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ICSU
International Council for Science



Update on current GCOS activities

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Chair of the GCOS Steering Committee

WCRP Joint Scientific Committee 35th Session

3 July 2014, Heidelberg, Germany

Milestones 1992 - 2011

1992: Establishment of GCOS as an outcome of the Second World Climate Conference (1990)

1995: **Plan for the Global Climate Observing System (GCOS)**, Publication No. GCOS-14, **GCOS Plan for Space-based Observations**, Publication No. GCOS-15

1998: **Report on the Adequacy of the Global Climate Observing Systems – United Nations Framework Convention on Climate Change**, Publication No. GCOS-48, COP-4, Buenos Aires, Argentina

2003: **Second Report on the Adequacy of the Global Observing Systems for Climate in Support of the UNFCCC**, Publication No. GCOS-82, COP- 9, Milan, Italy

2004: **Implementation Plan for the Global Observing System for Climate in Support of the UNFCCC**, Publication No. GCOS-92, COP-10, Buenos Aires, Argentina

2006: Systematic Observation Requirements for Satellite-based Products for Climate – **Supplemental Details to the Satellite-based Component of the Implementation Plan** for the Global Observing System for Climate in Support of the UNFCCC, Publication No. GCOS-107

2009: **Progress Report on the Implementation of the Global Observing System for Climate in Support of the UNFCCC 2004–2008**, Publication No. GCOS 129, COP-15, Copenhagen, Denmark

2010: **Implementation Plan for the Global Observing System for Climate in Support of the UNFCCC (2010 Update)**, Publication No. GCOS-138, COP-16, Cancun, Mexico

2011: Systematic Observation Requirements for Satellite-based Products for Climate **Supplemental details to the satellite-based component** of the Implementation Plan for the Global Observing System for Climate in Support of the UNFCCC - 2011 Update



Current GCOS status

We know what needs to be measured to monitor climate change and we have identified dedicated networks and measuring systems.

Implementation Plan (2010)

We know about how well the GCOS «agents of implementations» made progress in following the recommended actions of the Implementation Plan and its Satellite Supplement.

progress / adequacy reports(2009)

We know how much it would cost to observe all required ECVs.

2.5 Billion USD per year

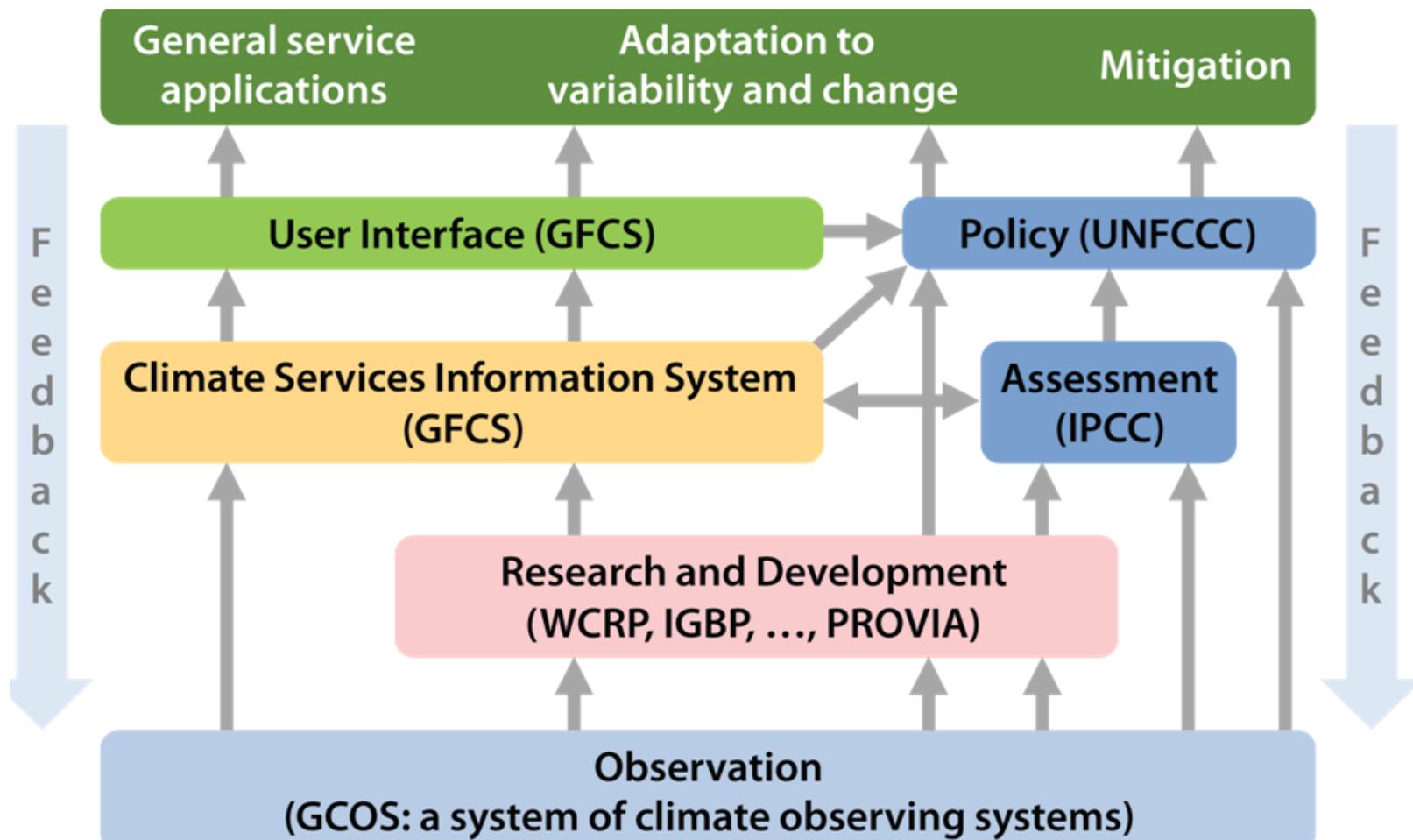
We achieved that space agencies, National Meteorological Services and Governments represented by their delegations to the UN Framework Convention for Climate Change respond to GCOS requirements and contribute to its implementation.

