GCOS Update for ICM-8

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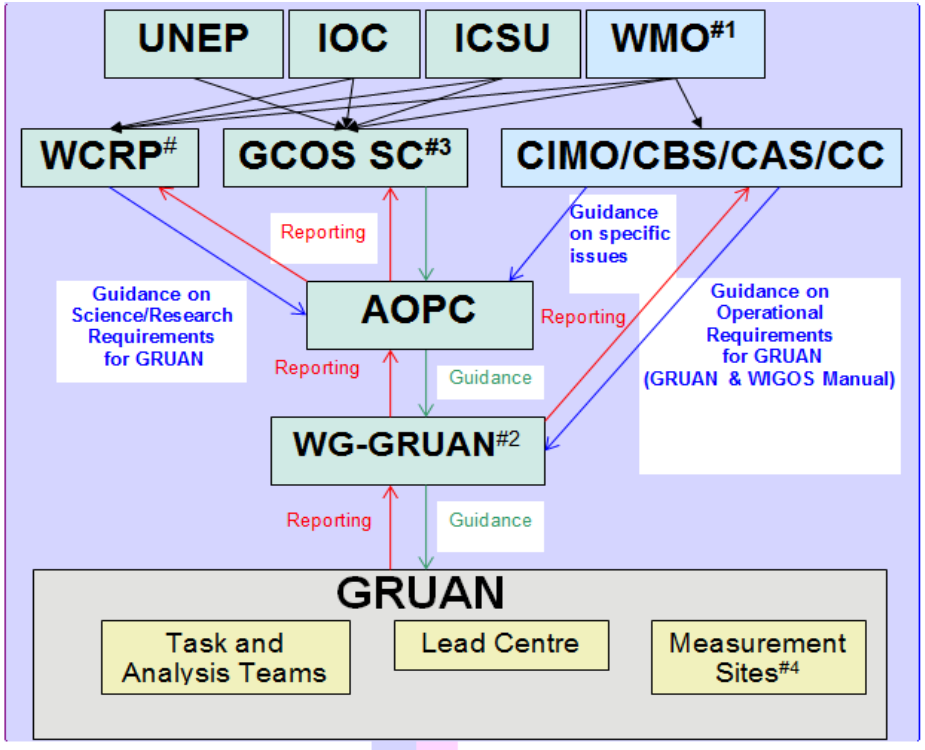
Boulder,CO, USA

GCOS
GLOBAL CLIMATE OBSERVING SYSTEM

WMO UNESCO IOC UNEP ICSU International Council for Science

GRUAN



[RD1][PT2]

Notes
1. WCRP identifies scientific and research requirements for GRUAN, while WMO identifies operational requirements.
2. Composition of WG-GRUAN to be determined by the AOPC in consultation with WMO and should include:
   - one representative from each of CIMO, CBS, CAS and CCl; these representatives will be responsible for reporting back to their respective Technical Commission;
   - others (according to its Terms of Reference)
3. Global Climate Observing System Steering Committee.
4. GRUAN Measurement Sites are contributed by Members of WMO.

Figure 1: Schematic outline of the structure of GRUAN.

