

CEOS Climate Coordination

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Two Important Tasks

- WP4300: CEOS Progress Report update to UNFCCC SBSTA Due: September 2010
 - Coordinated Response to first GCOS IP delivered to SBSTA in 2006
 - Progress report delivered to SBSTA in 2008
 - CEOS invited to provide update to SBSTA in 2010
- WP4200: CEOS Coordinated Response to new GCOS-IP Due: May 2011
 - Example of the new GCOS actions (draft) is in backup section

New CEOS Response to GCOS-IP 2010

- Good opportunity for a new CEOS response with more actionable actions and identification of lead groups to coordinate.
 - For example: **Action A31** “Continue production of satellite ozone data records suitable for studies of interannual variability and trend analysis. Reconcile residual differences between ozone data sets produced by different satellite systems” needs ownership for international coordination and then development of strategy and work plan with level of effort that needs to then be aligned with agencies’ climate program.

IMPORTANT to assign ownership for each ECV., Who owns A31?

Its important not to simply respond by saying that CEOS agencies will continue production of satellite ozone Where’s the beef!!

Is it only ACC, or does it include other international groups? Important to identify all groups! ACC please identify other groups (if any).

In Addition Establishing CEOS Climate Working Group

- Mission: coordinating the implementation of the CEOS climate activity plans from the various CEOS Agencies
 - Review generation of FCDRs and derived ECV satellite products by Member Space Agencies
 - Identify multi-agency implementation teams for each product and review their actions
 - Ensure coherent implementation plan exists for each product
 - Ensure coordination of climate product generation with other relevant international initiatives
 - Make recommendations to above teams and receive recommendations from them, for transmission to CEOS Plenary
 - Ensure compliance of satellite products with GCOS Monitoring Principles and with the GCOS 128 doc*.

*: Guideline for the Generation of Satellite-based
Datasets and Products meeting GCOS Requirements

Approach

- Identify domain leads (atmos, ocean, land)
- Coordinate with CEOS working groups, CEOS virtual constellations, and Climate related external groups (e.g. SCOPE-CM, GSICS, WCRP), and experts to develop plans responding to the GCOS IP10 actions.
- Plans must be actionable with high level of effort identified.
 - Meet with constellation leads at the climate side meeting on October 11, CEOS Plenary to discuss and agree to template and level of information needed for the response.
- Groups need to reach into the expert community, including authors contributing to the original CEOS response to the 2004 GCOS IP
- CWG will be involved in developing plan and use this information as part of their agencies' planning.

Domain Leads/Participants (current)

- Atmosphere - Goldberg, Privette, 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

Summary

- CEOS has a significant task to respond to the latest GCOS IP.
- Will ask for completed templates by January 2011 for SIT annual working meeting
- Proposing CEOS/WCRP/WMO/...Workshop to review and further develop responses and to promote community participation in the CEOS response.



Backup



New 2010 GCOS-IP Relevant Satellite Actions (draft)

Satellite-based ECVs

Atmosphere	Surface (0, 0, 6)	Air Temperature; Precipitation ; Air pressure; Water vapour; Surface radiation budget; Wind Speed & direction;
	Upper air (1, 1, 3)	Cloud properties, Wind speed & direction Earth radiation budget; Upper-air temperature; Water vapour;
	Composition (3, 0, 0)	Carbon dioxide Methane & other GHGs; Ozone; Aerosol properties
Ocean	Surface (4, 2, 1)	Sea-surface Temp; Sea-level; Sea-ice; Ocean colour; Sea state; Sea-surface salinity Carbon dioxide partial pressure
	Sub-surface (0, 0, 7)	Temperature; Salinity; Current; Nutrients; Carbon; Ocean tracers; Phytoplankton
Terrestrial (3, 7, 4)	Glaciers & ice caps; Land Cover; Fire disturbance Fraction of absorbed photo-synthetically active radiation; LAI , Albedo Biomass, Lake levels, Snow cover, Soil moisture Water use, Ground water, River discharge Permafrost and seasonally-frozen ground	

ACTION #	DESCRIPTION	Space Agencies Action?	(GCOS 92) Reference	GCOS 107 Product #	CEOS 59 Climate Action #
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			
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			
4	C4 Report to the UNFCCC on systematic climate observations using current guidelines.	X	C4		
5	C6 Ensure an orderly process for sustained operation of research-based networks and systems for ECVs.	X	C7	C.6	
7	C7 Ensure all climate observing activities adhere to the GCMPs.	X	C8	C.3 C.4	
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		
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 C.1 C.3 C.4 C.7 C.8	C-1 C-2 C-3
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			

