2019 GEOGLAM Stocktaking Report

G20 1st Meeting of Agriculture Deputies, 5-7 March 2019, Tokyo

Coordinator: GEOGLAM Secretariat, Group on Earth Observations, Geneva, Switzerland

1. Overview

The Group on Earth Observations Global Agricultural Monitoring Initiative (GEOGLAM) is a G20 initiative that uses Earth observations to improve information on crop production and agricultural land-use state and change, to support commodity markets and early warning in food insecure regions of the world. Initially launched in 2011 by the G20 Agriculture Ministers, GEOGLAM forms part of the G20 Action Plan on Food Price Volatility. GEOGLAM increases market transparency and improves food security by producing and disseminating relevant, timely and actionable information on agricultural conditions and production outlooks at the national, regional, and global scales. It achieves this by strengthening the international community's capacity to use coordinated, comprehensive, and sustained Earth observations.

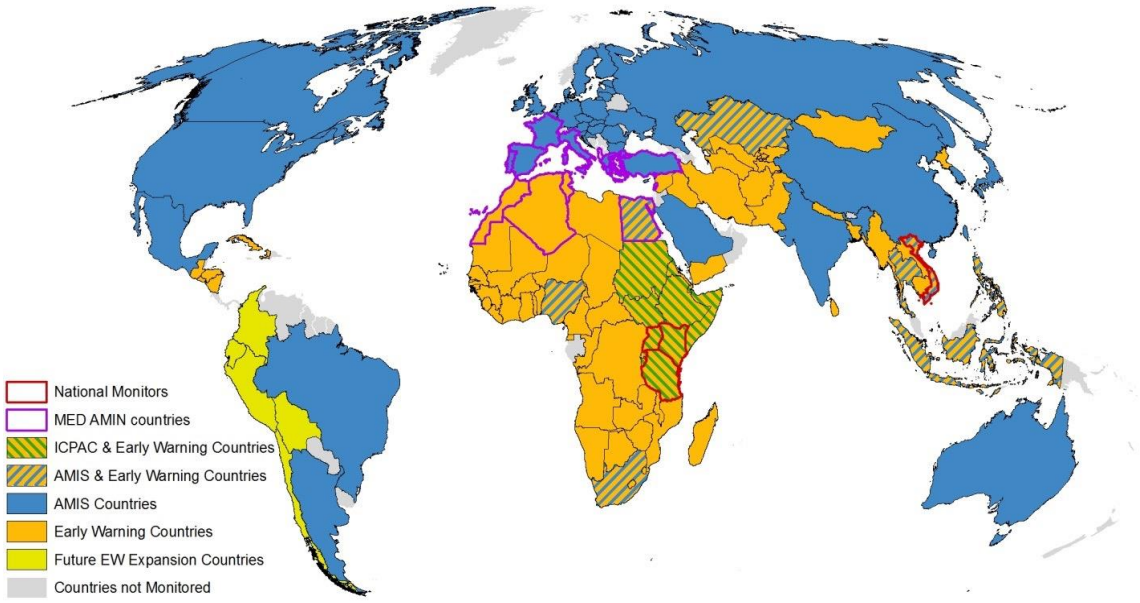
More background and context can be found in the 2018 GEOGLAM Stocktaking Report: bit.ly/GEOGLAMG20

2. Participating countries, geographic reach and major contributions

GEOGLAM provides a forum for the global agricultural monitoring community to collaborate, and enables countries to actively participate, share experiences and keep abreast of new developments, and ultimately strengthens inter- and intra-national communication, collaboration, and coordination in support of food security.

GEOGLAM participants include representatives from most G20 nations and many other countries, and several international organizations and NGOs. GEOGLAM information covers all G20 nations, as well as other major importing and exporting countries. The GEOGLAM Crop Monitor encompasses over 80% of global production, consumption and trade volumes of AMIS targeted crops (maize, rice, wheat and soybean). Over forty nations and institutions contribute to the Crop Monitors. The Crop Monitor for Early Warning (CM4EW) monitors crops that are important for food security by region, generally encompassing countries and regions that are susceptible to food insecurity. Combined, the GEOGLAM Crop Monitors cover the majority of the world (Figure 1).