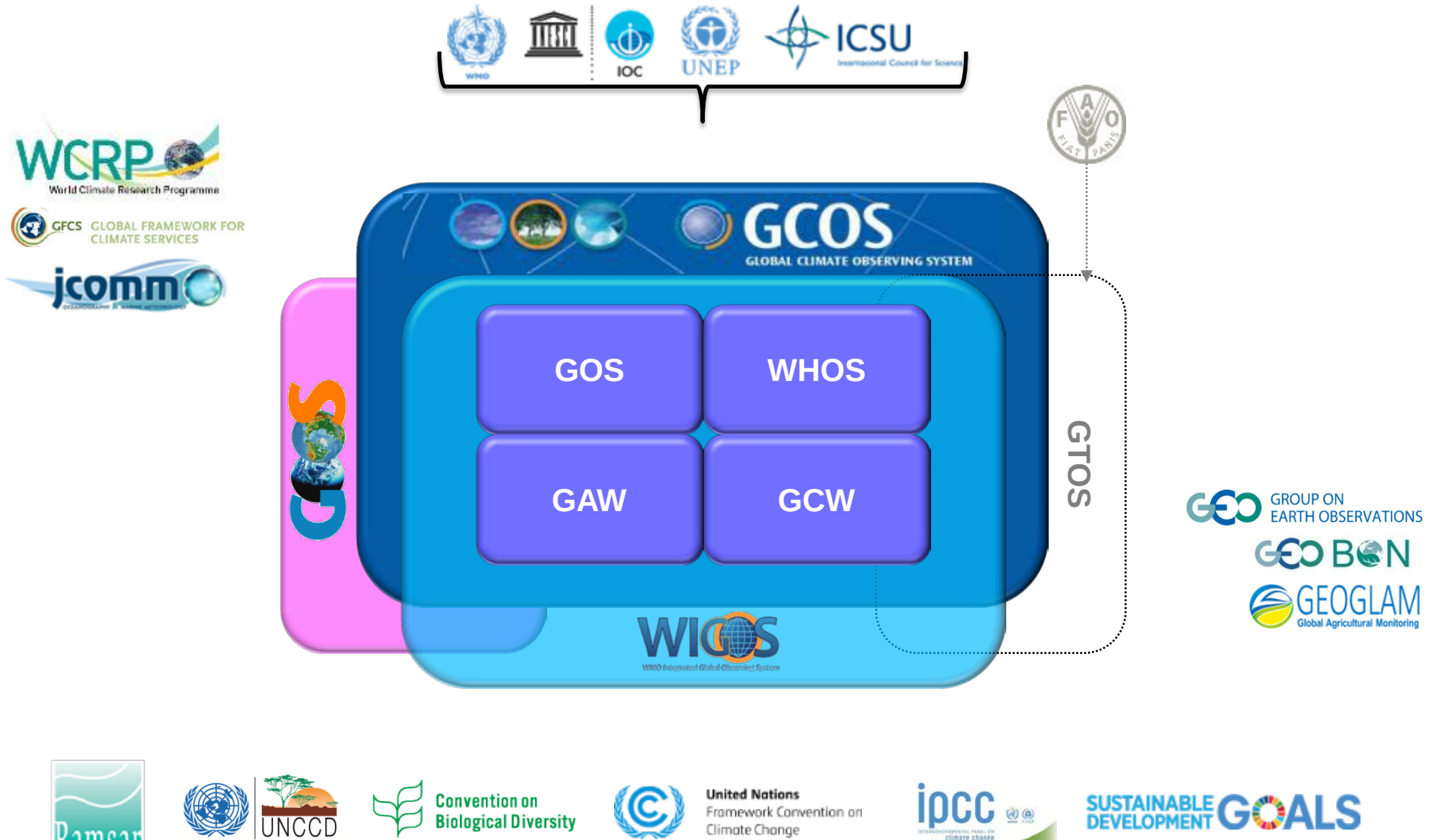
ENSURING THE AVAILABILITY OF GLOBAL OBSERVATIONS FOR CLIMATE

GCOS is intended to be a long-term, user-driven operational system capable of providing the comprehensive observations required for:

- Monitoring the climate system
- Detecting and assessing climate change
- Assessing impacts of, and supporting adaptation to, climate variability and change
- Promoting sustainable national economic development
- Monitoring the effectiveness of policies for mitigating climate change

Many observing systems contribute to the GCOS network and in many cases they also serve other functions, such as weather forecasting or air-quality monitoring.