ACTION #	DESCRIPTION	Space Agencies Action?	(GCOS 92) Reference	GCOS 107 Product #	CEOS 59 Climate Action #
A7	Ensure continuity of satellite precipitation products.	X			
A10	Ensure continuous generation of wind-related products from AM and PM satellite scatterometers or equivalent observations.	X	A11	A.1	A-1
A18	Implement and evaluate a satellite climate calibration mission, e.g. CLARREO .	X		A.5	
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	
A20	Ensure the continuity of the constellation of GNSS RO satellites.	X			
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
A23	Research to improve observations of the three-dimensional spatial and temporal distribution of cloud properties.	X	A23	A.4	A-3
A24	Ensure continuation of Earth Radiation Budget observations.	X	A24	A.6	A-5 A-6
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			
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 CO ₂ and CH ₄ coordinated by WMO GAW.	X	A27	A.9	A-10

ACTION #	DESCRIPTION	Space Agencies Action?	(GCOS 92) Reference	GCOS 107 Product #	CEOS 59 Climate Action #
A28	Assess the value of the data provided by current space-based measurements of CO ₂ and CH ₄ , and develop and implement proposals for follow-on missions accordingly.	X			
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			
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 C.7	A-9 C-1 C-2 C-3
A33	Ensure continuity of products based on space-based measurement of the precursors (NO ₂ , SO ₂ , HCHO and CO in particular) of ozone and aerosols and derive consistent emission databases, seeking to improve temporal and spatial resolution.	X			

ACTION #	DESCRIPTION	Space Agencies Action?	(GCOS 92) Reference	GCOS 107 Product #	CEOS 59 Climate Action #
O4	Ensure coordinated implementation of CEOS Virtual Constellations for each ocean surface ECV, in relation to in-situ ocean observing systems.	X	O7		
O7	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 O-7 O-8 O-9
O10	Ensure continuous coverage from one high-precision altimeter and two sunsynchronous, higher-resolution altimeters	X	O12	O.2	O-4 O-5
O12	Research programmes to demonstrate feasibility of utilizing satellite data to help resolve global fields of SSS.	X	O16		
O15	Implement plans for an Ocean Colour Radiometry (OCR) Virtual Constellation (VC)	X	O18	O.4	O-10 O-11 O-12 O-13
O20	Ensure sustained satellite-based (microwave, SAR, visible and IR) sea-ice products.	X	O23	O.1	O-1 O-2 O-3
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		
O41	Promote and facilitate research and development (new improved technologies in particular), in support of the global ocean observing system for climate.	X	O3		

ACTION #	DESCRIPTION	Space Agencies Action?	(GCOS 92) Reference	GCOS 107 Product #	CEOS 59 Climate Action #
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 T29		
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 T.1.2	
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	
T11	Develop a record of validated globally gridded near surface soil moisture from satellites	X			
T12	Develop Global Terrestrial Network on Soil Moisture	X			
T14	Obtain integrated analyses of snow cover over both hemispheres.	X	T11	T.3	
T16	Ensure continuity of laser, altimetry and gravity satellite missions adequate to monitor ice masses over decadal timeframe.	X	T14	T.2.2	
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	
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		
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	
	Produce reliable accepted methods for land cover map				

ACTION #	DESCRIPTION	Space Agencies Action?	(GCOS 92) Reference	GCOS 107 Product #	CEOS 59 Climate Action #
T24	Produce reliable accepted methods for land-cover map accuracy assessment.	X	T23		
T25	Develop an in situ reference network and apply CEOS WGCV validation protocols for land cover.	X	T25		
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	
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 T.5.2	
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		
T29	Evaluate the various LAI satellite products and benchmark them against in situ measurements to arrive at an agreed operational product.	X	T30		
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 T.7	
T31	Develop globally gridded demonstration datasets of above ground biomass across all biomes	X			
T33	Develop globally gridded estimates of terrestrial carbon flux from in situ observations and satellite products and assimilation/inversions models.	X			
T34	Reanalyze the historical fire disturbance satellite data (1982 to present).	X	T32		
	Continue generation of burnt area, active fire and FRP products from low orbit satellites consistent, including	X			



ACTION #	DESCRIPTION	Space Agencies Action?	(GCOS 92) Reference	GCOS 107 Product #	CEOS 59 Climate Action #
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	
T36	Apply CEOS WGCV and GOFC-GOLD validation protocol to fire disturbance data.	X	T34		



CEOS Climate Actions 2006

In response to GCOS 92 and 107



= newly started actions in 2009

Atmospheric Domain



= priority 1 actions



Action A-1: In 2007 CEOS agencies will review the capability of passive microwave sensors to make scatterometer-quality measurements and will work to ensure A.M. and P.M. satellite coverage of surface wind speed and direction by 2015.



