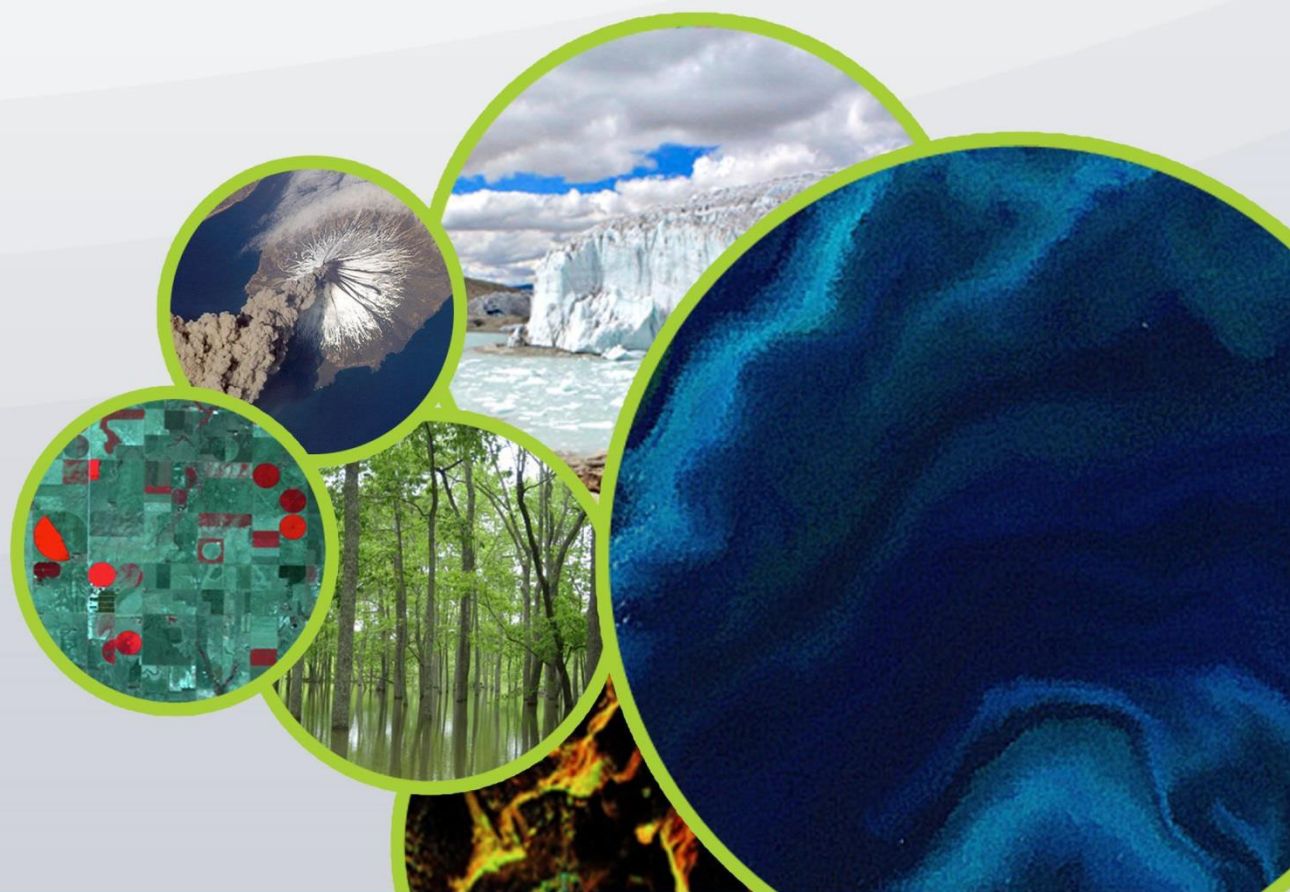




Committee on Earth Observation Satellites



2018-2020 Work Plan Progress Report

32nd CEOS Plenary (*for information*)

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Executive Summary

The CEOS 2018-2020 Work Plan Progress Report provides a detailed review of progress made against the 2018-2020 CEOS Work Plan according to the information available to the CEOS Executive Officer approximately 2 weeks prior to the annual CEOS Plenary meeting (30th September this year). The current document proposes a template for such reporting moving forward, incorporating both information available currently through the deliverable tracking tools at the disposal of the CEOS community now (deliverable status and due date), and suggested additional data (cumulative due date slippage and number of due date changes since creation) that it is proposed the current tools should be modified to acquire.

With regards the development and monitoring of CEOS deliverables using the Work Plan, significant progress has been made over the last twelve months reflecting a renewed impetus by the SIT Chair. This is demonstrated by the fact that information on deliverable status, including estimation of new deliverable due dates, was provided for 93% of deliverables in the 2018-2020 CEOS Work Plan within the defined deadline. This reflects an increased focus by SIT, but also more precise information on the Work Plan development and monitoring process provided to CEOS entities, and also a stronger interest among entities to use the Work Plan as an effective tool for defining and monitoring their work.

Progress made against the 2018-2020 Work Plan has been good, with 62% of Work Plan deliverables due in 2018 either “Completed” or “On Track” and a further 30% delayed with new due dates. The continued vigilance of the CEOS principals is required to ensure that the “On Track” deliverables do not slip into 2019. Analysis of the “Completed”, “On Track” and “Delayed” deliverables shows that improvements are needed in accurately estimating due dates, even among those deliverables due within 12 months of the deliverable creation. In addition, increased flexibility in defining due dates outside of the Work Plan time period should be introduced in order to facilitate a more realistic, rather than optimistic, view on when deliverables are likely to be completed.

1. Introduction

This document provides a summary view of progress made by the CEOS community against the 91 deliverables recorded in the CEOS 2018-2020 Work Plan (subsequently referred to as the Work Plan). The document reflects information on the status of each variable that was available to the CEOS Executive Officer on 1st October 2018 through the www.ceos-deliverables.org database.

In line with the SIT Chair priority to use the CEOS Work Plan as an effective work planning and progress monitoring tool, the information available to compile the CEOS 2018-2020 Work Plan Progress Report (subsequently referred to as the Progress Report) has improved significantly this year. This is largely due to an increased emphasis and communication on the Work Plan in all CEOS meetings. In turn, the majority of CEOS entities have a renewed focus on using this tool to assist their work planning and monitoring.

The Progress Report is structured in three main sections:

1. The first describes the progress **reporting approach** and can be considered as a template on how progress against the Work Plan could be reported to Plenary every year. This template is proposed to the 32nd CEOS Plenary as a model to follow for future reporting.
2. The second section provides a **report on the progress made against the Work Plan during 2018**. The progress is described in a summary form.
3. The third section provides an **exhaustive record of progress made** detailing the status of each deliverable using the reporting approach described.

2. Reporting approach

This section describes a template for reporting CEOS entities progress against the deliverables described in the Work Plan.

In order to effectively monitor the progress of CEOS entities against the Work Plan two key pieces of information are required for each deliverable: the deliverable status as of 30th September; and measures of the reliability of the estimated due date.

These two pieces of information are described in more detail in the following two sections.

- **Deliverable status as of 30th September.**

Each deliverable should be classified into one of the following four categories:

1. 

The deliverable has been completed and delivered.

2.  ,  to, e.g., 

The deliverable is “on track” to be completed as anticipated or has been delayed by a specified number of quarters. As the new due date is specified, the deliverable is still considered to be within the broad category of “on track” and is not considered to be as large a “risk” as a deliverable whose due date has not been communicated. When a deliverable has been delayed and the number of quarters is known, the number of months is provided in the detailed deliverable status section below (in orange).

