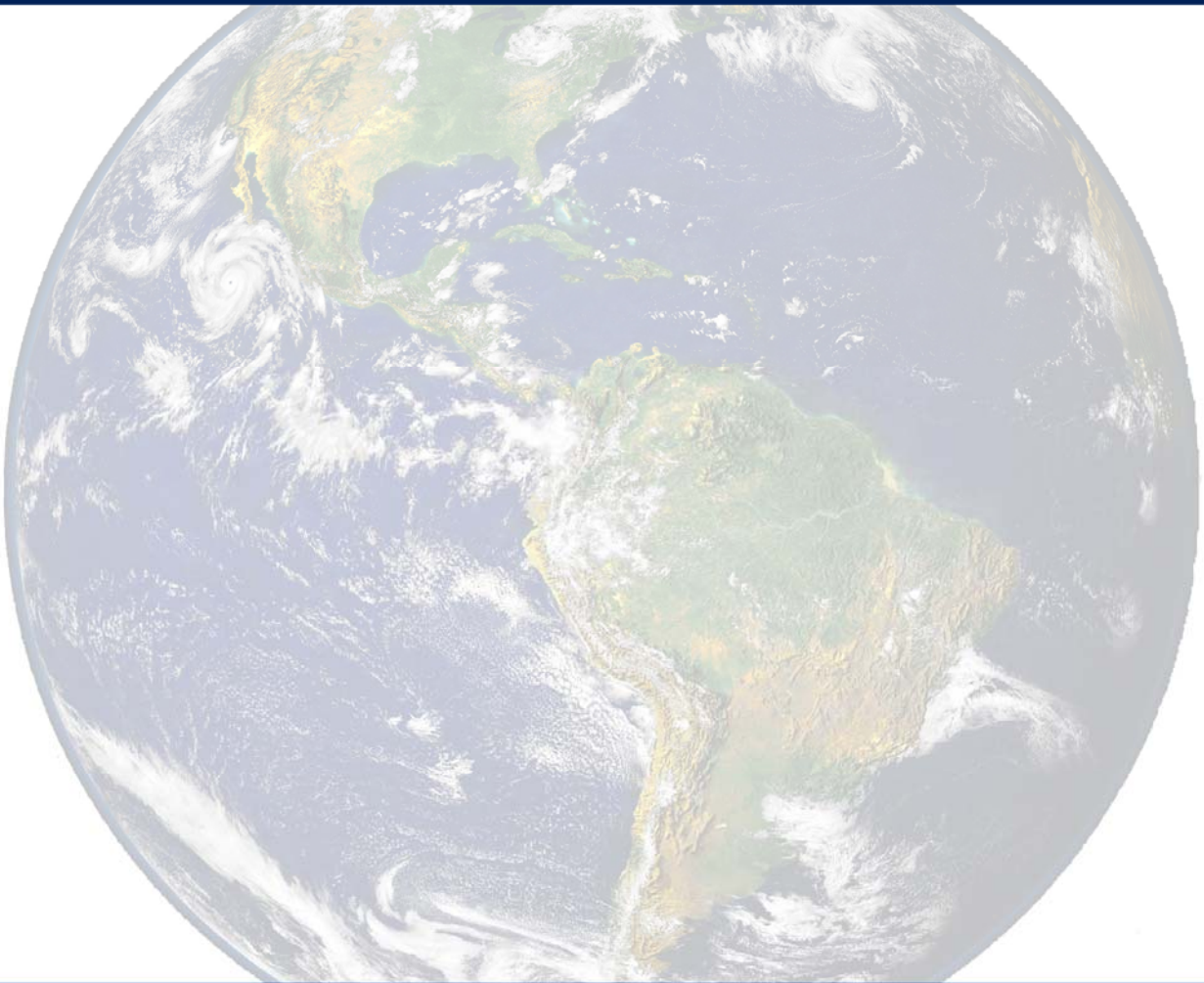


Committee on Earth Observation Satellites



CEOS 2014-2016 Work Plan



Version: June 2014

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1 Introduction and Overview

The *2014 CEOS Work Plan* has been developed by the CEOS Executive Officer (CEO) and the CEOS Chair (European Organisation for the Exploitation of Meteorological Satellites [EUMETSAT]), in consultation with the CEOS Strategic Implementation Team (SIT) Chair (Centre National d'Études Spatiales [CNES]), CEOS Secretariat (SEC), CEOS Working Groups (WG), CEOS Virtual Constellations (VC), CEOS Ad Hoc Teams, the CEOS membership at large, and CEOS's external stakeholders. The purpose of this document is to set forth near-term objectives and deliverables designed to achieve the goals outlined in the *CEOS Strategic Guidance* document. It includes a description of CEOS activities to be executed in the current calendar year (2014), and summarizes anticipated activities for the subsequent two years (2015-2016). Detailed information, including planned milestones and deliverables, accomplishments, and issues, is available and routinely updated in the CEOS Action Tracking System. Additional documents contributing information to this plan are located on the CEOS website (<http://ceos.org/>) and include *The Montreal Statement*, issued at the 27th CEOS Plenary Meeting in 2013; the *2013 CEOS Work Plan*; the terms of reference for the CEOS Virtual Constellations and Working Groups; and the *2015 Deliverables in Support of the GEOSS* (Global Earth Observation System of Systems). This Work Plan will be revised annually; however, the priorities and activities outlined herein are expected to remain fairly consistent from year to year. CEOS will revise this Work Plan each year, as current activities are completed, planned activities are executed, and new initiatives are projected.

CEOS Mission Statement:

CEOS ensures international coordination of civil space-based Earth observation programs and promotes exchange of data to optimize societal benefit and inform decision making for securing a prosperous and sustainable future for humankind.

To this end, CEOS's primary objectives are:

- To optimize the benefits of space-based Earth observation through cooperation of CEOS Agencies in mission planning and in the development of compatible data products, formats, services, applications and policies
- To aid both CEOS Agencies and the international user community by, among other things, serving as the focal point for international coordination of space-based Earth observation activities, including the Group on Earth Observations and entities related to global change
- To exchange policy and technical information to encourage complementarity and compatibility among space-based Earth observation systems currently in service or development, and the data received from them, as well as address issues of common interest across the spectrum of Earth observation satellite missions

Achievement of these three objectives requires significant internal, interagency coordination, and external consultation and coordination of outputs to respond to the needs of key stakeholders. These stakeholders consist of national governments, including the Group of Eight (G8) and the Group of 20 (G20) Industrialized Nations, the intergovernmental Group on Earth Observations (GEO), and organizations participating in treaties and global programs affiliated with the United

Nations (UN)¹. CEOS works closely with these stakeholders and their constituent organizations to achieve common objectives.

2 CEOS Priorities

As decided at the 2013 CEOS Plenary meeting in Montreal, Canada, CEOS Agencies will continue to enhance their cooperation to respond effectively to Earth observation users' needs by achieving integration across the full range of Earth observations, by closing important observational gaps, and by promoting the sharing of CEOS Agency data, and improving access to and use of such data. CEOS will support more effective societal decision making in the areas of climate monitoring and research; carbon observations, including observations to support the effective monitoring and management of the world's forested regions; food security; disaster risk management; biodiversity; capacity building; and data availability and access. CEOS Working Groups and Virtual Constellations will expand their technical and scientific coordination to support these priorities, and improve the overall level of complementarity and compatibility of their Earth observation and data management systems for societal benefit. CEOS will consider other requests from external stakeholders and determine what, if any, support is possible and appropriate. CEOS will also continue its outreach and communications efforts. As it executes these activities, CEOS will operate in accordance with the guidance provided in the *CEOS Governance and Processes* document regarding the organization's structure, processes, and stakeholder relations.

CEOS's internal and external coordination involve a considerable number of tasks supported by the full range of CEOS participants. This document is intended to provide overall guidance for CEOS on expected outcomes for CEOS and its stakeholders for 2014-2016. For 2014, the plan addresses CEOS initiatives at a general level. Specific details regarding support required to achieve these outcomes will be maintained by the respective responsible CEOS entities (e.g., CEOS Agencies, Working Groups, Virtual Constellations, Ad Hoc Teams), and reported as appropriate via updates to the online CEOS Action Tracking System (located at <http://ceos-actions.com>).

For subsequent years (2015-2016) this document summarizes planned CEOS activities more broadly; details regarding these future activities will be established in forthcoming updates of this document, as the activities near implementation. It is understood that the Virtual Constellations, Working Groups, and Ad Hoc Teams will prepare separate, more detailed Work Plans that complement this overall guiding Work Plan.

