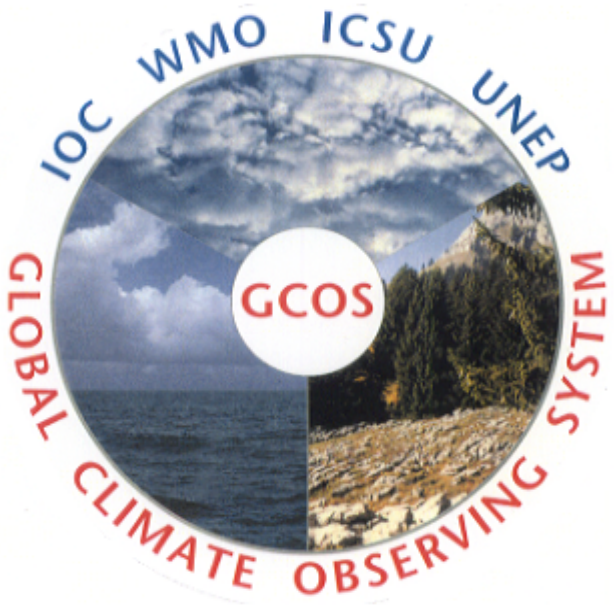
Implementation Plan for the Global Observing System for Climate in Support of the UNFCCC



Ocean Observations Panel For Climate
Tenth Session

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Characteristics of the Plan

- **A major satellite component, operated in a manner that ensures the long-term accuracy and homogeneity of the data. [Satellites ~41% of costs]**
- **Some ECVs will remain critically dependent on *in situ* observations for full measurement or for calibration and validation of satellite records. [In situ networks ~38% of costs]**
- **Global participation is essential for global coverage of key in-situ networks. [Capacity building ~5% of costs]**
- **Sustained product generation and improved data management. [Infrastructure ~10% of costs]**
- **International oversight and coordination – linkage to GEO. [Oversight of implementation ~4% of costs]**

Priority Areas in Implementation Plan

- **Actions to implement Essential Climate Variables (ECVs) globally**

  Key Action 1: Parties need, both individually and collectively, to commit to the full implementation of the global observing system for climate, sustained on the basis of a mix of high-quality satellite measurements, ground-based and airborne *in situ* and remote-sensing measurements, dedicated analysis infrastructure, and targeted capacity-building.

- **Priority over the first 5 years is on actions to address the critical issues in the Second Adequacy Report:**
  - **Generating integrated global analysis products**
  - **Improving key satellite and *in situ* networks**
  - **Enhancing of the full participation of least-developed countries and small island developing states**
  - **Improving access to high-quality global data for the essential climate variables (ECVs);**
  - **Strengthening national and international infrastructure**

Essential Climate Variables (ECVs)

- **Atmospheric (16)**
  - **Surface –** Air temperature, Precipitation, Air pressure, Surface radiation budget, Wind speed and direction, Water vapour
  - **Upper Air –** Earth radiation budget (including solar irradiance), Upper-air temperature (including MSU radiances), Wind speed and direction, Water vapour, Cloud properties
  - **Composition –** Carbon dioxide, Methane, Ozone, Other long-lived greenhouse gases, Aerosol properties.
- **Oceanic (15)**
  - **Surface –** Sea-surface temperature, Sea-surface salinity, Sea level, Sea state, Sea ice, Current, Ocean colour (for biological activity), Carbon dioxide partial pressure
  - **Sub-surface:**Temperature, Salinity, Current, Nutrients, Carbon, Ocean tracers, Phytoplankton
- **Terrestrial (13)**
  - River discharge, Water use, Ground water, Lake levels, Snow cover, Glaciers and ice caps, Permafrost and seasonally-frozen ground, Albedo, Land cover (including vegetation type), Fraction of absorbed photosynthetically active radiation (FAPAR), Leaf area index (LAI), [Biomass], Fire disturbance, [soil moisture]

Global coverage and Participation by all Parties

- Key Action 7: **Parties are requested to address the needs of least-developed countries, small island developing states and some countries with economies in transition for taking systematic climate observations by encouraging multilateral and bilateral technical cooperation programmes to support global observing systems for climate and by participating in the GCOS Cooperation Mechanism.**

- **Focus system improvement on GUAN (upper air), GSN (surface), Water , Sea level. Also some Reference sites.)**

Data for Climate Applications

"Adherence by nations to the agreed policy of free and unrestricted exchange is urgently required for both *in situ* and satellite climate observations"

- Key Action 8: Need to ensure that International Data Centres are established and/or strengthened for all ECVs

  "Ensure that observations and associated metadata for the ECVs, including historical observations, are available at international data centers"

- Key Action 9: The relevant intergovernmental organizations including WMO, FAO, UNEP, and ICSU need to create a mechanism for establishing standards, regulatory material and guidelines for terrestrial observing systems.

