	Welcome by the Chair	Stephen Briggs
	Welcome of the host	Qingchen Chao
	Tour de Table	Doc 1.1 List of Participants
	Approval of the Agenda	Doc 1.0 Draft Agenda
	Arrangements for the Session	
	2. Chairman's Introduction and View	Stephen Briggs
	3. Director's report	<p>Carolin Richter will report on major activities since the last SC meeting.</p> <p>Doc 3.1 Director's Report</p> <p>Doc 3.2 GCOS Implementation Plan (GCOS-200)</p> <p>Doc 3.3 Report of the 24th session of the GCOS Steering Committee, 2016</p>
	4. Process in revisiting the GCOS MoU and the engagement of the sponsoring organizations	<p>Carolin Richter will report on discussions with sponsoring organizations in revisiting the GCOS MoU and in light of future changes to the WMO organizational structure.</p> <p>Doc 4.1 GCOS MOU signed 1998 (current valid version)</p> <p>Doc 4.2 GCOS MoU 2015 (version which is based on the recommendations from the review board)</p> <p>Doc 4.3 GCOS MoU revisited by WMO new management in 2017</p>
	5. World Climate Research Programme (WCRP) Review – Information on process	Prof Jinghai Li (ICSU Vice-President) will report briefly on the process behind the WCRP review
Break		

	6. Sponsors Views on their expectations with regard to the future of GCOS programme	Albert Fischer for IOC Jian Liu for UNEP (with a special focus on PROVIA) Jinghai Li for ICSU (with an update on the merger of ICSU and ISSC)
	<p>7. Discussion:</p> <p>Taking into account the various report as well as the views from the representatives of the sponsoring organizations, the SC will discuss general future activities and engagements.</p> <p>What will be the role of the different bodies?: Steering Committee, Chairperson, Director, sponsors, Engagement Committee.</p> <p>What should be the function of the Steering Committee? What are we supposed to do?</p>	
12:30 – 14:00	Lunch Time Break	
After Lunch	Discussion to be continued	
15:00	After publication of the 2016 GCOS Implementation Plan, what now?:	GCOS Science Day, Reports from Panel meetings and major outcomes.
	8. Feedback from the GCOS Science Day	SC members will give feedback and discuss possible future events. Doc 8. Agenda for Science Day
20'	9. Terrestrial Observation Panel for Climate (TOPC)	Wolfgang Wagner Doc 9. TOPC Report (TOPC-19) Doc 9.1 New ECV: Evaporation from Land
20'	10. Ocean Observations Panel for Climate (OOPC)	Bernadette Sloyan Doc 10. 1 OOPC Report (OOPC-20) Doc 10.2 OOPC input to 6 th GOOS Steering Committee, Singapore, 11-13 September 2017
Break		
20'	11. Atmospheric Observation Panel for Climate - AOPC	Kenneth Holmlund Doc 11. AOPC Report (AOPC-22)
	12. Discussion	Doc 12.1 ToRs for all Panels Doc 12.2 List of Panel Members
Adjourn 17:30	Tai –Chi Class	

Day 2 of the Steering Committee - Wednesday 27 September 2017		
	Agenda Item	Documents and Annotations
09:00	Global Stocktake / Climate Indicators / Regional Workshops / GCOS Cooperation Mechanism – all these issues are encouraged by the UNFCCC COP Decision 19/CP.22	
	13. How GCOS can contribute to the Global Stocktake?	<p>Florin Vladu will inform about UNFCCC COP 23, SBSTA, Bonn (Germany), presided by Fiji.</p> <p>Doc 13.1 Statement to SBSTA 45, COP 22, (November 2016)</p> <p>Doc 13.2 Decision 19/CP.22</p> <p>Doc 13.3 Link to Earth Info Day at COP 22, presented talk and posters</p> <p>Doc 13.3 add Summary Report of the Earth Info Day</p> <p>Doc 13.4. Statement to SBSTA 46, reseach dialogue (May 2017)</p> <p>Doc 13.5 Draft Statement to SBSTA 47, COP 23 (6-11 November 2017) – to be decided</p> <p>Doc 13.6 List of planned side events during COP 23 with GCOS engagement.</p>
	<p>Discussion:</p> <p>What else can be done from our side to support the Paris Agreement and Global Stocktake?</p>	
Break		
	14. Climate indicators	<p>Stephen Briggs will introduce the topic on lagging and leading indicators</p> <p>Encouraged by COP decision 19/CP.22 and by WMO, we will discuss the work on climate indicators.</p> <p>Doc 14.1 Report on Workshops about Climate Indicators (GCOS-206)</p> <p>Doc 14.2 WMO Bulletin Article (currently in draft)</p> <p>Doc 14.3 Science Article (October 2016)</p> <p>Doc 14.4 Internal paper including panel discussions</p> <p>Doc 14.5 Draft outline for a publication (July 2017)</p>
12:30 – 14:00	Lunch Time Break	
	<p>Discussion on Climate indicators – continued</p> <p>What is the process behind a consolidated list of climate indicators?</p>	
	<p>15. Regional Workshops</p> <p>Information about the joint GCOS/ WMO Integrated Global Observing System (WIGOS) workshop on Fiji</p>	<p>Encouraged by COP decision 19/CP.22:</p> <p>Valentin Aich will report on the current planning of holding regional workshops.</p> <p>WMO encouraged to focus on ECVs related to “fresh Water” and to plan for related activities in regions.</p> <p>Doc. 15.1 Workshop Agenda and Participants</p>

