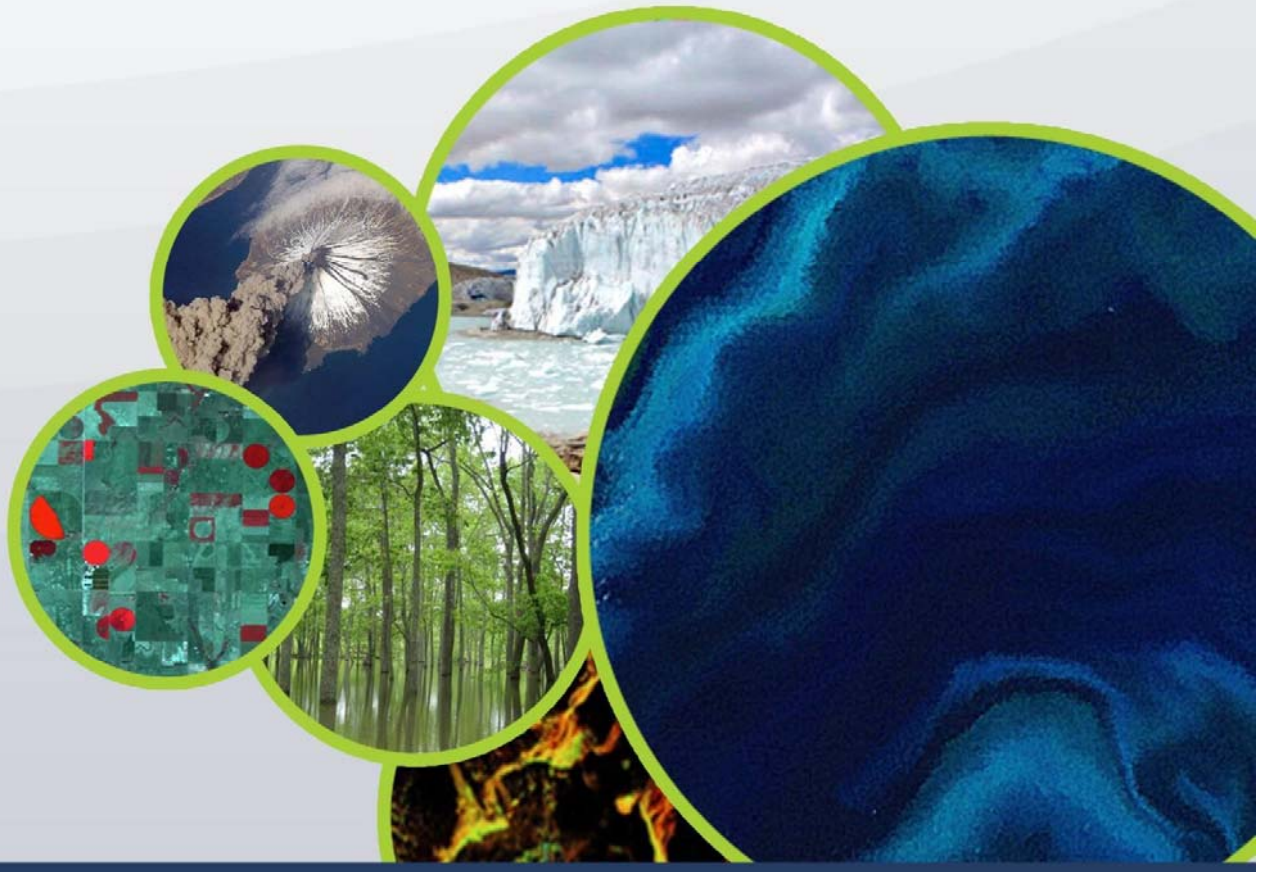
Committee on Earth Observation Satellites



2019-2021 Work Plan Progress Report

33rd CEOS Plenary *(for information)*

Contents

Executive Summary

The CEOS 2019-2021 Work Plan, endorsed by CEOS principals on 22nd March 2019, is the high level description of the activities within CEOS for the period 2019 through to 2021. This document, the CEOS 2019-2021 Work Plan Progress Report, provides a detailed review of progress made in 2019 against the 2019-2021 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 follows the template proposed for such reporting which was first presented to the 32nd Plenary in 2018. During the course of 2019, the CEOS systems Engineering Office has supported the upgrade of the CEOS Deliverables Database and website which facilitates the monitoring of CEOS Deliverables. This tool now incorporates information that will help track the cumulative due date slippage and number of due date changes since creation of each deliverable. While this information is now available, as it is relatively new, it will only begin to show its value in later Progress Report and will not be exploited much in this report.

With regards the development and monitoring of CEOS deliverables using the Work Plan, the significant progress in the behavior of contributors to the work plan that was noted in last year's Work Plan Progress has been continued and accentuated in the past year.

This is demonstrated by the fact that information on deliverable status, including estimation of new deliverable due dates, was provided for 98% of deliverables in the 2019-2021 CEOS Work Plan within the defined deadline. This figure, up on 93% last year, reflects a continued focus by SIT and the CEO on the Work Plan development and monitoring process. Precise information provided repeatedly to CEOS entities and a significant interest among entities to use the Work Plan as an effective tool for defining and monitoring their work can account for much of this increased attention to properly planning, executing, monitoring and reporting on the work of CEOS.

Progress made against the 2019-2021 Work Plan has been good, with 74% of Work Plan deliverables due in 2019 either "Completed" or "On Track" and a further 24% delayed with new due dates. This is a significant improvement on the performance of CEOS in 2018 and vindicates the renewed focus on planning, monitoring and reporting on CEOS work. Naturally, the continued vigilance of the CEOS principals is required to ensure that the "On Track" deliverables set to be delivered in Q4 2019 do not slip into 2020. Analysis of the "Completed", "On Track" and "Delayed" deliverables shows that improvements have been made in accurately estimating due dates, especially among those deliverables due within 12 months of the deliverable creation. Lastly, the tendency for defining Work Plan deliverables on very short term schedules remains in the 2019-2021 Work Plan. This is a "habit" which the CEOS community should aim to change in order to facilitate a more realistic, rather than optimistic, view on when deliverables are really likely to be completed.

1. Introduction

This document provides a summary view of progress made by the CEOS community against the 96 deliverables recorded in the CEOS 2019-2021 Work Plan (subsequently referred to as the Work Plan). The document reflects information on the status of each deliverable that was available to the CEOS Executive Officer on 1st October 2019 through the 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 2019-2021 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 was initially proposed to the 32nd CEOS Plenary as a model to follow for future reporting and, as anticipated, has largely been reused this year for reporting to the 33rd Plenary.
2. The second section provides a **report on the progress made against the Work Plan during 2019**. 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. While the deliverables tracking database has been upgraded this year to maintain this information for each deliverable, with only one year of history, this remains a relatively immature indicator.

