

CEOS Ad Hoc Working Group for GEOGLAM: Scope of Work

1. Goals of the CEOS Ad Hoc Working Group for GEOGLAM

The Committee on Earth Observation Satellites (CEOS) Ad Hoc Working Group for the Group on Earth Observation Global Agricultural Monitoring (GEOGLAM) Initiative was established in 2012 by CEOS to respond to the space-based Earth observation (EO) data needs set forth by GEOGLAM. From 2013-2015, the Ad Hoc Working Group annually prepared a CEOS Strategic Response to GEOGLAM Requirements document, for CEOS Plenary's endorsement, which focused on EO data acquisition only. Beginning in 2015, the activities of the group broadened to cover more activities, including fostering strategic relationships and promoting and facilitating data access, data availability, and data utilization. This brief document describes the broad scope of the Ad Hoc Working Group, demonstrating that this agile and evolving working group composed of space agency representatives, engineers, and agricultural remote sensing scientists is uniquely situated to resolve issues related to space data utilization that are experienced by GEOGLAM as well as across disciplines and geographic locations.

2. Relationships

GEOGLAM, established in 2011 by the G20 Agricultural Ministers as a part of their action plan on food price volatility, has as its over-arching goal to improve the international capacity to generate and disseminate timely, accurate, transparent, and relevant information on crop condition and early forecasts of crop production. The G20 reinforced their support of GEOGLAM in its Agricultural Ministers Declaration in 2017. CEOS, as the space arm of GEO, in general and through this Ad Hoc Working Group, is committed to assisting GEOGLAM in acquiring and gaining access to R&D-oriented and sustained space-based EO data required to meet its diverse projects' and activities' goals. One of GEOGLAM's most important activities is "EO Data Coordination," and this Ad Hoc Working Group assists in the execution of this activity, facilitating a broad range of research and development activities that will be transitioned to agricultural monitoring institutions who will support sustained space-data needs. The Ad Hoc Working Group also communicates with the GEOGLAM Secretariat to stay abreast of the rapidly evolving GEOGLAM Earth observing activities and requirements as the program matures and expands (e.g. Asia-RiCE (Rice Crop Estimation and Monitoring), Joint Experiment on Crop Assessment and Monitoring (JECAM), Rangeland & Pasture Productivity (RAPP)).

In the past two years, the interaction between the Ad Hoc Working Group and two other CEOS groups has grown: the Land Surface Imaging Virtual Constellation (LSI-VC), and the Working Group on Capacity Development. The Ad Hoc Working Group has convened with LSI-VC and the Space Data Coordination Group (SDCG) for GFOI during a joint meeting (September 2017), and decided to collaborate on common interests including Analysis Ready Data, Moderate Resolution Interoperability, and Future Data Architectures, as well as to continue meeting jointly once per year. The relationship with WGCapD is more nascent, although synergies with, in particular, regional GEO Networks (e.g. AmeriGEOSS, AfriGAM, AO-GEOSS) have been identified as opportunities to co-organize and coordinate training activities.

3. Activities

As GEOGLAM has evolved and the Ad Hoc Working Group has matured, it has become clear that the coordination of space-based EO data goes far beyond acquisition alone, as there are considerable barriers to accessing and utilizing the data. These issues include legal barriers (i.e. restricted datasets), financial barriers (i.e. costs associated with data purchase or re-processing), connectivity and computational barriers,

and utilization barriers (i.e. lack of human capacity, low data quality due to calibration/validation or geolocation errors, or lack of interoperability). As such, the Ad Hoc Working Group's activities have expanded to address, as much as possible, these pressing challenges.

The Ad Hoc Working Group has both short- and long- term goals, the attainment of which involves flexibility of implementation. For example, it was not until the second year of the Ad Hoc Working Group's existence that the broader issues of data access and availability were acknowledged as a priority. It is crucial that the Ad Hoc Working Group remain flexible enough to adapt through lessons-learned and to expand their mandate and activities to meet these critical challenges. While in the short term the Ad Hoc Working Group's efforts are focused on coordinating data for GEOGLAM, in the longer term, CEOS and this particular Ad Hoc Working Group can promote free and open data policies by demonstrating that the true benefit of EO based data cannot be assessed merely in scenes sold or disseminated, but more significantly through disasters mitigated and food crises anticipated due to early and synoptic analyses made uniquely possible through EO. We also have the opportunity to coordinate around promoting the use of EO for global policy agendas, including notably the United Nations Sustainable Development Goals. Finally, we can work with CEOS and the Space Agencies to enhance user adoption of EO-based methodologies, particularly through leveraging one another's training materials and resources in cooperation with international donor organizations (such as JICA, ADB, WB, etc.) and international organizations (UN-ESCAP, ASEAN, etc.).

