

# Climate Coordination for CEOS Response to GCOS

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# Two Important Tasks

- WP4300: CEOS Progress Report update to SBSTA Due: September 2010
- WP4200: CEOS response report to new GCOS-IP Due: May 2011

## SBSTA Conclusions/Feedback to CEOS

16. The SBSTA expressed its appreciation for the updated report provided by the Committee on Earth Observation Satellites (CEOS), on behalf of Parties that support space agencies involved in global observations, to the SBSTA at its twenty-ninth session.<sup>8</sup> It welcomed the progress made by those agencies in responding to the GCOS implementation plan and the support of CEOS to the space-based observations of GCOS. The SBSTA further welcomed the commitment by CEOS Member agencies to work towards improved availability of current and future data for forest carbon monitoring, as expressed in a statement delivered by a representative of CEOS.

17. The SBSTA encouraged coordinated implementation of the cross-cutting space-based components of GCOS to continue over the long term, including the continued coordinated response to the needs identified in the GCOS implementation plan through CEOS. It also encouraged CEOS and the Parties that support space agencies involved in global observations to continue, and if possible accelerate development of methodologies, and validation and inter-comparison of satellite-based applications for the terrestrial domain. The SBSTA invited CEOS to report at its thirty-third session on progress made in its efforts to meet the relevant needs of the Convention.

<http://unfccc.int/resource/docs/2009/sbsta/eng/l06.pdf>

<http://unfccc.int/resource/docs/2009/awglca6/eng/inf01.pdf>

## AD HOC WORKING GROUP ON LONG-TERM COOPERATIVE ACTION UNDER THE CONVENTION (relevant needs)

199.2 A specific capacity development and support mechanism shall be established and supported by developed country Parties to cater for specific capacity-building needs of developing country Parties, in particular LDCs, SIDS and African countries, including training (sub-regional training of trainers), mentoring, and learning by doing activities among other measures:

- (a) To empower relevant institutions at various levels taking into account also the need for stand alone capacity development activities at various levels;
- (b) To enhance observation, research and knowledge management;
- (c) To strengthen endogenous capacities;
- (d) To strengthen communication, education and awareness-raising at all levels, especially at the local and community levels;
- (e) To strengthen and use the regional networks of information and knowledge-sharing, including indigenous knowledge sharing;
- (f) To share experiences, information and best practices of developing countries regions including, African, Asia, Latin American countries within the AOSIS countries;
- (g) To assess, strengthen and mobilize the capacities of exiting relevant facilities and institutions in LDCs, SIDS, Africa and other developing countries;
- (h) To strengthen and use data for systematic observation, early warning , modelling, disaster preparedness and capacity evaluation and monitoring;
- (i) To strengthen capacity for modelling and needs assessments related to adaptation, mitigation, capacities, financing, and technologies;
- (j) To develop tools, methods and technologies and support their application;
- (k) To encourage and strengthen participatory and integrated approaches in planning and decision-making, including the meaningful participation various non governmental actors.

# Task WP4300

- CEOS Progress Report to UNFCCC SBSTA
  - Provide highlights of CEOS climate actions, including 17 priority 2 actions which were started last year.
  - Need to include Forest Carbon Tracking & terrestrial application intercomparisons and validation.
  - Early warning applications (Disaster)
  - Include “abstract” of the new CEOS response to new GCOS-IP (WP4200)
  - First draft – June 30
  - Internal review by CEOS – July 31
  - “Final” draft for review August 31
  - Send to UNFCCC – September 30

# WP4200: CEOS response to GCOS

- CEOS climate actions responds to GCOS Implementation Plans (IP)
  
- GCOS IP provides the requirements for climate quality observations, products and cal/val.
  - GCOS-92: GCOS IP released in 2004
  - GCOS-107: 2005 GCOS Satellite Supplement contains the attributes associated with satellite-based climate products
  - New GCOS IP for 2010.

