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COSMO-SKYMED® DATA FOR CROP MONITORING

Abstract

In intensive farming, at large-fields scale, farm managers need timely and frequently information on: • crop productivity for precise seasonal forecasting of revenues; • crop status for costs containment in the management of the irrigation and fertilization activities and in the early detection and fighting of diseases. At a local-regional-national scale, authorities and governmental agencies need information on: • crop yield for improving economic and market forecasting (price regulation); • crops conditions for a sustainable natural resources and for a more environmental compatible use of chemicals; • cultivated crop types and estimation of crop acreage for national inventories updating, for the definition of agriculture policies, for the management and control of agriculture policies by managing subsidies and combatting frauds, management and damage assessment of natural disasters.

Following the launch of COSMO Sky-Med® (CSK®) constellation (X-band, frequency 9.6 GHz, wavelength 3.1 cm) the Italian Space Agency (ASI) has decided to start the "AGRICIDOT" project.

The aim of this paper is to present: i) the "AGRICIDOT" project objectives; ii) the "AGRICIDOT" 2013 and 2014 campaigns over the agriculture area of Marchfeld (Austria) and the first preliminary results.

The main objectives of the "AGRICIDOT" project are: i) to estimate the accuracy achievable by the CSK® constellation in identifying crops by exploiting several combinations of acquisition modes of the system; ii) to investigate which variables of the crops (LAI, biomass) and with what accuracies, can be estimated by CSK®.

Thus, in 2013 and 2014, two CSK® acquisition plans have been carefully designed for crop identification and crop condition monitoring, at field and regional scale.

CSK® Stripmap Himage (3 m res.) and PingPong (15 m res.) has been acquired. Both the CSK® acquisition plans were designed to exploit CSK® properties (e.g. high revisit time and high to very high spatial resolution) to its maximum extent, in order to assess the ability of the CSK® system to monitor the crop variables of interest.

Results of the 2013 campaign will be presented: a) VH polarization is, in general, more sensitive to crop vegetation growth, b) sensor viewing incidence angle, relative to leaf incidence angle distribution, plays an important role in the crop variables estimation.

From the 2014 CSK® acquisition we will show that the combined use of images acquired in different polarizations and at a short time interval can improve the accuracy of both crop identification and crop variables estimation for a wide range of crop types.