Joint CEOS-CGMS WG Climate, WMO Monitoring of GUAN and GSN, GCOS reporting to SBSTA

We are managing a system improvement trust fund which enables us to renovate climate stations which are not operational anymore.

GCOS Coordination Mechanism

GCOS and its interfaces



Observations for Climate Services

- Observations are fundamental for climate services.
- The observations made over past years define climate, how it varies and how it is changing.
- They are also used to:
 - develop and validate the models used to predict future variations and change.
 - develop application models linking climatic variations to user-relevant measures such as disease incidence, crop yield and energy demand.
- Current observations:
 - help identify current climate extremes and consequent vulnerabilities.
 - provide the starting point for forecasts.
 - enable monitoring how and where the climate system is changing over time.

Observation requirements for adaptation



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GCOS Workshop on Observations for
Adaptation to Climate Variability and Change

Offenbach, Germany
26–28 February 2013

Co-sponsored by WMO, IOC of UNESCO, UNEP and the Department of
Energy and Climate Change (DECC), United Kingdom

GCOS-166

GCOS, jointly with WMO, IOC of UNESCO, UNEP and DECC has organized a workshop to discuss **Observations for Adaptation to Climate Variability and Change**.

Sectors:

Water Resources

Coastal Zones

Health

Forestry

Agriculture

Energy

Transport

Cross-cutting issues:

- *Risk Management*
- *Early Warning Systems*
- *Research, Modeling and Assessment*
- *Data Rescue and Management*

Workshop website:

[http://www.wmo.int/pages/prog/gcos/
index.php?
name=ObservationsforAdantation](http://www.wmo.int/pages/prog/gcos/index.php?name=ObservationsforAdantation)

Observation requirements for mitigation



<http://gcos.wmo.int>



GCOS Workshop on Observations for Climate Change Mitigation

Geneva, Switzerland
5–7 May 2014

Co-sponsored by the Land Cover Project Office of the Global
Observation for Forest Cover and Land Dynamics (GOFC-
GOLD) Programme



GCOS-185

GCOS, in collaboration with the Land Cover Project Office from the Global Observation for Forest Cover and Land Dynamics (GOFC-GOLD), has organized an international workshop to consider ***the climate observation requirements to support mitigation to climate change mitigation.***

- ***Focus on Land Use (Agriculture) and Forest***
- ***Representatives from UNFCCC, FAO, ICRAF, ESA, IPCC, etc.***

Workshop website:

<http://www.wmo.int/pages/prog/gcos/index.php?name=ObservationsforMitigation>



Observation requirements for mitigation and adaptation

Common themes regarding observation requirements for both adaptation and mitigation to climate change identified by the GCOS community:

- Need for higher spatial and temporal resolution;
- Need to focus on regions where climate change will have significant sector effects and where there are vulnerable populations;
- Need to develop infrastructure and governance to support sustained data rescue;
- Need to support research initiatives such as PROVIA and Future Earth.