# New CEOS Response to GCOS-IP 2010

- Good opportunity for a new CEOS response with actionable actions
- New actions can supersede the existing actions
- Estimate level of effort and completion time
- Begin with development of actionable actions



# Approach

- Identify domain leads (atmos, ocean, land)
- Assign working groups, constellations, and experts to develop actions responding to the GCOS IP10 actions.
- Action must be actionable with resources identified.
- Groups need to reach into the expert community, including authors contributing to the original CEOS response to the 2004 GCOS IP



# Domain Leads/Participants (current)

- Atmosphere - Goldberg, Eckman, Zehner, Neeck, Osamu, Wilson, Ector, Von Engeln
- Ocean – Dowell, Digiacomo, Lindstrom, Wilson, Bonekamp, B.S. Gohil, Parisot
- Terrestrial – Csiszar, Cecil, Holm
- Cal/Val – Stensass/Lecomte
- Data Management- Pakorn
- Education- Jungbluth

# GCOS Action # and Description

- Point of Contact
- Contributors:
- Significance
- Current Status:
- Accuracy requirements: target (desired) and planned (actual)
- CEOS Action with current and planned resources:
  - Supersede any existing CEOS climate actions?
- CEOS Action with additional resources:
  - Include significance of the shortfall without additional resources

# Ox1 – Implementation of the Ocean Colour Radiometry Virtual Constellation

- Point of Contact: Dowell, Bontempi, Murakami
- Contributors: OCR-VC and IOCCG (contributing Agencies including CNSA, ESA, EC, EUMETSAT, INPE, ISRO ,JAXA, KARI, NASA, NOAA, .....)
- Significance: Imperative to ensure better interagency collaboration, avoid gaps in OCR timeseries, ensure sensor and timeseries compatibility, promote application development and outreach
- Current Status: Implementation plan accepted in 2009, prioritization activity in currently ongoing
- Accuracy requirements (target 5% (desired 15%) and planned 25%) of nLw (normalized water leaving radiance)
- CEOS Action with current and planned resources: OCR-VC Implementation Plan documents in detail the individual contributions from CEOS agencies to the specific tasks and deliverables defined
- CEOS Action with additional resources: The ongoing prioritization activity has defined several topics (see Actions Ox2 and Ox3) which are fundamentally inter-agency in their nature and which require additional resources for their implementation. They broadly address issue relating to sensor and dataset inter-comparison and validation , data merging etc.
  - Failure to obtain additional resources for these activities would jeopardize the potential to generate and maintain a continuous ECV for OCR at the level of GCOS standard requirements

# Ox2 – Facilitate implementation of the Ocean Colour Radiometry ECV

- Point of Contact: Dowell, Bontempi, Murakami, Antoine (IOCCG Chair)
- Contributors: OCR-VC and IOCCG (contributing Agencies including CNSA, ESA, EC, EUMETSAT, INPE, ISRO, JAXA, KARI, NASA, NOAA, .....)
- Significance: There are now multiple OCR sensors both in orbit and commissioned for launch in the next 10 years. There is a fundamental need to monitor the accuracy of the the individual sensors , the difference between currently on orbit sensors as well and to monitoring the continued stability of the OCR ECV time-series.
- Current Status: There has been various prototype (fix-term research projects) on data merging (e.g. REASoN/GIOVANNI, GlobColour). The are also projects which are about to start which specifically address the GCOS requirement i.e. the ESA Climate change initiative.
- Accuracy requirements (target 5% (desired 15%) and planned 25%) of nLw (normalized water leaving radiance)
- CEOS Action with current and planned resources: As a first step a detailed gap analysis is required, at the level of available products. Subsequently a detailed implementation plan will be produced detailing the required components of a system/network to systematically produce the OCR ECV. It is proposed this may be undertaken in the context of the proposed CEOS Climate Advisory Group of which the OCR ECV implementation could be developed as a pilot.
- CEOS Action with additional resources: Additional resources are required to facilitate the data merging, inter-calibration and systematic processing activities and well as to support and international science team and will monitor the data quality of the resulting products.
  - The shortfall is that without additional resources it is difficult to foresee a multi-agency imitative to create systematic and continuous time-series of the OCR ECV.