Figure 1. Global Coverage of GEOGLAM Crop Monitors



GEOGLAM has worked directly with several countries to co-develop and implement national Crop Monitor bulletins, operated by mandated national agencies. These activities support programs and

policies that address food security and has had the greatest impact in terms of alleviating and/or responding to food scarcity events.

Some of the major contributions from G20 nations are listed in Appendix A.

3. Activities before 2016 (milestones, meetings, deliverables)

Major Milestones 2011-2016

2016: CM4EW launched; GEOGLAM becomes member of the AMIS Secretariat

2015: Launch of Sentinel 2a satellite and the Sen2Agri Sentinel exploitation initiative for local to global agricultural monitoring

2014: Comprehensive satellite data requirements for national to global agricultural monitoring developed in partnership with the Committee on Earth Observation satellites (CEOS); Annual report on global supply situation of maize, rice, wheat and soybean issued by CropWatch

2013: AMIS Crop Monitor launched; CropWatch multilingual website and quarterly global crop monitoring report released in English and Chinese;

2012: GEOGLAM initiative and Asia-RiCE launched

2011: GEOGLAM concept developed and endorsed by the G20 Agriculture Ministers as part of the Action Plan on Food Price Volatility

2011-2016: Capacity building events held by partners with Earth observation image processing and analysis tools, including: ASIS (FAO), SPIRITS (JRC), GeoWRSI and EWX (FEWSNET)

2009: Joint Experiments for Crop Assessment and Monitoring (JECAM) launched

Major Meetings 2011-2016

GEOGLAM consists of many projects, largely funded by G20 nations, tied together by a small secretariat. Meetings throughout the initiative timeline are too numerous to list here, but in general include:
2-3 face-to-face meetings of the GEOGLAM leadership and several phone calls each year;

- An annual research meeting and ad hoc JECAM and Asia-RiCE meetings
- Routine meetings between the GEOGLAM community and CEOS to ensure representation of requirements and priorities for agricultural monitoring in current and future satellite missions;
- Annual participation in the AMIS Information Group and AMIS Rapid Response Forum meetings
- Other: Many workshops, symposia and project-specific meetings are held annually, often through partnerships with other organizations and programs (India ISPRS meeting, Philippines NASA LCLUC and GEO RICE).

Major Deliverables 2011-2016

AMIS Crop Monitor: Monthly crop condition monitoring report for major commodity crops in major producing nations (80-90% of production and trade). Published in the AMIS market monitor (www.amis-outlook.org/amis-monitoring/crop-monitor)

Crop monitor for Early Warning: Monthly crop condition monitor of food crops in regions susceptible to food insecurity (cropmonitor.org)

China CropWatch: Quarterly global crop monitoring report (English / Chinese) and annual bulletin (www.cropwatch.com.cn)

Sen2Agri: Open source operational system for near real time nationwide mapping of cropland and crop types at 10m resolution from Sentinel and Landsat missions (www.esa-sen2agri.org)

SIGMA: FP7 EU funded project that developed remote sensing based methods to identify, map and asses agriculture and crop changes, changes in agricultural production levels, shifts in cultural practices and environmental impacts of agriculture (www.geoglam-sigma.inf)

AsiaRiCE: To ensure that rice crop monitoring issues are given suitable priority and attention within the scope of the full GEOGLAM initiative, and to establish a framework for the coordination necessary to engage, manage and support the various stakeholders. (http://www.asia-rice.org)

Comprehensive Earth observation data requirements: developed in partnership with CEOS (2014)