		Doc 15.2 Working Paper on Regional Workshops
	Discussion and decision: We will need to decide on time line; where should be go with the workshops, what do we want to achieve? What is needed the budget ?	
Break		
	16. GCOS Cooperation Mechanism	Encouraged by COP decision 19/CP.22: Tim Oakley reports on his work which focused on Africa in the past years, and about the next possibilities to strengthen the cooperation mechanism. Doc. 16 List of candidate projects
	Discussion and decision: We will need to discuss how to strengthen the trust fund.	
Adjourn	Tai –Chi Class	
Day 3 of the Steering Committee - Thursday 28 September 2017		
	Agenda Item	Documents and Annotations
09:00	Building Partnerships, Drafting a strategy, Planning the budget	
	17. How can GCOS strengthen its partnerships with (and vice versa):	Contributions (oral or ppt, maximum of 15' min each) from:
	WMO Technical Commission for Basic System (CBS)	Vice-President of CBS (Meiyan Jiao)
	WMO Integrated Global Observing System - WIGOS	Co-Chair WIGOS (Sue Barrell)
	WMO Technical Commission for Climatology (CCI)	President of CCI (Tom Peterson) 17.3 Background info on WMO Commission for Climatology Structure
	Programme of Research on Climate Change Vulnerability, Impacts and Adaptation – PROVIA	Jian Liu
Break		
	WCRP / WCRP Data Advisory Council	Jean-Noel Thépaut
	Copernicus Climate Change Service (C3S)	Jean-Noel Thépaut
	Global Ocean Observing System - GOOS	Albert Fischer
	Discussion: Have we addressed all partners ?	
12:30 – 14:00	Lunch Time Break	
	18. GCOS Strategy	Carolin Richter will inform about where we are in the process of drafting a new strategic plan, based

		on the decision at GCOS SC-25 to develop a new strategy.
	19. Communication Strategy	Valentin Aich will introduce the process which was behind the communication strategy: Doc. 19 Draft Communication Strategy 25 th anniversary products, New web site Use of social media (twitter), Info Graphics for: World Met Day, World Ocean day, GRUAN
	Discussion on strategy: Objectives and relation to wider communities, for example insurance. Take into account WMO objectives. Decide on process.	
	20. Budget	Carolin Richter is presenting the draft budget document "Summary for 2017 and Outlook 2018/2019". Doc 20. Draft Budget 2018/2019
Break		
	21. Summary of actions and decisions	GCOS secretariat staff Doc 21. List of Actions from last Steering Committee
	22. Decision on next meeting Date and Place	
	Close of formal meeting. Tai –Chi Class	
In-Camera	Only for SC-Members, Panel chairpersons, representatives of IOC, UNEP and ICSU. Extension of SC members; new candidate members; Chairmanships	
Close		

Appendix 3 Consolidated List of Actions

Number	Action	Notes	Responsibility
SC-25/1	Engage in a larger and broader value chain: IPCC WG I IOC regional levels IPCC WG II on regions		D/GCOS Carolyn Richter
SC-25/2	Be more active in the IPCC review process: GCOS review on IPCC special reports (on panel level, by individuals. Panel members to sign in actively in the review process and capture gaps and misquotations. GCOS to submit as a group relevant information, someone will need to collect these comments.	Discussion in the panel meeting in March	GCOS Sec with Panel Chairpersons. Valentin Aich to keep track on deadlines for reviews.
SC-25/3	Specific from IOC: GCOS to help designing the UN Decade of ocean Science for sustainable development 2021- 2030		IOC GOOS Director with D/GCOS – Carolyn Richter
SC-25/4	Follow-up on the UNEP offer of a staff to work with GCOS		D/GCOS – Carolyn Richter
SC-25/5	Green Climate Fund – follow up. GCOS should submit on behalf of all four sponsors, which might be a big strength.	Valentin Aich to contact WMO focal point for GCF	D/GCOS in cooperation with sponsors.
SC-25/6	WIGOS: develop guidance material for countries for national observation, have GCOS looking at it. GCOS as a key partner.		GCOS Sec with WIGOS PO Caterina Tassone
SC-25/7	UNFCCC adaptation fund: Check on possibility whether every year the GCOS state should be reviewed during the UNFCCC conference.	Assess if feasible	GCOS Sec with UNFCCC Sec Carolyn Richter, Simon Eggleston

