

A glimpse of future GMES Sentinel-1 radar images

April 23 2009



The colour composite of a RADARSAT-2 polarimetric radar image acquired over the Flevoland test site in the Netherlands on 4 April 2009. The different colours reflect the type and condition of the land cover. Field boundaries are clearly visible in this area, which is mostly agricultural. The dark areas correspond to water surrounding this area of reclaimed land, the very bright areas to urban settlements and the pink/blue area to middle-left is a nature reserve. Credits: MDA Geospatial Services

A newly initiated campaign marks an important step in preparing for how data from the Sentinel-1 European Radar Observatory will be used for applications such as land-cover mapping and crop management. Sentinel-1 is the first of the five missions that ESA is developing for the GMES initiative.

Sentinel-1 is a constellation of two C-band radar satellites that will provide continuous all-weather, day and night imagery for use in a range of diverse services - from marine and land monitoring to emergency services needed immediately following disasters from natural events, as well as those resulting from human activity.

The initial Sentinel-1 satellite is due to launch at the end of 2011 and will be the first mission dedicated to providing Earth observation data for the Global Monitoring for Environment and Security (GMES) initiative. GMES is a joint venture between the European Commission and ESA to fulfil the growing need for accurate and timely information to better manage the environment, understand and mitigate the effects of climate change and ensure civil security.

The objective of the current campaign, called AgriSAR, is to evaluate how frequent multi-polarisation acquisitions provided by Sentinel-1 will improve applications such as land-cover mapping and crop monitoring. To accomplish this ambitious task, ESA has asked MDA Geospatial Services to acquire multi-temporal, quad-polarisation RADARSAT-2 imagery throughout the 2009 growing season over three test sites. The chosen sites are located in Flevoland in the Netherlands, Barrax in Spain and Indian Head in mid-west Canada. MDA Geospatial Services will be able to simulate various imaging modes for the Sentinel satellites from the series of images acquired during the campaign.

"The campaign is remarkable in that it will, for the first time, include very frequent spaceborne [radar images](#) over three different test sites throughout the growing season and thus provide an excellent first simulation and visualisation of Sentinel-1 capabilities to support land applications," commented Evert Attema from ESA's Sentinel-1 project.

In addition to the contribution from MDA Geospatial Services, the campaign is also expected to include a number of European and

Canadian scientists who will be invited to help with ground activities. These activities will include the collection and analysis of information about land cover, crop type, crop condition and other parameters such as soil moisture. Of particular interest are the new algorithms and methods required to extract land-cover information from a dense temporal series of Synthetic Aperture Radar (SAR) images and follow how the crops develop.

"As the owner and operator of the RADARSAT-2 satellite, MDA Geospatial Services is looking forward to AgriSAR 2009," says Ron Caves from MDA. "The campaign provides a unique opportunity to thoroughly investigate the agricultural products that can be derived from multi-polarisation radar data and the methods and systems to generate these in an operational fashion."

As well as directly addressing the capabilities of the first two Sentinel-1 satellites for land applications, the campaign is also expected to help scientists investigate future developments in remote sensing with radar.

"The quad-polarisation imagery will allow researchers to investigate new types of products, for instance, high-resolution soil moisture maps and crop biomass, as well as help determine the added value of fully-polarimetric radar data for land applications," says Malcolm Davidson, ESA's Sentinel-1 Mission Scientist. "This will provide an exciting glimpse of what operational [radar](#) missions will look like and their capability beyond the current Sentinel-1 SAR satellite generation."

Source: European Space Agency ([news](#) : [web](#))

Citation: A glimpse of future GMES Sentinel-1 radar images (2009, April 23) retrieved 26 April 2024 from <https://phys.org/news/2009-04-glimpse-future-gmes-sentinel-radar.html>

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