3 Expected Outcomes for 2014-2016

The expected outcomes for 2014-2016 reflect the ongoing and emerging priorities of CEOS, as characterized by its internal decision making and external commitments. They are intended to focus on improved Earth observation (EO) systems coordination and enhanced data access for key global programs and initiatives.

¹ These treaties, international organizations, and international programs include the UN Framework Convention on Climate Change (UNFCCC), the UN Commission on Sustainable Development (UNCSD), the UN Office for Disaster Risk Reduction (UNISDR), and the Convention on Biodiversity (CBD), among others.

The main outcomes are described for the following thematic areas for the period 2014-2016:

- 3.1. Climate Monitoring, Research, and Services
- 3.2. Carbon Observations, Including Forested Regions
- 3.3. Observations for Agriculture
- 3.4. Observations for Disasters
- 3.5. Capacity Building, Data Access, Availability and Quality
- 3.6. Advancement of the CEOS Virtual Constellations
- 3.7. Support to Other Key Stakeholder Initiatives
- 3.8. Outreach to Key Stakeholders
- 3.9. Organizational Issues

The outcomes for each thematic area are summarized in tables that list the objectives/deliverables, including projected completion dates (indicated by quarter of the calendar year), background information, and responsible CEOS entities.

CEOS operates on a best-efforts basis. Responsible CEOS entities are expected to accomplish the objectives and deliverables identified in this document to the best of their abilities, but there is no formal commitment to achieve the projected completion date.

3.1 Climate Monitoring, Research, and Services

- I. **Coordinate development of Climate Data Records (CDRs) and related datasets addressing Essential Climate Variables (ECVs) established by the Global Climate Observing System (GCOS).**

2014-2016: Through the CEOS/Coordination Group for Meteorological Satellites (CEOS/CGMS) Working Group on Climate (Joint WGClimate), CEOS Agencies will complete the first version of the ECV inventory. This inventory will then form the basis for a gap analysis and the subsequent development of a coordinated action plan to address the identified gaps and opportunities. Guidelines for ECV assessments of both process and scientific metrics will also be developed to support the gap analysis and subsequent development of the action plan. The ECV assessment guidelines will be applied in collaboration with the CEOS Virtual Constellations.

Once a first version of the ECV inventory, gap analysis and action plan have been delivered, the ECV inventory will be further developed with additional records, leading to new versions of the gap analysis and associated action plan to further optimize ECV coverage and depth. This update cycle is anticipated to start in the second half of the three-year period. Linkages will also be put in place between the ECV inventory and the *GCOS Implementation Plan 2010* reporting. In addition, an effort is underway to collaborate with the in situ community.

- II. **Continue cooperation with GEO, GCOS, the World Meteorological Organization (WMO), and the CGMS in the development of a space-based system to support climate information and adaptation.**

2014-2016: CEOS Agencies will continue to cooperate with GEO, GCOS, WMO, and CGMS by implementing Agency actions to achieve the socio-economic benefits described in the

CEOS-CGMS-WMO *Strategy Towards an Architecture for Climate Monitoring from Space*, with emphasis on the strategy’s Applications and Decision-Making pillars. CEOS will consider how to address and contribute to the WMO’s Global Framework for Climate Services (GFCS). CEOS will also broaden CEOS/CGMS reporting to the UN Framework Convention on Climate Change (UNFCCC) Subsidiary Body for Scientific and Technological Advice-Research and Systematic Observation (SBSTA-RSO) in collaboration with GCOS. This reporting should include not only CEOS and CGMS support to the GCOS Implementation Plan, but also CEOS contributions to the Global Forest Observations Initiative (GFOI) and *GEO Carbon Strategy*, together with any relevant CGMS-specific contributions.

Completion of the ECV inventory, gap analysis, and action plan will allow CEOS to provide continuous feedback to climate monitoring and research efforts. These actions will allow CEOS to be prepared to respond to the GCOS Adequacy Report/Satellite Supplement (or equivalent), when published by GCOS.

Climate Monitoring, Research, and Services Objectives/Deliverables: 2014-2016			
Objective/Deliverable	Projected Completion Date	Background Information	Responsible CEOS Entity
CMRS-1: ECV inventory (first version)	Q2 2014	The ECV inventory provides the foundation for the fulfillment of the three main objectives assigned to the Joint WGClimate. At the first meeting of the Joint Working Group in March 2014, the current status of the inventory will be reviewed in the three domains (land, ocean and atmosphere) and the actions needed to achieve "Version 1" status of the inventory will be identified.	Joint WGClimate with support from VCs
CMRS-2: Gap analysis (first version)	Q4 2014	Also, at the first meeting of the Joint Working Group, the reference process will be defined for the gap analysis (including guidelines for ECV assessments), together with the necessary tools to support the implementation of this process. The gap analysis activities will commence once (a) Version 1 of the ECV inventory is available, and (b) the reference process for the gap analysis and supporting tools are available.	Joint WGClimate with support from VCs
CMRS-3: Action plan (first version)	Q1 2015	Once the gap analysis has been completed, a coordinated action plan will be developed to: <ul style="list-style-type: none"> • Create the conditions for delivering further climate data records from existing observational data by targeting processing gaps/shortfalls/opportunities (e.g., cross-calibration, reprocessing) • Optimize the planning of future satellite missions and constellations to expand existing and planned climate data records, in terms of both coverage and record length, and to address gaps with respect to GCOS requirements 	Joint WGClimate with support from VCs

Climate Monitoring, Research, and Services Objectives/Deliverables: 2014-2016			
Objective/Deliverable	Projected Completion Date	Background Information	Responsible CEOS Entity
CMRS-4: Case studies linking CDRs to societal applications and informed policy decisions	Q1 2015	To provide a connection between the availability of climate data records and the socio-economic benefits that could accrue, particularly from a policy-making perspective, case studies will be performed to characterize the link between the <i>capability to make informed policy decisions</i> and the <i>availability of climate data record information</i> . These case studies will make use of the CEOS-CGMS-WMO climate monitoring architecture and are expected to involve drilling down within the Applications and Decision-making pillars of the architecture. One of the case studies will be in an application area of the Global Framework for Climate Services (GFCS)—see CMRS-5.	Joint WGClimate
CMRS-5: Contributions to the Global Framework for Climate Services (GFCS)	Q4 2014	The Joint Working Group will examine the most effective means of contributing to the GFCS from the viewpoints of (a) ensuring adequate representation of the capabilities and plans of CEOS and CGMS agencies, as represented by the ECV inventory, gap analyses and action plan, and (b) formalization of the relationship between the GFCS and the Joint Working Group, including possible GFCS representation in working group meetings.	Joint WGClimate
CMRS-6: Report to UNFCCC Subsidiary Body for Scientific and Technological Advice-Research and Systematic Observation (SBSTA-RSO) at COP-20	Q3 2014	This report will address CEOS and CGMS support to the GCOS Implementation Plan, as well as CEOS contributions to GFOI and <i>GEO Carbon Strategy</i> . In addition, relevant CGMS-specific activities may also be included. Furthermore, in preparation for COP-21, a set of actions will be identified at the SIT Technical Workshop in September 2014 for subsequent consideration at the CEOS Plenary in October 2014.	Joint WGClimate with support from GFOI and future CEOS carbon entities
CMRS-7: CEOS Response to the GCOS IP and Satellite Supplement for submission (via GCOS) to COP-21	Q2 2015	The draft CEOS response to the GCOS IP and Satellite Supplement will be presented for endorsement at SIT-30 in Spring 2015. Following endorsement, it will be integrated into the GCOS Progress Report in August/September 2015 for submission to COP-21.	Joint WGClimate
CMRS-8: Incorporation of in situ data holdings within the ECV inventory	Q4 2015	To extend the benefits of the infrastructure of the ECV inventory to climate-relevant in situ data holdings, in January 2013 it was agreed to assess the feasibility of incorporating such information within the scope of the ECV inventory. At the first meeting of the Joint Working Group, progress on this objective will be assessed.	Joint WGClimate

Climate Monitoring, Research, and Services Objectives/Deliverables: 2014-2016			
Objective/Deliverable	Projected Completion Date	Background Information	Responsible CEOS Entity
CMRS-9: Update of ECV inventory, gap analysis and action plan (Version 2)	Q2 2015 to Q4 2016	Once the first full cycle has been completed (see CMRS-1 to CMRS-3), resulting in Version 1 of the ECV inventory, gap analysis and action plan, a new cycle will be triggered by the availability of an updated ECV inventory, leading to Version 2 of these deliverables.	Joint WGClimate with support from VCs

3.2 Carbon Observations, Including Forested Regions

- I. **Coordinate space-based observations to support the effective monitoring and management of the world’s forested regions to support any future international climate agreement and support the Space Data Component of the GEO Global Forest Observations Initiative (GFOI).**

2014: Through its Ad Hoc Space Data Coordination Group (SDCG) for GFOI, CEOS is developing and coordinating the implementation of strategies for the provision of satellite observations in support of the development of national forest monitoring and measurement, reporting, and verification (MRV) systems. At the 29th Meeting of the CEOS Strategic Implementation Team (SIT-29), the SDCG received endorsement of the second element of *The CEOS Strategy for Space Data Coverage and Continuity in Support of the GEO Global Forest Observations Initiative (GFOI) and Forest Carbon Tracking (FCT) Task* (agreed at the 25th CEOS Plenary in 2011). This second element—the *Space Data Services Strategy for GFOI*—seeks to provide a coordinated strategy for national data acquisition that will accommodate countries that have specific technical requirements or heritage and experience with working with a particular EO data source or type. With the endorsement, the SDCG will work with several countries to develop pilot services during 2014.