- Key Action 10: Parties need to ensure that their climate-observing activities adhere to the GCOS Climate Monitoring Principles

- Key Action 11: International standards for meta-data for all ECVs need to be established and adopted by the Parties in the creation and archiving of climate data records

Key Actions - Atmosphere

- **Key Action 12:**

(a) Ensure the implementation and full operation of the baseline networks and systems, the exchange of these data and recovery of historical records;

- **GCOS Surface Network (GSN).**
- **> Atmospheric component of the composite surface ocean observation system including sea-level pressure (see Key Oceanic Actions),**
- **GCOS Upper-Air Network (GUAN),**
- **Global Atmosphere Watch (GAW) global CO_2 network,**
- **MSU-like radiance satellite observations,**
- **Total solar irradiance and Earth radiation budget satellite observations**

(b) Establish a high-quality reference network of about 30 precision radiosonde stations and other collocated observations

(c) Exploit emerging technology including radio-occultation and GPS (water).

- **Key Action 13:**

(a) establish a reference network of precipitation stations on key islands and moored buoys around the globe and at high latitudes;

(b) submit national precipitation data (preferably hourly data) to IDCs;

(c) support the refinement of satellite precipitation measurement techniques.

Key Actions - Ocean

- **Key Action 17: Ensure climate quality and continuity for essential ocean satellite observations.**

(a) Sustained support for vector-wind (scatterometer), sea- ice, sea-surface temperature (microwave and infra-red) and ocean-colour measurements,

(b) Continuous coverage from altimeters to provide high-precision and high-resolution sea-level measurements (1 high-precision and 2 lower-precision altimeters).

Key Actions - Ocean

- **Key Action 18: Global coverage of the surface network by implementing and sustaining:**
  - (a) GCOS baseline network of tide gauges;
  - (b) Enhanced drifting buoy array;
  - (c) Enhanced Tropical Moored Buoy network;
  - (d) Enhanced Voluntary Observing Ships Climatology (VOSClim) network; and
  - (e) Globally-distributed reference mooring network.

- **Key Action 19: Global coverage of the sub-surface network by implementing and sustaining:**
  - (a) Argo profiling float array;
  - (b) Systematic sampling of the global ocean full-depth water column;
  - (c) Ship-of-Opportunity Expendable Bathythermograph (XBT) trans-oceanic sections; and
  - (d) Tropical Moored Buoy and reference mooring networks referred to in Key Action 18 above.

Key Actions - Terrestrial

- **Key Action 20: Support the operational continuation of the priority satellite-based products given below.**
  - Daily global albedo from geostationary and polar orbiting satellites,
  - LAI and fAPAR products to be made available as gridded products,
  - Gridded fire and burnt area products through a single International Data Centre,
  - Snow cover of both hemispheres,
  - Digital elevation maps of the ice sheet surfaces and full glacier inventory from current spaceborne cryosphere missions.
  - Specification and production of land-cover characterization data sets.

- **Key Action 21: A global network of at least 30 reference sites (collocated with atmospheric sites if possible) to monitor key biomes and to provide the observations required in the calibration and validation of satellite data.**

- **Key Action 22: Fill the identified gaps in the global networks for permafrost, glaciers, rivers and lakes**

Key Actions - Climate Products

The routine generation and ready availability of global climate products is a high and urgent priority.

