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GCOS Status Report

CGMS-49 plenary, agenda item 6

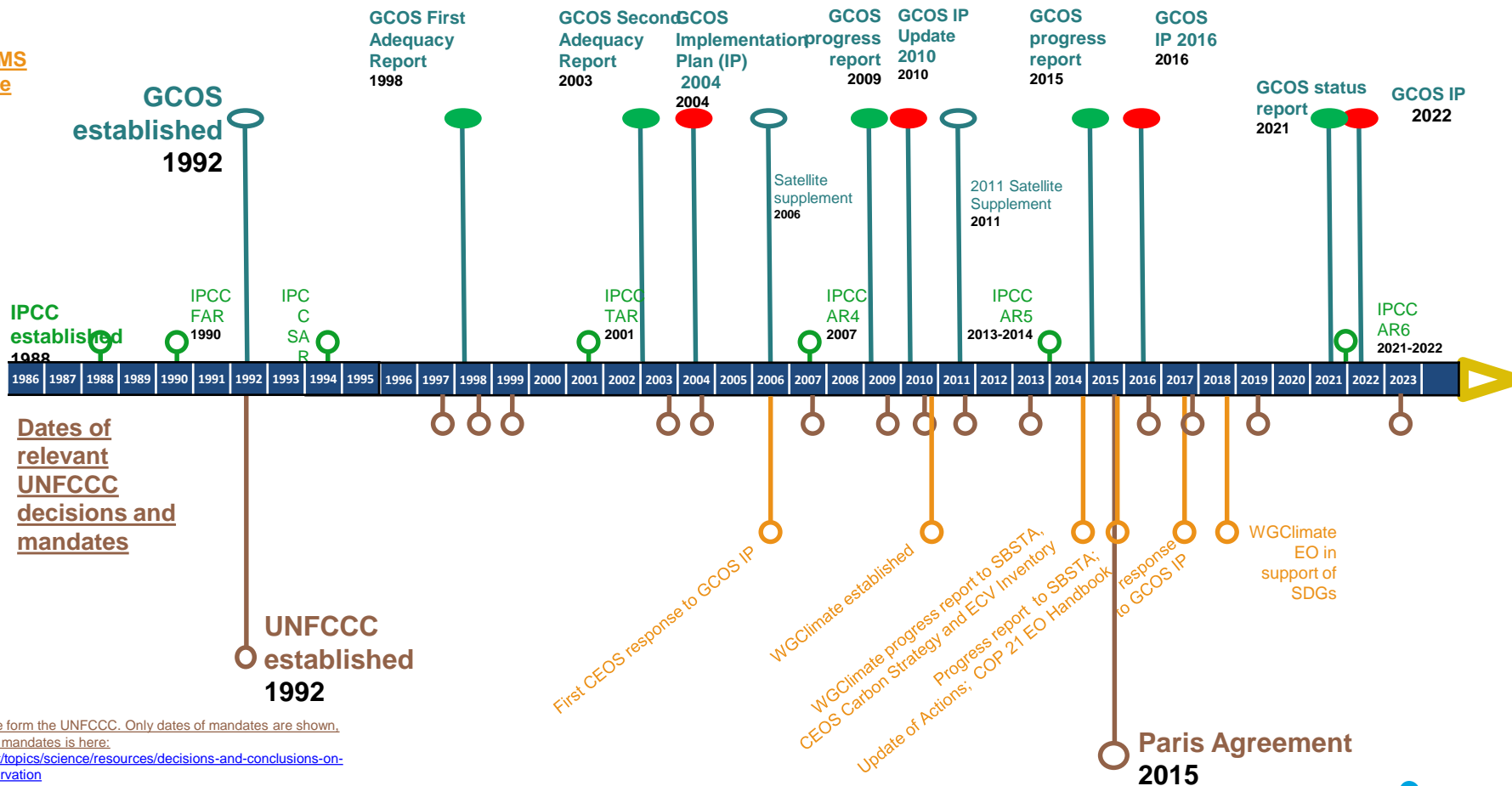
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GCOS Status Report

- As part of its mandate, since 1992, GCOS has reported on the status of the observing system
- In line with its commitments to the UNFCCC GCOS is currently planning on publishing
 - its latest Status Report in mid-2021
 - the next Implementation Plan in mid-2022
- Both documents will be submitted in time for their consideration by the UNFCCC SBSTA and COP the same year
- Both these reports respond to comments on earlier reports to make the documents easier to understand with clear priorities.
- The status report has been publically reviewed – the panels are addressing the comments

GCOS, IPCC, WGClimat and the UNFCCC

GCOS
CEOS CGMS
WGClimate
IPCC
UNFCCC



Based on a slide from the UNFCCC. Only dates of mandates are shown. The FULL list of mandates is here: <https://unfccc.int/topics/science/resources/decisions-and-conclusions-on-systematic-observation>

Writing the Status Report

The document has been drafted under a writing team, the GCOS Steering Committee and approved by the GCOS Expert Panel Chairs

ECV Stewards in each GCOS Expert panel have been appointed to monitor and report on individual ECV and connect to the relevant scientific communities

Contributions from ECV Stewards have been agreed by the panels and incorporated into the document