Action A-2: CEOS will strive to ensure continuity of GPS RO measurements with, at a minimum, the spatial and temporal coverage established by COSMIC by 2011. CEOS will continue efforts in 2007 to exploit the complementary aspects of radiometric and geometric upper-air determinations of temperature and moisture.



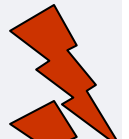
Action A-3: CEOS will support in 2007 investigations of cloud properties and cloud trends from combined satellite imager plus sounder measurements of clouds (with horizontal as well as vertical information) using Cloudsat/CALIPSO for validation.



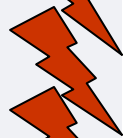
Action A-4: CEOS agencies will ensure continued improvements to precipitation determinations demonstrated by TRMM and planned by GPM in 2010. The Japan Aerospace Exploration Agency (JAXA) and the National Aeronautics and Space Administration (NASA) will lead a CEOS study team to establish, by 2007, the basis for a future Global Precipitation Constellation.



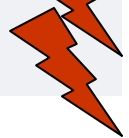
Action A-5: CEOS will plan by 2011 to make absolute, spectrally resolved measurements of radiance emitted and reflected by the Earth to space for information on variations in both climate forcings and responses.



Action A-6: CEOS agencies will participate in re-planning, by 2007, the Earth Radiation Budget Sensor (ERBS) removed from the planned payload of NPOESS.




Action A-7: CEOS agencies will participate in re-planning, by 2007, the Total Solar Irradiance Sensor (TSIS) removed from the planned payload of NPOESS.




Action A-8: CEOS agencies will participate in re-planning, by 2007, the OMPS limb instrument removed from the planned payload of NPOESS.


Atmospheric Domain

A red lightning bolt icon pointing downwards.


Action A-9: CEOS agencies will participate in re-planning, by 2007, the APS instrument removed from the planned payload of NPOESS.

A solid blue circle icon.

Action A-10: CEOS agencies will participate in planning, by 2011, the operational follow-on to the chemistry missions planned for the next 5 to 7 years.

A solid blue circle icon.

Action A-11: CEOS agencies will commit in 2007 to reprocessing the geostationary satellite data for use in reanalyses projects before the end of the decade.

A solid blue circle icon.

Action A-12: CEOS will determine options by 2010 for continuing improvements to wind determinations demonstrated by MODIS and to be demonstrated by ADM Aeolus.

Ocean Domain

Action O-1: CEOS agencies will examine their respective plans to maintain provision of microwave brightness temperatures and visible/infrared radiances for the sea ice ECV.

Action O-2: Relevant CEOS space agencies will consult with the science community on appropriate retrieval algorithms of passive microwave observation for reprocessing sea-ice products. Norway has expressed interest in committing to operational production of a global sea ice ECV (an initiative by the Norwegian Meteorological Institute, and coordinated by the Norwegian Space Center). The European Space Agency (ESA) is currently reprocessing the relevant ERS and Envisat archive to complement Canada's Radarsat in the context of WCRP's Climate and the Cryosphere (CLiC) core project.

Action O-3: New space-based measurements and products, including ice thickness and ice drift, will be considered by CEOS agencies as part of their future research missions.

Action O-4: The National Oceanic and Atmospheric Administration (NOAA) and EUMETSAT will lead a CEOS study team to establish, by 2007, the basis for a future Ocean Surface Topography Constellation that satisfies the threshold requirements for the sea level ECV (and those of the sea state ECV). This will include consideration of a future Jason-3 mission and requirements for new altimeter technologies to improve spatial resolution and extend observations in coastal regions (and over lakes and rivers for the lakes ECV).

Action O-5: The Centre National d'Etudes Spatiales (CNES) and the Indian Space Research Organization (ISRO) will cooperate on a new polar-orbiting altimeter aimed at filling a potential data gap beyond 2008. ESA and the European Union (EU) will lead planning for Sentinel-3 carrying an altimeter to complement spatial/temporal coverage of the sea level (and sea state) ECVs (and possibly sea ice extent and thickness, river, and lake level with the altimeter operating in Synthetic Aperture Radar (SAR) mode beyond 2012).