3. 

The deliverable has been delayed, but the new due date has not been communicated.

4. 

No information has been communicated on the status of the deliverable in the last reporting period.

- **Cumulative delay/Number of due date modifications since creation.**

The second key piece of information required for comprehensive progress reporting is twofold: the cumulative number of months the deliverable due date has been set back since its creation and the number of times the due date has been modified. These two values are measures of the reliability of the estimates for the completion date of the deliverable. In the current state of the deliverables tracking database it is not possible to extract this information. **This information is therefore not available in this progress report**, however an evolution of the deliverables tracking database is scheduled for early 2019 and it is anticipated that these key indicators will be added to the database.

3. Summary of Work Plan progress in 2018

This section provides a summary view of CEOS entities progress against the Work Plan in 2018.

The first general comment to make on the progress made in 2018 is that, under the impetus of the CEOS SIT Chair, CEOS entities are integrating the CEOS Work Plan and the preparation and monitoring that it enables much more into their everyday work. Even over the space of one year this evolution can be noted. One figure that demonstrates this is the very high number of WP deliverables for which updates were provided before the 30th September deadline leading into plenary reporting. Overall the information, including estimation of new deliverable due dates, was updated for 93% of deliverables. Of the remaining deliverables, information was provided for one but this did not specify the due date delay, and for the other 7, no information was provided.

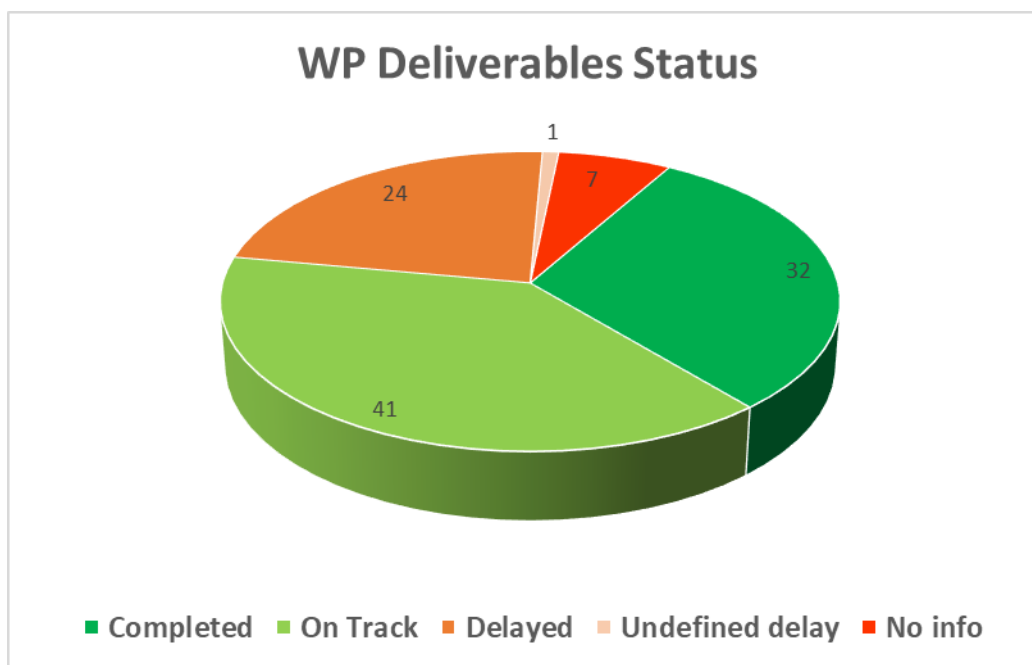


Figure 1 Status of the 105 deliverables in the 2018-2020 CEOS Work Plan

As presented in Figure 1, 69% of the 105 deliverables are Completed or On Track. The remaining deliverables are delayed, with 23% providing new due dates and 8% providing either no or insufficient information to define new due dates.

The next section will describe progress against actions due in the three respective years of the Work Plan. The final section will provide some analysis of the way in which we use the Work Plan based on the data that is available to us today.

It should be noted that the number of independent deliverables in the Work Plan is 91, however 3 of these deliverables are divided into 14 sub-deliverables which are counted in addition to the 91 deliverables. There are therefore a total of 105 deliverables used in all of the analysis in this report.

3.1. Progress against deliverables

Figure 2 shows the status of the **69 deliverables that are due in 2018**. Overall 62% are completed or on track to be completed during 2018, 30% are delayed by a defined number of months. For 1%, the delay is not defined and for 6% no information has been provided.

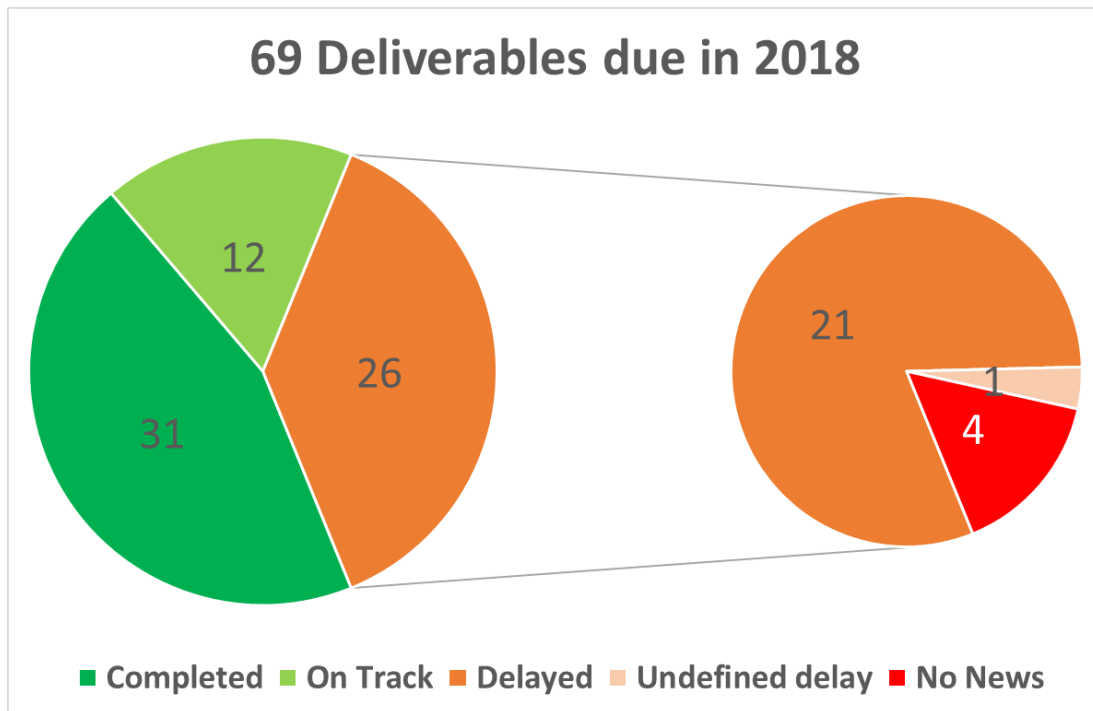


Figure 2 Status of the 69 deliverables due in 2018

The number of deliverables whose due date has been delayed is significant at around 30%. This represents a cumulative delay of 183 months or nearly 3 quarters per deliverable on average.

Although this tendency for deliverable due dates to slip is, perhaps, to be expected in a “best efforts” environment, the average size of the slippage is significant. Further analysis looking at how many times a deliverable due date is pushed back should be possible in the near future pending an evolution of the deliverables tracking database.