Co-sponsored GCOS/WCRP panels & related interactions

Atmospheric Observation Panel for Climate (AOPC)

- has most direct interaction with WMO/WIGOS/CCI; GRUAN governance is an example

Ocean Observations Panel for Climate (OOPC)

- co-sponsored by GOOS, reactivated following GOOS reorganization; support now based in GCOS office

Terrestrial Observation Panel for Climate (TOPC)

- Co-sponsored by FAO, Secretariat of GTOS is non-functional at FAO; new arrangements are needed

WCRP Data Advisory Council (WDAC)

- Includes panel chairs, CEOS, CGMS and IGBP; important for advancing joint interests

CEOS, CGMS and WMO Space Programme

- engagement continues to be active, e.g. on architecture for monitoring from space

- **current review of the ECVs**
- **discussion of cross-cutting topics**
- **discussion of specific work plans**

Co-sponsored GCOS/WCRP panels & related interactions

Atmospheric Observation Panel for Climate (AOPC)



- Platform for discussions on the climate-components of existing research and operational atmospheric observing systems and the related programmes, including important cross-cutting links to the World Climate Research Programme (WCRP) as well as to the Global Atmosphere Watch (GAW) Programme.
- New chair: Kenneth Holmlund (EUMETSAT); new vice-chair: Albert Klein-Tank (KNMI)
- Focus is on the GCOS Surface Network (GSN), the GCOS Upper-Air Network (GUAN) and the GCOS Reference Upper-Air Network (GRUAN) → recent review of designated GCOS networks.
- The Panel in its future sessions will continue to advise explicitly on climate-observing elements of the WMO Integrated Global Observing System (WIGOS), and seek to ensure that there is full cooperation between GCOS, WIGOS and WIS as they develop.
- Links to OOPC and TOPC on observations required to calculate fluxes and governing/influencing processes.



Co-sponsored GCOS/WCRP panels & related interactions

Workshop on the review of the GSN, GUAN and related atmospheric networks (7-8 April 2014)



- Chair: Phil Jones (Chairman of the Advisory Group on GSN & GUAN (AGG))
- Topics:
 - Review of design and purpose of GCOS networks in light of changes in technology and data needs
 - Review of network definitions and clarification of the need for a global surface reference network
 - Data rescue
- Recommendations:
 - Meaningful certification/designation should be applied to sites that meet GUAN requirements
 - Transition period of 5 years
 - Central monitoring and archival facility

Co-sponsored GCOS/WCRP panels & related interactions

Terrestrial Observation Panel for Climate (TOPC)



- Chair: Prof Konrad Steffen (WSL, Zurich, Switzerland)
- Dr. Riccardo Valentini (Italy) has handed in his resignation as the Chairman of the Global Terrestrial Observation Network (GTOS) Steering Committee in March 2013. The GTOS Secretariat, formally hosted at FAO in Rome, Italy, has been without staff support for more than a year. First steps for a sponsor dialogue have been initiated by GCOS and WMO.
- Strong partnerships with the Global Terrestrial Networks (GTNs) on lakes, permafrost, glaciers, rivers, and hydrological issues.
- Future link to OOPC on requirements focusing on observations in the coastal zone.
- Joint workshop of GCOS and GOFCC-GOLD on 'Observations for Climate Change Mitigation' from 5-7 May 2014, which focused on engaging REDD+ experts, the land cover/land use community (i.e. CCAFS, FAO), representatives from the climate modelling and integrated impact assessment community, etc.