Action O-6: An ATSR-like instrument is planned on ESA's Sentinel 3, presently scheduled for launch in 2012. JAXA will lead planning for Global Change Observation Mission-Water (GCOM-W) and GCOM-C (Climate) to maintain continuity of the sea surface temperature ECV.

Ocean Domain

Action O-7: CEOS agencies will examine their respective plans to maintain provision of microwave brightness temperatures for the sea surface temperature ECV.

Action O-8: Relevant CEOS agencies will examine their respective plans to maintain continuity of a 10-km-resolution sea surface temperature data sets global product.

Action O-9: CEOS agencies will cooperate to support the combination of all existing sea surface temperature data sets into a global FCDR.

Action O-10: ISRO will lead planning of Oceansat-2, ESA and the EU of Sentinel-3, and JAXA of GCOM-C, which are all new missions planned to carry an ocean colour sensor.

Action O-11: Relevant CEOS agencies will examine their respective plans to maintain continuity of the 25-km-resolution ocean colour global product.

Action O-12: CEOS agencies will cooperate to support the combination of all existing ocean colour data sets into a global FCDR.

Action O-13: In consultation with GCOS and the relevant user communities, CEOS agencies will explore the means to secure, by 2011, continuity of the 1-km-resolution global ocean colour product needed to fulfil the target GCOS requirements.

Action O-14: CEOS agencies will cooperate with the user community to support efforts aimed at building on the decade-long satellite sea state records and making a comprehensive use of future altimeter- and SAR-bearing missions.

Action O-15: ESA will fly SMOS in 2007 to demonstrate measurement of the sea surface salinity (and soil moisture) ECV; NASA/CONAE will fly Aquarius/SAC-D in 2009 to demonstrate measurement of the sea surface salinity ECV.

Action O-16: CEOS agencies will cooperate in developing future plans for an Ocean Salinity Constellation.


Ocean Domain

● **Action O-17:** CEOS agencies will undertake planning for reprocessing past data to improve FCDRs and legacy databases (e.g., AVHRR Pathfinder, ATSR, Sea Level Pathfinder, and the sea ice ECV) in close coordination and partnership with existing advisory groups and reanalysis centres. All Level 2 data products for use in reanalysis should be properly accompanied by estimates of their uncertainty.

● **Action O-18:** CEOS, through its Working Group on Calibration and Validation (WGCV) and in the context of developing standards for on-going missions and for the Constellations, will recommend best practices for pre-launch and onboard calibration of ocean sensors and for validation of space-based ocean observations with in situ sensors, including the establishment and maintenance of calibration and validation sites and networks. This will facilitate the combination of data from different sources and enable the establishment of global data sets and long-term series.


● **Action O-19:** CEOS agencies, in cooperation with other partners, will support planning for a follow-on to GODAE by 2007.

Terrestrial Domain




Action T-1: CEOS agencies will determine which alternative approach best fills the current Landsat-class data gap and will explore the potential of integrating high-resolution data from multiple platforms (e.g., China-Brazil Earth Resources Satellite (CBERS), Indian Remote Sensing (IRS) satellite, Landsat, Satellite Pour l'Observation de la Terre (SPOT), and others) based on the results of a CEOS study team led by the United States Geological Survey (USGS) that will establish, by 2007, the basis for a future Land-Surface Imaging Constellation.


Action T-2: CEOS agencies will assess the feasibility of generating global historic and continuing ECVs at fine resolutions for land cover and glacier change.



Action T-3: CEOS (led by USGS and NOAA), in cooperation with relevant stakeholders, will explore the feasibility, by 2007, of retrieving and reprocessing the 1-km AVHRR data record from various centralized archives (NOAA and High Resolution Picture Transmission (HRPT) stations).




Action T-4: CEOS will work to enhance the quality of the FCDRs and the ECVs generated from the AVHRR record to meet threshold requirements.



Action T-5: CEOS agencies will undertake research to support satellite technology development, such as lidar or P-band sensors, that are capable of retrieving biomass and LAI globally that meet GCOS requirements. CEOS agencies will also support research to improve algorithms that do not currently meet GCOS threshold requirements. New satellite technology and algorithms should be available by 2015.