Of the **27 deliverables due in 2019**, 21 are on track and 6 have been delayed. 3 of the delayed deliverables have new due dates, for the other 3 no information has been provided.

8 of the **9 deliverables due in 2020** are on track and one has already been completed.

3.2. Analysis

General analysis of the Work Plan deliverables over time can provide some insight into the way in which CEOS Entities currently use this tool to define and monitor their work. The objective in this section is to derive some such insights which help to identify changes which would be necessary in order to improve definition and monitoring of the work conducted by CEOS entities going forward.

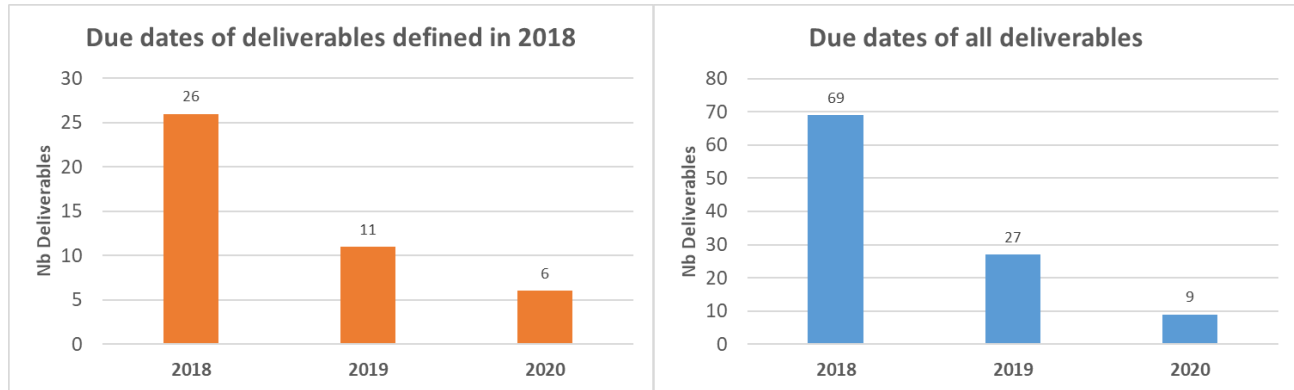


Figure 3 Work Plan deliverable due dates for deliverables defined in 2018 and all deliverables

The two plots shown in Figure 3 show that the Work Plan is being used as a short-term planning tool. The vast majority of deliverables are initially defined with due dates no further than the end of the current Work Plan, that is, within the next 3 years. This can be seen in the plot on the left entitled “Due dates of deliverables defined in 2018”. The fact that the theoretical coverage of the Work Plan is for the 3 coming years is also visible in the plot on the right “Due dates of all deliverables” which shows that all deliverables are due within this period. This is not representative of the actual duration of deliverables. As can be seen in Figure 5, a significant proportion of deliverables are in the Work Plan for longer than three years. One improvement that should be targeted is improving the accuracy of defining how long it will take to achieve a given deliverable.

It should be noted also that delivery of close to 70% of the deliverables is scheduled for the current year of the Work Plan even if, as can be seen in Figure 2, less than two thirds of these are actually completed in that time period (at least for 2018).

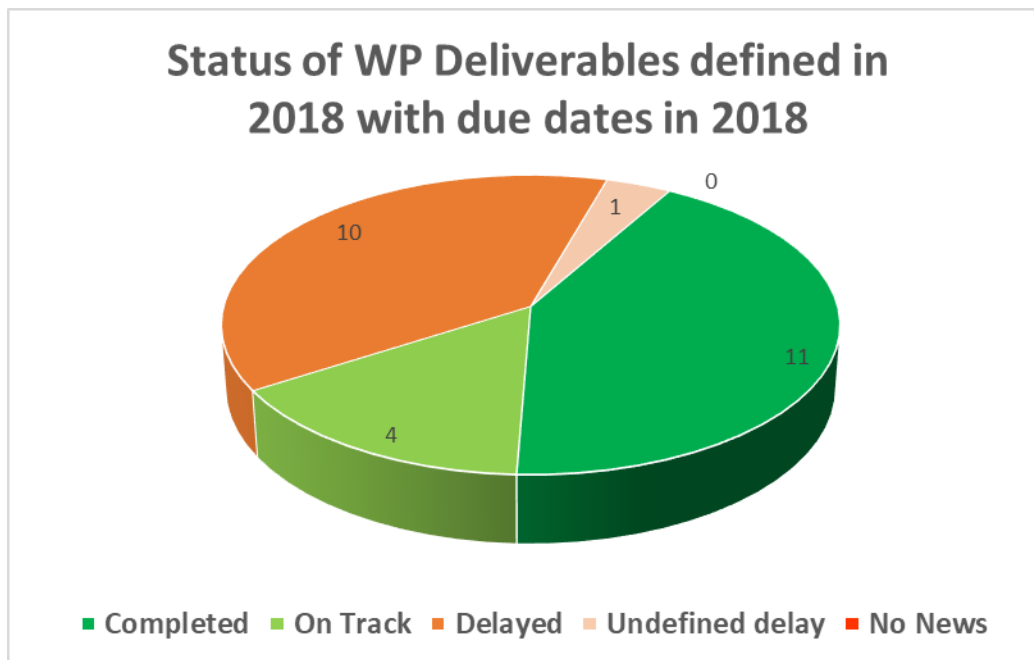


Figure 4 WP deliverables defined in 2018 with due dates in 2018

CEOS 2018-2020 Work Plan Progress Report

The plots in Figure 4 and Figure 5, on the other hand, show that despite the theoretical coverage of the Work Plan being only three years, in practice there is slippage in the due dates for a significant proportion of the deliverables. This is true even in the year of definition of the deliverable as shown in Figure 4. This plot shows the status of deliverables defined in 2018 which were identified with due dates in 2018. While the estimation of due dates for these deliverables should be well controlled, even they show significant slippage, with close to 40% delayed. Further analysis, including following these deliverables through time and quantifying the number and size of due date slippage would be necessary in order to gain additional insight into why this happens – for example, are specific types of CEOS entity (WGs, VCs, AHTs) more prone to deliverable slippage than others?

