

On-going activities (3.2.a.b.c)

Progress on the GCOS Status Report
GCOS Climate Observations Conference
Panels' Reports



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GCOS Status Report: OUTLINE

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- 1. OBSERVATIONS OF AND FOR ADAPTATION
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- ASSESSMENT OF PROGRESS ON GENERAL IP ACTIONS
- ASSESSMENT OF PROGRESS ON ATMOSPHERIC IP ACTIONS
- ASSESSMENT OF PROGRESS ON OCEAN IP ACTIONS
- ASSESSMENT OF PROGRESS ON TERRESTRIAL IP ACTION

GCOS Status Report: Status of ECV

ECV	Adequacy of the Observational System Assessment	Availability and Stewardship Assessment
Wind speed and direction (surface)	3 Coverage of in situ measurements of near surface wind speed and direction over land and ocean is excellent in some regions, but sparse or non-existent over large areas of some continents, over most ice-covered regions and for oceans with few shipping routes. Satellites have provided measurements of wind speed over ocean since the late 1980s, and wind vectors since the early 1990s.	4 Several NMHS and other organizations maintain datasets of sub-daily observations and daily and monthly averages. Work by NOAA NCEI and C3S is improving sub-daily global holdings. The most complete archive for in situ wind speed and direction is ICOADS at NOAA NCEI.
Temperature (surface)	4 Coverage of in situ measurements of air temperature over land and ocean is excellent in some regions, but sparse or non-existent over large areas of some continents, over most ice-covered regions and for oceans with few shipping routes.	4 For surface air temperature several NMHS and other organizations maintain datasets of sub-daily observations and daily and monthly averages. Work by NOAA NCEI and C3S is improving sub-daily global holdings. For in situ MAT the most complete archive is ICOADS at NOAA NCEI.
Pressure (surface)	4 Coverage of in situ measurements is generally excellent, but sparser or non-existent in remote regions and oceans with few shipping routes.	5 A specific dataset of sub-daily STP and SLP for sparse-input Reanalyses has been developed by the International Surface Pressure Databank (ISPD) for land regions and includes data from ICOADS for marine areas. This is being integrated into the holistic holdings being prepared by NOAA NCEI and C3S.
Groundwater	3 There is no global coverage. Networks usually depend on national authorities, so they are concentrated in countries with more resources.	3 Data are collected in many places, but they are not publicly available.

Groundwater	
ECV Products covered by this sheet	Groundwater storage change, groundwater level
Adequacy of the Observational System Assessment	(3) There is no global coverage. Groundwater level monitoring networks usually depend on national authorities, so they are concentrated in countries with more resources.
Availability and Stewardship Assessment	(3) Data are collected in many places, but they are not publicly available.
Networks	GGMN (Global Groundwater Monitoring Network) from IGRAC is the only open global repository of groundwater level data, containing data provided by national authorities. Other networks are the national networks established by each country.
Satellites	
Models, Reanalysis etc.	

Groundwater monitoring, i.e. measuring groundwater levels on a regular basis, is until now the best way to assess the status and trends of groundwater, a resource that can be impacted by overexploitation, drought, climate change, changes in irrigation patterns, and more. Countries interested in managing their groundwater resources in a better way have already established a groundwater monitoring network. From a country perspective, this is enough.....

Regarding “Adequacy of the Observational System” and in the case of monitoring groundwater levels,

GCOS Status Report – IP actions

G1	Guidance and best practice for adaptation observations	(3) Task Team on Observations for Adaptation convened and reported to Steering Committee. Work continues.
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A1

A15	Implementation of Reference Upper-Air Network	(4) GRUAN has expanded considerably with new sites in the tropics and Antarctica and progress on a number of new data products.
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A40

O1

O4	Development of climatologies and reanalysis products	(4) global ocean synthesis and reanalysis products are being regularly updated and are widely used by the scientific community in evaluations of climate variability and change.
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O56

