

CEOS Community Responses to the Essential Questions
version 1.0 draft

EQ1. What are CEOS’s scope and purpose?		<i>EQ1 Short-form Answer:</i>
<ul style="list-style-type: none"> Does CEOS conduct sustained, long-term, routine data provision, or does it demonstrate feasibility of space measurements and spin off long-term operations to other groups? 	<ul style="list-style-type: none"> CEOS does both, insofar as is possible within the constraints of available resources. Both are integral components of the work done in working groups and virtual constellations. 	
<ul style="list-style-type: none"> Does CEOS develop actual “CEOS Satellites” in addition to its traditional role in developing requirements and providing multi-lateral coordination of satellite systems among CEOS members? 	<ul style="list-style-type: none"> CEOS does not develop actual “CEOS Satellites,” but instead leverages the capabilities and assets of individual CEOS member agencies through the mechanism of the Virtual Constellations. 	
<i>CEOS Full Response to EQ1:</i>		
<p><i>CEOS is the key international coordination mechanism for space-based Earth observation, and as such its purview includes government agencies that develop and operate both research and operational EO satellites. CEOS member Agencies are variously engaged in demonstration of the feasibility of space measurements and, in some cases, sustained, long-term, routine data provision. As an extension of its members’ goals, CEOS also does both of these things.</i></p> <p><i>In connection with its partners and customers (e.g., GEO, GCOS and other global EO programs), CEOS also encourages development and demonstration of space measurements and the provision of satellite data on a sustained, long-term basis by its Members. CEOS Working Groups in particular undertake activities in both demonstration/proof-of-concept and long-term sustained data provision, and both are useful to CEOS members, partners, and customers. This dual nature should continue.</i></p> <p><i>CEOS, over time, should also figure out its relationship with the private sector in connection with commercial remote sensing programs.</i></p> <p><i>CEOS Member Agencies are increasingly willing to engage in cooperative activities, as opposed to just perceiving CEOS as a “talking shop” to promote their own individual programs. Collaboration is taking place at an advanced level in CEOS Virtual Constellations, Working Groups and in dedicated collaborative activities (e.g. GFOI, GEO GLAM, etc.) Apart from the satellites produced, operated and owned by CEOS members, CEOS itself does not make physical satellites. Satellite development partnerships among CEOS Agencies (e.g. Jason) will likely be furthered through the CEOS Virtual Constellation approach, wherein CEOS coordinates the Virtual Constellation, while the satellites that comprise the constellations are owned by specific members of CEOS.</i></p>		
EQ2. What is the value of CEOS to others, and how do others view, support, and engage with CEOS?		<i>EQ2 Short-form Answer:</i>
<ul style="list-style-type: none"> Internally, what benefits, tangible or otherwise, does an organization gain through active CEOS membership? 	<ul style="list-style-type: none"> CEOS provides opportunities for participation in multilateral coordination, individual career growth and agency growth through 	

	opportunities to lead, and the potential for agencies to more easily identify partnership opportunities through which they can share development and operational costs.
<ul style="list-style-type: none"> Externally, what benefits, tangible or otherwise, do governments, society, and users/partners gain through the existence of CEOS? 	<ul style="list-style-type: none"> External partners/users rely upon CEOS to represent and promote interaction among space agencies, to promote open data policies, and to provide high-quality Earth observations that result in societal benefits across a wide variety of topical areas.
<ul style="list-style-type: none"> In both cases, how does CEOS ensure that those benefits are commensurate with the level of investment (in time, human capital, and/or financial commitments)? 	<ul style="list-style-type: none"> CEOS ensures that benefits are commensurate with investment when its activities are productive and reflect awareness of the value of member resources and constraints. The level of participation in activities is a key measure of whether CEOS is succeeding in keeping an appropriate balance.

CEOS Full Response to EQ2:

Internal benefits to CEOS Member Agencies include participation in multilateral Earth observation coordination activities; acquisition of experience through rotational leadership opportunities in heading a Working Group, Constellation, or in chairing SIT or CEOS as a whole; and potentially the opportunity to share development and operations costs by identifying bilateral and multilateral partnership opportunities. Participating Agencies benefit through the CEOS approach to full and open data sharing, and individual agencies can reap benefits and potential cost savings though addressing issues in a collective manner.