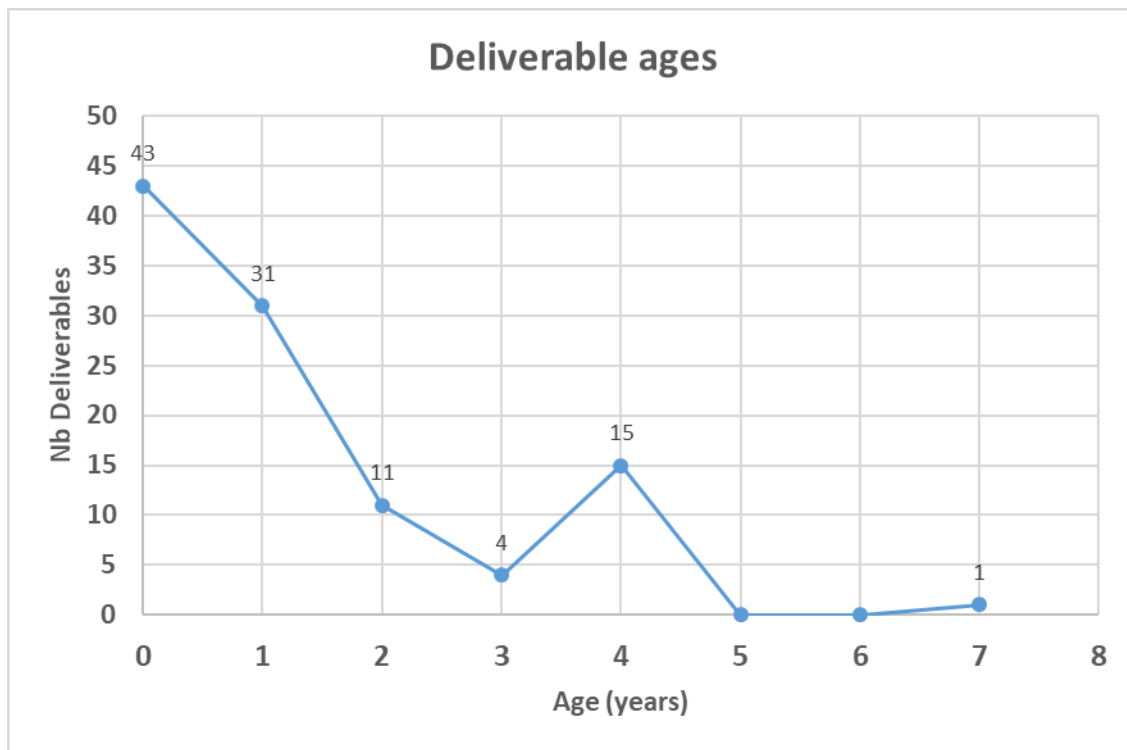


Figure 5 Work Plan deliverable ages

The analysis provided here gives some examples of the possibilities provided by the current database and by the potential evolutions which are planned for implementation in the coming year. Further discussion is required to target more precisely the information that would be most useful to distill from the database in order to facilitate improved monitoring of the implementation of the CEOS Work Plan. This discussion will be scheduled during the early part of next year with those that are best placed to contribute: the CEOS entities with deliverables in the CEOS Work Plan.

4. Detailed deliverable status

This section presents the status of each open CEOS deliverable according to the methodology described in section 2. This means categorizing each deliverable according to three categories:

- Completed
- On track
- Delayed

Within the category “Delayed” the deliverable can have one of three status:

- Known delay (quantified as a number of months)
- Unknown delay
- No information

In order to maintain coherence with the Work Plan document the status of the 91 currently open deliverables (of which 3 have 14 sub deliverables) are presented organized according to the thematic areas of the 2018-2020 Work Plan.

- 4.1. Climate Monitoring, Research, and Services
- 4.2. Carbon Observations, Including Forested Regions
- 4.3. Observations for Agriculture
- 4.4. Observations for Disasters
- 4.5. Observations for Water
- 4.6. Future Data Architectures
- 4.7. Capacity Building, Data Access, Availability and Quality
- 4.8. Advancement of the CEOS Virtual Constellations
- 4.9. Support to Other Key Stakeholder Initiatives
- 4.10. Outreach to Key Stakeholders
- 4.11. Organizational Matters

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4.1. Climate Monitoring, Research, and Services

Climate Monitoring, Research, and Services Objectives/Deliverables: 2018-2020			
Objective/Deliverable	Projected Completion Date	Background Information	Responsible CEOS Entity
Information dissemination and communication			
CMRS-13: Development and Promotion of Case Studies	Q3 2019	Previous work, supervised by the EC JRC and WMO, has already produced WMO 1192 <i>Case Studies for Establishing an Architecture for Climate Monitoring from Space</i> . WGClimate #6 An updated version containing additional case studies is targeted for the WMO congress in 2019. The output of previous and potential future work is to be supported by the dedicated Joint CEOS/CGMS WGClimate website.	WGClimate
Delivery of a second iteration of the Essential Climate Variable Inventory			
CMRS-15: Cycle 2 Gap analysis	Q2 2018	Several teams will perform the cycle 2 gap analysis in parallel, with the work organized by thematic area. To ensure consistency of approach across the full inventory, the gap analysis work of the individual teams will be overseen/coordinated by the WGClimate Chair team.	WGClimate
CMRS-16: Action plan	Q2 2018	The action plan will identify agreed actions that CEOS and CGMS Members and Associates intend to take to address priority gaps. The action plan will be endorsed and released to the CEOS community at the 31 st CEOS Plenary Meeting.	WGClimate
Annual delivery of the Essential Climate Variable inventory			
CMRS-17: Collection, incorporation, and quality control of new & updated information from data providers	Q4 every year from 2019 onwards	Based on a stable questionnaire, with potential updates of the inventory structure, to accommodate, for example, requirements stemming from C3S and WCRP; and experiences from applicable projects.	WGClimate
CMRS-20: Gap analysis	Q4 every year from 2019 onwards	WG chairs will initiate gap analysis work that always provides incremental updates to the year before in terms of improvements on the compliance to GCOS requirements and a report in focus areas addressing needs of CEOS and CGMS. The gap analysis is coordinated by the WG Chair team and support by several expert teams that will perform the gap analysis in parallel.	WGClimate
CMRS-21: Action plan	Q4 every year from 2019 onwards	The action plan identifying agreed actions that CEOS and CGMS Members and Associates intend to take to address priority gaps will be updated once a year. The actual action plan will be endorsed and released to the CEOS community at a suitable meeting.	WGClimate
Engagement with GCOS			
CMRS-19: Joint CEOS/CGMS response to the new GCOS IP	Q2 2018	Complement the response to the GCOS IP 2016 with the technical supplement addressing individual ECVs. Reflecting the partnership, this document will be developed jointly by CEOS and CGMS.	WGClimate

ON TRACK

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4.2. Carbon Observations, Including Forested Regions

Carbon Observations, Including Forested Regions Objectives/Deliverables: 2018-2020			
Objective/Deliverable	Projected Completion Date	Background Information	Responsible CEOS Entity
CARB-4: CEOS delivery of coordinated land surface observations for GFOI countries	Q2 2018	CEOS will acquire coordinated land surface observations for GFOI countries in accordance with the endorsed strategies.	SDCG for GFOI
CARB-5: Updated <i>Global Baseline Data Acquisition Strategy for GFOI, Space Data Services Strategy for GFOI, and Strategy for Satellite Data in support of GFOI R&D</i>	Q2 2018	With the end of the commissioning phase of Sentinel-2B GFOI has reach full operational capability in 2017. Element-1 (baseline data acquisition strategy), Element-2 (data services) and Element-3 (R&D) will require updates to reflect changes in space data assets, national implementation plans and GFOI's move into Phase 2.	SDCG for GFOI
CARB-12: White paper on a carbon observation constellation	Q3 2018	White paper on coordinated detailed planning/preparation of a constellation of instruments to measure CO ₂ and CH ₄ from space.	AC-VC
CARB-15: Carbon data Portal prototype	Q3 2018	Implement a carbon data portal to facilitate the discoverability and accessibility of ECV products and space-borne CDRs. The portal is designed with a service-oriented architecture and follows the principles outlined by the GEOSS Community Portal white paper. The portal will seamlessly access data both in CWIC and FedEO to provide necessary data, tools and services to the carbon science community of both CEOS and GEOSS. The reference implementation can be shared with the broader CEOS carbon community.	WGISS
CARB-16: Cal/Val and production of biomass products from CEOS missions	Q4 2019	Development of a coordinated cal/val strategy across NASA and ESA biomass missions that rationalizes protocols, data sharing, and the establishment of ground-based carbon super-sites.	NASA and ESA
CARB-17: Engaging with IPCC inventories and promoting satellite EO	Q4 2019	The 2006 IPCC Guidelines for National GHG Inventories currently indicates that satellite data has limitations in spatial, vertical and temporal resolution. However, the IPCC Guidelines will be updated and released in 2019, and update of verification guidance with respect to atmospheric measurement and new datasets is expected. This creates the possibility that the update will include use of GHG observation data from satellites. CEOS has accumulated GHG scientific data by satellites such as GOSAT and OCO-2, and more satellites will follow. Thus, CEOS engagement with IPCC and efforts to support this update are important for EO data uptake in Climate actions.	JAXA
CARB-18: Colombia Data Cube Prototype for Forest Mapping and Carbon Stock Assessments	Q4 2018	The SEO initiated a Data Cube prototype in Colombia in 2016. This project will demonstrate an end-to-end approach for Carbon stock assessments of forests to support UNFCCC reporting. Coordination with FAO and the GFOI Office will be essential.	SEO (with support from SDCG for GFOI)