The SDCG will continue to implement the first element of the CEOS Space Data Strategy for GFOI—the *Global Baseline Data Acquisition Strategy for GFOI*—and at SIT-29 received endorsement of the 2014 update to the strategy to reflect new data stream availability. The SDCG will develop the implementation plan for the *Space Data Services Strategy for GFOI* in 2014. A 2013 implementation report on global acquisitions was also presented at SIT-29.

2015-2016: The SDCG will deliver annual implementation updates to the *Global Baseline Data Acquisition Strategy for GFOI* and the *Space Data Services Strategy for GFOI* at the annual SIT meetings. The SDCG will continue to coordinate expanded coverage of the *Global Baseline Data Acquisition Strategy for GFOI*, culminating in global coverage in the 2016-2017 timeframe.

The SDCG will develop a strategy document for the supply of data in support of GFOI research and development (R&D) activities—the third element of the CEOS Space Data

Strategy for GFOI. It is expected that CEOS endorsement of this document will be sought at SIT-30 in 2015.

II. Publish the *CEOS Strategy for Carbon Observations from Space* and determine how CEOS can best implement the strategy.

2014: The CEOS Carbon Task Force (CTF) provided CEOS Agency representation to the GEO Carbon Community of Practice (CoP) and the development of the *GEO Carbon Strategy*—one of the first actions of the CoP. The *GEO Carbon Strategy* is a defining document for the GEO and carbon science communities. The CTF prepared the *CEOS Strategy for Carbon Observations from Space* in response to the *GEO Carbon Strategy*. The CEOS strategy addresses the three domains—atmospheric, oceanic and terrestrial—and their interfaces, and has identified a number of actions to be completed by space agencies.

CEOS participants at SIT-29 endorsed the CEOS strategy and discussed the best approach for assessing the feasibility of implementing the recommended actions. SIT-29 participants agreed to create an Ad Hoc Carbon Strategy Implementation Study Team to develop a set of implementation options for the recommended actions contained in the CEOS carbon strategy. The success of the process employed to manage the actions resulting from the CEOS response to the GCOS Implementation Plan can serve as a model for the carbon strategy approach.

2015-2016: CEOS will continue to track the status of the recommended actions identified in the *CEOS Strategy for Carbon Observations from Space*.

Carbon Observations, Including Forested Regions Objectives/Deliverables: 2014-2016			
Objective/Deliverable	Projected Completion Date	Background Information	Responsible CEOS Entity
CARB-1: Updated <i>Global Baseline Data Acquisition Strategy for GFOI</i>	Q1 2015	A baseline, coordinated global data acquisition strategy for GFOI was endorsed by CEOS in 2013. This strategy, also known as “Element-1,” utilizes freely available core data streams for global, systematic and sustained wall-to-wall acquisitions of forested areas. An update to this plan to reflect the addition of new data streams and annual implementation changes will be presented for endorsement at SIT-29. The SDCG will continue to coordinate the implementation of the strategy and to report annually to SIT.	SDCG for GFOI
CARB-2: Initial version of <i>Space Data Services Strategy for GFOI</i>	Q2 2014	GFOI will develop a coordinated strategy for national space data services, also known as “Element-2,” aiming to provide a coordinated strategy for national data acquisitions. The first version of this strategy will be presented for endorsement at SIT-29. The SDCG will coordinate the initial implementation of the strategy, and will report to SIT.	SDCG for GFOI

Carbon Observations, Including Forested Regions Objectives/Deliverables: 2014-2016			
Objective/Deliverable	Projected Completion Date	Background Information	Responsible CEOS Entity
CARB-3: Strategy on supply of data in support of GFOI R&D activities	Q2 2015	At the SDCG-5 meeting in 2014, it was confirmed that a strategy was required for the third element of the CEOS Space Data Strategy for GFOI, and that endorsement should be sought at SIT-30.	SDCG for GFOI
CARB-4: CEOS delivery of coordinated land surface observations for GFOI countries	Q4 2014	Support the delivery of a Data Services Pilot Project for Kenya, which will be developed by GFOI; the pilot will test data storage, processing, and archive search/discovery tools.	SDCG for GFOI
CARB-5: Updated <i>Global Baseline Data Acquisition Strategy for GFOI</i> and <i>Space Data Services Strategy for GFOI</i>	Q1 2016	Element-1 (data acquisition strategy) and Element-2 (data services) will require annual updates to reflect changes in space data assets and national implementation plans. It is expected that GFOI will reach full operational status in 2016-2017.	SDCG for GFOI
CARB-6: Endorsed <i>CEOS Strategy for Carbon Observations from Space</i>	Q2 2014	The <i>CEOS Strategy for Carbon Observations from Space</i> was under development for two years and underwent final revisions to ensure the strategy has feasible and executable actions identified. The <i>CEOS Strategy for Carbon Observations from Space</i> was endorsed at SIT-29.	CEOS Carbon Task Force (CTF)
CARB-7: Implementation plan for carbon observations	Q4 2014	Institutional responsibilities for implementation of the CEOS carbon strategy will be proposed and adopted by CEOS Plenary.	Ad Hoc Carbon Strategy Implementation Study Team

3.3 Observations for Agriculture

- I. **Develop and implement a data acquisition strategy to provide satellite observations that will facilitate the monitoring of agricultural production in support of the GEO Global Agricultural Monitoring (GEOGLAM) initiative.**

2014: GEOGLAM aims to enhance agricultural production estimates through the use of Earth observations, and to address concerns raised by the G20 Agricultural Ministers about market volatility for the world’s major crops. Through its Ad Hoc Working Group on GEOGLAM, CEOS has developed, and continues to coordinate the implementation of strategies for the provision of satellite observations to GEOGLAM. The GEOGLAM implementation plan (as documented in the *CEOS Acquisition Strategy for GEOGLAM Phase 1*) utilizes a phased approach to expand its efforts over a growing list of countries, increase the scope of the program, add datasets, and build capacity toward an operational program in ~2017.

The CEOS Ad Hoc Working Group on GEOGLAM provided an update on CEOS support to GEOGLAM Phase 1 implementation at SIT-29. The Ad Hoc Working Group will also submit an updated strategy for endorsement at CEOS Plenary in October 2014, in part addressing the potential for CEOS support to GEOGLAM Phase 2, depending on the maturity of the GEOGLAM Implementation Plan and availability of resources for Phase 2. GEOGLAM is expected to update its implementation plan in late 2014/early 2015.

The CEOS Ad Hoc Working Group on GEOGLAM will continue working with GEOGLAM to define their space data requirements, identify potential CEOS inputs, and track/report on the application of data provided by CEOS agencies. Through the CEOS Systems Engineering Office (SEO), CEOS will work with GEOGLAM (including Asia-RiCE) to define a number of prototypes for the CEOS Space Data Management System (SDMS).

The CEOS Ad Hoc Working Group on GEOGLAM supported the CEOS-GEOGLAM Co-Community meeting during February 2014 and a date for a follow-up Co-Community meeting will be sought later in 2014.

2015-2016: GEOGLAM will continue to expand its efforts by increasing the number of supported countries, expanding its use of mission data by utilizing new mission datasets (i.e., optical and radar), continuing development of sampling strategies, and investigating methods for data management and distribution. The Ad Hoc Working Group on GEOGLAM will update the *CEOS Acquisition Strategy for GEOGLAM Phase 1* to reflect the expansion of effort and changes to data supply arrangements.