GCOS


WMO
IOC
UNEP
ICSU
WCRP
World Climate Research Programme
GFCS GLOBAL FRAMEWORK FOR CLIMATE SERVICES
jcomm
GCOS
GLOBAL CLIMATE OBSERVING SYSTEM
GOS
WHOS
GAW
GCW
GTOS
WIGOS
WMO Integrated Global Observing System
GEO GROUP ON EARTH OBSERVATIONS
GEO BON
GEOGLAM
Global Agricultural Monitoring
Ramsar
UNCCD
Convention on Biological Diversity
United Nations Framework Convention on Climate Change
ipcc
SUSTAINABLE DEVELOPMENT GOALS

3 SCIENCE PANELS

- 3 Science Panels for Atmosphere, Land and Oceans:
  - Capture requirements for users of climate observations.
  - Identify & review Essential Climate Variables (ECV) and their specification
  - Review adequacy of networks to measure & exchange data
  - Give recommendations for the new Implementation Plan
  - Advocating sustained networks, open data access, and future evolution
  - Coordinate with other observing systems

AOPC Atmospheric Observation Panel for Climate GCOS • WCRP

GCOS • GTOS • WCRP TOPC Terrestrial Observation Panel for Climate

GCOS • GOOS • WCRP OOPC Ocean Observations Panel for Climate

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Driving the Global Climate Observation Agenda

Identify/Review Essential Climate Variables (ECVs) through science panels

Regular review of how these ECV are observed

Develop plans to ensure continuity and improvement of observations

- GCOS follows a 3 phase approach driven by users
- 2015 Status Report started the 3rd assessment cycle with a new Implementation Plan due in 2016 for UNFCCC COP 22

(1st cycle: 1995-1998)

(2nd cycle: 2003-2004-2010)

(3rd cycle: 2015-2016)

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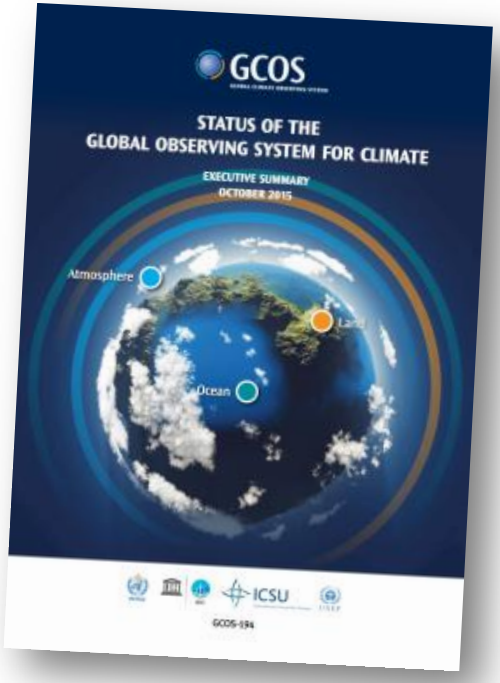
GCOS STATUS REPORT

- GCOS *Status of the Global Observing System for Climate* (GCOS-195) has been published.
- It was submitted to this SBSTA at COP 21 in Paris 2015.
- Describes how well climate is currently being observed, where progress has been made, where progress is lacking or where deterioration has occurred.



- provides a basis for the new GCOS Implementation Plan. COP21 urged Parties to work towards addressing the priorities and gaps identified in the Status Report
- 353 pages of relevant material (270 pages for the atmosphere domain)
- covers matters relevant to the other issues such as biodiversity, desertification, wetlands and sustainable development (SDGs).

From the Status Report: Progress by action in the 2010 IP

A16: Continue implementation of the GCOS Reference Upper-Air Network

Action: Continue implementation of the GCOS Reference Upper-Air Network of high-quality radiosondes and other supporting observations, including operational requirements and data management, archiving and analysis.

Who: National Meteorological Services and research agencies, in cooperation with AOPC, WMO CBS, and the Lead Centre for GRUAN.

Time-Frame: Implementation largely complete by 2013.