Co-sponsored GCOS/WCRP panels & related interactions

Ocean Observations Panel for Climate (OOPC)

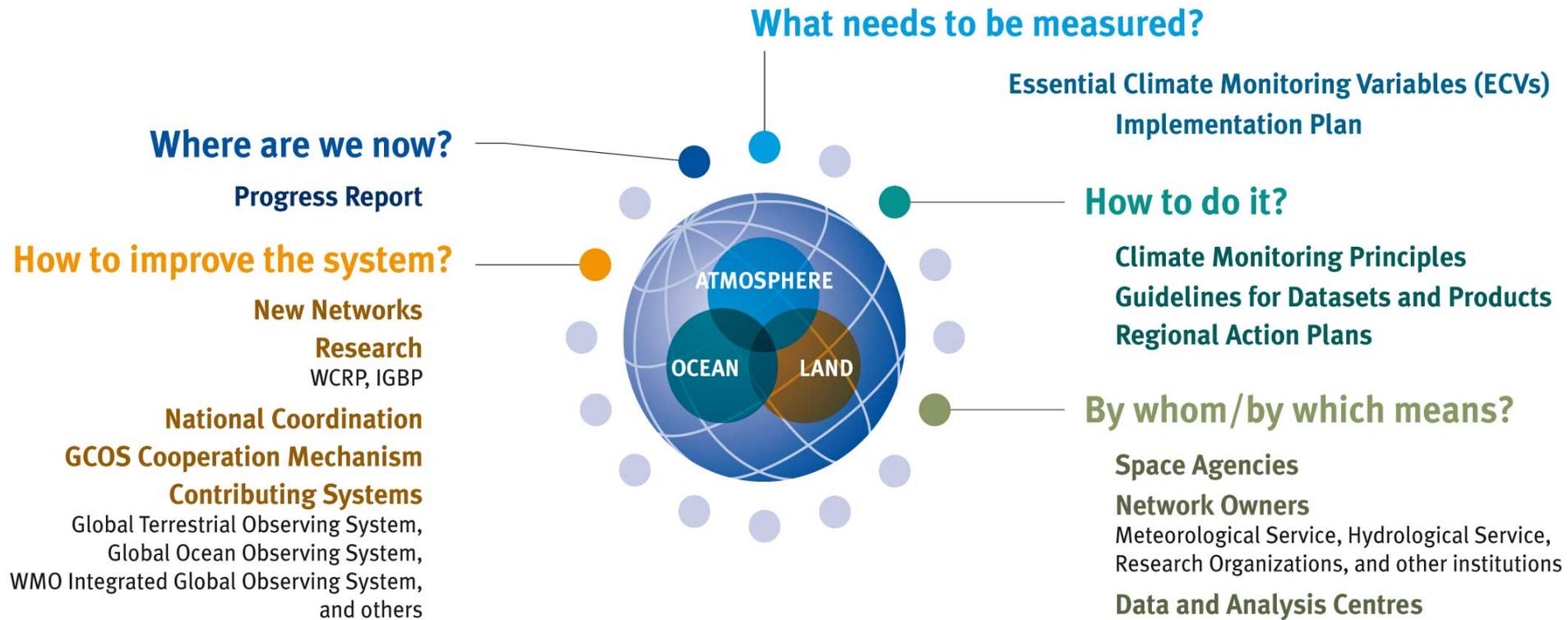


- The OOPC Technical Secretariat has moved to GCOS at WMO headquarters.
- Co-chairs: Mark Bourassa (University of Florida, USA) and Toshio Suga (JMA, Japan)
- Due to a restructuring of the Global Ocean Observing System (GOOS) that follows the Framework for Ocean Observations (FOO), GOOS has – similar to the structure of GCOS – three expert panels for ocean physical observations (OOPC), biogeochemical observations (IOCCP), and biological observations.
- New Terms of Reference and Work Plan following OOPC-XVI in Washington, September 2013.
- OOPC will expand its focus to coastal oceans/shelf areas, and the deep ocean.
- NOAA/JAMSTEC Workshop for the coordination of the Tropical Pacific Observing System (TPOS 2020), which was held from 27-30 January 2014 at Scripps Institute, San Diego, USA, that discussed the potential of existing (Argo, satellite observation, etc.) and new technologies (i.e., profiling floats, gliders) in the tropical region.