T1	Improve coordination of terrestrial observations	(3) Discussions have taken place with FAO, GEO
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Action A15:	Implementation of Reference Upper-Air Network
Action	Continue implementation of GRUAN metrologically traceable observations, including operational requirements and data management, archiving and analysis and give priority to implementation of sites in the tropics, South America and Africa
Benefit	Reference-quality measurements for other networks, in particular GUAN, process understanding and satellite cal/val.
Who	Working Group on GRUAN, NMHSs and research agencies, in cooperation with AOPC, WMO CBS and the Lead Centre for GRUAN
Time frame	Implementation largely completed by 2025
Performance indicator	Number of sites contributing reference-quality data streams for archival and analysis and number of data streams with metrological traceability and uncertainty characterization; better integration with WMO activities and inclusion in the WIGOS manual.
Annual cost	US\$ 10–30 million

Assessment: 4 – Progress on track: GRUAN has expanded considerably with new sites in the tropics and Antarctica and progress on a number of new data products.

GRUAN has grown considerably since the IP was published with several new sites declaring their candidature and several sites officially certified for the first time. This includes the first sites in the tropics and Antarctica. Challenges remain in assuring network coverage over South America.

- Currently “zero order draft” prepared
- Underway
 - Consistency of draft being improved
 - Summary sections addressed
 - WGClimat contribution late
- Plans
 - To be reviewed by panels in December 2020/January 2021
 - Public review early 2021
 - Final approval by panels and steering committee by June 2021

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2nd Climate Observation Conference: 12–14 October 2021, Darmstadt, Germany (Supported by GCOS, WCRP, EUMETSAT....)

Objective:

- Review the gaps and deficiencies in the global climate observations as identified by the IPCC AR6, GCOS status report 2021 and elsewhere, and
- get community consensus on the main areas and strategies for improvement across the observation and user communities
- examine how well observations of the global Earth cycles (the global energy balance, global water and carbon cycles, and explaining changing conditions of the biosphere) support users' needs for climate data
- facilitate a dialogue with funders, sponsors, implementation agents and stakeholders

The outputs will provide inputs into the next GCOS implementation plan (2022).

Scientific Committee: (SC Chair and 2 members; One panel chair from each panel; Copernicus; WGClimate; NASA 2 x WCRP; WMO; IOC; EUMETSAT)

3 possible options: in person, hybrid, online. Will be decided in May 2021

Timeline	
15.10.2020	Initial announcement, “save the date”: DONE
15.10.2020	Start Scientific Committee setup: DONE
15.11.2020	SC1 meeting – Introduction: DONE
15.01.2021	SC2 meeting - call for abstracts preparation, high level agenda
15.02.2021	Call for abstracts, registration opens, web site ready
15.03.2021	Speaker invitation started
15.05.2021	Abstract submission deadline
15.05.2021	SC3 meeting - abstracts evaluation, last speaker invitation
15.06.2021	SC4 meeting - Detailed agenda
15.07.2021	Programme published
15.09.2021	Registration deadline
12-14.10.2021	Climate Observation Conference

Panels' reports



AOPC

Peter Thorne



Main activities over the last year

1. GCOS Surface Reference Network instigation progress
 1. Work with SC-ON and SC-MINT to agree ToR and chairs for a new Task Team to instigate the network
2. GBON planning input
 1. Attendance at meeting at WMO developing requirements
 2. Contributions to SC-ON Study Group
3. TT Lightning refresh
 1. Revised ToR and refreshed membership
4. AOPC panel membership refresh
 1. Almost full panel. New expertise bought in to fill gaps. Better gender balance.
5. Contribution to Status Report, ECV requirements

1. Meet if / when Covid allows
2. Decisions around GSN and GUAN if GBON is adopted and successfully implemented
3. Continue support of GSRN TT during phase of instigation of network
4. Data repositories: collaborate with data centres to establish data repositories, in particular for GNSS-PW and Thunderdays data.
5. Status Report, Implementation Plan, GCOS Climate conference
6. Respond to requirements arising from WMO / SC-ON
7. Beyond that waiting for GCOS Study Group outcomes ...