- **Key Action 23: An internationally-coordinated approach to the development of integrated global climate products and making them accessible to all "Parties".**

- **Key Action 24: Establishing a sustained capacity for global climate reanalysis, to develop improved methods for such reanalysis, and to ensure coordination and collaboration among centres conducting reanalyses.**

Actions with agents for implementation

- **Key Action 2: *S*upport for an International Project Office to provide overall coordination, to monitor performance, to report regularly on implementation, to initiate corrective actions**
- **Key Action 3: The international and intergovernmental organizations need to incorporate the relevant actions in this Plan within their own plans and actions.**
- **Key Action 4: Need to complete development and alignment of Regional Action Plans for observations in the context of this Plan.**
- **Key Action 5: National coordination and planning and production of national plans on their climate observing, archiving and analysis activities that address this Plan.**
- **Key Action 6: "*Parties*" are requested to submit information on their activities with respect to systematic observation of all ECVs as part of their national communications to the UNFCCC.**

COP-10 decision and SBSTA conclusions

- Encourages Parties to strengthen their efforts to address the priorities identified in the implementation plan,
  - incorporate actions in their national plans and
  - invited to report on their activities.
- Invited Parties supporting Earth observation satellites to provide a coordinated response.
- Welcomed the emphasis on enhancing the participation of developing countries and encouraged Parties to implement “regional action plans”
- Appreciated the collaboration between GCOS and GEO.
  - Welcomed progress on 10-year GEOSS implementation plan
  - Incorporate actions in GCOS IP into the GEOSS IP.
- Encourages Parties to enhance their work and collaboration on observing ECVs and on developing climate products, including through participation in the GCOS cooperation mechanism
- Invited the GCOS to report on progress at subsequent sessions.

Issues to Consider

- GCOS is seeking the active engagement of OOPC as an "agent for implementation". Action needed in many areas including system improvement in developing countries.
  - E.g., baseline sea level network

- IP contains 131 total actions with 21 actions specifically involving JCOMM – OOPC is an important scientific input to JCOMM

- COP-10 decision has provided strong support to IP and requested WMO and IOC to incorporate actions from IP into their Plans.

- Report to SBSTA 22 from GOOS and GCOS "on progress made towards implementing the initial ocean climate observing system".

GEO Work Packets - GCOS

- **27 - Support GSN and GUAN networks, GAW observatories, initial Global Ocean Observing System (GOOS), river discharge, lake levels, soil moisture, permafrost, snow cover and glacier observing networks, which are recommended in the GCOS IP. (GCOS)**
- **29 - Improve the reporting of observations to international data and analysis centres in terms of data volumes, quality and timeliness. (GCOS)**
- **30 - Improve the capability of international data centres for data archiving and distribution of data and products. (GCOS)**
- **32 - Identify the needs and solutions necessary to implement the global observing systems for climate in all regions and countries based on the recommendation of GCOS IP and specific regional action plans. (GCOS)**
- **33 - Initiate an intergovernmental mechanism in the terrestrial domain to prepare and issue regulatory and guidance information on observational procedures and data management as, for example, also asked for in decision 9/CP.9 (UNFCCC, 2003). (GCOS, GTOS -> WMO, FAO)**

GEO Work Packets - GCOS

- **28 - Support implementation of actions called for in GCOS IP and the relevant IGOS-P Theme Reports. (GCOS)**
- **31 - Establish a strong collaboration mechanism between observational organizations & research communities, and users of climate information, to further refine the observations, analyses and products. (GCOS, WCRP, IGBP)**
- **36 - Focus on research programmes to support the development of observational capabilities for ECVs such as tropospheric ozone, cloud and aerosol properties and their vertical profiles, CO2 and other greenhouse gases, soil moisture and groundwater, above-ground biomass, permafrost, snow cover and glaciers, and ocean salinity, carbon and nutrients and their vertical profiles. (GCOS, WCRP, ICSU)**
- **37 - Coordinate climate sectors and broad user groups to clarify and specify requirements for socio-economic benefit areas (disaster prevention, health, energy, water resources, ecosystem, agriculture, and biodiversity) for climate products and information. (GCOS w. IPCC)**

GCOS thanks the many contributors
to the Implementation Plan

Implementation Plan available from
http://www.wmo.ch/web/gcos

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Annually Recurring Costs of actions

Cost Category*	Number of Common Actions	Number of Atmospheric Actions	Number of Oceanic Actions	Number of Terrestrial Actions	Total
I – <100K	4	8	7	11	30
II – 100K-1M	8	4	11	13	34
III – 1M-10M	2	11	17	11	42
IV – 10M-30M	1	8	6	2	17
V – 30M-100M	0	1	0	0	1
Common actions with costs covered in domains	6	-	-	-	6
Total Number	21	32	41	37	131
Estimated total cost profile	**34.4M**	**282.8M**	**211.2M**	**102.6M**	**631.0M**