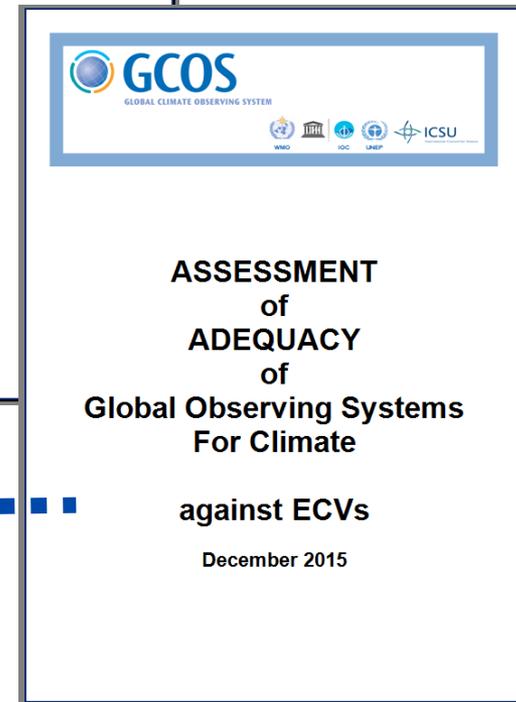
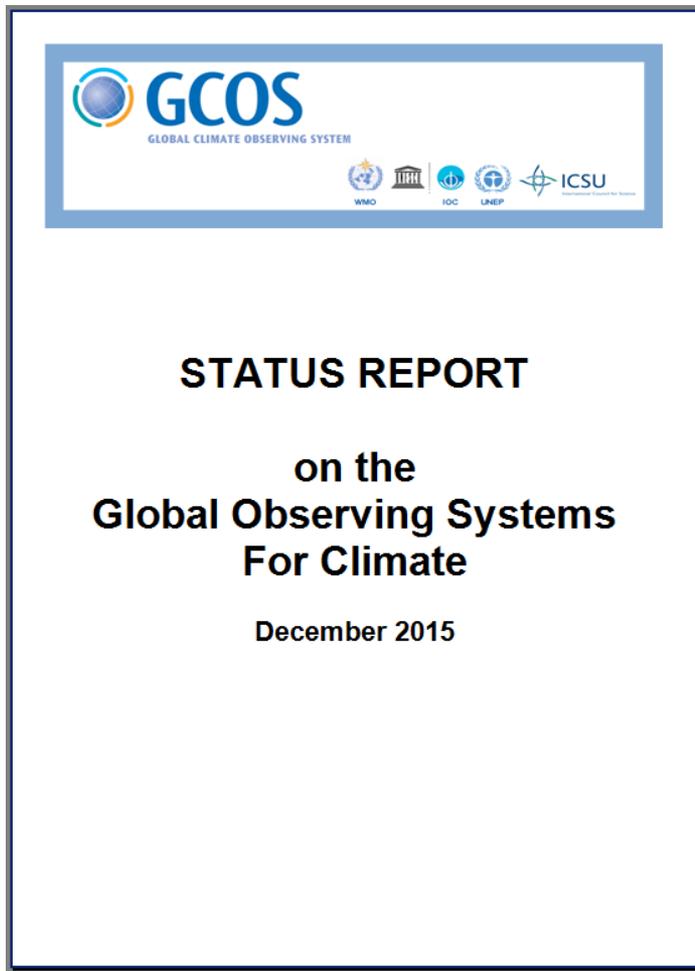


- **Reflection of modeling needs within the GCOS ECV baseline**
(WCRP is keen to enter a dialogue with GCOS on the potential update of ECVs to stronger underline the needs of the modeling community, which would have real benefits for projects such as CLIVAR, where a direct association with an ECV could make a big difference to its feasibility)
- **Extension of the CEOS/WMO/CGMS ECV Inventory to in-situ data**
(strongly endorsed by GCOS and WDAC)
- **Review of best practice report**
(second draft of the report – giving guidance as to how assessments of datasets should be carried out – has been produced and will be forwarded to WCRP core projects and GCOS/WCRP panels)
- **GCOS panel participation in WDAC**
(panel chairs of the joint GCOS/WCRP expert panels should be present at future WDAC sessions)
- **Concern about the fragility of some observing networks**
(e.g., TAO/TRITON – TPOS 2020, Argo)