Gaps and needs for cross panel interactions

1. Would be good if we could agree and stick to a process and format for panel IP contributions to avoid a repeat of frictions that have arisen in status report drafting.
2. Panel actually needs to spend more time as a panel given new membership and almost 3 years since it met as a panel for more than a day and a half.
 - Cross-panel issues are secondary concern to actually being able to meet as a panel at this juncture for long-enough to actually discuss and agree the priorities
3. Recent resignation of Chinese member leaves us geographically unbalanced and expertise light on satellites

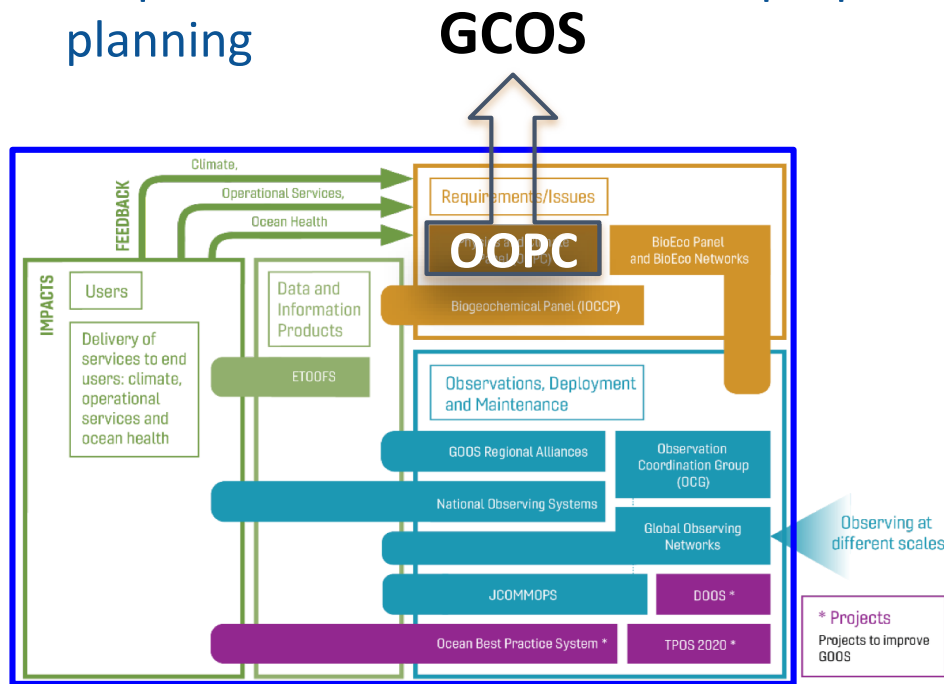
OOPC

Sabrina Speich & Weidong Yu



OOPC:

- Conduit into all of GOOS, with structures covering parallel work in requirements for biogeochemistry and bioeco observations
- Requires wide consultation and proper planning