3. Summary of Work Plan progress in 2019

This section provides a summary view of CEOS entities progress against the Work Plan in 2019.

The first general comment to make on the progress made in 2019 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. Over the period of the last two years, this evolution has been notable. 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 reporting to CEOS Plenary. Overall the information, including estimation of new deliverable due dates, was updated for 98% of deliverables, up on 93% in 2018. No information was provided for only two of the 96 monitored deliverables in 2019.

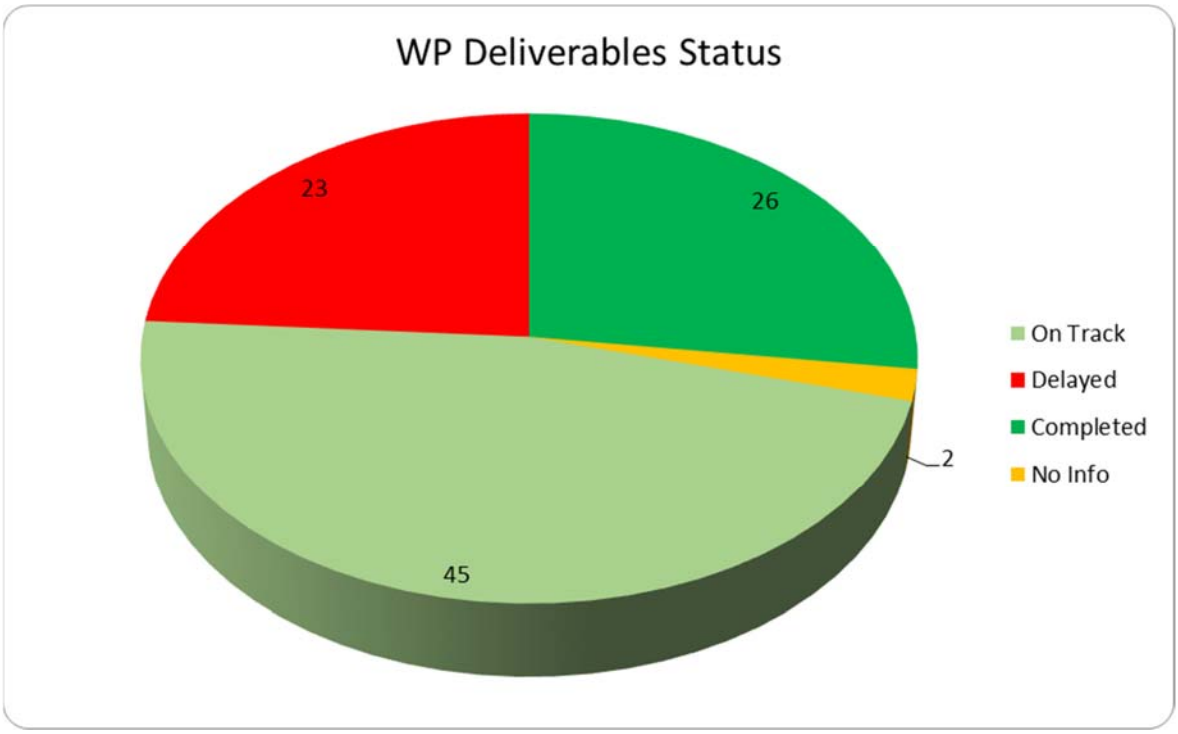


Figure 1 Status of the 96 deliverables in the 2018-2020 CEOS Work Plan

As presented in Figure 1, 74% (69% in 2018) of the 96 deliverables are Completed or On Track. The remaining deliverables are delayed, with 24% (23% in 2018) providing new due dates and only 2% (8% in 2018) providing either no or insufficient information to define new due dates. These figures show a positive evolution with respect to 2018.

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 monitored deliverables in the Work Plan is 96, however 3 of these deliverables are divided into 14 sub-deliverables (or actions) which, in the analysis this year, have not been counted in addition to the 91 deliverables. In addition to these 96

deliverables, 3 deliverables are Frozen. These deliverables are thought pertinent by the responsible entities that have proposed them, however resources to advance them have not been identified immediately. It is anticipated that such deliverables should be monitored over the medium term to ensure that they continue to be considered by the CEOS entities that proposed them. The final category of deliverables included in the Work Plan are ongoing "CEOS Service" activities (section 4.9 below). These 7 additional deliverables are considered as ongoing work undertaken by CEOS entities in the interest of the broader CEOS and EO community which is not of a "project" nature. These services and are not included in the current analysis.

3.1. Progress against deliverables

Figure 2 shows the status of the **68 deliverables that are due in 2019**. Overall 72% are completed or on track to be completed during 2019(62% in 2018), 26% are delayed by a defined number of months. For 1%, no information has been provided.

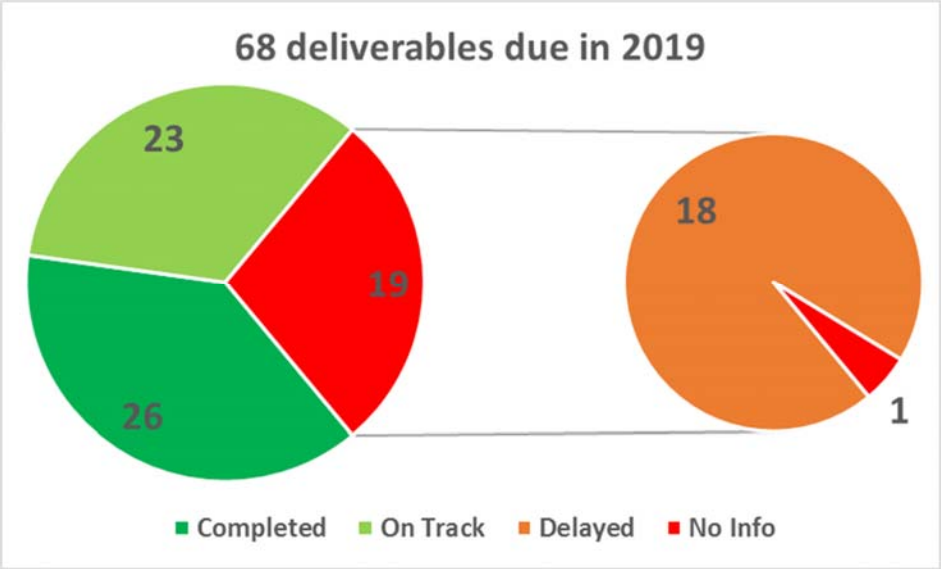


Figure 2 Status of the 69 deliverables due in 2018

The number of deliverables whose due date has been delayed is slightly smaller than in 2018 at 26%, compared to 30%. However, this year this represents a cumulative delay of 236 months or nearly 1 year per deliverable on average. This has increased from 3 quarters in the 2018 Progress Report. This significant increase is due to a number of deliverables (CARB-23, CARB-24, VC-3, VC-9) slipping by more than 2 years. This can perhaps be explained in these cases by a clearer definition of the work to be done for a given deliverable and the realization that a realistic due date is much further off than initially anticipated.