Number	Action	Notes	Responsibility
SC-25/8	<p>Recommendation to build upon bilateral cooperation.</p> <p>GCOS to develop Guidance according to the GCOS guidelines.</p>	<p>Within the drafting and development of Regional Workshop plans ?</p> <p>Grouping partner that are alike and foster cooperation</p>	D/GCOS Carolin Richter
SC-25/9	<p>Consider what are the high key impacts products of GCOS and how it could deliver. How to impress policy makers? What are the core services that this program can provide?</p> <p>Have case studies, and have it run through all levels.</p>	<p>GCOS Sec to draft a list, draft a case study and run it through the SC</p> <p>(base reference from COP 22)</p>	GCOS Sec
SC-25/10	<p>Continue to motivate host for SC to organize a national GCOS Science Day.</p> <p>Record how China benefitted from GCOS and how GCOS helped on a political level.</p>		D/GCOS – Carolin Richter
SC-25/11	<p>Approved new ECV, Evaporation.</p> <p>Community to be informed on web page, where online version can be found. Record on SC report.</p>	<p>TOPC to Prepare an appendix to SC report.</p>	GCOS Sec TOPC Simon Eggleston
SC-25/12	<p>Produce 54 fact sheets, one for each ECVs</p>		GCOS Sec with new UNEP staff.
SC-25/13	<p>ECV Requirement Definitions: Panels to be able to explain why this number has been chosen. The panels have different approaches to the ECV requirements.</p> <p>Add this information to the on-line version of the table where a better definition is been made. Panel chairpersons to check if this description is clear.</p>		GCOS Sec with all Panels

Number	Action	Notes	Responsibility
SC-25/14	<p>On membership:</p> <p>Review criteria for calling in new members: Bending criteria in order to make the panel fit.</p> <p>Open up to PhD and post docs for subject matter experts.</p> <p>Identify the active technical experts.</p> <p>Encourage Panel members to nominate people (say 3 names); they should Contact IGAC for suggestions on gender and geographic diversity search out in the community. Turn to GCOS focal points and GOS coordinators.</p>	<p>Make clear that the routine of program membership and cycling off a panel is part of it.</p>	<p>GCOS Sec with all Panels Chairpersons.</p>
SC-25/15	<p>Working with OSCAR: Can the implementation of the three panel requirements in OSCAR be harmonised?</p> <p>GCOS panel representatives (from GCOS Secretariat) who can speak across the panel; provide guidance from OSCAR back to panels.</p>	<p>GCOS Sec resolve all OSCAR issues they can. Check OSCAR requirements against IP. When needed refer back to panel chairs.</p>	<p>GCOS Sec to look for such a repr.</p>
SC-25/16	<p>Joint TT on Metadata use of WIGOS. Invite a nominee of each of the panels to consider that.</p>		<p>GCOS Sec with Panel Chairpersons</p>
SC-25/17	<p>TT on investigating the ToRs of OOPC with regard to delivering the physics to GOOS, but the more complex, and all-encompassing climate observations to GCOS:</p>		<p>GCOS secretariat with GOOS office, OOPC co-chairs</p>

Number	Action	Notes	Responsibility
SC-25/18	<p>Establish a Task Force on Observations for Adaptation:</p> <p>analyse the UNFCCC process</p> <p>Identify events to which we can contribute and at which can be called upon to explain GCOS input.</p> <p>Discussion on future climate indicators</p> <p>Possibly output could be a special report as an input – or on the climate indicators</p> <p>Members: Sybil Seitzinger , Florin Vladu (as expert), Youba Sokona, Qinchen Chao, Stephen Briggs, Han Dolman, Michel Verstraete, Rodney Martinez (who has bene volunteerd in his absence as he is the chair of the CCI working group on societal benefits)</p> <p>Draft charge for this group</p>	<p>First status report by March 2018</p>	<p>SC Chairman / D/GCOS</p>
SC-25/19	<p>Draft GCOS Statement to SBSTA 47</p>		<p>D/GCOS</p> <p>Carolin Richter</p>
SC-25/20	<p>List of indicators agreed by SC25:</p> <ol style="list-style-type: none"> 1. Surface Temperature 2. Ocean Heat 3. Atmosphere CO2 4. Sea Level 5. Ocean Acidification 6. Arctic (6a) and Antarctic (6b) Sea Ice Extent 7. Glacier Change 	<p>GCOS Sec publish on web site; communicate to WMO State of the Climate to take into account in future statements.</p> <p>Showcase climate indicators: produce an infograph; publish on website</p>	<p>GCOS Secretariat.</p> <p>Carolin to communicate to WMO; Valentin to work on the website and infograph</p>