# Task WP4200

- CEOS Response to new GCOS-IP
  - CEOS provided review comments to the draft GCOS-IP
  - Most of the GCOS actions were discussed at the Arlington meeting (Jan 2010).
  - GCOS-IP will be released in August 2010
  - Number of draft templates completed
  - Monthly Telecons , leads have been identified
  - Mentor the development of actions to achieve consistency
  - CEOS Response Working Meeting /First Draft October 2010 (Brazil))
  - Second Draft January 2011 (CEOS planning meeting)
  - Final Draft for CEOS Climate Advisory Group March 2011
  - Release in May 2011 (CEOS SIT)

# GCOS-IP Relevant Satellite Actions

| ACTION # | DESCRIPTION  | Space Agencies Action? | (GCOS 92) Reference | GCOS 107 Product #                     | CEOS 59 Climate Action # | Assignee              |
|----------|--|------------------------|---------------------|--|--------------------------|-----------------------|
| 1        | C1 Participating international and intergovernmental organizations are invited to review and update their plans in light of this document in order to ensure they better serve the needs of the UNFCCC.  | X                      |                     |  |                          | ALL                   |
| 2        | C2 Designate national coordinators and/or committees, achieve national coordination, and produce national plans for contributions to the global observing system for climate in the context of this Plan.  | X                      |                     |  |                          | All                   |
| 4        | C4 Report to the UNFCCC on systematic climate observations using current guidelines.   | X                      | C4                  |  |                          | All                   |
| 5        | C6 Ensure an orderly process for sustained operation of research-based networks and systems for ECVs.  | X                      | C7                  | C.6                                    |                          | All                   |
| 7        | C7 Ensure all climate observing activities adhere to the GCMPs.  | X                      | C8                  | C.3<br>C.4                             |                          | All                   |
| 8        | C8 Support the implementation of the global observing system for climate in developing countries and countries with economies in transition through membership in the GCOS Cooperation Mechanism and contributions to the GCOS Cooperation Fund.   | X                      | C9                  |  |                          | ALL                   |
| 9        | C9 Ensure continuity and over-lap of key satellite sensors; recording and archiving of all satellite metadata; maintaining currently adopted data formats for all archived data; providing data service systems that ensure accessibility; undertaking reprocessing of all data relevant to climate for inclusion in integrated climate analyses and reanalyses. | X                      | C10                 | C.0<br>C.1<br>C.3<br>C.4<br>C.7<br>C.8 | C-1<br>C-2<br>C-3        | WGISS, Maiden, Pakorn |
| 10       | C10 Achieve adoption of the GCOS dataset and product guidelines, critical comparison of datasets/products and advice on product generation for all ECVs by the climate community.  | X                      |                     |  |                          | All                   |



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|----------|--|------------------------|---------------------|--------------------|--------------------------|--------------------|
| A7       | Ensure continuity of satellite precipitation products.   | X                      |                     |                    |                          | Neeck, Riko        |
| A10      | Ensure continuous generation of wind-related products from AM and PM satellite scatterometers or equivalent observations.  | X                      | A11                 | A.1                | A-1                      | Wilson, Bonekamp   |
| A18      | Implement and evaluate a satellite climate calibration mission, e.g. CLARREO .   | X                      |                     |                    | A-5                      | SBA Team           |
| A19      | Ensure the continued derivation of MSU-like radiance data and establish FCDRs from the high-resolution IR sounders, following the GCMPs.   | X                      | A19                 | A.2                |                          | SBA Team           |
| A20      | Ensure the continuity of the constellation of GNSS RO satellites.  | X                      |                     |                    |                          | Ector, VonEngen    |
| A22      | Ensure continuation of the measurements needed to extend the climate data record of visible and infrared radiances, e.g., from the International Satellite Cloud Climatology Project, and include additional data streams as they become available. Pursue reprocessing as continuous activity taking into account lessons learnt from preceding research. | X                      | A22                 | A.4                | A-3                      | SBA Team           |
| A23      | Research to improve observations of the three-dimensional spatial and temporal distribution of cloud properties.   | X                      | A23                 | A.4                | A-3                      | SBA Team           |
| A24      | Ensure continuation of Earth Radiation Budget observations.  | X                      | A24                 | A.6                | A-5<br>A-6               | SBA Team           |
| A25      | Establish long-term series of limb-scanning satellite measurements of profiles of water vapour, ozone and other important species from the UT/LS up to 50km.   | X                      |                     |                    |                          | Hilsenrath, Eckman |
| A26      | Establish a network of ground stations (MAXDOAS, lidar, FTIR) capable of validating satellite remote sensing of the troposphere.   | X                      |                     |                    |                          |                    |
| A27      | Maintain and enhance the GCOS Comprehensive Networks for CO2 and CH4 coordinated by WMO GAW.   | X                      | A27                 | A.9                | A-10                     | Hilsenrath, Eckman |