3.1 Activities 2012-Present

The activities of the Ad Hoc Working Group have included, to date:

1. Supporting GEOGLAM in the organization of its 2012-2014 EO data requirements, and identifying and evaluating candidate missions to address these requirements. The requirements were drawn from best-practices for agricultural monitoring and information provision from GEOGLAM. Detailed assessments included coverage analyses and gap analyses, accounting for cloud cover impacts on optical acquisitions. This effort is currently being revisited (2016-Present) in order to make them more "holistic," updating the requirements based on evolving best practices from R&D, ensuring the reflection of operational data user experiences and needs, and accounting for computational requirements as well;
2. Developing in 2012-2015 the CEOS Strategic Response to GEOGLAM Requirements document, with a long-term vision toward ramping up to sustained imaging for national to regional to global scale operational monitoring programs;
3. Supporting data acquisitions for research and development toward operations, largely coordinated through JECAM in cooperation with SIGMA and Sentinel-2 for Agriculture, as well as for Asia-RiCE via wall-to-wall observation coordination of Radarsat-2, ALOS-2m and Sentinel-1 over Vietnam and Indonesia;
4. Linking to CEOS mission acquisition metadata, so as to facilitate the analysis of data records for backward-looking analyses, including analyses promoting the interoperable use of multiple sensors (SAR, optical, microwave, and the integration of multiple data types);
5. Assisting in the development of flexible user agreements, to facilitate access to restricted datasets. This was initially focused on access to Radarsat-2 data, through the use of a Multiple User Request Form (MURF) and ALOS-2 Kyoto and Carbon (K&C) research project framework, with potential to adapt to other datasets;
6. Engaging non-traditional and commercial EO suppliers, which have valuable satellite assets for GEO activities;

7. Developing agricultural overlays and tools for the CEOS Systems Engineering Office's COVE (CEOS Visualization Environment) tool. This includes land cover classification models, revisit analyses, and a coverage analyzer tool to support long-term country-level coverage assessments;
8. Developing and prototyping data management services, to confront and mitigate challenges related to data storage, internet connectivity, and computational power for data analysis and visualization. These prototype Space Data Management Systems (SDMS), developed by the CEOS Systems Engineering Office, have been utilized and tested by FAO and the Asia-RiCE projects. This activity has evolved in the CEOS Data Cube, which should soon be prototyped for the JECAM Site Network and Asia-RiCE;
9. Coordinating with LSI-VC on ARD, MRI, and FDA activities, as well as sharing the GEOGLAM EO Requirements gathering process for other land surface imaging themes and areas in cooperation with CEOS Data Cube activity;
10. Coordinating with WGCapD on training activities and longer-term visions for developing institutional capacity for EO data adoption;
11. Supporting the provision of CEOS agencies' EO datasets such as moderate resolution optical, passive microwave, precipitation radar, and others for usage by the GEOGLAM Crop Monitor team in their generation and delivery of monthly crop outlook information as input to the G20 Agricultural Market Information System.

3.2 Activities 2017 & Beyond

Planned future activities of the Ad Hoc Working Group will include:

1. Upon completion of the "refreshed" GEOGLAM EO Requirements, an evaluation of CEOS capacity to meet missions (see Section 3.1, Bullet 1), as well as an investigation into solutions for data access and utilization challenges;
2. Evaluation of the acquisition metadata archives using the COVE tool, and requesting archival data for GEOGLAM usage in the production of baseline datasets (e.g. crop area & type masks, and crop calendars) and in promoting interoperability amongst datasets;
3. As-needed updates of the CEOS Strategic Response to GEOGLAM Requirements;
4. Further development of the Data Cube support to JECAM, Asia-RiCE and other GEOGLAM initiatives;
5. Evaluation of emerging agriculture initiatives that will require EO data (e.g. Rangelands and Pasture Productivity (RAPP), GEOGLAM Regional Networks, NASA Food Security & Agriculture Consortium);
6. Evaluation of new missions and datasets for GEOGLAM use, as well as continued consulting with mission design teams on an as-requested basis;
7. Continued collaboration with other CEOS groups, in particular LSI-VC and WGCapD.