II. Continue support to the Joint Experiments on Crop Assessment and Monitoring (JECAM) initiative.

2014-2016: JECAM was initiated in 2009 by the GEO Agriculture Monitoring Community of Practice (CoP) to enhance collaborative international research on agriculture through use of remotely-sensed EO. In 2011, CEOS initiated efforts to supply JECAM users with relevant remote sensing data through a coordinated EO data acquisition program involving CEOS Agencies and commercial data providers. CEOS Agencies will continue data acquisitions for support to JECAM research at selected sites for both Northern Hemisphere and Southern Hemisphere growing seasons. It is expected that these acquisitions will continue at least through the end of 2016, and be described in an annual report. CEOS Agencies will continue to liaise with the JECAM Project Office as it continues its research and development support for the GEOGLAM initiative.

Observations for Agriculture Objectives/Deliverables: 2014-2016			
Objective/Deliverable	Projected Completion Date	Background Information	Responsible CEOS Entity
AGRI-1: Updated Acquisition Strategy for GEOGLAM	Q4 2014	The <i>CEOS Acquisition Strategy for GEOGLAM Phase 1</i> spans the 2012-2014 timeframe and focuses on foundation activities, building on existing activities and pilot projects for a small number of countries, and scoping the program for future phases. Required updates to this document include the addition of new mission datasets, updates to sampling approaches, adjustments to the strategy that improve GEOGLAM coverage, and updates to country coverage. The updated strategy will be presented for endorsement at CEOS Plenary in October. An implementation update on the strategy was provided at SIT-29.	Ad Hoc Working Group on GEOGLAM

Observations for Agriculture Objectives/Deliverables: 2014-2016			
Objective/Deliverable	Projected Completion Date	Background Information	Responsible CEOS Entity
AGRI-2: JECAM Annual Report	Q4 2016	During the Phase 1 period, GEOGLAM will allow JECAM to develop and operationalize its monitoring techniques, including sampling approaches; allow countries to build capacity to collect and process Earth observation data; and allow time to validate and incorporate results into decision-making processes. An annual report of the JECAM efforts will summarize the results of the project and its relevance to GEOGLAM.	Ad Hoc Working Group on GEOGLAM

3.4 Observations for Disasters

I. Strengthen support to the disaster management community through the sustained coordination of disaster-related activities undertaken by CEOS Agencies.

2014: CEOS Agencies, through the Working Group on Disasters (WGDisasters), will respond to the three Disaster Risk Management (DRM) Pilots defined in the 2013 *CEOS Disaster Risk Management Observation Strategy: Floods, Seismic Hazards, and Volcanoes*. First, the specific EO requirements will be identified for each pilot, in close cooperation with representatives from the user communities (stakeholders, scientists, civil protection organizations, local authorities, resources management national authorities, etc.). Through WGDisasters, CEOS Agencies will provide data for other entities to develop new end products and services to better deliver flood-related information (Floods), map active faults at global scale (Seismic Hazards), and operationally monitor active volcanoes for large scale eruptions (Volcanoes). Both the Seismic Hazard and the Volcanoes pilots have objectives that are directly related to the ongoing Geohazard Supersites and Natural Laboratories GEO initiative (see 3.4, section III). CEOS representatives will maintain a close dialogue with GEO and UN experts to ensure appropriate recognition of the use of space-based EO within the *2015-2025 Post-Hyogo Framework for Action (HFA2)* (see 3.4, section II).

CEOS Agencies are also developing the concept of a Disaster Recovery Observatory, a one-time demonstration in the 2014-2016 time period, that will allow the development of specific tools tailored to provide easy access to data over affected areas (pre-event data, response data, and coordinated post-event acquisitions). An organized repository, combined with an effective exploitation platform, will allow disaster managers to work in a known environment with advanced satellite products and promote use of these products to key user communities. The Disaster Recovery Observatory will make available as much geospatial data as possible for use in the immediate aftermath of a major disaster and for a number of years after the event. WGDisasters will survey potential institutional donors to study the possible inclusion of additional hazards and the sustainability of the activities for 2016 onwards (e.g., operational hazard monitoring systems).

2015-2016: CEOS will continue the DRM Pilot and Disaster Recovery Observatory activities until completion of the activities in 2016, producing concrete outcomes with advertised feedback from users collected continuously to better support space agencies' requests to

play an improved and critical role in DRM. Some of the activities to be conducted during this period will be related to capacity building.

II. Ensure that the importance of Earth observations from space is emphasized at the UN 2015 World Conference on Disaster Risk Reduction and in the post-Hyogo Framework for Actions (HFA2).

CEOS will also actively participate in the 2015 UN World Conference on Disaster Risk Reduction (WCDRR) and will closely cooperate with major stakeholders such as the UN Office for Disaster Risk Reduction (UNISDR) and Japanese officials involved in the preparation of the 2015 WCDRR.

2014: The 2015 WCDRR conference will be preceded by several preparatory meetings in 2014 on all continents. Those meetings aim at:

- Providing inputs for the generation of the HFA2 document that will define the major priorities in Disaster Risk Reduction (DRR) for the period 2015-2025
- To start to collect the draft expression of commitments of the various DRR actors that will be consolidated/finalized at the 2015 WCDRR

2015-2016: CEOS will participate in the 2015 WCDRR conference and CEOS Agencies, coordinated through the WGDisasters, will work with the DRR communities and major stakeholders according to the priorities indicated in the HFA2.

III. Continue support to the Geohazards Supersites and Natural Laboratories (GSNL) Initiative.

2014: The Geohazards Supersites and Natural Laboratories (GSNL) Initiative aims to improve our knowledge of geophysical processes posing geohazards, with an initial focus on earthquakes and volcanoes. The effort is led by a global partnership of scientists and satellite and in situ data providers (multi-sensor interferometric synthetic aperture radar [InSAR], seismic, Global Positioning System [GPS], etc.) and is compiling comprehensive data sets for a few selected sites of high priority intended to be used in research to support increased understanding of the hazards. In 2013, CEOS officially endorsed Hawaii and Iceland to receive coordinated space-based EO data acquisitions. In 2014, CEOS will consider proposals for new Supersites to support specific seismic and volcano hazards, in conjunction with the DRM activities outlined above.

CEOS will work to facilitate coordinated data access to the data made available to the GSNL by suitable means. In particular, a web client will be configured to search and access the distributed data catalogs.

2015-2016: In complement to—or as part of—the current CEOS DRM Pilots related to the GSNL initiative, CEOS Agencies will also regularly monitor the use of space data by scientific community involved in GSNL and will assess the potential extension of the number of sites supported by CEOS Agencies. Event Supersites, which are agreed and supported for a

limited time immediately following a major disaster, will be considered and supported as approved during this time frame.

Observations for Disasters Objectives/Deliverables: 2014-2016			
Objective/Deliverable	Projected Completion Date	Background Information	Responsible CEOS Entity
DIS-1: Strategy for preparing the 2015 WCDRR and the post-Hyogo Framework for Action (HFA2)	Q2 2014	Propose a way forward for the 2015 World Conference on Disaster Risk Reduction (WCDRR).	WGDisasters
DIS-2: Proposal for Recovery Observatory	Q2 2014	Develop the full Recovery Observatory proposal for approval.	WGDisasters with support from the Working Group on Information Systems and Services (WGISS)
DIS-3: Data Acquisition Plan in support to DRM Pilots	Q2 2014	Prepare for approval of the strategic data acquisition plan in response to the Floods, Seismic Hazards, and Volcanoes Pilots' EO requirements.	WGDisasters
DIS-4: Decadal Plan (2015-2025) to address top priority HFA2 needs	Q2 2016	Develop a long-term plan (2015-2025) to address top priority HFA2 needs. The plan will be prepared in close cooperation with the major stakeholders involved in DRR including donor agencies, and with key representatives of the DRR user community.	WGDisasters
DIS-5: Revised Geohazard Supersite Selection Process and decision on new proposed Supersites	Q4 2014	Review working procedures between the Supersite Coordination Team (SCT) and WGDisasters, and develop an improved Geohazard Supersites selection process. Endorse Turkey (Marmara sea), Vesuvio and Etna volcanoes (Italy) as new permanent Supersites supported by CEOS in complement to Hawaii and Iceland. Additionally, Event Supersites may be proposed at any time during 2014.	Supersite Coordination Team
DIS-6: Web client to facilitate joint catalog search and access to Supersite data	Q4 2014	The SCT agreed to implement standard web services to enable catalog search on Supersite data and access protocols for Supersite data holdings.	Supersite Coordination Team

3.5 Capacity Building, Data Access, Availability and Quality

I. Advance CEOS Data Democracy activities.

2014: In accordance with GEO's three-year (2012-2015) Work Plan, the Working Group for Capacity Building and Data Democracy (WGCapD) will build upon the CEOS Data Democracy Initiative in an effort to increase the capacity of institutions in less developed countries so they may use EO data to achieve sustainable development. This effort will include (1) continuing the Digital Elevation Model (DEM) workshops and pursuit of Shuttle

Radar Topography Mission (SRTM) 30m data with a proposed workshop in Nepal; (2) providing practical EO education for students and teachers; (3) organizing e-learning courses on Remote Sensing technologies for university educators in developing countries; (4) populating the Capacity Building Portal, hosted by the Earth Observation for Economic Empowerment (EOPOWER) project, and increasing the awareness of the Capacity Building Inventory; (5) planning the implementation of the TerraSAR-X add-on for Digital Elevation Measurement (TanDEM-X) Edu Project, that aims at increasing awareness of TanDEM-X data among university students participating in scientific projects for disaster management and hydrological modeling (the synthetic aperture radar [SAR] data shall be available in 2015); and (6) supporting the CEOS DRM Pilots as the liaison for capacity building activities.