The possibility of monitoring how many times a deliverable due date is pushed back is now available in the deliverables.ceos.org database. This is likely to be increasingly useful moving forward.

Of the **23 deliverables due in 2020**, 18 are on track, 4 have been delayed and for one, no information has been provided.

All **5 deliverables due in 2021** are on track.

3.2. Analysis

General analysis of the Work Plan deliverables over time can provide some insight into the way in which CEOS Entities currently define and monitor their work. The objective of this section is to derive some such insights which may identify trends or could provide guidance to improve definition and monitoring of the work conducted by CEOS entities going forward.

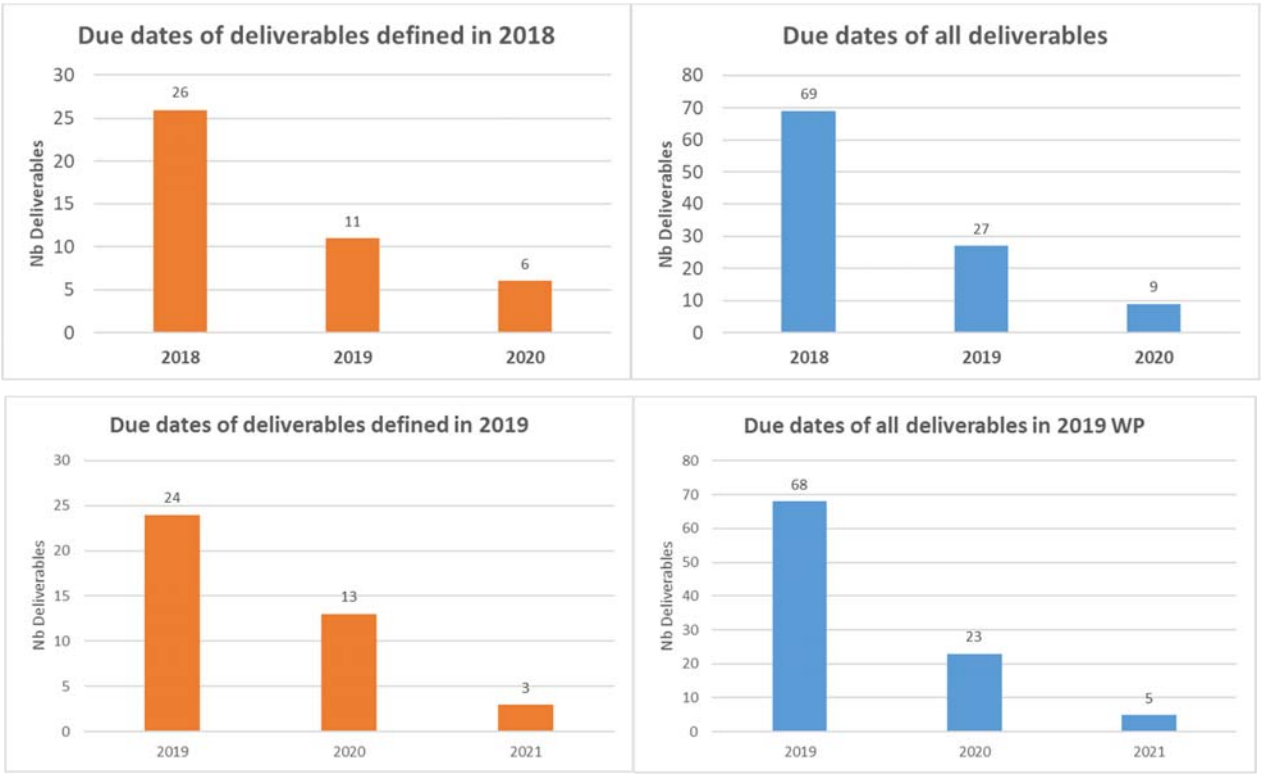


Figure 3 Upper level - Work Plan deliverable due dates for deliverables defined in 2018 and all deliverables and; Lower level – Work Plan deliverables due dates for deliverables defined in 2019 and all deliverables

The plots shown in Figure 3 Upper level - Work Plan deliverable due dates for deliverables defined in 2018 and all deliverables and; Lower level – Work Plan deliverables due dates for deliverables defined in 2019 and all deliverablesshow that the Work Plan continues to be used as a short-term planning tool and, indeed, that this tendency seems to have been accentuated since the 2018-2020 Work Plan. All deliverables are initially defined with due dates no further than the end of the current Work Plan, that is, within the next 3 years. The conclusions drawn on observing a similar plot in the 2018 Progress report can be reiterated here: both plots concerning the 2019-2021 Work Plan follow the same tendencies of the previous year. In this case, all deliverables in the 2019-2021 Work Plan are scheduled to be completed within the 3-year lifetime of the Work Plan, whether they have been initiated in 2019 or are older.

The objective identified in our analysis in 2018 of encouraging people responsible for CEOS deliverables to improve their estimations of deliverable due dates continues to be true.

Again in 2019, delivery of close to 70% of the deliverables is scheduled for the current year of the Work Plan. The percentage of these deliverables which are currently completed or on track to be completed in 2019 in 2019 is slightly higher than 2018 (less than two thirds) at approximately 72%.