GCOS Continuous Improvement & Assessment Cycle



Next Status Report and New Implementation Plan

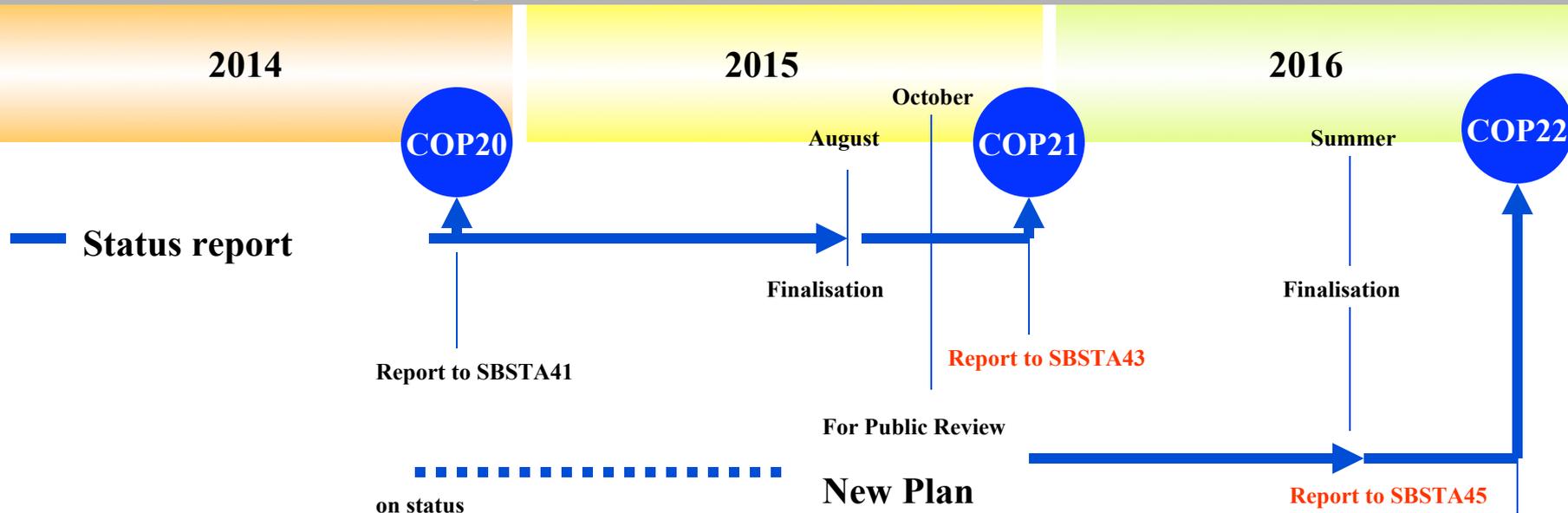


New Implementation Plan in 2016

Road Map for 2014 to 2016

Input to the Assessment

WCRP Conference 2011 **WIGOS Planning** **IOC GOOS Planning**
SPARC Data Workshop 2013 **ESA CCI** **CORE-CLIMAX** **QA4ECV**
UNFCCC National Reports **EUMETSAT-WCRP Climate Symposium (Oct 2014)**
GCOS Adaptation Workshop 2013 **WCRP WDAC (May 2014)**
GEO Work Plan Symposium (April 2014) **CEOS-CGMS Response**
GCOS GOFC-GOLD Mitigation Workshop (5-7 May 2014) **GCOS-IPCC WG II and DRR Workshop (Nov 2014)**
IPCC AR5 2013/2014 **WCRP-IPCC WG I Workshop (Sep 2014)**
GCOS AOPC TOPC OOPC **Space Architecture-ECV Inv.**



GCOS Continuous Improvement & Assessment Cycle

NEXT STEPS

- **Follow-up workshops** focused on sector-specific requirements – in partnership with GFCS.
- **Status Report**, consisting of a report on progress as well as assessment of adequacy of the global observing system for climate, scheduled for 2015
- New **Implementation Plan**, scheduled for 2016, which should identify:
 - verifiable and costed actions
 - specific requirements for products (i.e., through supplement reports)

