Achieving sustainable food security for all people is a priority highlighted by the new Sustainable Development Goals of the United Nations, which defined its second goal as “End hunger, achieve food security and improved nutrition and promote sustainable agriculture”. However, hunger remains an everyday challenge for almost 795 million people worldwide. In June 2012, the declaration of the G20 Mexico summit emphasized the needs for enhancing food security and addressing commodity price volatility.

In response to such growing pressure, it is critical to develop better agricultural monitoring capabilities from local to global scale. Since 2011, support for agricultural monitoring using satellite data has become substantial, with formal institutional support, objectives and timelines e.g. by the Global Agricultural Monitoring Initiative (GEOGLAM) building on GEO’s Agricultural Community of Practice (AG COP) and the Joint Experiment of Crop Assessment and Monitoring (JECAM).

The continuous availability of Sentinel-2 time series will constitute a major advancement for large scale agriculture monitoring capabilities. Its temporal revisit frequency of 5 days, its specific spectral bands and its high spatial resolution (10-20 meters) combined with its 290 km wide swath are particularly suited to operational agriculture monitoring applications.

In this context, the European Space Agency launched in 2014 the Sentinel-2 for Agriculture (Sen2-Agri) project which aims to provide to the international community validated algorithms and open source codes to process Sentinel-2 data in an operational manner into relevant EO agricultural products for major worldwide representative agriculture systems. These Sen2-Agri EO products consist of four Sentinel-2 based outputs:

- Cloud free surface reflectance composites;
- Dynamic cropland masks delivered along the agricultural season;
- Cultivated crop type map and area indicator for main crop groups;
- Vegetation status indicators describing on a 5 to 10 days basis the vegetative development of crops.

The project does not deliver the products but the open-source system to generate them. The system is made of software components (each one being an independent executable corresponding to algorithms) and of an orchestrator which manages these components to monitor the whole system and execute processing jobs.

Being part of the Data User Element programme, a user-oriented approach drives the entire project in order to address concrete needs. Throughout the project, key users are involved in several activities such as user requirements consolidation, products validation and assessment, users workshops and capacity building thanks to training and full scale demonstration.

The first phases of the project focus on the algorithms selection, system design and implementation. These processes were achieved using Sentinel-2-like time series (SPOT Take 5 as primary source) over 12 globally distributed test sites. These time series were complemented by in situ crop measurements shared by JECAM network members and other teams working in various agrosystems.
This dataset served as input to a benchmarking study which helped to select the most suitable algorithm(s) for fulfilling products specifications at the best. The next phase is dedicated to the demonstration of the Sen2-Agri system to deliver the products with Sentinel-2 data in near real-time. It will start early 2016 with the first full crop season of the Sentinel-2 mission. The demonstration will be done at local scale (a full Sentinel-2 swath) for five sites and at national scale (~500,000 km²) for three countries. In both cases, the demonstration will be carried out in close interactions with national partners and teams working on the field, with the final objective to transfer the system to their operations.

Through its activity, the project provides a strong scientific contribution to the JECAM network and GEOGLAM initiative. The benchmarking study allowed completing one of the very first cross-cutting analyses for multiple, globally distributed sites and the coming demonstration phase will help filling the gap between state-of-the-art remote sensing practices and operational systems.

- **Keywords**: agriculture, ESA Programme: DUE, Sentinel-2
- **Satellite and data used**: Sentinel-2, Landsat, SPOT, in-situ