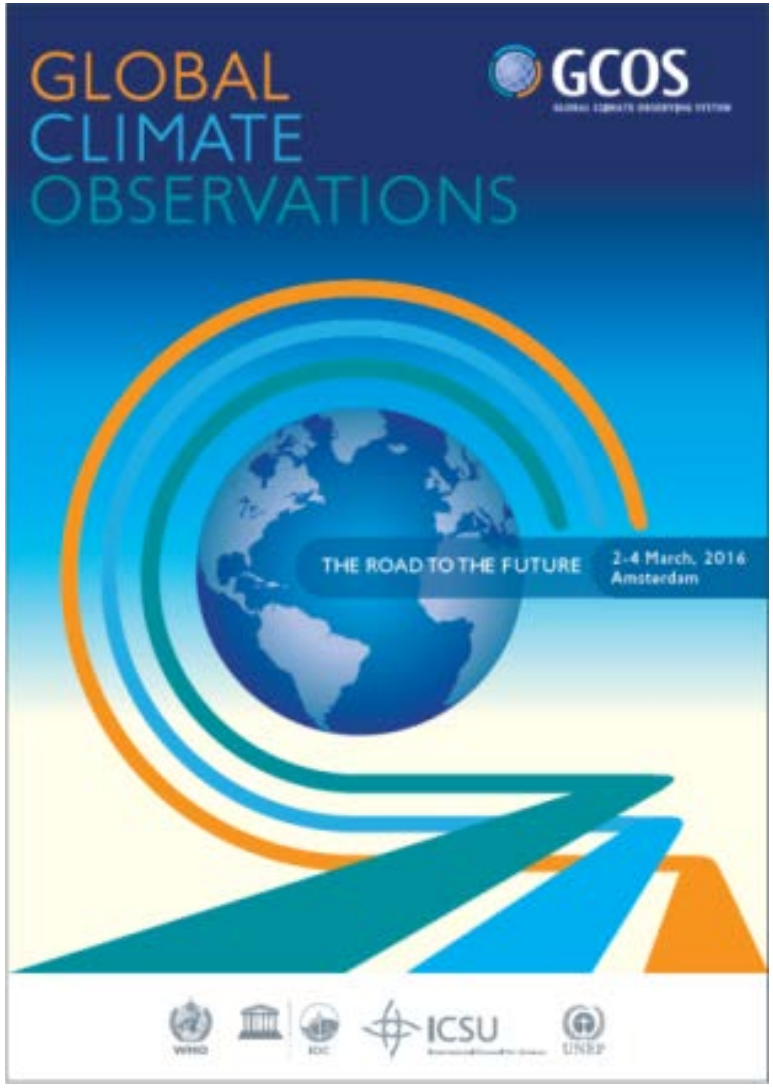
Performance Indicator: Number of sites contributing reference-quality data for archive and analysis.

Annual Cost Implications: 30-100M US$ (20% in non-Annex-I Parties).

Category B: Action largely completed according to expectation. Good progress on ongoing tasks

- Substantial progress has been made with implementation, although it is far from complete.
- All but 3 of the 15 stations in the network in February 2015 made ascents and provided product data in 2014
- The established working practices include a gradual process of site certification
- A manual and a guide for GRUAN have been published jointly by GCOS and WIGOS
- Progress has been modest in expanding the network to its target of 35-40 sites (but possibly 6 new ones in Australia)
- Absence of stations in mainland Africa and South America

GCOS OPEN SCIENCE CONFERENCE



Collect community views

- 2-4 March 2016, Royal Academy of Arts and Sciences, Amsterdam, NL
- 150 participants, from 40 countries
- 100 observers using the video live stream, from 28 countries
- about 150 received abstracts
- 57 invited talks and speakers
- 62 posters being displayed
- dedicated website:

  gcos-science.org

GCOS OPEN SCIENCE CONFERENCE

- **Performance of the current climate observations**

  Successes of the current global observing system

- **Adequacy of the current global climate observation**

How adequate are the current ECVs:

in terms of science needs: do they help improving the understanding of key aspects of the climate system?

in terms of user needs: do they provide the information an increasing variety of users needs?