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NO INFO

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4.3. Observations for Agriculture

Observations for Agriculture Objectives/Deliverables: 2018-2020			
Objective/Deliverable	Projected Completion Date	Background Information	Responsible CEOS Entity
AGRI-4: CEOS Strategic Response to GEOGLAM Requirements	Next update Q4 2018	The <i>CEOS Strategic Response to GEOGLAM Requirements</i> identifies how CEOS Agencies will coordinate their relevant Earth observing satellite systems to acquire data to support information requirements arising from GEOGLAM. Updates to this document may include the addition of new mission datasets, updates to primary and contributing datasets, updates to sampling approaches, adjustments to the strategy that improve GEOGLAM coverage, and updates to country coverage. In addition, this task will include updates to the Scope Document, which reflects the high-level plans for the Ad Hoc GEOGLAM team and addresses new requirements evolving from regional networks and RAPP.	CEOS Ad Hoc Working Group on GEOGLAM
AGRI-8: Vietnam Data Services Prototype	Q2 2018	Complete initial deployment of a Vietnam Data Cube with a particular emphasis on data interoperability (optical and radar) and agriculture applications including rice crop monitoring.	SEO
AGRI-9: RAPP (Rangelands) Data Cube Demonstrations and Application Testing	Q4 2018	Complete a Data Cube demonstration for one or more test sites to support RAPP (rangelands). This demo will explore steps for data cube creation at local test sites and explore applications targeted toward rangelands agriculture (fractional cover, custom cloud-free mosaics, NDVI anomaly).	SEO

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4.4. Observations for Disasters

Observations for Disasters Objectives/Deliverables: 2018-2019			
Objective/Deliverable	Projected Completion Date	Background Information	Responsible CEOS Entity
DIS-10: Implementation of data coordination for the GEO-GNSL initiative	Q4 2020	Potential proposals for new GSNL activities (i.e. new permanent & event Supersites) aiming at expanding the objectives of the current pilots will be assessed by the Data Coordination Team and the various pilot teams in due time. The assessment will be done by WG Disasters following the procedures endorsed by CEOS. The status of implementation of the plan, of the pilots and supersites being supported, and the coordination relating to the GSNL initiative will be reported at CEOS SIT and Plenary meetings.	WGDisasters
DIS-12: Report on survey of donors for post-2017 operation of a Recovery Observatory	Q4 2018	WGDisasters will develop a survey of initial results of the Recovery Observatory from the perspective of institutional donors, and include outlooks on possible inclusion of additional hazards and the sustainability of Recovery Observatory activities for 2018 onwards. The findings of this survey will be presented in a lessons learned report in 2018 to enable timely consideration by CEOS Agencies.	WGDisasters

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Observations for Disasters Objectives/Deliverables: 2018-2019			
Objective/Deliverable	Projected Completion Date	Background Information	Responsible CEOS Entity
DIS-15: Support for GEO-DARMA identification of major hazards and DRR issues for each selected region	Q2 2018	GEO-DARMA will seek independent identification of disaster risk management priorities at regional level by authoritative regional institutions in line with the priorities from the <i>Sendai Framework for Disaster Risk Reduction 2015-2030</i> . This task will require the active support of major stakeholders in the field of disaster risk management at global, regional and national levels in order to implement a series of pilot projects.	WGDisasters
DIS-16: Report on Landslide Pilot and follow-on actions.	Q4 2019	A report will be prepared to summarize the learnings from the landslide pilot, and to recommend pathways forward.	WGDisasters
DIS-17: Demonstrators Implementation Plan	Q2 2018	Follow on actions from seismic hazards, volcanoes and flood pilots	WGDisasters

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4.5. Observations for Water

Observations for Water Objectives/Deliverables: 2018-2020			
Objective/Deliverable	Projected Completion Date	Background Information	Responsible CEOS Entity
WAT-4: Updates on implementation of the CEOS Strategy for Water Observations from Space, including consideration of required adjustments based on activity in GEO	Q4 2019	CEOS, through the SIT Chair, will continue to monitor progress on GEO water-related activities. The SIT Chair will also engage with GEO to determine when, and if, the strategy should be revisited. Regular updates will be provided at SIT meetings.	SIT Chair
WAT-6: Response to satellite-related aspects of the GEO AquaWatch Initiative Implementation Plan	Q4 2018	CEOS support for the implementation of the GEO AquaWatch (monitoring and forecasting of water quality of inland and coastal waters) community activity is crucial, as satellite observations are an integral component. AquaWatch will be submitted as a formal GEO Initiative in 2017.	NOAA and CSIRO (with OCR-VC)

ON TRACK

NO INFO

4.6. Future Data Architectures

Future Data Architectures Objectives/Deliverables: 2018-2020			
Objective/Deliverable	Projected Completion Date	Background Information	Responsible CEOS Entity
Framing the discussion on FDAs			
FDA-2: Collaborative development of CEOS Data Cube technology	2019-Q4	CEOS Agencies will develop the CEOS Data Cube as a piece of re-usable and customizable open source technology that lowers the barriers to use of satellite Earth observation data. Activity will be undertaken in accordance with the CEOS Data Cube Work Plan.	CSIRO, GA, SEO, UKSA, USGS
FDA-5: Promote awareness of FDAs	Q2 2019 (Interim reports)	With growing interest in Future Data Architectures, WGCapD will identify ways of promoting the use of Future Data Architectures and possible outreach capacity building activities for end users and decision makers (e.g. webinars, workshops, etc).	WGCapD supported by WGISS and SEO
FDA-8: Establish a common description of Future Data Architecture functional blocks and identify interfaces and interoperability approaches.	Q3 2018	Based on the outputs of the inventory and review of existing standards and approaches at CEOS agencies, on the pilot projects and using the various workshops (listed below) where FDA activities are discussed, FDA-AHT will establish a common understanding and develop a white paper describing the functional blocks and typical interoperability approaches for a generic FDA.	FDA AHT supported by WGISS
FDA-9: Inventory and characterise existing FDAs operated by both public and private entities including the standards and approaches they use (e.g. Data Cubes, Exploitation Platforms, Copernicus DIAS, etc).	Q3 2018	As CEOS agencies are defining their processing and data dissemination standards, they seek to apply and follow international standards and best practices, including those generated by WGISS. This does not only concern common standards in terms of catalogs, metadata, terminology, and semantics, but it also involves interoperability standards for data discovery and download and for EO data analysis Application Programming Interfaces (APIs), as well as common interface standards such as INSPIRE, OGC, and W3C, and interoperability with other data access services (e.g., European Data Portal, international, GEOSS). WGISS will inventory and characterise existing FDAs operated by both public and private entities including the standards and approaches they use (e.g. Data Cubes, Exploitation Platforms, Copernicus DIAS, etc).	WGISS
CEOS Analysis Ready Data (ARD)			
FDA-7: Product Specifications in accordance with the CARD4L Framework	Q1 2018	CEOS Analysis Ready Data for Land (CARD4L) will be satellite data that have been processed to a minimum set of requirements and organized into a form that allows immediate analysis with a minimum of additional user effort, and interoperability both through time and with other datasets. LSI-VC will complete the development of the first concrete specifications for CARD4L-branded products.	LSI-VC (with WGCV)