Action T-6: CEOS will assess the feasibility of collecting operational multi-angle observations. Research will be carried out by CEOS agencies to improve radiation transfer schemes for albedo and fAPAR, especially under cloudy conditions.

Cross Cutting




Action C-1: CEOS will review the prevailing institutional arrangements in place for the planning and implementation of cooperative efforts by space agencies in the domain of climate (among others) by 2007. In particular CEOS agencies will review the ways to improve coordination of future remote sensing tasks that address the upcoming space-based measurement challenges, so as to avoid duplication of efforts while taking cooperation between the international partners to a higher level.

Action C-2: CEOS agencies will work with GEO to leverage progress and results from the implementation actions for climate to benefit all other relevant SBAs.




Action C-3: CEOS will work with GCOS to periodically evaluate climate needs and their realization.




Action C-4: CEOS agencies will adjust their internal procedures and mechanisms relative to satellite mission planning and operating processes in order to ensure adequate adherence to the GCMPs.

Action C-5: CEOS agencies will review their respective satellite data records with particular attention to adherence to the GCMPs and will consider undertaking necessary corrective actions within available resources.


Action C-6: CEOS will consider the GCMPs and relevant ECV requirements in defining criteria that will serve as the foundation for the CEOS Constellation studies being initiated in 2006 and beyond.



Action C-7: CEOS agencies will increase their cooperation in ensuring stability, accuracy, and inter-comparability of their respective satellite observations. These observations will be tied to irrefutable international standards in order to enhance the utility of space programmes for climate applications.



Action C-8: CEOS agencies will contribute to development of GSICS under development by CGMS and WMO to better integrate calibration efforts. Furthermore, CEOS agencies will continuously pursue establishment of reference measurements in space, complementing those on the ground and in the air, which will enable absolute inter-calibration of radiance measurements.



Action C-9: CEOS will charge its WGCV to promote existing in situ networks, identify new opportunities for product validation, and support both validation research and operational validation projects at an adequate level.

Cross Cutting

Action C-10: CEOS agencies will coordinate their efforts in designing future data archives and data dissemination systems, ensuring that past data holdings (including associated metadata) are preserved, assessing standards and protocols, and incorporating new information technology (IT) developments as much as possible. Practical actions in response to this cross-cutting need will be developed by CEOS' Working Group on Information Systems and Services (WGISS) in line with the technical solutions adopted by GEO.

Action C-11: CEOS agencies will systematically consult with appropriate scientific and user advisory groups in establishing detailed specifications for each FCDR and derived products, including associated uncertainties.

Action C-12: CEOS agencies will consult on appropriate rules to ensure sustained, open accessibility to FCDRs in order to allow the periodic reprocessing and generation of homogeneous products.

Action C-13: CEOS agencies will generate, within available resources, independently processed data sets and products.

Action C-14: Recognising that space agencies are responsible for only a portion of the value chain involved in the generation of FCDRs, CEOS will explore ways to strengthen linkages to the communities involved in climate product generation and use, e.g., through framework agreements with major reanalysis centres.

Action C-15: CEOS agencies will encourage funding of climate change research at an adequate level for multiple groups to analyze data records, reprocess climate variables, and perform reanalysis.


Action C-16: CEOS agencies will consider, in the context of the Constellations, ways and means to support the transfer of demonstrated observations from research satellites into operational capabilities. In particular, CEOS will encourage "convergence" of climate-observing requirements (usually for high-quality data) with operational requirements (usually for rapid and ensured data availability), and support institutional arrangements that would help transfer ECVs from research to operations

Cross Cutting


Action C-17: CEOS agencies will maintain R&D efforts aimed at confronting the knowledge challenge posed by climate and climate change, and strive to overcome the current scientific and technical limitations of climate-quality measurements.

Action C-18: CEOS agencies will ensure that data acquired through research satellites are fully used for the benefit of creating and/or improving the FCDRs of all ECVs.

Action C-19: CEOS agencies will continue to devote particular efforts to the reprocessing and improvement of these fundamental data sets.

 **Action C-20:** CEOS agencies will endeavour to ensure global, easy, and timely access to climate-related products, including by developing countries.

Action C-21: CEOS will establish a programme in 2007 to document the data archive and access arrangements in place for each of the FCDRs contributed by space agencies. WGISS will lead this effort in order to evaluate practical solutions to current obstacles and issues.

 **Action C-22:** CEOS agencies will continue their efforts, both individually and through the CEOS Working Group on Education and Training (WGEdu), to build capacity.