2015-2016: Continue updating and improving the Capacity Building Portal.

II. Continue to support the development and operationalization of the GEOSS Common Infrastructure (GCI) and its CEOS-related elements.

2014: Through the Working Group on Information Systems and Services (WGISS), CEOS Agencies will foster the implementation and enhancement of the GCI through continued development and coordination of tools that improve discovery, interoperability, and access to satellite data. Such tools include the CEOS WGISS Integrated Catalogue (CWIC), the International Directory Network (IDN), the Heterogeneous Missions Accessibility (HMA), and the Federated Earth Observation (FedEO) protocol-based system. WGISS will also transition to the Open Geospatial Consortium (OGC) OpenSearch standards and will develop a guidelines document, *CEOS OpenSearch Best Practices* to explain how to use the OpenSearch document as the common search and access mechanism in FedEO and CWIC.

WGISS will continue to promote and exchange technical information and lessons-learned experience about current and trending data system technologies/services impacting CEOS Agencies.

2015-2016: WGISS will support data access for the CEOS Virtual Constellations, Working Groups, and GCI through the use of the CEOS OpenSearch protocol, which will make CWIC and FedEO accessible from external clients such as the GCI. WGISS will also ensure that the IDN will be used as a dataset registration system for CEOS Agencies and will demonstrate/showcase the Virtual Constellation data access initiative.

III. Coordinate the development of suitable methodologies for the on-ground characterization of satellite-based EO sensors, the calibration of EO missions, and the validation of satellite-based Level 1 and Level 2 products.

2014-2016: The Working Group on Calibration and Validation (WGCV) will continuously carry out contributions to the calibration of satellite-based sensors and the validation of satellite-based Earth observation data products, as that is its basic objective. The results of this work are the building blocks for the other VCs and WGs in terms of calibration and validation. For these broad applications, different tasks are focused in several sub-groups dealing with specific areas of interest. Three sub-groups serve, in particular, the calibration

of sensors and their link to international acknowledged standards. Another three sub-groups are related to topical subjects concerning validation of data products.

WGCV will continuously maintain the CEOS Cal/Val portal, including the activities of its sub-groups. The Cal/Val portal will provide users with information about achievements in calibration and validation and the Cal/Val supersites.

IV. Continue the cooperation with other CEOS elements in supporting the generation of well-calibrated and validated data records.

2014-2016: The Working Group on Calibration and Validation (WGCV) will intensify and structure its original goals to align with the needs of new challenges arising within CEOS. With the implementation of Joint WGClimate, the CEOS response to the *GEO Carbon Strategy* through the Carbon Task Force, and the further implementation of Virtual Constellations, there is a high demand for WGCV support, specifically oriented to the needs of those groups. To serve these needs, the WGCV will implement a customer-oriented approach based on the current organizational structure by offering WGCV capabilities internally to those CEOS entities. As a first step WGCV will summarize its current capabilities in a gap analysis, subsequently followed by the identification of opportunities for cooperation on a working level with the other CEOS Working Groups and Virtual Constellations. Once those opportunities are systematically summarized, cooperation can be concretely intensified and specific measures aligning with the needs and goals of the VCs and Working Groups identified.

V. Continue cooperation with GEO, Global Space-based Inter-calibration System (GSICS), and WMO and ground-based networks in the provision of high quality EO data products.

2014-2016: WGCV will continue its work with the GEO Secretariat, including work on the GEO Tasks, mainly by extension of its leadership in Quality Assurance for Earth Observations (QA4EO) to encourage widespread adoption of QA4EO Principles within future and, where possible, current CEOS activities. WGCV will extend the showcase repository to address science and data product provider community needs, ideally by covering Level 1 Atmosphere, Terrestrial, and Ocean “compartments.” The development of calibration infrastructure and comparison campaigns within the frame of WGCV will also be used to follow and promote QA4EO Principles and best practices.

WGCV will strengthen its cooperation with GSICS in the topic of sensor calibration. WGCV will first summarize its current capabilities, and then identify opportunities for cooperation. Once those opportunities are identified, a working-level framework will be established to coordinate the relevant activities with GSICS.

WGCV will also strengthen its cooperation with WMO and ground-based networks in terms of broadening the base for calibration and validation. Cooperation with representatives of networks will be deepened, especially with dedicated presence during WGCV meetings.

Capacity Building, Data Access, Availability and Quality Objectives/Deliverables: 2014-2016			
Objective/Deliverable	Projected Completion Date	Background Information	Responsible CEOS Entity
CB-1: Digital Elevation Model (DEM) workshops	Q4 2015	Pursuit of Shuttle Radar Topography Mission (SRTM) 30m data with a proposed workshop in Nepal.	WGCapD
CB-2: Provide practical EO education for students and teachers	Q4 2016	WGCapD members will target major Earth observation and other relevant conferences and workshops and provide training sessions for students and teachers. This effort will also include demonstrations of the value of Earth observation.	WGCapD
CB-3: E-learning courses on remote sensing technologies	Q4 2016	Organize e-learning courses for university educators in developing countries; follow-up to initial e-learning pilot for select African countries in 2013.	WGCapD
CB-4: Capacity Building Portal	Q2 2015	Populate the Capacity Building Portal, hosted by the Earth Observation for Economic Empowerment (EOPOWER) project; portal aims at increasing the awareness of the Capacity Building Inventory across CEOS and GEO. See GEONetCab site at http://www.geonetcab.eu/ .	WGCapD
CB-5: Implement the TanDEM-X Edu Project	Q3 2016	Plan for the implementation of the TanDEM-X EduProject, which aims at increasing awareness of TanDEM-X data among university students participating in scientific projects for disaster management and hydrological modeling (dependent on SAR data being made available in 2015)	WGCapD
CB-6: Capacity Building for DRM	Q4 2016	WGCapD will designate a representative for each of the three Pilot Projects to determine how to best support WGDIs with its capacity building activities.	WGCapD with support from WGDIs
DATA-1: CEOS OpenSearch Best Practices Guideline Document	Q4 2014	This document will serve as a guideline that shows a common set of rules to help CEOS Agencies implement an OpenSearch service aligning with CEOS best practices, with the goal of achieving better interoperability among CEOS Agencies. Also, this document will be of benefit to those using CEOS portals or any client developer who is interested in CEOS satellite data and wants to make use of the satellite data catalogs in their application.	WGISS
DATA-2: Full representation of CEOS Agency datasets in the IDN and accessible via CWIC/OpenSearch	Q4 2014	As the IDN contains OpenSearch endpoints for data access and is also the link with GCI, it is essential that all CEOS Agencies keep information on the data up-to-date in the IDN. This effort will facilitate timely access to products developed by the Virtual Constellations (e.g., Group for High Resolution Sea Surface Temperature [GHRSS]).	WGISS with support from VCs