CEOS provides a natural forum for coordination and information exchange, since it is informal enough to avoid difficulties stemming from technology export regimes that are quite strict within formal national and multilateral space activities. CEOS is also a natural environment to discuss backup needs for specific satellites, and also how to address societal issues by means of space assets.

GEO, GCOS and other external organizations as well as individual users have come to rely on CEOS as representing and promoting interaction among space-based Earth Observation agencies. The CEOS Earth Observation Handbooks and the CEOS portals provide key information with respect to CEOS Member Agency and CEOS collective planning. A recent example of the importance of CEOS to external entities is the decision of the sea surface temperature community through its GHRSSST (Group for High Resolution Sea Surface Temperature) mechanism to formally connect to CEOS in development of the CEOS Sea Surface Temperature Virtual Constellation. CEOS Working Groups allow coordinated approaches to instrument and cal/val activities, development of common standards, and development of useful tools. In addition, the collective actions that can be taken by CEOS, e.g. contributions to GCOS/UNFCCC requirements, GEO/GEOSS and others, are tangible benefits to society from CEOS.

CEOS Members or potential member agencies must continually weigh staff availability and financially-related travel constraints in deciding whether to participate in CEOS Plenary, SIT, and subsidiary meetings as well of the costs of active involvement in CEOS-related collaborative activities.

CEOS coordination efforts need to be slim enough to be affordable, but strong enough for rapid action.

Both small and larger undertakings must be based on volunteered actions from CEOS members, where each contributor defines what is worthwhile doing, and where each contributor also is cognizant of the benefits of CEOS coordination and the powerful human network of CEOS participants that is now distributed within multiple space related agencies. Agencies ultimately judge whether continued CEOS participation is of value to them. CEOS leadership should encourage active participation but be aware and responsive in dealing with individual Member constraints.

EQ3. What are CEOS's essential outcomes and relationships?	<i>EQ3 Short-form Answer:</i>
<ul style="list-style-type: none"> • What are the most valuable external relationships that CEOS maintains or should maintain? 	<ul style="list-style-type: none"> • Key external relationships include those with GEO, GCOS, SBSTA, and UNFCCC.
<ul style="list-style-type: none"> • What are the most valuable outcomes that CEOS provides or enables for its user communities? 	<ul style="list-style-type: none"> • Data democracy and open data access are among the most valuable outcomes that CEOS provides. Other very highly valued CEOS outcomes include the reduction of observation gaps, easy access to data, lessons learned for data management, and the demonstration of data utilization for specific applications with direct societal benefit.
<ul style="list-style-type: none"> • How would CEOS's mission & goals be affected if key stakeholders or partners were substantially changed or ceased to exist? 	<ul style="list-style-type: none"> • The value of CEOS is highly dependent upon strong stakeholder engagement. Given the rising importance of Earth observations for key environmental needs, if those stakeholders were not present, it would be necessary for CEOS to define new goals and find new customers. It is, however, likely that other international coordination mechanisms and intergovernmental organizations would instead seek CEOS engagement.

CEOS Full Response to EQ3:

CEOS takes seriously its relationships with key external entities and is a respected and known partner as a Participating Organization in the Group on Earth Observations (GEO) and in its interactions with the Global Climate Observing System (GCOS), and the SBSTA (Subsidiary Body for Scientific and Technological Advice) of the UN Framework Convention on Climate Change (UNFCCC). CEOS was developed under the auspices of the Group of Seven Industrialized Nations and is also now under the purview of the G20. There is recognition that CEOS provides increased capacity to respond to societal issues in a uniform way on behalf of the space community through the provision of information on space systems, provision of data in a standardized form, and responses to address specific issues.

The concept of Data Democracy is a valuable way forward in guiding data access, direct readout of satellites, and the sharing of satellite data particularly with users in developing countries. CEOS and its Member Agencies need to better understand and subscribe to the Utilization Principles developed by CEOS at its 2003 Plenary and included in its December 2003 "Improving Utilization of Earth Observation Satellite Data" publication. Similarly, other Working Groups view their relationships with

user communities as being of paramount importance. Some of the most valued CEOS outcomes include easy access to data, lessons learned for data management, and the demonstration of data utilization for specific applications (e.g. disasters, water).

CEOS needs to continue to focus on gap analysis and act to reduce observation gaps through the work of the Virtual Constellations.

