Update on GCOS Activities

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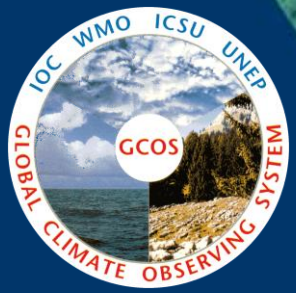
WMO IOC UNEP ICSU International Council for Science



Update on:

- Satellite products needed for regional and global climate predictions and projections
- 2009 GCOS Progress Report and preparation of second edition of GCOS Implementation plan
- Possible CEOS involvement in UNFCCC National Reporting on Systematic Observation

The Role of Observations in Support of Adaptation:

- The GCOS Contribution to the Nairobi Work Programme

- Adequate global observations critical to designing good adaptation strategies/policies. Why?
  - Global data is needed to adequately test, verify, and improve global climate change models
  - Better models will enable more reliable predictions of future climate in coming decades, essential for developing adaptation strategies
- Denser regional and national networks and reanalyzed data over recent decades are essential. Why?
  - Information is needed on the scales on which adaptation measures will be implemented
  - Reanalyzed records needed to establish model performance over past decades and indentify model errors

Observations and Adaptation

- Satellite Data sets needed to test and understand regional and global model performance
  - Aerosol, Albedo, Land Cover, Snow cover, Glaciers and Ice Caps, Precipitation, Sea Surface Temperature, Sea Ice, etc
- Most of the same data sets also used to detect regional climate change and can provide higher spatial resolution observations than in-situ data

Observations and Adaptation

Engaging regions in improved data records and the use of regional climate prediction methods

- Pilot Project of 3 workshops(approved December 2007):

  "**Climate Observations and Regional Modeling in Support of Climate Risk Management and Sustainable Development**"
- Partners: GCOS, WCRP, WMO/CLW, ICPAC
- Geographic focus: East Africa
- Source of Funding: World Bank - Global Facility for Disaster Reduction and Recovery (GFDRR)
- Outcome desired for participating countries and the region as a whole: An improved understanding and appreciation of the ability of available observational data and regional climate models to contribute to the development of adaptation and climate risk management strategies.

UNFCCC National Reports

- Parties to the Convention must submit National reports on implementation of the Convention to the Conference of the Parties (COP).
- Last main report 2006, next 2010
- Some reporting elements such as Systematic Observation also invited in interim reporting invitations.

UNFCCC guidelines on reporting and review

CONTENTS

Reporting on global observing systems for climate

- Satellite observations are essential to complete the information base for

  Atmospheric, Oceanic and Terrestrial ECV observations.

Therefore, Parties with space programmes involving Earth observations should comment on their plans to ensure availability of past and future data and metadata records of the satellite measurements for the listed ECVs and associated global products contained in tables 2 4 and 6

ECVs / Global Products requiring Satellite Observations	Fundamental Climate Data Records required for Product Generation (from past, current and future missions)
Surface Wind Speed and Direction Surface vector winds analyses, particularly from reanalysis	Passive microwave radiances and scatterometry
Upper-air Temperature Homogenized upper-air temperature analyses: Extended MSU-equivalent temperature record; New record for upper-troposphere and lower-stratosphere temperature using data from radio occultation; Temperature analyses obtained from reanalyses	Passive microwave radiances; GPS radio occultation; High-spectral resolution IR radiances for use in reanalysis
Water Vapour Total column water vapour over the ocean and over land; Troposphere and lower- stratosphere profiles of water vapour	Passive microwave radiances; UV/VIS radiances; IR imagery and soundings in the 6.7 μm band; Microwave soundings in the 183 GHz band
Cloud Properties Cloud radiative properties (initially key ISCCP products)	VIS/IR imagery; IR and microwave soundings
Precipitation Improved estimates of precipitation, both as derived from specific satellite instruments and as provided by composite products	Passive microwave radiances; High-frequency geostationary IR measurements; Active radar (for calibration)
Earth Radiation Budget Top-of-atmosphere Earth radiation budget on a continuous basis	Broadband radiances; Spectrally-resolved solar irradiances; Geostationary multispectral imagery
Ozone Profiles and total column of ozone	UV/VIS and IR/microwave radiances
Aerosol Properties Aerosol optical depth and other aerosol properties	VIS/NIR/SWIR radiances
Carbon Dioxide, Methane and other GHGs Distribution of greenhouse gases, such as CO_2 and CH_4, of sufficient quality to estimate regional sources and sinks	NIR/IR radiances
Upper-air Wind Upper-air wind analyses, particularly from reanalysis	VIS/IR imagery; Doppler wind lidar
Atmospheric Reanalyses	Key FCDRs and products identified in this report, and other data of value to the analyses

Atmosphere: Products and Data Records

('Sat Supplement', GCOS-107)

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Oceans: Products and Data Records

('Sat Supplement', GCOS-107)

ECVs / Global Products requiring Satellite Observations	Fundamental Climate Data Records required for Product Generation (from past, current and future missions)
Sea Ice Sea-ice concentration	Microwave and visible imagery
Sea Level Sea level and variability of its global mean	Altimetry
Sea Surface Temperature Sea-surface temperature	Single and multi-view IR and microwave imagery
Ocean Colour Ocean colour and oceanic chlorophyll-a concentration derived from ocean colour	Multispectral VIS imagery
Sea State Wave height and other measures of sea state (wave direction, wavelength, time period)	Altimetry
Ocean Salinity Research towards the measurement of changes in sea-surface salinity	Microwave radiances
Ocean Reanalyses utilizing altimeter and ocean surface satellite measurements	Key FCDRs and products identified in this report, and other data of value to the analyses