A chapter on satellite observations was drafted by WGClimate

The main document only contains summary assessments - the detail is contained in annexes

The entire document has been out for public review and the panels are now about to review the comments and prepare a final version

Report Outline

FOREWORD

EXECUTIVE SUMMARY

1. INTRODUCTION
2. OBSERVATIONS OF THE EARTH SYSTEM CLIMATE CYCLES
3. STATUS OF THE GCOS ESSENTIAL CLIMATE VARIABLES
 - 3.1. Atmospheric ECV
 - 3.2. Ocean ECV
 - 3.3. Terrestrial ECV
 - 3.4. Summary Assessment of each ECV
4. SATELLITE OBSERVATIONS
5. STATUS ACTIONS FROM THE 2016 IMPLEMENTATION PLAN
 - 5.1. General Actions
 - 5.2. Atmospheric Actions:
 - 5.3. Oceanic Actions
 - 5.4. Terrestrial Actions
 - 5.5. Detailed Progress on Implementation Plan Actions
6. OBSERVATIONS OF AND FOR ADAPTATION, AND OF EXTREMES
 - 6.1. Observations of and for Adaptation
 - 6.2. Observations of Extremes
7. IMPLICATIONS

Annexes

Annex A: Detailed Assessment of each ECV

Annex B: Assessment of Progress on Implementation Plan Actions

Annex C: Networks

Annex D: Glossary

Annex E: Contributor and reviewers

Main Observing System Highlights since 2016

Securing and extending the observing systems required substantial efforts and collaboration

There has been significant progress in many areas - this effort needs to be maintained.

Satellite observations have improved their coverage both spatially, temporally and in terms of observed variables.

Satellite data are accessible and well curated.

WMO and NMHS ensure the required long-term monitoring for many ECVs in the atmospheric domain.

Improvements due to new in situ observations from the ground and from commercial aircraft.

Most ground-based networks are well managed and archives appropriately stewarded.

GCOS and WMO are establishing a reference network for in situ observations, (similar to GRUAN)

The ocean observing community has agreed best practices for observations, data and meta-data.

Development of autonomous platforms and suitable sensors for a range of ocean ECVs.

Long-term continuity of some satellite observations is not assured:

- no follow up mission for Aeolus (wind profiles) is planned,
- no continuity is assured for cloud radar and lidar on research satellites
- only one limb sounder with similar capabilities to the Aura Microwave Limb Sounder is planned (near-global coverage every day for water vapor vertical profiles from the upper troposphere) but has now exceeded its expected lifetime.
- High-latitude sea-ice thickness monitoring is at risk (when CryoSat and ICESat2 stop working) and a gap might occur if CRISTAL is delayed.
- High-inclination altimetry is still problematic with only two research satellites flying (CryoSAT2 and ICESat2). In the future, European missions CRISTAL & CIMR would extend operational monitoring capabilities to the late 2020s (if confirmed). Likewise, Sentinel-3A/B altimeter data could be optimised for sea ice in the future.

Gaps in the satellite-based observations include:

- lower tropospheric ozone (to supplement the limited coverage of surface and to determine statistically significant trends)
- an instrument that measures stratospheric CH₄ profiles globally

quantitative assessment of anthropogenic greenhouse gas fluxes.

- Satellite observations of GHG to support in-situ observations and enable inverse modelling of fluxes.

Sustainable, operational funding is needed

- many atmospheric observations are made on an operational basis,
- most other observations are supported through short-term research funding.
- sustainable monitoring of a changing climate provides great societal benefits.
- a functional and effective observing system for climate needs funding and coordination

Data, Archiving, Stewardship, Access

- Data centres with sustainable, long-term, adequate funding
- A consistent approach, clearly defined principles, clear and enforced data management plans
- All data should be free and open and accessible in a timely manner
- perform quality monitoring and ongoing reprocessing of data when needed

ISSUES:
In situ observations

Many projects have not led to long-term sustainable improvement

- Many the projects in developing countries that have a component devoted to observations have not led to sustainable long-term improvements in the observational capacity of these countries

Gaps

- Africa, South America, SE Asia, the Southern Ocean, and ice-covered regions
- Ocean Subsurface measurements continental boundaries, in the polar oceans
- Improving surface flux measurements of heat, carbon, freshwater, and momentum is necessary.

The next GCOS Implementation Plan

- The Status Report is a major input into the IP
- GCOS is starting to draft its next Implementation Plan (IP)
- This report aims
 - To be shorter and more “actionable” than in the past
 - Organised around what observing systems can do rather than ECV-specific actions
 - Consider adaptation and mitigation
 - Respond to comments from user communities – including satellites
- The GCOS/WCRP Climate Observations conference
 - Online 30th August – 3rd September 2021
 - Details: <https://www.eventsforce.net/eumetsat/27/dailyAgenda>
 - Registration: <https://www.eventsforce.net/eumetsat/27/register>

GCOS Next Steps

- Other on-going tasks:
 - Developing a GCOS Surface Reference Network (GSRN)
 - Improvement/definition of Global Climate Data Centres (mainly in situ)
 - Determining GCOS response to adaptation and mitigation needs
 - Input into UNFCCC Global Stocktake (GST)
 - Improving observations of climate cycles
 - Improving consistency and coherence of ECV



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