Number	Action	Notes	Responsibility
SC-25/21	<ul style="list-style-type: none"> • Build partnerships with relevant partners for regional workshops and synchronize with other workshops of partners like IPCC, GFCS, UNDP • Share experience from early Workshops • Strengthen the national coordinators • Contact the group of negotiators, chair is from Mali. • Committee African Climate Change. • UNDP is waiting for scientific support. • Establish at upcoming COP a contact. • Contact Chair of the African Climate Change centre • Inform Chair of LEG and ask for advice • Contact EUMETSATs UFA • Contact Asia-Oceanic User Satellite Conference 		GCOS Secretariat Simon Eggleston
SC-25/22	Look for skills which enables GCOS to submit the right project proposals.		GCOS Secretariat Tim Oakley Task Force
SC-25/23	WIGOS newsletter: GCOS article on the SC meeting		SC chairman and GCOS Secretariat
SC-25/24	CCI: 9-10 October 2017 @WMO, meeting on the statement of climate: ensure attendance Raise issue of having a UNFCCC representative at the meeting in future?		GCOS Secretariat
SC-25/25	GOOS: GOOS Strategy: GCOS will asked to provide input to the GOOS strategy:		Michael Zemp, Sybil Seitzinger, Sue Barrell, Johnny Johanessen
SC-25/26	Ocean Obs19: Engage with committees		Han Dolman

Number	Action	Notes	Responsibility
SC-25/27	Interface GCOS and GOOS	GCOS SC engagement is needed	D/GCOS
SC-25/28	Review space agencies response to the GCOS IP	Deadline 13 October 2017	Chair AOPC to share the draft with OOPC and TOPC, deadline 13
SC-25/29	Address to WG Climate: nominate a rapporteur on space matters to the GCOS SC	Letter to be written by Carolin Richter	D/GCOS
SC-25/30	Land Obs System: what partnership should be covered on a strategic and what on working level?		SC Chair / DGCOS with SC members, by email
SC-25/31	Prepare Strategy document	Aim for 6 pages: vision, system of systems, Target: for senior management. December 2017	DGCOS, Carolin Richter
SC-25/32	Follow up on recommendation of communication strategy		GCOS Secretariat
SC-25/33	Web page: link into the major stakeholders and into the sponsors	Sponsors to provide a text on why they are sponsors.	GCOS Secretariat Valentin Aich
SC-25/34	Develop a Tag line	Organize a competition (Valentin Aich)	GCOS Secretariat
SC-25/35	Continue fundraising: members, agencies, GCF		D/GCOS Carolin Richter

Appendix 4 List of Acronyms and Abbreviations

Advancing National Adaptation through Climate information	ANACI
Atmospheric Observation Panel for Climate	AOPC
Chinese Meteorological Administration	CMA
Climate Data Records	CDR
Committee on Earth Observation Satellites	CEOS
Commission for Basic Systems	CBS
Commission for Climatology	CCI
Conference of Parties	COP
Copernicus Climate Change Service	C3S
Coordination Group for Meteorological Satellites	CGMS
Essential Climate Variable	ECV
Essential Ocean Variable	EOV
European Union	EU
European Space Agency	ESA
Sixth Assessment Report	AR6
GCOS Cooperation Fund	GCF
GCOS Cooperation Mechanism	GCM
GCOS Reference Upper-Air Network	GRUAN
GCOS Steering Committee	SC
Global Climate Observing System	GCOS
Global Data-processing and Forecasting System (GDPFS)	GDPFS
Global Framework for Climate Services	GFCS
Global Observing System	GOS
Global Ocean Observing System	GOOS
Global Terrestrial Network	GTN
Green Climate Fund	GCF
Group on Earth Observations	GEO
Implementation Plan	IP
Intergovernmental Panel on Climate Change	IPCC
Intergovernmental Oceanographic Commission	IOC