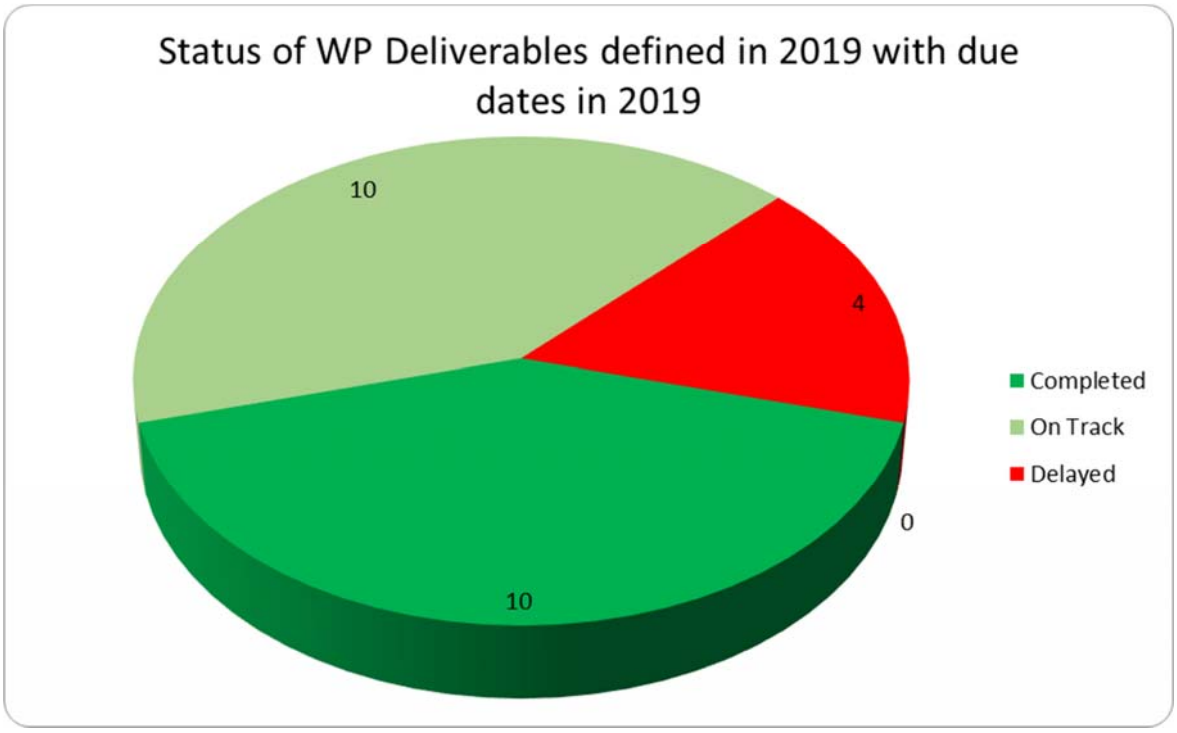


Figure 4 WP deliverables defined in 2019 with due dates in 2019

In the 2018 Work Plan Progress Report it was noted that even in those deliverables initiated in 2018 and with a due date in 2018, there was slippage in the due dates for a significant proportion (42%). That trend continues, but is attenuated in this year's Work Plan, falling to only 16%. The optimistic view would be that this is a sign of increased vigilance among CEOS Entities in executing the work identified in the Work Plan, thus vindicating the attention paid by CEOS leadership to monitoring the progress of the Work Plan.

With regards more detailed analysis, as identified in last year's progress report either regarding a more detailed analysis categorizing which types of CEOS entities are most prone to due date slippage or the types of CEOS Entity that push back due dates on a recurrent basis, detailed analysis has not been possible this year. Some data on these issues is now available in the database and will allow us to build up a clearer picture of these trends in the years to come.

4. Detailed deliverable status

This section presents the status of each open CEOS deliverable according to the methodology described in section 0. 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

Climate Monitoring, Research, and Services Objectives/Deliverables: 2019-2021				
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 *Case Studies for Establishing an Architecture for Climate Monitoring from Space*. WGClimate #10 will discuss how additional case studies may be realized. The results and potentially an updated plan for case studies is targeted for 2019.	WGClimate	COMPLETED
Engagement with GCOS				
CMRS-22: CEOS Statement and report to SBSTA	Q4 every year	WG Chair drafts the "Space Agencies Statement" and presents this for endorsement to CEOS Plenary.	WGClimate	ON TRACK
CMRS-23: Intermediate report on the status of the Space Agency Response to the 2016 GCOS Implementation Plan	Q3 2020	This report assesses the status of activities from the "Space Agencies response to the 2016 GCOS IP" and provides an updated of the report to GCOS. Report is assumed to need endorsement by CEOS and CGMS Plenaries. This should consider the Coordinated Action 12 on monitoring progress on GOCS Action T71 (results for this should come from action CMRS-30-2018-1).	WGClimate	ON TRACK
CMRS-24: Support to the GCOS Status report on observing systems for climate monitoring	Q3 2021	WGClimate shall support to the assessment of the fulfilment of the 2016 GCOS IP. Outputs from Actions CMRS-23, 24, and 28 shall provide a solid picture of space agencies contributions.	WGClimate	ON TRACK
Implementation of the international greenhouse gas monitoring system				
CMRS-25: Provide oversight to the implementation of the international greenhouse gas monitoring system (Coordinated Actions 11, 13, and 14).	Q3 2019 Q3 2021 Q3 2026	Three sub deliverables are defined: • Establish a roadmap for the development of a GHG monitoring system • Develop of a prototype GHG monitoring system • Develop the initial operational GHG monitoring system	WGClimate	ON TRACK
Climate Data Records				
CMRS-26: Update definitions for FCDR, CDR, ICDR (Coordinated Action 1)	Q3 2019	Update definitions for Fundamental Climate Data Records, Climate Data Records for GCOS ECVs and Interim Climate Data Records for both typs of data records. It is planned to agree on definitions at 10th and 11th WGClimate meetings during 2019.	WGClimate	+12mths
CMRS-27: Implement Coordinated Actions 5 on FCDR Inventory, 6 on nomenclature document for CDRs, 10 on meta data standards	Q3 2020	Upgrade the ECV Inventory technically that it can provide information on Level 1 base data records (FCDRs) used for CDRs of GCOS ECVs. Provide to CEOS agencies documentation on CDR related nomenclature and meta data standards.	WGClimate	ON TRACK