Given the value of EO satellite data for key environmental needs, it is likely that international coordination mechanisms and intergovernmental organizations, including G20, will seek and expect continued access to such data and continued engagement with CEOS. The value of CEOS would be eroded if key stakeholders were to disappear or to diverge from CEOS, and if those stakeholders were to cease to exist, CEOS would need to establish a new mission and new goals to ensure its own viability.

EQ4. How does CEOS define and measure success in meeting its objectives?	<i>EQ4 Short-form Answer:</i>
<ul style="list-style-type: none"> • How does CEOS evaluate its own progress? 	<ul style="list-style-type: none"> • CEOS evaluates its own progress through such means as the Self-Study, through the leadership responsibilities given to the Troika and Secretariat, and through feedback provided by key stakeholders.
<ul style="list-style-type: none"> • What are the criteria CEOS uses for deciding that a CEOS activity is successful or unsuccessful? 	<ul style="list-style-type: none"> • The criteria that CEOS should use to determine success should include participation, commitment levels and the support of key participating agencies, and achievement of anticipated results. Long-term, ongoing activities will require different criteria than will short-term projects.
<ul style="list-style-type: none"> • How does CEOS decide whether an activity should be continued or ended? 	<ul style="list-style-type: none"> • Activities that are productive, that have important outcomes, and that have sufficient financial and human resources from CEOS members are candidates for continuation. Activities that do not show progress, that do not provide outcomes of value, or that lack interest or resources from key members, should be refocused or discontinued. Activities should not be viewed in isolation, but rather as part of the overall CEOS portfolio in assessing costs and benefits.

CEOS Full Response to EQ4:

CEOS evaluates its own progress directly and introspectively through such means as its current Self-Study. Its leadership bodies, notably the Troika and the Secretariat are charged with constantly establishing priorities, assessing the robustness and any needed fixes to CEOS activities, as well as addressing the value and lessons that can be learned from recent meetings. Close CEOS interaction with GEO and its Secretariat, and with GCOS, UNFCCC and other key mechanisms also result in feedback loops from such organizations that must be taken into consideration with respect to the continued efficacy of CEOS activities and courses of action. The high interest in the success of responses to societal needs

through CEOS Working Groups and Virtual Constellations clearly show the success of CEOS, while at the same time, the increasing difficulty in populating those groups demonstrates one of CEOS's risks.

Criteria that CEOS uses to determine success should include the level of participation, and more importantly, commitment levels as well as achievement of anticipated results. CEOS leadership must be able to refocus, or if necessary terminate less successful activities. The inability of one or more key participating Agencies to maintain interest or provide necessary human capital and financial resources can seriously undermine efforts, with it then being incumbent on CEOS leadership to ascertain whether there is viable support for continuation and successful completion of the activity.

Open-ended, ongoing activities require different success criteria than fixed-term activities, and success criteria and measurements should be built into the development and implementation phases of CEOS activities in the expectation that activities be successfully completed or transitioned outside of CEOS responsibility or oversight. CEOS must remain acutely aware of the resource implications of open-ended or long-term commitments, and not become bloated or overwhelmed by a sum total of activities that are not progressing toward completion and are therefore also impeding the redirection of resources needed for important new activities.

EQ5. What situations or conditions pose the greatest risks and opportunities for CEOS?	<i>EQ5 Short-form Answer:</i>
<ul style="list-style-type: none"> • How does CEOS ensure that its activities are sustainable? 	<ul style="list-style-type: none"> • CEOS must ensure that its activities are commensurate with both financial and human resources. CEOS should remain organizationally lean enough to be seen as both affordable and high value to members, and it must maintain high relevance to stakeholders. CEOS should be cautious about initiating new activities in times of austere budgets, and should be decisive in reconfiguring or adjusting activities when necessary to ensure sustainability.
<ul style="list-style-type: none"> • What factors or elements are absolutely essential to ensure that CEOS remains vital? 	<ul style="list-style-type: none"> • The continued full engagement of its membership is the single most critical element required to ensure that CEOS remains vital.
<ul style="list-style-type: none"> • What internal or external conditions would most severely stress CEOS? 	<ul style="list-style-type: none"> • The greatest stressors that CEOS could face would include loss of interest by key members who provide resources to activities, serious loss of continuity in key leadership roles, loss of key external stakeholders, or the emergence of other organizations to take on roles and relationships that CEOS has traditionally occupied.