4. Progress since the previous stocktaking exercise (March 2018)

Activity: Crop Monitor for the Agricultural Market Information System	
On track - Complete and continuing	Published monthly reports of near real time global crop conditions in G20 and other major producing nations. (www.amis-outlook.org/amis-monitoring/crop-monitor/overview/en/)

Activity: Crop Monitor for Early Warning (CM4EW)	
On track - Complete and continuing	Published monthly crop condition reports for food insecure nations of the world. (cropmonitor.org/)

Activity: Capacity Development - National and Regional Crop Monitoring (Implemented and operated by mandated agencies, supported by GEOGLAM)	
On track - Complete and continuing	Implementation of National Crop Monitors: Uganda; Kenya; Tanzania; Vietnam. Development of Regional Crop Monitors: Horn of Africa (10 nations). Training of quantitative yield forecasting with several tools including the Crop Statistics Tool (JRC). Operational in Algeria, still in testing for: Senegal, Burkina, Ethiopia, Somalia, South Africa.

Activity: Participatory CropWatch Cloud Platform	
On track, and will continue upgrading	CropWatch migrated to a cloud service platform including CropWatch Processing, Explore, Analysis, and Bulletin sub systems. Providing service to the public through quarterly bulletins and monthly updates. Partners can have access to agro-climatic, agronomic, and PAY information, and make use of CropWatch analytics to independently analyze crop conditions for a region of interest. (https://cloud.cropwatch.com.cn/)

Activity: Review of Data and Systems Requirements for Operational Agricultural Monitoring	
Complete	Workshop held and report complete.

Activity: Study on the Value of Earth Observations and GEOGLAM to Commodity Markets	
On track	Progress on track, preliminary results presented to the AMIS Rapid Response Forum, 26 February 2019

Activity: Increased Emphasis on Regional Networks	
On track	New GEOGLAM networks established in Asia+ (Belt and Road) and Agricultural Monitoring in the Americas; strengthening of Asia-RiCE with ASEAN project (AFSIS)

Activity: ASAP – Anomaly Hotspots of Agricultural Production	
On Track - New activity	Online decision support system for early warning of agricultural production anomalies (crop and rangeland), developed by the JRC for food security crises prevention and response. Monthly assessments for hotspot countries published on the ASAP platform, a direct JRC contribution to the CM4EW. (**https://mars.jrc.ec.europa.eu/asap/**)

Activity: "Essential Agricultural Variables" (EAVs) for GEOGLAM	
On Track - New activity	White paper written to support development of EAVs, towards the development of quantitative metrics to support markets and food security, and new policy drivers around the UN Sustainable Development Goals; Paris Accord and the Sendai Framework for Disaster Risk Reduction.

Activity: Development of a Forward Community Research Agenda for GEOGLAM	
On Track - New activity	First draft completed.

5. Work plan for 2019

Funding sustainability: Funding for the GEOGLAM Secretariat expires at the end of 2019. A funding business case and sustainability working group will be established.

Crop Monitor for AMIS and Crop Monitor for Early Warning: These monthly flagship GEOGLAM deliverables will continue for 2019, and continual enhancements will be made (i.e. rangelands and seasonal forecasts).

Capacity Development: National and regional capacity development will accelerate with new countries and strengthened regional coordination. A capacity development working group and strategy will be developed, including guidance/best practices documents for knowledge transfer relationships.

Assessing the Value of Earth Observations: The study will continue.

Essential Agricultural Variables (EAVs) for GEOGLAM: A working group will be established to rigorously define GEOGLAM EAV technical specifications.

Research and Development:

- Forward research agenda. Completion and adoption of the document;
- Development JECAM cross-site experiments and related publications to support the best practices documents and the full exploitation of new EO assets, including the existing and forthcoming Synthetic Aperture Radar (SAR) capabilities;
- Final publications from five completed cross-site experiments;
- Continuation of four current cross-site experiments and associated publications;
- Fully updated JECAM website;
- Develop and test of SAR training material and lessons learned;
- Sen2-Agri system for multiyear mapping - training, exploitation and application (Canada, Mali, Belgium and possibly Ukraine);
- Development of new experiments responding to the GEOGLAM research agenda priority areas.