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| A28      | Assess the value of the data provided by current space-based measurements of CO2 and CH4, and develop and implement proposals for follow-on missions accordingly.   | X                      |                     |                    |                          | Hilsenrath, Eck |
| A31      | Continue production of satellite ozone data records (column, tropospheric ozone and ozone profiles) suitable for studies of interannual variability and trend analysis. Reconcile residual differences between ozone data sets produced different satellite systems.  | X                      |                     |                    |                          | Hilsenrath, Eck |
| A32      | Develop and implement a coordinated strategy to monitor and analyze the distribution of aerosols and aerosol properties. The strategy should address the definition of a baseline GCOS network or networks for in-situ measurements, assess the needs and capabilities for operational and research satellite missions for the next two decades, and propose arrangements for coordinated mission planning. | X                      | A31                 | A.8<br>C.7         | A-9<br>C-1<br>C-2<br>C-3 | SBA Team        |
| A33      | Ensure continuity of products based on space-based measurement of the precursors (NO2, SO2, HCHO and CO in particular) of ozone and aerosols and derive consistent emission databases, seeking to improve temporal and spatial resolution.  | X                      |                     |                    |                          | Hilsenrath, Eck |

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|----------|--|------------------------|---------------------|--------------------|------------------------------|-----------------------------------|
| O04      | Ensure coordinated implementation of CEOS Virtual Constellations for each ocean surface ECV, in relation to in-situ ocean observing systems.   | X                      | O7                  |                    |                              | Wilson, Bonekamp                  |
| O07      | Continue the provision of best possible SST fields based on a continuous coverage-mix of polar orbiting IR and geostationary IR measurements, combined with passive microwave coverage, and appropriate linkage with the comprehensive in situ networks noted in O8. | X                      | O9                  | O.3                | O-6<br>O-7<br>O-8<br>O-9     | Wilson, Dowell, SBA Team          |
| O10      | Ensure continuous coverage from one high-precision altimeter and two sunsynchronous, higher-resolution altimeters  | X                      | O12                 | O.2                | O-4<br>O-5                   | Wilson, Bonekamp                  |
| O12      | Research programmes to demonstrate feasibility of utilizing satellite data to help resolve global fields of SSS.   | X                      | O16                 |                    |                              | SBA Team                          |
| O15      | Implement plans for an Ocean Colour Radiometry (OCR) Virtual Constellation (VC)  | X                      | O18                 | O.4                | O-10<br>O-11<br>O-12<br>O-13 | Dowell, Hiroshi                   |
| O20      | Ensure sustained satellite-based (microwave, SAR, visible and IR) sea-ice products.  | X                      | O23                 | O.1                | O-1<br>O-2<br>O-3            | SBA Team                          |
| O28      | Develop projects designed to assemble the in situ and satellite data into a composite reference reanalysis dataset, and to sustain projects to assimilate the data into models in ocean reanalysis projects.   | X                      | O29                 |                    |                              | Dowell, Hiroshi, Wilson, Bonekamp |
| O41      | Promote and facilitate research and development (new improved technologies in particular), in support of the global ocean observing system for climate.  | X                      | O3                  |                    |                              | Dowell, Hiroshi, Wilson, Bonekamp |

