EXECUTIVE SUMMARY

The Copernicus program is the EU response to the increasing demand for reliable environmental data. The Copernicus Land Service continuously monitors and forecasts the status of land territories and supplies reliable geo-information based upon (i) Earth observation data provided by the Copernicus Space Component, (ii) ground measurements collected by the Copernicus In-situ Component. The Copernicus Land Service has been built in the framework of the FP7 geoland2 project, which has set-up pre-operational infrastructures. IMAGINES performs innovation and development activities to support the operations of the global component of the Copernicus Land service, preparing the use of the future Sentinel data in an operational context. Moreover, IMAGINES favors the emergence of new downstream activities dedicated to the monitoring of crop and fodder production, that are key for the implementation of the EU Common Agricultural Policy, of the food security policy, and could contribute to the Global Agricultural Geo-Monitoring Initiative (GEOGLAM) coordinated by the intergovernmental Group on Earth Observations (GEO).

The main objectives of IMAGINES are to (i) improve the retrieval of basic biophysical variables, mainly LAI, FAPAR and the surface albedo, identified as Terrestrial Essential Climate Variables, by merging the information coming from different sensors (PROBA-V and Landsat-8) in view to prepare the use of Sentinel missions data; (ii) develop qualified software able to process multi-sensor data at the global scale on a fully automatic basis; (iii) complement and contribute to the existing or future agricultural services by providing new data streams relying upon an original method to assess the above-ground biomass, based on the assimilation of satellite products in a Land Data Assimilation System (LDAS) in order to monitor the crop/fodder biomass production together with the carbon and water fluxes; (iv) demonstrate the added value of this contribution for a community of users acting at global, European, national, and regional scales.

The IMAGINES deliverables are (i) global and regional multi-scale biophysical variables derived from multi-sensor satellite data together with agricultural indicators, including the above-ground biomass, the carbon and water fluxes, and drought indices resulting of the assimilation of the biophysical variables in the LDAS; (ii) operational processing lines interoperable with the existing COPERNICUS infrastructure and able to run automatically at the global scale; (iii) a utility assessment of the products and of the services.

IMAGINES is built on the achievements of the EC-funded FP7 geoland2 project which has brought the last brick to the implementation of fully mature COPERNICUS Land services. The added value of IMAGINES is to build a framework able to ensure the continuity of the research and development activities needed for the evolution of the Copernicus Land Service, in response to user needs and to new sensors.

IMAGINES generates a two-tier product hierarchy: (i) core biophysical variables, (ii) more elaborate products like the crop/fodder above-ground biomass, the carbon and water fluxes, and drought indicators. The design of methodologies, the development of the processing lines, the demonstration of their capabilities, are supported by three cross-cutting activities: (i) validation and verification at each step of the development cycle, (ii) the dissemination and promotion of products and services towards the user community, and (iii) the coordination and management of the project.

IMAGINES gathers 8 partners from 4 European countries and one international organization (ECMWF). The partnership consists of public bodies (research institutes, universities, operational production centers), and of two SMEs playing a key role in the management of the project, the scientific and technical coordination, the scientific validation of the products, and the interface with the final users. The duration of the project is 40 months, starting on 1st November 2012, with 2 main phases: 1) the definition, development and demonstration of 333m PROBA-V products; Preparation of the LDAS to be ready to assimilate the PROBA-V products; 2) the definition and development of multi-sensor multi-scale products using PROBA-V & Landsat-8 (as proxy of Sentinel-3 and Sentinel-2) and Sentinel-1 data; Assimilation of PROBA-V product in the LDAS; Validation, promotion and user feedback on PROBA-V products and indicators from LDAS.