Identifying user needs from non-UNFCCC areas, such as conventions on biodiversity and desertification, ECVs for adaptation and mitigation and the use of the concept of essential variables in other domains.

- **Planning for future global climate observations**

Outline a future programme of climate observations based on improved communication with a variety of stakeholders, technology improvements, and requirements that arise from recent climate negotiations and treaties.

GCOS OPEN SCIENCE CONFERENCE

Brief summary of main output of the conference:

Need for an extensive set of relevant climate indicators: surface temperature is problematic when used as the only indicator for communicating the impacts and the evolution of climate change. A suite of indicators has to be develop to describe other impacts of climate change, like heating of the ocean, rising sea level and ocean acidity, melting glaciers and reducing snow cover and changes in arctic sea ice

Continued importance and need for *in situ* observations needs to be stressed. Integration of satellite and *in situ* data is required for QA/QC and ground reference, and to construct composite ECV products, in particular through reanalysis. *In situ* observation networks are a requirement for producing an accurate, reliable satellite-based

Improved observations of ocean and land surface stress, latent heat flux and sensible heat flux may reduce imbalances in calculations of the global energy budget. Traditionally GCOS has focused more on state variables of the system than on fluxes. The new perspective on the importance of the Earth cycles on the selection of ECVs allow us to identify gaps and see where ECVs contribute to fundamental understanding of the cycle

Include biology in any description or modelling of the climate system. Interaction with the appropriate communities working with these biological variables is required so that the appropriate biological ECV can be specified.

2016 GCOS Implementation Plan

INCORPORATES INPUT FROM

- 2015 GCOS Steering Committee
- The Status Report
- The GCOS Conference
- The panels
- UNFCCC Needs from Paris Agreement

2016 GCOS IMPLEMENTATION PLAN

Action: Continue implementation of the GCOS Reference Upper-Air Network of metrologically traceable observations, including operational requirements and data management, archiving and analysis.

Who: Working Group GRUAN, National Meteorological Services and research agencies, in cooperation with AOPC, WMO CBS, and the Lead Centre for GRUAN.

Time-Frame: Implementation largely complete by 2025

Performance Indicator: Number of sites contributing reference-quality data-streams for archive and analysis and number of data streams with metrological traceability and uncertainty characterisation. Better integration with WMO activities and inclusion in the WIGOS manual.

Benefits: Reference quality measurements for other networks, in particular GUAN, process understanding and satellite cal/val.

2016 GCOS IMPLEMENTATION PLAN

Action AU10

Action: Expand the number of GRUAN sites measuring with high-quality instruments (e.g. frost point hygrometers) in the UTLS and promote and support the development of more economical instrumentation for GRUAN and to enable wider adoption.

Who: NMSs, NMIs, HMEI and GRUAN

Time-Frame: Ongoing.

Performance Indicator: Number of sites providing data to GRUAN archive.

Benefits: Improved UTLS water vapour characterisation, CDRs

Action AU14

Action: To understand the vertical profile of radiation requires development and deployment of technologies to measure in-situ profiles, in the first instance at GRUAN sites.

Who: NMSs, NMIs, HMEI.

Time-Frame: Ongoing.

Performance Indicator: Data availability at GRUAN archive

Benefits: Understanding of 3D radiation field, model validation, better understanding of radiosondes

2016 GCOS Implementation Plan

Date	Milestone
2013-2015	Preparatory work in 2013 – 2015 (GCOS panel meetings and three workshops with GFCS/UNFCCC/IPCC; Publication of Status Report)
15 November 2015	Draft Table of Contents submitted to COP21
2-4 February 2016	First Writing Team meeting: Detailed outline & writing assignments
2-4 March 2016	Open GCOS Conference: collect community views
April 2016	GCOS panel meetings finalize their draft chapters
24-26 May 2016	2nd Writing Team meeting: completes draft
June 2016	Limited review (including WMO, Technical Commissions and RAs)
July 2016	Public review (6 weeks)
September 2016	Final version approved by GCOS SC-24
October 2016	Final plan submitted to COP22