Capacity Building, Data Access, Availability and Quality Objectives/Deliverables: 2014-2016			
Objective/Deliverable	Projected Completion Date	Background Information	Responsible CEOS Entity
CV-1: Cal/Val portal WGCV update	Q4 2015	Subsequent inclusion or linkage of sub-group websites with the CEOS Cal/Val portal, including an update of sub-group websites. Cal/Val portal will then serve as the WGCV entry point, where all recent achievements shall be included.	WGCV
CV-2: Website for SAR calibration sites and targets	Q3 2015	Establish and maintain a website for SAR calibration sites including both natural and man-made targets. Characterize natural targets in different frequency bands.	WGCV
CV-3: Workshop on state of the art for pre-flight calibration techniques	Q1 2016	Hold an open-invitation workshop to discuss and promote best practices on pre-flight and onboard calibration of sensors, initially focusing on optical.	WGCV
CV-4: WGCV self-analysis for capabilities to serve VC and WGs needs	Q4 2016	WGCV will analyze its capabilities, given the new demands of the VCs and WGs. Based on the analysis, WGCV will tailor its specific opportunities on the working level and communicate the results in a report.	WGCV
CV-5: GSICS cooperation	Q4 2014 to Q4 2016	Cooperation with GSICS in specific domains of sensor calibration, especially sensor inter-calibration. This work includes the analysis of opportunities for cooperation with GSICS, including identification of concrete topical fields. Based on that internal analysis a cooperative arrangement with GSICS shall be implemented. This arrangement will be communicated to the CEOS Plenary for approval, and will be described in the WGCV Work Plan.	WGCV
CV-6: Inter-calibration of ground-based networks	Q4 2016	Inter-calibration of air quality ground-based networks in cooperation with WMO/Global Atmosphere Watch (GAW) and Network for the Detection of Atmospheric Composition Change (NDACC), supporting the validation of atmospheric sensor data products.	WGCV
CV-7: Coordinated set-up of ground-based networks in supporting validation of air quality products	Q4 2016	Planning and characterization of air quality ground-based network in cooperation with NDACC, AERONET/PHOTONS (AERosol RObotic NETwork/PHOTométrie pour le Traitement Opérationnel de Normalisation Satellitaire).	WGCV with support from AC-VC
CV-8: Sea Surface Temperature (SST) & Land Surface Temperature (LST) Comparison Campaign Plan	Q2 2014	Set up a multi-agency comparison project to ensure international consistency in post-launch Cal/Val of satellite-derived Earth surface temperatures for climate data records. This effort includes (a) implementation of a laboratory campaign for radiometers and black bodies, and (b) initiation of ocean-based SST and land-based LST comparison campaigns, both supported by a White Paper which includes the plan for the project and costing.	WGCV with support from SST-VC

Capacity Building, Data Access, Availability and Quality Objectives/Deliverables: 2014-2016			
Objective/Deliverable	Projected Completion Date	Background Information	Responsible CEOS Entity
CV-9: Radiometric Calibration Network (RADCALNET)	Q1 2014 to Q4 2016	Establish an automated network via a multi-agency project, including coordination infrastructure, and land-based test-sites for post-launch traceable calibration of sensor radiometric gain, initially for <50 m resolution sensors.	WGCV
CV-10: Potential and fitness checks for TanDEM-X DEM products	Q4 2014 to Q4 2016	The proof of the TanDEM-X DEM products is essential for many applications within CEOS and includes (a) an analysis of intermediate TanDEM-X products with respect to accuracy, completeness, and quality for CEOS test sites in Europe, demonstrating its potential in the United Kingdom (UK) for the improvement of very high resolution landslip mapping; (b) a follow-up study for final TanDEM-X DEM products over nine globally spread CEOS test sites and test areas over the UK; and (c) a “Fitness for Purpose” of TanDEM-X products assessment for geo-radiometric correction of high resolution optical imagery (Sentinel-2) and of SAR data from Sentinel-1.	WGCV
CV-11: Validation of terrestrial ECV products	Q1 2015 – Q4 2016	The validation of terrestrial ECV products is in line with activities carried out in WGCV-Land Product Validation (LPV). The validation of ECVs covered within WGCV-LPV shall be strengthened. This includes (a) an update of validation stage, (b) ECV-specific synthesis of a state-of-the-art validation approach for each terrestrial variable with corresponding references and protocols, (c) ECV-specific identification of a golden standard for validation, and (d) continuation of development of ECV-specific validation protocols, including a community review process and updates. Results of each step will be made public via the WGCV-LPV website and finally the Cal/Val portal.	WGCV
CV-12: Evaluation of validation supersites and new validation approaches	Q2 2015	Evaluation of well-characterized supersites with data continuity prospects for validation purposes that allow for testing of products, algorithms, and validation strategies through radiative transfer modeling.	WGCV

3.6 Advancement of the CEOS Virtual Constellations

- I. **Characterize the Virtual Constellations in the context of both the development of the space segment for GEOSS and of the multitude of outcomes and deliverables that CEOS seeks to provide for GEO and other users and frameworks.**

2014-2016: Ensure that the Virtual Constellations (VCs)—Atmospheric Composition (AC-VC), Land Surface Imaging (LSI-VC), Ocean Colour Radiometry (OCR-VC), Ocean Surface Topography (OST-VC), Ocean Surface Vector Wind (OSVW-VC), Precipitation (P-VC), Sea Surface Temperature (SST-VC)—are accomplishing the outcomes and deliverables

associated with the activities documented in the *CEOS Virtual Constellations Process Paper* and the respective Virtual Constellation’s terms of reference.

Advancement of the CEOS Virtual Constellations: 2014-2016			
Objective/Deliverable	Projected Completion Date	Background Information	Responsible CEOS Entity
VC-1: List of Relevant Datasets from VCs	Q4 2014	Each VC will provide WGISS with a list of relevant datasets that its respective constellation members desire to access. WGISS will work with CEOS data providers to ensure search and accessibility (when possible) of these datasets are available so as to ensure coverage of all datasets required by VCs.	VCs with support from WGISS
VC-2: Total ozone dataset validation and harmonization	Q4 2014	Total ozone measurements from multiple sensors are being considered by AC-VC. The separate long-term American and European total ozone data sets (with clear error characterization) are already proving valuable to the user community. An effort to combine European/American datasets is in progress, with the goal to produce a long-term ozone data set for the atmospheric modeling community. There is a need to develop common validation protocols and extend the process to other ozone datasets (e.g., Chinese FY3 observations).	AC-VC
VC-3: Share pre-launch calibration plans, instrument characterization/calibration databases, and Level 1-b data in a common format to allow application of common algorithms to all datasets	Q2 2015	Three geostationary instruments to monitor air quality are scheduled to fly late in this decade: Sentinel 4, Tropospheric Emissions: Monitoring of Pollution (TEMPO), and Geostationary Environment Monitoring Spectrometer (GEMS). Community efforts are exploiting synergies among the instruments to enhance their value for science and decision support by developing common calibration and validation techniques and developing standard constellation products based on the community-developed white paper http://ceos.org/images/ACC/AC_Geo_Position_Paper_v4.pdf , which was endorsed at SIT-26.	AC-VC
VC-4: Operational demonstration service for volcanic ash (and SO ₂) monitoring and forecasting	Q3 2014	Use data from multiple instruments capable of observing volcanic emission gases and aerosols, including Ozone Monitoring Instrument (OMI), Global Ozone Monitoring Experiment-2 (GOME-2), Atmospheric Infrared Sounder (AIRS), and Infrared Atmospheric Sounding Interferometer (IASI) to provide operational demonstration services to users in the aviation and other relevant user communities.	AC-VC

Advancement of the CEOS Virtual Constellations: 2014-2016			
Objective/Deliverable	Projected Completion Date	Background Information	Responsible CEOS Entity
VC-5: Coordination of algorithm development and calibration/validation support for the greenhouse gas constellation	Q2 2015	Multiple instruments to measure atmospheric greenhouse gases are planned or under development in addition to the Greenhouse gases Observing SATellite (GOSAT) in the coming years. To enhance the value of these measurements, the AC-VC is coordinating algorithm development, calibration/validation support, and other activities consistent with the actions recommended in the <i>CEOS Strategy For Carbon Observations from Space</i> .	AC-VC
VC-6: Vision and plan for an essential OCR-Virtual Constellation space segment (Polar and GEO)	Q4 2016	The objective is a plan to meet goals identified in the OCR-VC terms of reference. Data continuity needs to be assured, including data quality assessments and comparisons of existing and upcoming (as well as previous) sensors and mitigation of launch delays, maintenance of critical cal/val and quality assurance activities, general implementation of minimum ocean color mission requirements, and new and improved products. Key gaps will still exist, e.g., lack of next generation R&D missions to expand observing capabilities and scientific knowledge, likewise additional geostationary ocean color platforms.	OCR-VC
VC-7: Catalog of Cal/Val infrastructure and activities	Q2 2015	This effort will help in identifying risks and needs for advancement and will promote calibration efforts by CEOS Agencies.	OCR-VC
VC-8: Action Plan for GEO Blue Planet Components	Q1 2015	The OCR-VC, in accordance with OCR-VC Terms of Reference, will support the implementation of the GEO Blue Planet Task and will develop an action plan for GEO Blue Planet Components delivered.	OCR-VC
VC-9: Implementation of the International Network for Sensor InTercomparison and Uncertainty Assessment for Ocean Colour Radiometry (INSITU-OCR)	Q1 2015	Implementation of the International Network for Sensor InTercomparison and Uncertainty Assessment for Ocean Colour Radiometry (INSITU-OCR), including recommendations of the INSITU-OCR White Paper (www.iocccg.org/groups/INSITU-OCR_White-Paper.pdf) and establishment of the INSITU-OCR office.	OCR-VC