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CEOS 2018-2020 Work Plan Progress Report

Future Data Architectures Objectives/Deliverables: 2018-2020			
Objective/Deliverable	Projected Completion Date	Background Information	Responsible CEOS Entity
Interoperable Free and Open Tools			
FDA-10: Finalise inventory of Software and Tools available or used at CEOS agencies for EO data exploitation and use focusing on Open Source but remaining as broad and inclusive as possible and implement a mechanism for discovery and access.	Q3 2018	Each CEOS agency will continue to develop its data and computational infrastructures consistent with its capacity and user service mandates. CEOS has a role in identifying tools to support complementarity and interoperability across CEOS agencies in support of the FDA strategy objectives. WGISS will finalise the ongoing work of inventorying the software and tools available or used at CEOS agencies for EO data exploitation and use (e.g. EO data visualization, analysis, processing, readers/writers, etc), and implement a mechanism for discovery and access. Focus will be on Open Source but remaining as broad and inclusive as possible.	WGISS
Data, Processing, and Architecture Interface Standards			
FDA-11: Organise several sessions/workshops to share lessons learned and outcomes from FDA systems and platform pilots and Interoperability Projects.	Q4 2018	Several CEOS agencies have already carried out initial pilot projects and CEOS seeks to share the experience gained from these to ensure the discussions on the strategic dimensions of FDA are informed by practical evidence. Sessions (including but not limited to those detailed below) should focus on several issues ranging from technical to programmatic lessons learned will be shared and considered as input for the definition of technical FDA recommendations. <ul style="list-style-type: none"> • WGISS-45, FDA workshop, 11/04 • SIT-33, 24-25/04 • FDA Big Data Workshop, 26/04 Boulder • SIT Technical Workshop, 12-13/09 	FDA AHT and WGISS
FDA-12: Inventory of space data product formats used by CEOS agencies.	Q4 2019	Develop an inventory of current product format used in CEOS agencies and identify recommendations to facilitate interoperability.	WGCV
User Metrics			
FDA-13: Develop a User Metrics Best Practice.	Q4 2018	The proposed User Metrics initiative seeks to ensure planning and responsibilities are put in place for CEOS to leverage the experience being gained by individual agencies and GEO to collate available user metrics and to adapt the FDA strategy as these metrics are analysed beyond what is simply being downloaded. WGISS will perform a survey on existing user metrics in Earth Observation and other domains (e.g. social media) and develop a best practice for User Metrics recommended for application by CEOS agencies; these will include a user questionnaire to allow classifying the final user in terms of use of the data products and allowing generation of summary statistics on how EO data is being used and for what.	WGISS

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4.7. Capacity Building, Data Access, Availability and Quality

Capacity Building, Data Access, Availability and Quality Objectives/Deliverables: 2018-2020			
Objective/Deliverable	Projected Completion Date	Background Information	Responsible CEOS Entity
CB-10: CEOS MIM Database Update Survey and Release of Online Version	Survey Q2, release Q4, each year	CEOS Agencies to provide resources to support their responses to the survey issued in the April-May timeframe to update the CEOS MIM database; release of the updated CEOS MIM Database will be online prior to the annual CEOS Plenary Meeting.	ESA, with support from CEOS Agencies
CB-19: Collaborate with the CEOS SDG-AHT to identify SDG-related training and capacity building opportunities related to space-based EO and meeting the challenges of the 2030 Agenda for Sustainable	Q4 2018	WGCapD is participating in the CEOS SDG Ad Hoc Team which will support GEO in promoting use of EO to track progress towards, and achieve, the Global Sustainable Development Goals (SDGs).	WGCapD
CB-20 Provide CB support to the regional and thematic AmeriGEOSS initiative	Q4 2018	Provide training and capacity building support to AmeriGEOSS with training opportunities as part of their annual meetings/initiatives Help with the development of methods and guidance documentation for best practices around institutional capacity development for GEOGLAM project in the Americas as well as with the Capacity Building Development plan.	WGCapD
CB-21: Explore future options for providing portal-based access to capacity building and training resources	Q4 2020	Conduct a study of existing and potential new approaches to collect, coordinate, and synergize available capacity building and training resources related to satellite Earth observations, e.g. GEOCAB, VLab training calendar and methods, and other alternate approaches.	WGCapD
CB-26 Provide CB support to the regional and thematic AfriGEOSS initiative	Q4 2020	Provide training and capacity building support to the AfriGEOSS with training opportunities as part of their annual meetings/initiatives. For AfriGEOSS 2018 (June 25-29), investigate the possibility of offering a training on Flood Mapping or Forestry.	WGCapD
CB-27 Provide CB support to regional and thematic AOGEOSS initiative	Q4 2020	Engage with AOGEOSS initiative and find out the needs of the region for possible training initiatives WGCapD could support	WGCapD
CB-28 Conduct global capacity building courses through a multi-lingual MOOC (Massive Online Open Course) on radar backscatter	Q1 2019	DLR's SAREDU project by FSU Jena will provide a multi-lingual MOOC (German, English, French, Spanish, Portuguese-tbc) on radar backscatter through the EO-College portal in Q4 2018 or 2019	WGCapD

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CEOS 2018-2020 Work Plan Progress Report

Capacity Building, Data Access, Availability and Quality Objectives/Deliverables: 2018-2020			
Objective/Deliverable	Projected Completion Date	Background Information	Responsible CEOS Entity
CB-29 Conduct global capacity building courses through Webinar on Asia-GEOGLAM, SAR Missions – Present and future, Disaster Risk Reduction (UNOOSA) (global training-interactive)	Q3 2019	ISRO with support of NASA, DLR and other theme specialists will plan to conduct these webinar series on these specialised topics.	WGCapD
CB-30 Conduct global capacity building courses through a MOOC (Massive Online Open Course) on SAR	Q1 2019	ESA with support of DLR's SAREDU project by FSU Jena and CSA will provide a second run of an improved ECHOES IN SPACE SAR MOOC extended by additional application examples	WGCapD
CB-31 Conduct global capacity building courses a MOOC (Massive Online Open Course) on Land Cover and Land Use Changes	Q4 2019	ESA with support of other WGCapD members will provide a MOOC (Massive Online Open Course) on Land Cover and Land Use Changes, if feasible through the EO-College portal in cooperation with DLR	WGCapD
CB-32: Provide regional hands-on training in land cover land use change topics in GEOSS regions in conjunction with related meetings.	Q4 2019	WGCapD will build on the successful NASA-ESA Trans-Atlantic Training program to provide hands on training in land cover land use change topics, starting in Asia to leverage existing NASA investments.	WGCapD
DATA-2: Full representation of CEOS Agency datasets in the IDN and accessibility via supported WGISS systems and standards	Q2 2019	As the IDN contains OpenSearch endpoints for data access and is also the CEOS Data Collections access point for the GEOSS Common Infrastructure (GCI) and GEO Portal, it is essential that all CEOS Agencies keep information on their data collections, including Analysis Ready Data, up-to-date in the IDN according to its metadata model (DIF-10)	WGISS and CEOS agencies / Working Groups
DATA-8: Maintain and evolve WGISS Connected Data Assets Infrastructure and Systems for CEOS Agencies data and services discovery and access	Q4 2018	Consolidation, operations, maintenance and evolution of current CWIC/FedEO/IDN overall Architecture.	WGISS
DATA-9: ECVs/CDRs Discovery and Access through WGISS Systems	Q3 2018	Facilitate discoverability and accessibility of ECV Products and space-born CDRs relevant for the CEOS Carbon Action via WGISS Connected Data Assets Systems & Standards (FedEO/CWIC/IDN, OpenSearch).	WGISS
DATA-11: Data and Technology Exploration webinars and workshops	Q4 2019	WGISS will host at least one workshop annually to serve as a forum for exchange of technical information and lessons-learned experience about current, trending and future data management approaches and technologies, services and other Internet-related technologies.	WGISS