Integrated Observing System	IOS
International Council for Science	ICSU
International Global Atmospheric Chemistry	IGAC
Joint Commission on Oceanography and Marine Meteorology	JCOMM
Least Developed Countries	LDCs
LDC Expert Group	LEG
Memorandum of Understanding	MOU
National Meteorological and Hydrological Services	NMHS
Observations Coordination Group	OCG
Observation System Capabilities and Review tool	OSCAR
Ocean Observations Panel for Climate	OOPC
Open Program Area Group	OPAG Programme of
Research on Climate Change Vulnerability, Impacts and Adaptation	PROVIA
Rolling Review of Requirements	RRR
Small Island Developing States	SIDS
Subsidiary Body on Scientific and Technological Advice	SBSTA
Sustainable Development Goals	SDG
Terrestrial Observation Panel for Climate	TOPC
United Nations	UN
UN Development Program	UNDP
United Nations Educational, Scientific and Cultural Organization	UNESCO
United Nations Environment Programme	UNEP
United Nations Framework Convention on Climate Change	UNFCCC
UFA	User Forum Africa
Working Group	WG
World Climate Programme	WCP
World Climate Research Programme	WCRP
World Data System	WDS
World Weather Watch	WWW
WCRP Data Advisory Council	WDAC
World Meteorological Organization	WMO
WMO Integrated Observing System	WIGOS

Appendix 5 New ECV: Evaporation from Land

Background

1. The issue of a terrestrial ECV for evaporation from land has been considered by GCOS for some time. Discussions in TOPC were reported to the 23rd session of the GCOS Steering Committee which concluded that, *energy fluxes may be essential but cannot be well measured over land thus no new ECVs were proposed for energy. However, this is an important issue and should be discussed in the new GCOS Implementation Plan.*
2. *The GCOS Implementation Plan (GCOS-200) highlighted the need for an ECV covering terrestrial heat fluxes (analogous to the ocean heat flux ECV). However, new published papers indicated that this may now be the practical on a global basis and so the implementation plan directed TOPC to examine the practicality of such an ECV.*
3. *TOPC established a task group comprised of Han Dolman, Diego Miralles, Carlos Jimenez & Matthew McCabe who presented a paper Proposal for evaporation/latent heat flux as ECV at TOPC 19.*
4. *TOPC reconsidered this at its 19th session and concluded, in light of recent literature, that that evaporation can be measured with acceptable uncertainty and it was now the appropriate time to designate a new ECV Evaporation from Land and to submit this to the GCOS Steering Committee for their final approval.*
5. TOPC noted *that* accurate knowledge of evaporation is important for closing the water, energy and carbon cycles. It is used to, inter alia:
 - a. diagnose the influence of the land surface on air temperature
 - b. constrain estimates of convection and cloud formation in the troposphere
 - c. understand the relevance of water vapour, lapse rate and cloud feedbacks
 - d. unravel the two-way interaction between vegetation and climate
 - e. monitor drought and heatwave occurrence and their impacts
 - f. benchmark climate model representation of these processes
6. TOPC noted that, while there are analogous ECV products for the oceans, the land is more heterogeneous than the oceans. Table 1 describes the requirements of ocean surface heat flux from the GCOS implementation Plan (GCOS-200).
7. The 25th session of the Steering Committee reviewed the report from TOPC and agreed that *Evaporation from Land* should be a new ECV as defined below.

Table 1 Oceanic Latent and Sensible Heat fluxes from the GCOS implementation plan (GCSOS-200)

ECV	Products	Frequency	Resolution	Required measurement uncertainty	Stability (per decade)
Ocean surface heat flux	Latent heat flux	Hourly to monthly	1–25 km	10–15 Wm ²	1–2 Wm ²
	Sensible heat flux				
	Radiative heat flux				

Evaporation from land

8. *Evaporation from land* should consist of two products, *Latent heat flux* and *Sensible heat flux*.
9. The requirements for *Evaporation from Land* are given in Table 2, in the same format as annex A of the GCOS implementation Plan (GCOS-200).

Table 2 ECV Product requirements for proposed new ECV: Evaporation from land

ECV	Products	Frequency	Resolution	Required measurement uncertainty	Stability (per decade)
Evaporation from land	Latent heat flux	sub-daily, latency of less than 1 month	threshold 25km goal 1km	<10%	Better than 1%
	Sensible heat flux				

GCOS Secretariat
Global Climate Observing System
c/o World Meteorological Organization
7 bis, Avenue de la Paix
P.O. Box No. 2300
CH-1211 Geneva 2, Switzerland
Tel: +41 22 730 8275/8067
Fax: +41 22 730 8052
Email: gcos@wmo.int