4.2. Carbon Observations, Including Forested Regions

Carbon Observations, Including Forested Regions Objectives/Deliverables: 2019-2021				
Objective/Deliverable	Projected Completion Date	Background Information	Responsible CEOS Entity	
CARB-15: Carbon data Portal prototype	Q2 2019	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	COMPLETED
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.	WGCV	ON TRACK
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.	WGClimate	COMPLETED
CARB-20: Updated CEOS Space Data Strategy for GFOI	Q4 2019	The CEOS Space Data Strategy was first developed in 2011 in support of GEO-FCT and GFOI. It will be brought up to date to reflect: the new outlook for forest area observations and the corresponding global baseline acquisition strategy; special needs of individual countries for space data services; the new phase for the GFOI R&D programme; and in particular the inclusion of the new generation of CEOS missions providing Above Ground Biomass measurements. The Strategy should support the broader CEOS Carbon Strategy and links maintained between the relevant actions.	SDCG for GFOI	COMPLETED
CARB-21: Phase II R&D Programme for GFOI	Q4 2019	The existing GFOI R&D programme and corresponding data supply activity will be concluded in H1 2019 and a summary achievements report will be produced. ESA as GFOI lead for R&D, with SDCG and other GFOI Leads will lead design of a Phase II programme and respective data supply that is focused on issues identified as a priority by the major donor governments – with the hope of securing stronger funding prospects for GFOI R&D activities going forward. This will likely be an iterative process through 2019.	SDCG for GFOI	+3mths

Carbon Observations, Including Forested Regions Objectives/Deliverables: 2019-2021			
Objective/Deliverable	**Projected Completion Date**	**Background Information**	**Responsible CEOS Entity**
CARB-22: Early Warning Module for GFOI	Q3 2020	Scoping discussions continue amongst the GFOI Leads for the definition of a GFOI Early Warning Module. Given the essential role of satellite data in early warning of deforestation, SDCG will follow closely and contribute to the Module, ensuring necessary representation for space data providers.	SDCG for GFOI
CARB-23: Forest Biomass measurements for GFOI countries	Q4 2019	The new generation of Above Ground Biomass measurement missions offers great promise to forest monitoring capabilities. SDCG and WGCV Land Product Validation group will work with GFOI Capacity Building partners, including World Bank, to accelerate the policy relevance and application of these missions through strong communications, education, and interchange between GFOI countries and space data providers. SDCG will promote to GFOI countries the CEOS Biomass Protocol currently under development by WGCV LPV (due Q1 2019), and will develop education materials to help inform countries as to the opportunities ahead. Measures to address the policy relevance of the data from the relevant missions will be identified, making best use of the user and policy interface provided by GFOI.	WGCV, SDCG for GFOI
CARB-24: Forest applications in the 2019 CEOS Chair Initiative and CEOS ARD Pilots.	Q4 2019	The 2019 CEOS Chair Initiative aims to establish prototype forest monitoring applications within an Open Data Cube environment for the Mekong Basin region. SDCG and its agencies will assist the selection of analytics and supporting data for realization of the Chair outcomes. Similar support will be provided for the anticipated ARD pilots being proposed within the CEOS ARD strategy (which may also include Mekong Cube).	SDCG for GFOI
CARB-25: Updated space data content in the 2019 GFOI Methods and Guidance Documentation (MGD)	Q2 2020	GFOI will start the process of updating the MGD in 2019 taking into account the "2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories". SDCG will engage to ensure proper representation and promotion of the full range of capabilities from space data.	SDCG for GFOI

4.3. Observations for Agriculture

Observations for Agriculture Objectives/Deliverables: 2019-2021			
Objective/Deliverable	**Projected Completion Date**	**Background Information**	**Responsible CEOS Entity**
AGRI-4: CEOS Strategic Response to GEOGLAM Requirements	Next update Q2 2019	The *CEOS Strategic Response to GEOGLAM Requirements* 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-10: Open Data Cube tools for GEOGLAM	Q4 2019	Develop and demonstrate several data cube analysis tools to support GEOGLAM, including crop mask overlays and NDVI phenology plots that will use moderate resolution data. GEOGLAM will explore utility in the context of its GEOGLAM Crop Monitor activities.	SEO
AGRI-11: Create a document on measurement suitability for agricultural products and associated decisions	Q4 2019	Work with CEOS to document and make available to users information on CEOS data quality, data suitability for a given usage and data access – a proposed activity to leverage the MIM database for the agricultural community. Extract information on measurement suitability from the MIM database to generate target products as identified in the GEOGLAM requirements table to create a "fact sheet" about mission/measurement suitability for agricultural monitoring. The final product should emphasize decisions that can be technically supported by EO data.	CEOS Ad Hoc Working Group on GEOGLAM and SEO
AGRI-13: Iteratively respond to GEOGLAM EO Data Coordination team's definitions of "Applications Ready Data" (ARD+) and "Essential Agricultural Variables for GEOGLAM".	Q4 2019	GEOGLAM will internally lead the development of EAVs and ARD+ based on both biophysical and political requirements. This activity is already underway with a version already under review. Production of these EAVs for GEOGLAM will require a long-term coordinated effort between GEOGLAM and the CEOS Working Group Calibration/Validation's Land Product Validation (LPV) sub-group. It is proposed that in 2019, the mechanisms for such a collaboration are characterized.	GEOGLAM (primary) CEOS Ad Hoc Working Group on GEOGLAM, and WGCV LPV (iterative response)

4.4. Observations for Disasters

Observations for Disasters Objectives/Deliverables: 2019-2021				
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	ON TRACK
DIS-12: Report on Haiti RO Early Evaluation by local users and international organizations	Q3 2019	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 mid 2019 (after 3rd Series of User Workshops) to enable timely consideration by CEOS Agencies.	WGDisasters	COMPLETED
DIS-15: Support for GEO-DARMA identification of major hazards and DRR issues for each selected region	~~Q3 2019~~ Q4 2021	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 *Sendai Framework for Disaster Risk Reduction 2015-2030*. 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	ON TRACK
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	+12mths
DIS-18: Volcano Demonstrator Reports	Q4 2021	Three annual reports (preliminary, progress and final) will be generated by the Volcano Demonstrator	WGDisasters	ON TRACK
DIS-19: Expanding the use of EO data for monitoring, measuring and understanding disasters	Q3 2019	Develop e-collaboration with EO practitioners to promote further utilisation of CEOS data	WGDisasters	COMPLETED
DIS-20: Pursue the standardization of geohazards EO-products	Q1 2020	Identify a framework for standardization of geohazards related EO-products to achieve acceptance by the EO community and decision makers	WGDisasters	ON TRACK
DIS-21: Deliver and report on the results of the Sesimic Demonstrator	Q1 2020	Deliver and report on the results of the period Q3 2018-Q4 2019, including report on the newly-reached geoscience centers and end users supported by the Demonstrator.	WGDisasters	+6mths
DIS-22: Final Haiti RO Report	~~Q1 2021~~ Q3 2020	Final report on Haiti RO results	WGDisasters	ON TRACK