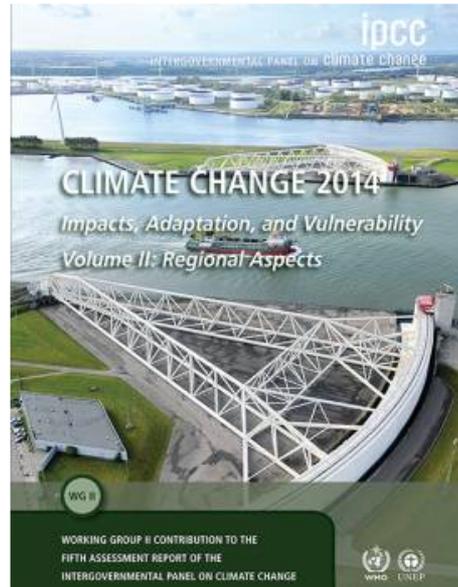
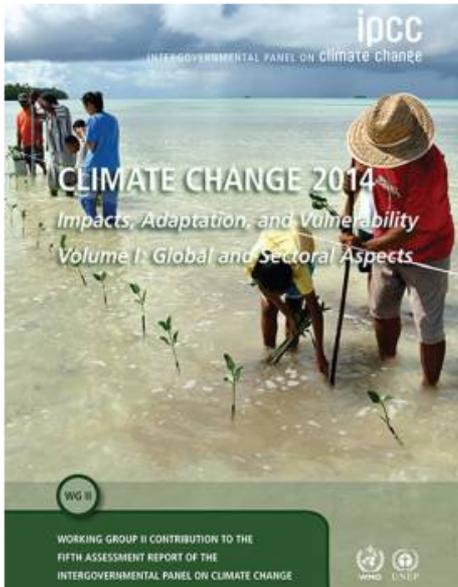
Next steps - Input to the new assessment

Content will be based on various inputs, including from:

- 2011 WCRP Conference and 2013 SPARC Data Workshop
- 2013/2014 IPCC Fifth Assessment Report
- 2013/2014 national reporting to UNFCCC on systematic observation
- 2014 EUMETSAT/WCRP Climate Symposium
- WMO (GFCS, WIGOS), IOC (GOOS) and post-2015 GEO planning
- CEOS/CGMS/WMO initiatives (Architecture, Inventory of datasets)
- other assessments of requirements (GEO, ESA CCI)
- assessments by GCOS/WCRP panels
- dedicated GCOS workshops
- an open review

Next steps - Joint GCOS/IPCC/UNFCCC Workshop

Climate Change 2014: Impacts, Adaptation, and Vulnerability



Joint GCOS-IPCC WGII-UNFCCC Workshop on *Uncertainties in Observations and Needs for Research – Focus on impacts, adaptation and vulnerability.*

- Lead authors from the IPCC WGII report and the GCOS community
- Timeframe: November 2014

The Working Group II contribution to the Fifth Assessment Report considers the vulnerability and exposure of human and natural systems, the observed impacts and future risks of climate change, and the potential for and limits to adaptation. The chapters of the report assess risks and opportunities for societies, economies, and ecosystems around the world. The WGII AR5 Summary for Policymakers was approved at the 10th Session of Working Group II, held in Yokohama, Japan, from 25 to 29 March 2014. The Session also accepted the underlying scientific and technical assessment. .

Recommendations for WCRP

- GCOS will ensure the participation of a WCRP representative at the upcoming 22nd GCOS Steering Committee Session (1-3 October 2014).
- GCOS will encourage its panel chairs to attend future WDAC Sessions (WDAC was pleased to see attendance of the GCOS Space Rapporteur Robert Husband, and a remote presentation of the OOPC co-chair Mark Bourassa).
- GCOS and WCRP/WDAC should develop a common approach to advocate for target observing systems (e.g., under TPOS2020).
- GCOS should consider the possibility to publish observation data sets on ESGF via obs4MIPs.
- GCOS will welcome the input from WCRP on the 2015 GCOS progress report on Global Climate Systems, the 2016 GCOS Implementation Plan, and on possible new ECVs (e.g., supporting direct or derived flux observations).
- GCOS and WCRP to cooperate in regard to contributions from GCOS to the workshop “Input observations for reanalyses” (to be held 2015 at ECMWF), and “The Climate Symposium” (October 2014, Darmstadt, Germany).

A strong engagement of the WCRP scientific community in GCOS activities will benefit both programmes on a long-term scale!

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Global Observing Systems for Climate