ECVs / Global Products requiring Satellite Observations	Fundamental Climate Data Records required for Product Generation (from past, current and future missions)
Lakes For lakes in the Global Terrestrial Network for Lakes: Maps of lakes; Lake levels; Surface temperatures of lakes	VIS/NIR imagery, and radar imagery; Altimetry; High-resolution IR imagery
Glaciers and Ice Caps Maps of the areas covered by glaciers other than ice sheets; Ice-sheet elevation changes for mass-balance determination	High-resolution VIS/NIR/SWIR optical imagery; Altimetry
Snow Cover Snow areal extent	Moderate-resolution VIS/NIR/IR and passive microwave imagery
Albedo Directional-hemispherical (black sky) albedo	Multispectral and broadband imagery
Land Cover Moderate-resolution maps of land-cover type; High-resolution maps of land-cover type, for the detection of land-cover change	Moderate-resolution multispectral VIS/NIR imagery; High-resolution multispectral VIS/NIR imagery
fAPAR Maps of fAPAR	VIS/NIR imagery
LAI Maps of LAI	VIS/NIR imagery
Biomass Research towards global, above-ground forest biomass and forest-biomass change	L band / P band SAR; Laser altimetry
Fire Disturbance Burnt area, supplemented by active-fire maps and fire-radiated power	VIS/NIR/SWIR/TIR moderate-resolution multispectral imagery
Soil Moisture[1] Research towards global near-surface soil-moisture map (up to 10cm soil depth)	Active and passive microwave

Terrestrial: Products and Data Records

('Sat Supplement' GCOS-107)

26 ECVs addressed

Atmospheric

- Precipitation, Earth radiation budget (including solar irradiance), Wind speed and direction, Water vapour, Upper-air temperature, Cloud properties, Carbon dioxide, Ozone, Other long-lived greenhouse gases, Aerosol properties

Oceanic

- Sea-surface temperature, Ocean salinity, Sea level, Sea state, Sea ice, Ocean colour

Terrestrial

- Lakes, Snow cover, Glaciers and ice caps, Albedo, Land cover, Fraction of absorbed photosynthetically active radiation (fAPAR), Leaf area index (LAI), Biomass, Fire disturbance, [Soil moisture]

Possible CEOS involvment

- Principals contacting and assisting National UNFCCC reporting points

- Option of CEOS preparing a synthesis submission

2009 GCOS Report

- Why? To assess progress 5 years after GCOS IP
- Requested by UNFCCC by June 2009

  - 3 main sources of input:
    - Data monitoring centres; Partner programmes; Panels
    - Aditional information on national activites using updated guidelines (COP-13, Bali), to UNFCCC by 15 September 2008 (UNFCCC invitation)
    - IPCC AR4: Sydney Workshop October 2007

Updating the GCOS IP

- A revised 2nd edition will be prepared with 2009 progress report.
- This revised 2nd edition will again be made available for community comment and will submitted to the UNFCCC
- For satellites the task is largely accomplished through the Satellite supplement

2009 GCOS Report and IP Update

- Sydney Workshop (jointly with WCRP, IGBP)
  - 4-6 October 2007, 66 IPCC authors (WG I & II)
  - "Future Climate Change Research and Observations: GCOS, WCRP and IGBP Learning from the IPCC 4th Assessment Report"
  - Survey, based on "Key Uncertainties and Gaps"
  - Output:
    - Set of "Urgent Needs" and Recommendations
    - Views on structure/content of future IPCC assessments (encouraged by IPCC)

2009 GCOS Report and IP update

GCOS-WCRP-IGBP Sydney Workshop: “Urgent Needs” include

- Identification of regions where society is most vulnerable to climate change (“climate hot spots”);
- Identification of thresholds beyond which potentially “dangerous” changes (to society) will occur (“climate tipping points”)
- An authoritative set of information at the scales relevant for adaptation policy;
- Better understanding of ice-sheet dynamics;
- Impacts, adaptation and vulnerability communities’ needs for research and observations, and addressing these needs based on current capabilities and prospects;
- Better regional information on past and future climate change;
- Methodologies to define, determine and communicate uncertainties and limitations in regional observations and model products in a context-sensitive manner;
- Quantification of radiative forcing due to aerosols and clouds by comprehensive model-model and model-observation comparisons;
- Better understanding of the hydrological cycle, especially convection and precipitation processes;
- Ensuring sustained observations of the oceans and the land surface;
- Continuity of key satellite missions for climate;
- Ensuring analysis, reanalysis and reprocessing of all climate data, with attention to observing system changes.

2009 GCOS Report and IP Update

- Timetable
  - 2 meetings in Summer + Autumn to prepare draft reports
    - Review April-July 2009
    - Final versions Autumn 2009
- Editors
  - Chaired by Paul Mason under direction of John Zillman
  - Editor as GCOS IP, Jim Rasmussen
  - GCOS secretariat lead Stephan Bojinski

Thank you

For more information about the GCOS programme
please visit our website

http://gcos.wmo.int

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Goal and Structure of GCOS

- The **Goal** of GCOS is to provide continuous, reliable, comprehensive data and information on the state of the global climate system
- GCOS consists of the climate-relevant components of existing atmospheric, oceanic and terrestrial observing systems and their enhancement to meet the totality of national and international user needs for climate observations
- GCOS is sponsored by WMO, UNEP, IOC and ICSU
- National support is provided by GCOS National Coordinators and Focal Points