Advancement of the CEOS Virtual Constellations: 2014-2016			
Objective/Deliverable	Projected Completion Date	Background Information	Responsible CEOS Entity
VC-10: Recommend the creation of a GEO Water Quality Community of Practice	Q2 2015	An emerging thrust for the OCR-VC is in the area of remote sensing of coastal and inland water quality. A related International Ocean Colour Coordinating Group (IOCCG) Working Group (Earth Observations in Support of Global Water Quality Monitoring) has recently been established. The OCR-VC recommends the creation of a GEO Water Quality Community of Practice, which would significantly expand upon the IOCCG working group and bring together data providers and users to significantly advance the utilization of satellite observations in support of water quality monitoring in both developed and developing nations.	OCR-VC
VC-11: Updated OST CEOS Constellation User Requirements Document (URD)	Q3 2015	Update will encompass SAR Mode Altimetry.	OST-VC
VC-12: Catalog of Cal/Val infrastructure	Q2 2015	This catalog will help with Cal/Val planning and promote agency coordination. A major interest of the OST-VC is the sustainability of critical Cal/Val elements.	OST-VC
VC-13: Reprocessing strategy for TOPEX/Jason-1 missions	Q4 2014	TOPEX/Poseidon mission ended in 2006, after 13 years of operation. Although updated products have been generated to align with current standards, a full reprocessing has been long in feasibility study. The Jason-1 mission ended operations in 2013. Final reprocessing is planned by CNES and NASA.	OST-VC
VC-14: Vision for an OSVW Constellation	Q4 2016	White Paper describing and justifying the oceanography and climate requirements for an OSVW constellation.	OSVW-VC
VC-15: OSVW Standards and Metrics	Q4 2016	Standards and metrics for OSVW services and products, including standard Cal/Val methods.	OSVW-VC
VC-16: P-VC Data Portal and links to CEOS Water Portal	Q1 2015	Completion of Phase 2 of the P-VC Data Portal providing free and open availability of precipitation products in support of CEOS-GEO Actions WA-01-C1_3 and WA-01-C1_4.	P-VC
VC-17: Support to ECV precipitation parameters	Q4 2016	Precipitation ECV support: Provide the CEOS Response to GCOS Action A-8; ensure continuity of satellite precipitation products through five deliverables.	P-VC
VC-18: Programs for improvement of global precipitation products	Q4 2016	Precipitation products (with respect to algorithm development, outputs, and user requirements) using multi-satellite and multi-agency data through coordination between Precipitation Constellation (PC) partners.	P-VC

Advancement of the CEOS Virtual Constellations: 2014-2016			
Objective/Deliverable	Projected Completion Date	Background Information	Responsible CEOS Entity
VC-19: Documented plan for the SST Virtual Constellation	Q3 2015	Building on Donlon, et al (2010) <i>Successes and Challenges for the Modern Sea Surface Temperature Observing System</i> , the SST-VC will describe and justify the requirements and design for the modern virtual constellation for SST. This description of an optimal SST constellation will prove useful to CEOS Agencies in planning and implementing a globally coordinated and cost-effective observing capability for SST.	SST-VC

3.7 Support to Other Key Stakeholder Initiatives

I. Continue CEOS contributions and maintain leadership role in the GEO Blue Planet Task.

2014: As multi-sensor oceanographic satellite observations continue to be successfully transitioned from research into routine and sustained operations supporting a diverse suite of research and applications, there are significant opportunities to support the components and associated priority actions identified in the GEO Blue Planet Task. The Ocean Colour Radiometry, Ocean Surface Topography, Ocean Surface Vector Wind, and Sea Surface Temperature VCs will play a role in the sustainment/continuation/harmonization of essential ocean variables to develop coordinated, multi-sensor ocean products. These variables, including sea surface height, sea surface temperature, sea surface salinity, sea surface winds, and chlorophyll-a (and other ocean color-derived) data, will be compiled into collocated and readily accessible dataset packages with fit-for-purpose latency (near-real time as well as delayed mode). The planning project is called CEOS Ocean Variables Enabling Research and Applications for GEO (COVERAGE). Individual VCs will likewise continue to identify their own specific contributions to the various Blue Planet Components.

2015-2016: CEOS may develop experimental and operational data, products, and services to explore optimal utility of COVERAGE for applied, industrial, and research uses.

II. Further develop CEOS contributions to meet biodiversity observation requirements.

2014: The CEOS Biodiversity Expert will work with CEOS Agencies in close consultation with the GEO Biodiversity Observation Network (GEO BON) to better define biodiversity and conservation user requirements and assess related CEOS Agencies’ observation capabilities in support of the 2020 targets for the Convention on Biodiversity (CBD). Using an approach similar to that which was implemented for ECVs, CEOS will consult with GEO BON and CBD representatives to better define CBD-related Essential Biodiversity Variables (EBVs) that may be supported by space-based EO. CEOS representatives will participate in ongoing data provider/user community consultations on this topic to assess the potential level of CEOS support, and make appropriate recommendations to CEOS leadership.

2015-2016: The CEOS Biodiversity activity will engage in various workshops and symposia to increase the visibility of remote sensing for biodiversity related application. Moreover the different user groups (e.g., practitioners, decision makers) will be targeted concerning their different needs for remote sensing application. Lists of remote sensing product priorities for different EBVs and user groups will be assembled. A joint funding proposal for innovative application of remote sensing for biodiversity research will be pursued to enable provision of a range of relevant products and services.

III. Continue dialogue on potential CEOS contributions to Integrated Water Cycle products and services.

2014: In 2014, the GEOSS Water Strategy Report was released, which included ten actions that space agencies should accomplish to implement the strategy. The CEOS Water Expert will work with CEOS Agencies to develop and coordinate Agencies' inputs on implementing the GEO Water Strategy. CEOS will engage with GEO to identify specific ways in which CEOS can support improved water cycle products and services. CEOS will also support data portals (including the CEOS Water Portal) and satellite data provision, validation, and capacity development for regional initiatives in Asia, Africa, and Latin America.

2015-2016: CEOS will continue the effort with GEO to identify specific ways in which CEOS can support and advance satellite data acquisition.

IV. Continue dialogue on enhanced CEOS-level coordination to support improved research and monitoring of the Earth's Polar Regions.

2014: CEOS Agencies will maintain a dialogue with GEO, CGMS, and the World Meteorological Organization (WMO) on their respective interests and coordination initiatives relating to polar observations. CEOS Agencies will consider the best means to interact with the WMO Polar Space Task Group (PSTG) to facilitate acquisition and distribution of fundamental satellite datasets for the development of specific information products for polar research and applications (e.g., cryospheric, atmospheric, etc.). CEOS will identify a more formal mechanism to interact with the PSTG. CEOS will support continued data acquisition to ensure the full coverage and monitoring of the ice sheets. Fast-flowing glaciers, often considered as indicators of climate change impacts, will also be monitored at high resolution.

2015-2016: CEOS Agencies will continue to maintain a dialogue with GEO, CGMS, and the WMO on their respective interests and coordination initiatives relating to polar observations. CEOS and PSTG will continue to facilitate acquisition and distribution of fundamental satellite datasets for the development of specific information products for polar research and applications (e.g., cryospheric, atmospheric, etc.). CEOS Agencies will support the development of key science products under their own respective science programs. The PSTG, charged with prioritizing requirements, engaging in a dialogue with polar science authorities, and supporting the development of satellite sensor derived products for cryospheric research and applications, will encourage formal submission of science requirements documents from the cryosphere communities (permafrost, sea ice,

snow cover, etc.). CEOS and PSTG will develop observation strategies to avoid observational gaps over polar regions.