CEOS Full Response to EQ5:

In times of particular austerity, CEOS needs to be cautious in assessing whether new activities should be initiated, and it needs to be decisive in reconfiguring or adjusting existing activities to ensure

sustainability.

CEOS can ensure its own sustainability by staying organizationally slim enough to be affordable and meaningful enough to be seen as worthwhile by its members. CEOS, looking inward, must be able to provide its members with information and coordination, while outwardly being able to respond to societal issues on behalf of the whole space community.

The status of individual CEOS activities is regularly reported at the SIT and the Plenary, with the SIT Chair, in the cases of Working Groups and Constellations, monitoring developments on a more frequent basis. CEOS leadership bears responsibility for providing constant oversight with respect to CEOS activities. Likewise, CEOS leadership needs to ensure the ongoing succession/rotation of CEOS leadership positions (CEOS Chair, SIT Chair, Executive Officer/Deputy Executive Office, Working Group Chairs and Constellation Co-Leads), working through the Troika to engage CEOS Agency Principals, as necessary, to ensure these positions are filled in a timely manner.

The greatest stressors to an organization like CEOS would include if key members were to no longer consider CEOS worthwhile, or if other external organizations were to take on roles that currently belong to CEOS.

As a “best efforts” organization with no budget, the viability of CEOS is contingent on the continued engagement of its membership, in particular those Member Agencies who have made specific human capital leadership or resource commitments. Changing circumstances directly impacting a CEOS leader or his/her Agency can disrupt plans and require collective action to immediately remedy an acute CEOS structural emergency. CEOS has normally been able to adapt and regroup in dealing with external circumstances when necessary.

Externally, while economic downturns certainly have an impact on space agency EO budgets and prospects for development of instruments and satellites, CEOS has value and has persisted as a coordination mechanism with increasing stature for nearly three decades.

The critical importance of EO satellite data for food security, disaster monitoring and the understanding and monitoring of climate change will most likely guarantee the continuing need for CEOS. To this point, it would be to CEOS’s benefit to articulate and showcase good examples of coordination efforts with societal benefit that CEOS has been able achieve where individual agencies could not.

EQ6. Ten years from now, what concrete major goals does CEOS want to have achieved?

EQ6 Short-form Answer:

- CEOS should remain the leader for internal coordination of space-based Earth observations.
- CEOS should be the place to go for use of space observations for societal needs.
- CEOS should have a demonstrated body of work in which coordinated Earth observation satellite data have provided real societal and/or scientific benefit.
- CEOS should have closed important observation gaps through partnerships, membership growth and coordination, new launches, and leverage of existing member assets.

- CEOS should have reached out to form working partnerships with organizations responsible for in situ observations, resulting in better integration across the full range of Earth observations.

CEOS Full Response to EQ6:

In ten years, CEOS should be the undisputed body for coordination among all relevant Earth Observation space activities. It should be the acknowledged place to go for use of space observations for societal needs, and it should have clear, widely-understood and accepted mechanisms for how to address these needs. CEOS should be able to point to clear and unequivocal examples of ways in which Earth observation satellite data have served various application fields including disasters, climate, agriculture, and water, and it should be able to demonstrate a strong case for the value of those data in providing increased societal benefit. In ten years' time, CEOS should be able to say that it keeps its focus on space with a slim and efficient organization, in order to provide maximum value of the efforts invested, still based on a best-effort approach.

By 2023, CEOS will likely have acted to address a number of observation gaps, with Agencies stepping up in multilateral partnerships to develop and launch instruments and satellites as a result of their interaction within CEOS Virtual Constellations. CEOS should be actively working with in situ organizations in providing integrated observations, thereby playing an even more valuable role as GEO's "observation arm" in connection with the second GEOSS 10-year Implementation Plan. There are especially good prospects for progress by CEOS, in coordination with CGMS, GEO and other organizations, in addressing essential climate variables and producing key climate data records. Next generation satellite instruments will be providing data sets in a world in which EO data is more broadly shared on a full and open basis, particularly also with Developing Countries. The activities and value of the four CEOS Working Groups should be better appreciated and understood within the CEOS and broader global communities.