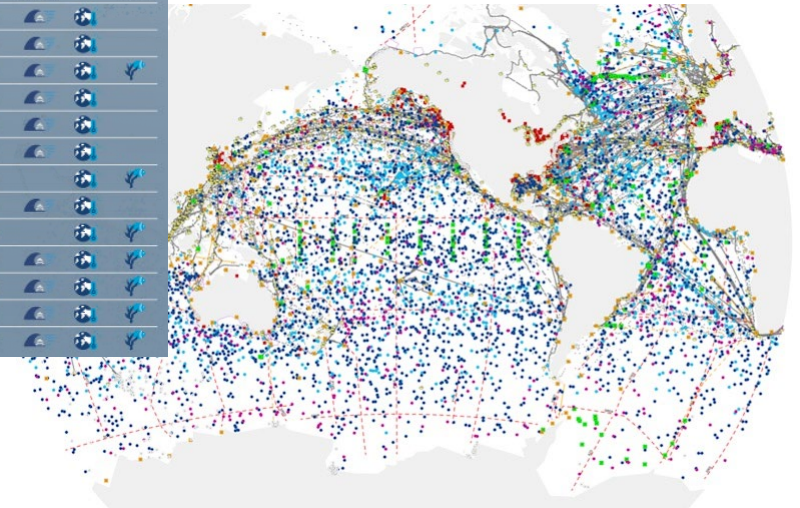


GOOS Structure
Integrating the Ocean Observing

1. OceanOPS network status summary versus EOVs/ECVs

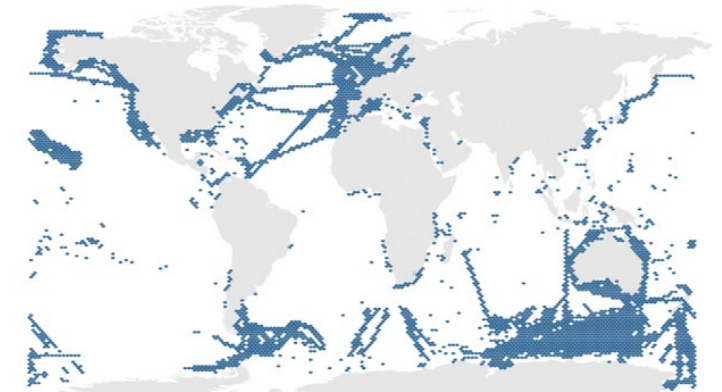
GOOS in situ networks ¹	Implementation Status ²	Data & metadata			Best practices ⁴	GOOS delivery areas ⁷	
		Real time ³	Archived high quality ³	Meta-data ³		Operational services	Climate
Ship based meteorological measurements - SOT/VOS	★★	★★	★★★	★★	★★	☀️	🌊
Ship based aerological measurements - SOT/ASAP	★★	★★	★★	★★	★★	☀️	🌊
Ship based oceanographic measurements - SOT/SOOP	★★	★★★	★★★	★★	★★	☀️	🌊
Sea level gauges - GLOSS	★★★	★★	★★★	★★	★★	☀️	🌊
Drifting and polar buoys - DBCP	★★★	★★	★★	★★	★★	☀️	🌊
Moored buoys - DBCP	★★	★★★	★★	★★	★★	☀️	🌊
Interdisciplinary moorings - OceanSITES	★★	★★	★★	★★	★★	☀️	🌊
Profiling floats - Argo	★★★	★★★	★★★	★★★	★★	☀️	🌊
Repeated transects - GO-SHIP	★★★	★★	★★★	★★	★★	☀️	🌊
OceanGliders	Emerging	★★	★★	★★	★★	☀️	🌊
HF radars	Emerging	★★★	★★★	★★	★★	☀️	🌊
Biogeochemistry & Deep floats - Argo	Emerging	★★★	★★	★★★	★★	☀️	🌊
Animal borne ocean sensors - AnIBOS	Emerging	★★★	★★	★★	★★	☀️	🌊

www.ocean-ops.org/reportcard2020



2. First biological “sustained” ocean observations assessment

- Biological observations - subsumed into a small number of ECVs that are important for capturing the impact of climate on the ocean;
- Sustained obs cover only 7% of surface of the ocean; only 1/3 of those are freely and openly shared;



Satterthwaite et al., in press, 2020

- 🌐 **OceanObs19 Conference (134 Articles in Frontiers) & Action plan**
- 🌐 **Energy imbalance assessment (von Schuckmann et al. 2020)**
- 🌐 **Air-sea fluxes OASIS proposal - funded SCOR working group**
- 🌐 **BGC-Argo (5 years plan: US funded \$53 million; awaiting decision in Europe, Asia, Australia)**
- 🌐 **Evaluations of parts of the observing system with design recommendations for the future**
 - TPOS 2020 completion this year
 - TAOS Review almost completed (will be published January 2021)
 - IndOOS-2 (published in BAMS in Nov. 2020)