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| T3       | Development of a subset of current LTER and FLUXNET sites into a global reference network for ecological monitoring sites with sustained funding perspective.   | X                      | T3<br>T29           |                    |                          | Lecomte, WGCV    |
| T6       | Submit weekly/monthly lake level/area data to the International Data Centre; submission of weekly/monthly altimeter-derived lake levels by space agencies to HYDROLARE.   | X                      | T6                  | T.1.1<br>T.1.2     |                          | Wilson, Bonekamp |
| T8       | Submit weekly surface and sub-surface water temperature, date of freeze-up and date of break-up of lakes in GTN-L to HYDROLARE.   | X                      | T8                  | T.1.3              |                          | SBA Team         |
| T11      | Develop a record of validated globally gridded near surface soil moisture from satellites   | X                      |                     |                    |                          | SBA Team         |
| T12      | Develop Global Terrestrial Network on Soil Moisture   | X                      |                     |                    |                          | SBA Team         |
| T14      | Obtain integrated analyses of snow cover over both hemispheres.   | X                      | T11                 | T.3                |                          | SBA Team         |
| T16      | Ensure continuity of laser, altimetry and gravity satellite missions adequate to monitor ice masses over decadal timeframe.   | X                      | T14                 | T.2.2              |                          | SBA Team         |
| T21      | Implement operational mapping of seasonal soil freeze/thaw through an international initiative for monitoring seasonally-frozen ground in non-permafrost regions  | X                      | T17                 | T.3                |                          | SBA Team         |
| T22      | Obtain, archive and make available in-situ calibration/validation measurements and collocated albedo products from all space agencies generating such products, and promote benchmarking activities to assess the quality and reliability of albedo products. | X                      | T19                 |                    |                          | Lecomte, WGCV    |
| T23      | Implement globally coordinated and linked data processing to retrieve land surface albedo from a range of sensors on a daily and global basis, using both archived and current Earth Observation systems.   | X                      | T21                 | T.4                |                          | Holm, LSI        |
|          | Produce reliable, accepted methods for land cover map   |                        |                     |                    |                          |                  |

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| T24      | Produce reliable accepted methods for land-cover map accuracy assessment.  | X                      | T23                 |                    |                          | Holm, LSI          |
| T25      | Develop an in situ reference network and apply CEOS WGCV validation protocols for land cover.  | X                      | T25                 |                    |                          | Lecomte, WGCV      |
| T26      | Generate annual products documenting global land-cover characteristics at resolutions between 250m and 1km, according to internationally-agreed standards and accompanied by statistical descriptions of their accuracy.                                     | X                      | T26                 | T.5.1              |                          | Holm, LSI          |
| T27      | Generate maps documenting global land cover based on continuous 10-30m land surface imagery every 5 years, according to internationally-agreed standards and accompanied by statistical descriptions of their accuracy                                       | X                      | T27                 | T.5.1<br>T.5.2     |                          | Holm, LSI          |
| T28      | Establish a calibration/validation network of in situ observing sites for FAPAR and LAI (reference sites) and conduct systematic, comprehensive evaluation campaigns to understand and resolve differences between the products and increase their accuracy. | X                      | T29                 |                    |                          | Lecomte, WGCV      |
| T29      | Evaluate the various LAI satellite products and benchmark them against in situ measurements to arrive at an agreed operational product.  | X                      | T30                 |                    |                          | Lecomte, WGCV      |
| T30      | Operationalize the generation of FAPAR and LAI products as gridded global products at spatial resolution of 2 km or better over time periods as long as possible.  | X                      | T28                 | T.6<br>T.7         |                          | Holm, LSI, Csiszar |
| T31      | Develop globally gridded demonstration datasets of above ground biomass across all biomes  | X                      |                     |                    |                          | Holm, LSI, Csiszar |
| T33      | Develop globally gridded estimates of terrestrial carbon flux from in situ observations and satellite products and assimilation/inversions models.   | X                      |                     |                    |                          | Holm, LSI, Csiszar |
| T34      | Reanalyze the historical fire disturbance satellite data (1982 to present).  | X                      | T32                 |                    |                          | Csiszar            |
|          | Continue generation of burnt area, active fire and FRP products from low orbit satellites consistent, including  | X                      |                     |                    |                          |                    |

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| T35      | Continue generation of burnt area, active fire and FRP products from low orbit satellites consistent, including version intercomparisons to allow un-biased, long-term record development. | X                      | T33                 | T.9                |                          | Csiszar             |
| T36      | Apply CEOS WGCV and GOFC-GOLD validation protocol to fire disturbance data.  | X                      | T34                 |                    |                          | Lecomte, WGCV, Holm |