4.5. Observations for Water

Observations for Water Objectives/Deliverables: 2019-2021				
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 2020-2021 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	NO INFO
WAT-6: Response to satellite-related aspects of the GEO AquaWatch Initiative Implementation Plan	Q1 2020	CEOS support for implementation of GEO AquaWatch (monitoring and forecasting of water quality of inland and coastal waters) is crucial, as satellite observations are an integral component for this international effort. AquaWatch is now a GEO Initiative and submitted its Implementation plan to GEO in February 2019.	OCR-VC, WGCapD	+9mths

4.6. Data Quality

Data Quality Deliverables: 2019-2021				
Objective/Deliverable	**Projected Completion Date**	**Background Information**	**Responsible CEOS Entity**	
CV-3: Workshop on state of the art for pre-flight calibration techniques	Q3 2019	Hold an open-invitation workshop to discuss and promote best practices on pre-flight and onboard calibration of sensors, initially focusing on optical.	WGCV	+15mths
CV-14: Report on application of approaches for cloud masking	Q2 2020	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	ON TRACK
CV-15: L1 top-of-atmosphere interoperability	Q4 2019	Develop an initial recommendation of a community reference in collaboration with GSICS.	WGCV	ON TRACK
CV-17: Continental scale surface reflectance validation	Q3 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	COMPLETED
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	+12mths
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	ON TRACK
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	+6mths

4.7. Capacity Building and Data Democracy

Capacity Building, Data Access, Availability and Quality Objectives/Deliverables: 2019-2021				
Objective/Deliverable	Projected Completion Date	Background Information	Responsible CEOS Entity	
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	ON TRACK
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	ON TRACK
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	+12mths
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	+3mths
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	COMPLETED
CB-31 Conduct global capacity building courses a MOOC (Massive Online Open Course) on Land Cover and Land Use Changes	Q2 2020	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	ON TRACK
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	ON TRACK
CB-33: Provide SAR and other EO data training in support of VNSC Chair initiative.	Q4 2019	WGCapD will provide basic and applied SAR training for VNSC and stakeholders based on their needs.	WGCapD	COMPLETED

Capacity Building, Data Access, Availability and Quality Objectives/Deliverables: 2019-2021				
Objective/Deliverable	Projected Completion Date	Background Information	Responsible CEOS Entity	
CB-34: Provide webinar on LCLUC theme	Q3 2020	Focus will be on Land Cover/Land Use Change theme. Deliver lectures/training materials relating to Land Use/Cover Change in South/Southeast Asia countries either through Webinars or hands-on training to participants (in one of the South/Southeast Asian countries).	WGCapD	ON TRACK
CB-35: Provide CB support to AmeriGEO Week 2019 in Peru.	Q3 2019	Provide training and capacity building support to AmeriGEO with training opportunities as part of their annual AmeriGEO Week.	WGCapD	COMPLETED
CB-36: Provide CB support to AfriGEO Symposium 2019.	Q3 2019	Provide training and capacity building support to AfriGEO with training opportunities as part of their annual AfriGEO Symposium.	WGCapD	COMPLETED
CB-37: Develop white paper describing approaches for capacity building networks supported by others, e.g. UN, can work together.	Q2 2019	Provide white paper for review at the SIT.	WGCapD	COMPLETED
CB-38: Provide CB support to Hyperspectral Remote Sensing.	Q2 2020	The DLR funded HyperEDU initiative lead by the GFZ Potsdam will, provide free & open learning material for Hyperspectral remote sensing through the EO-College portal.	WGCapD	ON TRACK
CB-39: Provide hands-on training on forest monitoring and Orfeo Tool Box for AEM.	Q1 2019	CNES will organize and implement training sessions on forest monitoring and Orfeo Tool Box for AEM. Participation of various national agencies from France (Office National des Forêts (ONF), Institut national de recherche et sciences et technologies pour l'environnement et l'agriculture (IRSTEA), ONF-I)	WGCapD	COMPLETED
CB-40: Provide hands-on training for flood monitoring for Vietnam School of Earth Observation.	Q3 2019	CNES will support second Vietnam School of Earth Observation on the topic of flood monitoring. Participation of International Center of Interdisciplinary Science Education (ICISE), Quy Nhon, Vietnam (ICISE).	WGCapD	COMPLETED
CB-41: Collaboration between AHT-SDG and WGCapD to organise SDG-related training and capacity building related to the use of space-based EO to meet the data challenges of the 2030 Agenda for Sustainable Development	Q3 2019	WGCapD and AHT-SDG collaboration to support GEO in promoting use of EO to track progress towards, and achieve, the Global Sustainable Development Goals (SDGs).	WGCapD (with the support of AHT-SDG)	COMPLETED
FDA-5: Promote awareness of FDAs	Q3 2019	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, WGISS, SEO	COMPLETED

4.8. Data Discovery, Access, Preservation, Usability and Exploitation: approaches, systems, tools and technologies

Data Discovery/Access/Preservation/Usability/Exploitation Objectives/Deliverables: 2019-2021				
Objective/Deliverable	**Projected Completion Date**	**Background Information**	**Responsible CEOS Entity**	
DATA-9: ECVs/CDRs Discovery and Access through WGISS Systems.	Q4 2019	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	+6mths
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	ON TRACK
DATA-13: Develop a White Paper on Single Sign-On (SSO) authentication.	Q2 2019	**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 services.	WGISS	+6mths
DATA-15: Explore emerging trends and disrupting technologies (e.g. Artificial Intelligence), evaluate advantages / drawbacks for adoption in Earth observation and identify most relevant use cases. Summarise analysis in the form of white papers.	Q4 2020	There is a need to enable rapid transfer of new technologies, techniques and expertise from ICT domains and artificial intelligence communities to the world of EO research and application. Specific communities, such as the Artificial Intelligence (AI) community are already formulating specific requirements toward EO data and product providers. Improved data analysis is a key driver to increase the usability and use of Earth Observation data, in particular by user communities which have not been acquainted with EO. The action will survey existing/new Big Data technologies and techniques, and assess their applicability in Earth Observation.	WGISS	ON TRACK
DATA-16: CEOS data holdings reported and accessible in GEO and other international relevant contexts.	Q4 2019	CEOS is often referred as the space arm of GEO. CEOS data holdings need to be reported and visible in GEO and accessible to the GEOSS Platform, GEO Regional Initiatives Systems and Community Portals through the WGISS connected data access infrastructure. This action and deliverable explicitly refers to the interaction with GEO and the GEOSS platform.	WGISS	ON TRACK
DATA-17: Mekong Data Cube.	Q4 2019	Develop and demonstrate a Mekong Data Cube supporting Vietnam, Laos, Cambodia and Thailand with stakeholder support from the Mekong River Commission (MRC). Datasets will include Landsat, Sentinel-1, Sentinel-2 and ALOS PALSAR Mosaics. Applications will focus on rice and forests. This project is a CEOS Chair initiative from VNSC/VAST.	CEOS Chair	ON TRACK
FDA-2: Collaborative development of Open Data Cube technology.	Q4 2019	CEOS Agencies will develop and contribute to the Open Data Cube initiative which uses an open source data management technology that lowers the barriers to use satellite Earth observation data. Activity will be undertaken in accordance with the Open Data Cube Work Plan and include a full code release (with documentation and installation modules), a communications plan and an application library.	SEO	ON TRACK