- **Main areas of OOPC (holistically with GOOS) work in 1-5 year forward**
 - **Improving the ocean observing through observations strategy analyses:**
 - Ocean heat and freshwater storage
 - Ocean-Atmosphere fluxes
 - Boundary systems
 - Appropriate ocean and climate indicators
 - Engagement with Ocean Predict and operational services
 - **GOOS Implementation Planning process with synthesis across components**
- **Using the UN Decade of Ocean Sciences to focus on integration, system design, connection across value chain with better links to modeling;**
- **Science/assessment (i.e. WCRP under restructuring, IPCC, Ocean Status)**



Gaps and needs for cross panel interactions

Gaps

- GCOS is responsible for identifying requirements and influencing the work of observing systems in all 3 domains: GOOS is that observing system for the ocean and has climate as a major driver
- Defining requirements and observing system design for capturing climate cycles (energy, carbon, water) in an **integrated** way across the 3 domains (Opportunity in the GCOS conference, opportunity for cross-panel work)

Connections to cross-panel work

- UN Ocean Decade programme “Into the coasts”: connection to terrestrial observations
- BioEco panel interested in engaging for maturation of ECVs in a common way across biological realm
- Developing an Observing Air-Sea Interactions Strategy (OASIS)
- Global and regional cycles as a focus
- Development of an integrated GCOS Extremes and Adaptation observing and assessment strategy

TOPC

Thelma Krug



Main activities over the last year

1. Contributions to Status Report
2. Preparations for public consultation of ECV requirements:
 - a) Proposed changes to ECV
 - b) Consideration of responses postponed
3. Adaption Task Team
 - Work delayed due to COVID
 - Reported to TOPC in October: needs revitalising and GCOS-wide inputs.
4. Development of Biosphere indicator continuing
 - Focussing on phenology in temperate and boreal zones.
5. Agreement on the development of a new list of major lakes
 - Integrating different existing lists.
6. Cycles papers continuing: Carbon and Biosphere
 - Water paper submitted to BAMS

1. Adaptation Task team:
 - Revitalise the TOPC Task Team on adaptation with 1st meeting in early 2021. Prepare a timeline
 - TOPC to ensure engagement of SC & the 3 panels
 - Inputs from relevant users (e.g. Copernicus, GEO)
 - Prepare a report for SC 2021.
2. Finalise lists of major lakes and do the same for rivers
3. Progress biosphere indicator including a community discussion (led by Nadine Gobron, Martin Herold)
 - Designed by early 2021,
 - Approved by SC 2021,
 - Potential production by Jan 2022.
4. Agree revised ECV requirements
 - Consider needs of users especially adaptation and mitigation
 - Consider rock glaciers as part of permafrost
5. Improving collaboration between/with Global Terrestrial Networks (GTN)
6. Status Report, Implementation plan and GCOS Conference

Gaps and needs for cross panel interactions

1. Coastal Areas

- Identify user needs
- Land Use/ Land Use Change in Coastal Areas
- River discharge (lack of reported data)
- Overlaps – mangroves?

2. GSRN

- Identify Suitable ECV (e.g. Soil Moisture) and contribute to its development

3. Data Centres

- Improve long-term sustainability (e.g. Soil Moisture and Permafrost have both recently had finding and institutional issues)

4. Climate Cycle Work – contribute to SC task team

- The cycles are a good basis for cross-domain activities

5. With AOPC consider adequacy of flux (energy & water) measurements

Thank you



**GLOBAL CLIMATE
OBSERVING SYSTEM**

KEEPING WATCH OVER OUR CLIMATE



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