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CEOS 2018-2020 Work Plan Progress Report

Capacity Building, Data Access, Availability and Quality Objectives/Deliverables: 2018-2020			
Objective/Deliverable	Projected Completion Date	Background Information	Responsible CEOS Entity
DATA-12: CEOS data holdings reported in GEO	Q3 2018	Provide support to GEO in their efforts of reconciling metrics of CEOS data holdings provided through WGISS Connected Data Assets standards and systems.	WGISS
DATA-13: Develop a White Paper on Single Sign-On (SSO) authentication.	Q4 2018	Single sign-on (SSO) allows user login with a single ID and password to gain access to connected (federated) systems. This capability is crucial for interoperability between different FDA platforms and systems. WGISS will develop a white paper on single-sign-on (SSO) authentication best practices to support machine-to-machine authentication for EO analysis	WGISS
CV-1: Update of general WGCV website to enhance better communication across CEOS and users	Q3 2018	Re-organization of WGCV website concept which includes on one side the entry to the CEOS portal, the CEOS CalVal portal, and the different subgroup web-sites in order to achieve a better outreach and communication strategy.	WGCV
CV-3: Workshop on state of the art for pre-flight calibration techniques	Q4 2018	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-9: Radiometric Calibration Network (RADCALNET)	Q4 2018	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. Progress will follow the developed project plan.	WGCV
CV-13: Intercomparison of atmospheric correction models	Q4 2018	The WGCV task team "Atmospheric Correction" will carry out several comparison measures between models and report about their findings including recommendations with respect to EO applications.	WGCV
CV-14: Report on application of approaches for cloud masking	Q4 2018	The WGCV task team "Cloud Masking" will research different cloud masking approaches for different sensors and spectral areas in order to deliver a report about their findings including recommendations for the applications of cloud	WGCV
CV-15: L1 top-of-atmosphere interoperability	Q4 2018	Develop an initial recommendation of a community reference in collaboration with GSICS.	WGCV
CV-16: Report on outcomes from GSICS/CEOS reference Solar Spectrum evaluation	Q2 2018	Cooperation through a series of virtual meetings to evaluate recent advances to recommend a solar spectra for GSICS and CEOS to ensure interoperability.	WGCV
CV-17: Continental scale surface reflectance validation	Q2 2019	Provide guidance for development of methodologies to validate the results of the recent ACIX work leading to protocols for determining uncertainties for interoperable reflectance products.	WGCV
CV-18: Greenhouse gas reference standards for interoperability	Q4 2019	Develop list of reference standards for CO2 and CH4 products that are suitable for use in intercomparison of multiple missions	WGCV
CV-19: Biomass validation protocols	Q2 2020	Development of an initial set of guidance for validation of biomass products using near-term missions such as NISAR, GEDI, and BIOMASS	WGCV

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4.8. Advancement of the CEOS Virtual Constellations

Advancement of the CEOS Virtual Constellations: 2018-2020			
Objective/Deliverable	Projected Completion Date	Background Information	Responsible CEOS Entity
VC-2: Ozone dataset validation and harmonization	Q4 2020	Production of peer-reviewed papers on ozone profile intercomparisons of data sets and long term (1979-now) combined data sets.	AC-VC
VC-3: Air quality constellation coordination	Q4 2018	Prepare document on validation needs for the AQ Constellation.	AC-VC
VC-9: Implementation of the International Network for Sensor InTercomparison and Uncertainty Assessment for Ocean Colour Radiometry (INSITU-OCR)	Ongoing	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.ioccg.org/groups/INSITU-OCR/White-Paper.pdf) and establishment of the INSITU-OCR Secretariat (EUMETSAT, NASA and NOAA). Implementation is following a modular approach.	OCR-VC (with EUMETSAT, NASA and NOAA)
VC-14: Vision for an OSVW Constellation	Q2 2019	White Paper describing and justifying the oceanography and climate requirements for an OSVW constellation. The International Ocean Vector Winds Science Team (IOVWST) meeting held in 2016 strongly recommended: at least three scatterometers in orbits designed to roughly meet the WMO requirements; and one instrument in a non-sun-synchronous orbit to help with the diurnal cycle, better sampling at mid-latitudes, and to improve inter-calibration. It has been proposed that a User Requirements Document be developed. An interim report will be presented to CEOS at SIT-31, and a more in-depth analysis will be prepared for the OceanObs meeting to be held in Q3 2019.	OSVW-VC
VC-15: OSVW Standards and Metrics	Q4 2018	Standards and metrics for OSVW services and products, including standard Cal/Val methods. Cal/Val methods will be addressed by the IOVWST Climate Working Group.	OSVW-VC
VC-17: Support to ECV precipitation parameters	Q4 2018	Precipitation ECV support: Provide the CEOS Response to GCOS Action A-8; ensure continuity of satellite precipitation products through five deliverables. Deliverables for 2018 are: reprocessing of all TRMM data to GPM standard (Version 8) (Q2), expansion of GPM DPR Ka band swath in routine operations (Q2), operational availability of JPSS-1/NOAA-20 MIRS precipitation products (Q2), completion of AMSR2 FO MDR and initiation of pre-project phase (Q3), launch of MetOp-C (Q4).	P-VC

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CEOS 2018-2020 Work Plan Progress Report