FDA-8: Establish a common description of Future Data Architecture functional blocks and identify interfaces and interoperability approaches.	Q3 2019	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.	WGISS	+9mths
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).	Q4 2019	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	COMPLETED
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 2019	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	+3mths
FDA-14: Facilitate discovery and access for end users to data analytics and processing tools and services through the WGISS Connected Data Assets Infrastructure.	Q4 2020	Facilitate discovery and access for end users through the WGISS Connected Data Assets Infrastructure, to data analytics and processing tools and services available from CEOS agencies and members. Association to relevant datasets and additional associated information would also be of help.	WGISS	ON TRACK

4.9. CEOS Services

CEOS Services 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
DATA-2: Full representation and accessibility of CEOS Agency datasets through WGISS Standards and Connected Data Assets Infrastructure (i.e. IDN, CWIC, FEDEO)	Q2 every year	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). This will allow accessing all CEOS agencies data from external clients (e.g. GEOSS Platform and Portal) through a single entry point.	WGISS and CEOS agencies / Working Groups
CV-9: Radiometric Calibration Network (RADCALNET)	Q4 every year	Operate an automated multiagency network of coordinated infrastructure and land-based test-sites for postlaunch traceable calibration of sensor radiometric gain.	WGCV
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
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	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	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	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

4.10. Advancement of the CEOS Virtual Constellations

Advancement of the CEOS Virtual Constellations: 2019-2021				
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	+24mths
VC-3: Air quality constellation coordination	Q1 2019	Prepare document on validation needs for the AQ Constellation.	AC-VC	+ 35 mths
VC-9: Implementation of the International Network for Sensor InTercomparison and Uncertainty Assessment for Ocean Colour Radiometry (INSITU-OCR)	Q4 2019	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)	+24mths
VC-14: Vision for an OSVW Constellation	Q4 2019	Short 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. This "optimal constellation" will be revisited at the 2019 IOVWST meeting in May and will be endorsed as is or modified. A short report will then be delivered to CEOS by end 2019.	OSVW-VC	ON TRACK
VC-17: Support to ECV precipitation parameters	Q4 2019	Precipitation ECV support: Provide the CEOS Response to GCOS Action A-8; ensure continuity of satellite precipitation products through five deliverables. Deliverables for 2019 are: reprocessing of TRMM data into GPM standard (IMERG) for longer term consistency (Q3), and operational availability of JPSS-1/NOAA-20 MIRS precipitation products (Q2).	P-VC	COMPLETED
VC-18: Programs for improvement of global precipitation products	Q4 2019	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. Deliverable for 2019 is expansion of GSMaP_NOW NRT multisatellite product to Meteosat region (Q2).	P-VC	COMPLETED
VC-19: Documented plan for the SST Virtual Constellation	Q1 2019	Building on Donlon, et al (2010) *Successes and Challenges for the Modern Sea Surface Temperature Observing System*, 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	+9mths

VC-31: Evaluate CARD4L supply and user access trials via pilot activities (e.g., with SDCG for GFOI, GEOGLAM)	Q4 2019	The completion of the CARD4L Product Family Specifications is just one milestone in the CEOS effort to lower the barrier to broad utilisation of space-based data; hurdles remain in relation to data production, accessibility, and usability in particular. Unless CARD4L is produced systematically, easily accessible at volume, compatible with varied existing work flows, and guaranteed to be sustained into the future, the benefits of the Specifications will not be realised. This task is intended to cover aspects such as: – CARD4L production from multiple instruments across the spectrum of available PFS; – routine publishing of this CARD4L via agency data portals, cloud data stores, other data aggregators/platforms; and, – investigation and implementation of new data paradigms such as COGs and STAC for CARD4L usability and discoverability. Digital Earth Africa has been agreed as an initial focal point, however this task is by no means exclusive to this initiative. GFOI, GEOGLAM, and the CEOS GEO-LEO activity may also present opportunities for CARD4L supply and user access trials.	LSI-VC (with SDCG-GFOI, CEOS-GEOGLAM *ad-hoc* WG)
VC-33: Complete Annual Update of the CARD4L Product Family Specifications (PFS)	Q1 2019	The CARD4L Product Family Specifications are intended to be living documents, updated on an annual basis at the occasion of the first LSI-VC team meeting of the calendar year. In addition, new PFS are expected to periodically join the CARD4L portfolio. This task captures the ongoing effort of the LSI-VC in these regards.	LSI-VC
VC-37: CEOS Information Tool Improvements	Q4 2019	Identify potential modifications to existing CEOS information tools that can be made to help improve their value for gap analyses. Including modifying the CEOS MIM database to allow complex queries and gap analyses through the addition of an API. Develop a prototype online user interface using an API connected to the MIM.	LSI-VC
VC-39: Formally define terms used in the context of the Moderate Resolution Interoperability (MRI) Initiative.	Q2 2019	There is a broad spectrum of definitions of 'interoperable'. An agreed and documented formal definition is needed before further work can be done on VC-30.	LSI-VC
VC-40: Complete Initial CARD4L Product Assessments	Q4 2019	LSI-VC and WGCV have agreed a process for the assessment of data products as CARD4L. There are two components to this process: a self-assessment against the CARD4L PFS by the data provider, and secondly, a peer review undertaken by WGCV in collaboration with LSI-VC. This task captures the ongoing effort of the WGCV and LSI-VC.	LSI-VC, WGCV