Support to Other Key Stakeholder Objectives/Deliverables: 2014-2016			
Objective/Deliverable	Projected Completion Date	Background Information	Responsible CEOS Entity
BP-1: Compilation of ocean variables into coordinated dataset packages—the CEOS Ocean Variables Enabling Research and Applications for GEO (COVERAGE)	Q4 2015	Coordination of essential ocean variables into single package deliveries, with fit-for-purpose latency for research and applications. The four ocean VCs (in coordination with the Blue Planet committee) will play a role in the sustainment/continuation/harmonization of essential ocean variables. What does CEOS need to do differently in the future to support this project? How can CEOS support "integration" of activities across VCs and individual missions? What are the achievable spatial-temporal scales and appropriate latencies for multi-variable packages?	CEOS Blue Planet Expert (NASA)
BON-1: Further define biodiversity variables that may be supported by space-based observations	Q4 2014	Consult with biodiversity community representatives (GEO BON, CBD, Conservation Remote Sensing Network [CRSnet], etc.) to better define relevant spaceborne parameters (e.g., for EBVs).	CEOS Biodiversity Experts (Deutsches Zentrum für Luft- und Raumfahrt [DLR] and NASA)
BON-2: Continue to define biodiversity variables that may be supported by space-based observations and engage international community in coordinating biodiversity/conservation initiatives	Q4 2015	Review and improve list of relevant space-borne variables, to include marine systems as well on top of terrestrial applications. Hold joint sessions with biodiversity/conservation community at international conferences (e.g., International Symposium on Remote Sensing of Environment. [ISRSE]). Coordinate different biodiversity/conservation initiatives related to EO (Cambridge Conservation Initiative [CCI], CRSnet, GEO BON). List of future needed parameters.	CEOS Biodiversity Experts (DLR and NASA)
BON-3: Increase the visibility of remote sensing for biodiversity related application	Q4 2016	Joint symposium with all initiatives, exploring links to other CEOS activities. Develop joint forum/data archive and define processing chains.	CEOS Biodiversity Experts (DLR and NASA)
WAT-1: Response to GEOSS Water Strategy	Q4 2016	Evaluate how CEOS Agencies will respond to the ten actions identified for space agencies.	CEOS Water Expert (JAXA)
POL-1: Annual Status Report	Q4 2014	Facilitate communication between PSTG and CEOS through provision of an annual status report on polar activities and develop a formal collaboration approach with PSTG.	CEOS Polar Expert (CSA)

3.8 Outreach to Key Stakeholders

- I. **Engage, attend, be strategically involved (where appropriate), report on CEOS achievements, and present at key meetings.**

2014-2016: CEOS desires to increase and improve the connections between CEOS and its stakeholders during deliverable development. CEOS leadership and the national delegations of CEOS Agencies will expand links with stakeholders to inform ministers of CEOS Earth observation products and coordination efforts and to enlist appropriate G20/G8 support for enhanced Earth observation coordination. CEOS should highlight CEOS achievements in global change monitoring and the significance of long-term satellite observation capabilities in statements at key high-level meetings. Key 2014 meetings identified for CEOS liaison include the GEO-XI Plenary and the UN Framework Convention on Climate Change 20th Council of the Parties (COP-20, November 2014). Key 2015 meetings will be identified as they are announced.

- II. **Maintain and annually update CEOS online services such as the CEOS website and Missions, Instruments and Measurements (MIM) database.**

2014-2016: The CEOS Database (a.k.a., the Missions, Instruments and Measurements, or MIM) is the only official consolidated statement of CEOS Agency programs and plans. Each year, the database will be updated based on survey inputs provided by all CEOS Agencies to reflect the current status of CEOS Agency missions and instruments. The European Space Agency (ESA) and the SEO have developed a number of analysis and visualization tools to apply this information in support of gap assessments. Together, these resources represent the cornerstone of CEOS's capability to undertake informed coordination decisions. CEOS will continue development of these resources each year, with a particular focus on engaging them for ECV development and observational gap analyses. New enhancements for advanced search capabilities will be added, as well as links to other CEOS resources (e.g., CEOS Visualization Environment [COVE], CWIC, IDN) or to external information systems, such as WMO's Observing Systems Capability Analysis and Review Tool (OSCAR).

In 2014, the ESA CEOS Database team will work on the creation of new tools for the community to discover and browse ECV data sets. This effort will be conducted in coordination with the SEO, Joint WGClimate, and other interested members of the CEOS community. This activity will preserve the standalone nature of the ECV Inventory. To improve outreach impact, CEOS will revise its website to include a more modern user interface and updated appearance. The new website will maintain a "content management" approach, and include new features for document management and meeting registration.

- III. **Publish the CEOS Newsletter.**

2014-2016: CEOS, through contributions of JAXA, will continue the publication of this valuable, long-standing communication tool. It will be issued twice per year.

Outreach to Key Stakeholders: 2014-2016			
Objective/Deliverable	Projected Completion Date	Background Information	Responsible CEOS Entity
OUT-1: CEOS awareness and promotional material delivered at key meetings	N/A	The CEOS calendar will be used to confirm CEOS representation at key international and stakeholder meetings, as updated throughout the three-year term.	CEOS Chair with support from CEO, SIT Chair and CEOS SEC
OUT-2: CEOS Newsletter	Q1 and Q3 of each year	Call for information input in December and June; newsletters released in February and August.	JAXA, with support from CEOS Agencies
OUT-3: CEOS Database update survey and release of online version	Survey Q2 annually, release Q4 annually	Background information: CEOS Agencies to provide resources to support their responses to the update survey issued in the April-May timeframe; release of the updated CEOS Database will be online prior to CEOS Plenary.	ESA, with support from SEO and CEOS Agencies
OUT-4: EO handbook	Q4 2015	Periodic releases of the EO Handbook rely on data from MIM.	ESA
OUT-5: Provision of ECV Inventory Tools	Q4 2014	Release of tools to support the discovery and browsing of ECV datasets recorded in the ECV Inventory.	ESA, with support from SEO, Joint WGClimate, and other CEOS Agencies
OUT-6: Updated CEOS website	Q4 2014	SEO will present a proposal for update at SIT-29, and complete the update by the 2014 CEOS Plenary.	SEO

3.9 Organizational Issues

I. Develop additional detailed guidance documents as proposed by the CEOS Self-Study Implementation Initiative (CSSII).

2014: Three documents will be prepared in 2014 to provide detailed information that supplements the general process descriptions described in the *CEOS Governance and Processes* document: a *CEOS Three-Year Work Plan*; a *Working Group Process Paper* detailing how Working Groups are proposed, formed, governed, and operated; and a *New Initiatives Process Paper* to describe details regarding the process by which new initiatives are proposed to and considered by CEOS. CEOS will also propose and implement a new document configuration management system.

Organizational Issues Deliverables: 2014-2016			
Objective/Deliverable	Projected Completion Date	Background Information	Responsible CEOS Entity
ORG-1: First Version of the new CEOS Three-Year Work Plan (this document).	Q1 2014	This version should be suitable for: (a) providing visibility to the SIT and Plenary regarding the main CEOS deliverables and associated activities, and (b) monitoring progress during the course of the year (e.g., by providing progress reference points for the regular SIT and CEOS Chair tag-ups with Working Groups and VCs).	CEO
ORG-2: Process Paper for CEOS Working Groups	Q2 2014	Prepare a process paper with guidance on the leadership, structure, governance, execution of activities, and evolution of Working Groups; provide guidelines for proposing new Working Groups.	CEO in consultation with SEO and CEOS SEC
ORG-3: Process Paper for CEOS New Initiatives	Q2 2014	Prepare a process -paper with guidance on proposals for new CEOS initiatives, to include specific criteria and steps required to successfully address new internal and external requests for activities/initiatives.	CEO in consultation with SEO and CEOS SEC
ORG-4: Document Management System	Q4 2014	A proposal for a CEOS Document Management System will be presented at SIT-29, and the update will be completed by the 2014 CEOS Plenary. This system will be part of the website revisions.	SEO, CEO, and CEOS Chair
ORG-6: Terms of Reference for WGDIsasters	Q4 2014	Confirm the structure of the CEOS WGDIsasters and develop Terms of Reference encompassing the current work on Supersites coordination, Disaster Risk Management (three pilots and acquisition strategy), the Recovery Observatory proposal, the Disasters Societal Benefit Area, and other CEOS disaster-related activities.	WGDIsasters

This CEOS Work Plan will be updated annually by the CEO under the guidance of the CEOS Chair, and in consultation with the CEOS Strategic Implementation Team Chair, CEOS Secretariat, CEOS Working Groups, Virtual Constellations, Ad Hoc Teams, the CEOS membership at large, and CEOS’s external stakeholders. This document shall be consistent with and mutually supporting of other CEOS guiding documents.