Communications: Develop new website and documentation of best practices for crop monitoring. Evolve towards GEO Knowledge Hub as it develops.

GEOGLAM Secretariat Coordination: Continue to enhance coordination between existing activities to leverage national and international investments in agricultural monitoring.

Outreach: CEOS2019 chair priority initiative regarding rice crop monitoring in Mekong Basin using the Vietnam open data cube. Demonstrations at CEOS plenary in Hanoi and Asia Pacific Regional Space Agency forum (APRSAF) in Japan. Proposal to have an exhibition of GEOGLAM and Asia-Rice team activity in G20 agriculture ministerial meeting in Japan.

Appendix A. Major Contributions From G20 Nations*

**Note: The lead nations are identified, however most initiatives consist of multi-national consortiums involving many nations (G20 and otherwise), research institutions, international and non-governmental organizations.*

The following list is not exhaustive, but provides an overview of some of the largest contributions to GEOGLAM:

Australia: Leadership of the Rangeland and Pasture Productivity initiative RAPP (Commonwealth Scientific and Industrial Research Organization CSIRO);

Belgium: Co-lead and technical support for the Joint Experiments for Crop Assessment and Monitoring (JECAM) global research network (UCLouvain); provision of VHR Pléiades imagery over JECAM sites and leadership of Research Projects (VITO);

Brazil: Support for the GEOGLAM Secretariat and Agriculture Community of Practice coordinator, 2011-2014 (INPE, National institute for Space Research)

Canada: Co-lead, funding and technical support for the global JECAM research network, and operational funding for the GEOGLAM Secretariat (Science and Technology Branch, Agriculture and Agri-Food Canada)

China: CropWatch bilateral quarterly bulletins on global crop production jointly analyzed by experts from eight Institutes internationally and CropWatch Cloud analytical tools; capacity development initiatives and activities established for Mozambique, Mongolia and in development for Zambia, Russia, Thailand and other Belt & Road countries (Aerospace Information Research Institute, Chinese Academy of Sciences); support for the GEOGLAM secretariat, Junior Project Officer 2018-2019 (Ministry of Science and Technology);

European Commission: Contribution of information and technical expertise on operational monitoring systems; significant research and capacity development funding support including H2020 projects (i.e. SIGMA project, ECoLaSS project) directly supporting the GEOGLAM/JECAM R&D activities (European Commission, in particular the Joint Research Centre, Directorate General (DG) Research and Innovation, DG Internal Market, Industry, Entrepreneurship and SME's (GROW) and DG Agriculture and Rural Development);

European Space Agency: Research and capacity development funding support (i.e. Sen2Agri Project, Sen4CAP Project and the Food Security Thematic Exploitation Platform);

France: Support for the GEOGLAM Secretariat and GEOGLAM Project Coordinator 2015-2017 (Centre National d'études spatiales, CNES).

Germany: Direct funding for the GEOGLAM Secretariat, GEOGLAM Programme Director 2018-2019 (German Ministry of Food and Agriculture, BMEL)

Japan: Asia-RiCE, leadership of rice monitoring research and knowledge sharing towards operational monitoring in Asia (Japan Aerospace Exploration Agency, JAXA)

United States: Funding leadership of the Crop Monitor Initiatives (NASA and USAID); funding leadership of the Earth Observation Data Coordination activity and coordination of Agricultural Monitoring in the Americas regional initiative (NASA, primarily through its NASA Harvest Program; contribution to Crop Monitor information (USDA); overall coordination of the Crop Monitors and the Harvest Program (University of Maryland)

Other: Over 40 institutions from around the world (including most G20 nations) are contributing on a monthly in-kind basis to the operational Crop Monitor bulletins. Over 30 JECAM site managers are supporting in situ data collection on a long term voluntary basis.