Advancement of the CEOS Virtual Constellations: 2018-2020			
Objective/Deliverable	Projected Completion Date	Background Information	Responsible CEOS Entity
VC-18: Programs for improvement of global precipitation products	Q4 2018	Precipitation products (with respect to algorithm development, outputs, and user requirements) using multi-satellite and multi-agency data through coordination between Precipitation Virtual Constellation (P-VC) partners. Deliverables for 2018 are: ICE-POP: International Collaborative Experiment – PyeongChang Olympics-Paralympics 2018 (Q2), GPM Disease Initiative Workshop (Q2), AMSR-E reprocessing to AMSR2 standard algorithms and formats (Q4), expansion of GSMaP_NOW NRT multisatellite product to Meteosat region (Q4).	P-VC
VC-19: Documented plan for the SST Virtual Constellation	Q3 2018	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
VC-30: Interoperability case study for Landsat and Sentinel-2	Q4 2018	The framework for moderate land sensor interoperability – see now completed VC-29 – will be applied to the Landsat and Sentinel-2 missions	LSI-VC (with WGCV)
VC-31: Evaluate CARD4L among target user communities and provide feedback on changes to CEOS information tools	Q4 2018	Conduct an evaluation of CARD4L with target user communities, starting with GEOGLAM and GFOI.	LSI-VC (with SDCG-GFOI, CEOS-GEOGLAM <i>ad-hoc</i> WG)
VC-32: CARD4L Product Assessment Framework	Q3 2018	Define how a formal process for the assessment of products as CARD4L will be completed including: how the CARD4L PFS are to be used, roles and responsibilities, how feedback on the CARD4L Framework generated through this process is handled, promotion of CARD4L datasets, etc.	LSI-VC
VC-33: Maintain the CARD4L Product Family Specifications (PFS)	Q4 2018	Ongoing task to maintain the CARD4L Product Family Specifications and integrate new Product Families when deemed appropriate.	LSI-VC
VC-34: CARD4L Engagement Strategy	Q3 2018	<p>A CARD4L Engagement Strategy will be defined to outline the approach for:</p> <ul style="list-style-type: none"> • Estimation of the cost-benefits of CARD4L for providers and users. • Promotion of CARD4L, including through workshops, conferences and journals. • Encouraging the development of CARD4L compliant datasets. • Gathering feedback from users on the benefits of and potential improvements to CARD4L datasets. <p>The Engagement Strategy will also include a target roadmap for CEOS agency CARD4L production. An online list of CARD4L datasets, including their level of maturity, will be maintained at: http://ceos.org/ard/</p>	LSI-VC

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CEOS 2018-2020 Work Plan Progress Report

Advancement of the CEOS Virtual Constellations: 2018-2020			
Objective/Deliverable	Projected Completion Date	Background Information	Responsible CEOS Entity
VC-35: Passive microwave radiometer continuity	Q4 2018	Coordinate inter-agency efforts to seek continuity and redundancy of Passive Microwave Radiometer observations for SST.	SST-VC
VC-36: Monitoring MRI implementation examples		Monitor existing MRI – see now completed VC-29 – implementation examples by agencies such as the MRI framework for moderate resolution land sensor interoperability applied to the Landsat and Sentinel-2 missions. Develop the long-term plans and actions for MRI, as well as identifying any expansion of MRI to other sensors. Specifically, the following actions are planned: <ul style="list-style-type: none"> • Furthering the framework under consideration of the agreed principles and expanding it to other sensors with a focus on moderate resolution SAR. • Analyzing various past/ongoing implementations (e.g. NASA HLS, ESA HSL) for MRI framework compliance. • Initiating detailed assessments of various implementation options (common grid, spectral & temporal adjustments). 	LSI-VC
VC-37: CEOS Information Tool Improvements	Q4 2018	Identify potential modifications to existing CEOS information tools that can be made to help improve their value for gap analyses.	LSI-VC

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4.9. Support to Other Key Stakeholder Initiatives

Support to Other Key Stakeholder Objectives/Deliverables: 2018-2020			
Objective/Deliverable	Projected Completion Date	Background Information	Responsible CEOS Entity
SDG-2: Compile and maintain a compendium of CEOS Agencies engagement on SDGs	Q3 2018	Collect and centralize information across CEOS Agencies on their SDG engagement and related activities, through online surveys and other consultation channels, including direct phone calls with the SDG PoCs of the respective CEOS Agencies. The Compendium of CEOS engagement on SDGs is meant to be used for CEOS internal use only, to collect main points of contacts on SDGs in the various CEOS agencies, identify strengths and weaknesses in CEOS collective engagement, and better coordinate / align / optimize CEOS agencies' engagement on SDGs. The compendium will be made available to CEOS members and regularly updated as soon as new information is available from the CEOS Agencies.	AHT SDG
SDG-3: Review and assess the contribution of EO to the SDG Targets and Indicators. Produce a compendium and policy brief.	Q3 2018	Assess the current and potential contribution of EO to the SDG Targets and Indicators (through the lenses of space-based EO) and identify areas of better EO uptake, with the objective to increase the effective use of satellite observations and products in the overall SDGs processes (targets achievement and indicators? monitoring) and by all key players (global to local)	AHT SDG

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CEOS 2018-2020 Work Plan Progress Report

Support to Other Key Stakeholder Objectives/Deliverables: 2018-2020			
Objective/Deliverable	Projected Completion Date	Background Information	Responsible CEOS Entity
SDG-4: CEOS engagement plan on SDGs	Q3 2018	Develop a coherent, flexible and adaptive CEOS engagement strategy on SDGs to maximize CEOS efforts and available resources on SDGs for a higher impact (on the use of EO in SDGs) and for more tangible benefits for CEOS agencies. A specific emphasis will be placed on the development of national use cases of EO methods and applications for target setting and SDG indicator monitoring and reporting.	AHT SDG
BP-4: CEOS Action Plan for GEO Blue Planet Initiative Components Implementation Plan	Q4 2018	Building upon the GEO Blue Planet Initiative Implementation Plan (September 2016) and the 3 rd Blue Planet Symposium (June 2017), coordinate efforts across the CEOS Ocean VCs and develop action plan for CEOS contributions to Blue Planet activities.	CEOS Blue Planet Expert (NOAA) (with Ocean VCs)
BON-4: Increase the visibility of remote sensing for biodiversity research and conservation applications	Ongoing	The remote sensing biodiversity research and conservation applications community has grown steadily over the past decade. The last few years has seen an increase in collaboration and activities. To further accelerate collaborations, the community will focus on developing joint symposia at professional society meetings, convening community workshops, and supporting additional venues for collaborations (eg online fora). The biodiversity group anticipates supporting at least three such activities per year.	CEOS Biodiversity Experts (DLR and NASA)
BON-5: Develop improved descriptions of candidate remotely sensing enabled EBVs and their sub-variables	Q4 2018	EBVs—both those for which remote sensing can play a role and those for which it cannot—are still under development. The GEO BON Ecosystem Structure and Ecosystem Function working groups in particular are focused largely on development of the remote sensing enabled EBVs and they will make recommendations to the broader biodiversity community.	CEOS Biodiversity Experts (DLR and NASA)
POL-1: Annual status report	Q4 2018	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)
COV-2: COVERAGE use cases & focal pilot application	Q2 2018	Determine priority application for COVERAGE via stakeholders engagement and compile use cases/requirements	COVERAGE Lead (NASA)
COV-3: COVERAGE Project Implementation Plan	Q2 2018	Develop detailed project implementation plan and schedule	COVERAGE Lead (NASA)
COV-4: COVERAGE Phase B prototype system	Q2 2019	Development of prototype COVERAGE system demonstrating core functionality for limited datasets	COVERAGE Lead (NASA)
COV-5: COVERAGE Phase C system	Q2 2020	Implementation of fully featured COVERAGE system in support of designated GEO application	COVERAGE Lead (NASA)
COV-6: COVERAGE system evaluation (Phase D)	Q4 2020	Testing and evaluation of the COVERAGE system	COVERAGE Lead (NASA)

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4.10. Outreach to Key Stakeholders

Outreach to Key Stakeholders: 2018-2020			
Objective/Deliverable	Projected Completion Date	Background Information	Responsible CEOS Entity
OUT-1: CEOS awareness and promotional material delivered at key meetings	Ongoing	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

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4.11. Organizational Matters

Organizational Issues Deliverables: 2018-2020			
Objective/Deliverable	Projected Completion Date	Background Information	Responsible CEOS Entity
ORG-7: Refreshed Terms of Reference for Working Groups	Q3 2018	As a result of the updated Governing Documents, work is required to reformat/translate existing Terms of Reference into the new structure to ensure consistency. A status update will be provided by each Working Group at SIT-33.	Working Groups with support from CEO

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