Advancement of the CEOS Virtual Constellations: 2019-2021			
Objective/Deliverable	**Projected Completion Date**	**Background Information**	**Responsible CEOS Entity**
VC-41: Pursue CEOS ARD promotion	Q4 2019	LSI-VC will undertake a number of tasks regarding the promotion of CARD4L, including: 1. Develop an information pack capturing the key value of CARD4L, using the CARD4L information notes as a basis. 2. Communicate actively with the commercial sector using the information pack and networks including UK Catapult, DIAS providers, and EARSC. 3. Increase communication with remote sensing agencies, scientists, and commercial providers through the ESA Living Planet Symposium, IGARSS, the ESA Ground Segment Coordination Body (GSCB), and other forums such as the World Geospatial Forum. 4. Act on the suggestions from the CARD4L survey. 5. Promote datasets via the CEOS ARD website (i.e., the CARD4L stocktake) and also through the relevant WGISS systems (e.g., Connected Data Assets (CDA)). 6. Advocating that CEOS Agencies adopt CARD4L Specifications, as the specifications become available.	LSI-VC
VC-42: Open-source library for surface reflectance product generation	Q4 2020	Publish an open-source software library for the generation of CARD4L surface reflectance products. The main focus will be on sen2like/HLS type processing modules. Any agency can contribute to the library, and it could potentially be open to private sector contributions.	LSI-VC
VC-43: Update of CEOS OST-VC User Requirements Document	Q4 2020	The current constellation User Requirement Document (URD) is the 2009 "Next 15 years of altimetry" report. An update is underway, with the objective to complete this work in 2020. This has been supported by early work by CNES phase 0 study (mix nadir/swath, global UR analysis), and coordination CNES-ESA (swath altimeter for operational oceanography => URD SAOO). The contents of the update will likely address: • Analysis of user needs: systematic + exploratory; • Swath altimetry + nadir altimetry: combined; • Recommendation for an "operational constellation" (targets: Copernicus Next Gen, China altimetry program); • Recommendation for additional science missions in complement; and, • Multiple applications: mesoscale monitoring, polar oceans, long-term record for sea level rise.	OST-VC
VC-44: Definition of an improved Precipitation CDR	Q4 2019	Provide the CEOS Response to ECV Inventory Gap Analysis Recommendation #14. Deliverables for 2019 include: update precipitation ECV inventory (Q2); study the situation on precipitation climate data records based on the findings of the WGClimate gap analysis report (Q3), to identify ways forward to stimulate the production of an improved precipitation CDR (Q4), and Engage with the CGMS-IPWG and WMO SCOPE-CM communities for best practices and current activities for the establishment of international collaborations for developing and producing such a CDR (Q3).	P-VC

ON TRACK

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4.11. Support to Other Key Stakeholder Initiatives

Support to Other Key Stakeholder Objectives/Deliverables: 2019-2021			
Objective/Deliverable	**Projected Completion Date**	**Background Information**	**Responsible CEOS Entity**
SDG-2: Compile and maintain a compendium of CEOS Agencies engagement on SDGs	Q2 2019	Collect and centralize information across CEOS Agencies on their SDG engagement and related activities, through online surveys and other consultation channels. 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 gaps in CEOS collective engagement, and better coordinate / align / optimize CEOS agencies' efforts on SDGs. The compendium will be made available to CEOS members only 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 2019	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
SDG-4: CEOS engagement plan on SDGs	Q2 2019	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
SDG-5: Analyse the SDG satellite data requirements	Q4 2019	Produce, in cooperation with the GEO EO4SDG initiative, a "SDG satellite data requirement Table" for a number of SDG indicators that are already or can be supported by satellite data. The SDG satellite data requirement Table" will summarise the satellite data needs (satellite observations, geographical coverage, time frame, frequency of observations, spatial resolution, EO data products etc.) for countries to achieve their SDG targets and report on SDG indicators.	AHT-SDG
SDG-6 Open Data Cube algorithms for the SDGs	Q4 2019	Develop and demonstrate a set of Data Cube algorithms that use CEOS satellite data and can be applied to several SDGs (e.g. 6.6.1, 11.3.1, 15.3.1). Seek feedback from statistical agencies and other stakeholders to understand how to improve these algorithms.	SEO (with the support of AHT-SDG)
BP-4: CEOS Action Plan for GEO Blue Planet Initiative Working Group and Pilot Project activities as documented in the 2020-2022 Blue Planet	Q1 2020	Building upon the GEO Blue Planet Initiative 2020-2022 Implementation Plan (March 2019), the 4th Blue Planet Symposium (July 2018) and the 1st International Operational Satellite Oceanography Symposium (June 2019), coordinate efforts across the CEOS Ocean VCs, WGs and agencies and develop an action plan for CEOS contributions to Blue Planet Working Group activities.	CEOS Blue Planet Expert (with Ocean VCs and WGCapD)

Support to Other Key Stakeholder Objectives/Deliverables: 2019-2021			
Objective/Deliverable	**Projected Completion Date**	**Background Information**	**Responsible CEOS Entity**
BON-6: Develop a draft standardised approach for specifying satellite observation requirements and EBV metadata.	Q4 2019	The approach will act as a template to facilitate development of detailed requirements and metadata. The ESA GlobDiversity Project, the GEO BON EBV Data Task Force, and the relevant EBV working groups are the key players in drafting this approach.	CEOS Biodiversity Experts
BON-7: Develop an updated list of candidate RS-enabled EBVs.	Q2 2020	The original list of EBV candidates has been in flux as discussions have progressed. This updated list will feed into discussions at the GEO BON 2020 Open Science Meeting planned for June 2020 and lead to further refinement and consensus.	CEOS Biodiversity Experts
POL-1: Annual status report	Q4 2019	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
COV-4: COVERAGE Phase B prototype system	Q1 2020	Development of prototype COVERAGE system demonstrating core functionality for limited datasets	COVERAGE lead (with Ocean VCs)
COV-5: COVERAGE Phase C system	Q1 2021	Implementation of fully featured COVERAGE system in support of designated GEO application	COVERAGE lead (with Ocean VCs)
COV-6: COVERAGE system evaluation (Phase D)	Q3 2021	Testing and evaluation of the COVERAGE system	COVERAGE lead (with Ocean VCs)

COMPLETED

ON TRACK

COMPLETED

+9mths

ON TRACK

ON TRACK

4.12. Organizational Issues and Outreach

Outreach to Key Stakeholders: 2019-2021			
Objective/Deliverable	**Projected Completion Date**	**Background Information**	**Responsible CEOS Entity**
OUT-1: CEOS awareness and promotional material delivered at key meetings	Q4 2019	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
ORG-3: Review and update workings of the www.ceos-deliverables.org database / website	Q4 2019	Review, propose and implement an updated version of the ceos-deliverables database and the interface to this database via the web. This update should include the desired additional information necessary to monitor the CEOS Work Plan as discussed at 32nd CEOS Plenary.	CEO, SEO

COMPLETED

COMPLETED