LAND | MARINE | ATMOSPHERE | EMERGENCY MANAGEMENT | CLIMATE CHANGE | SECURITY

Copernicus

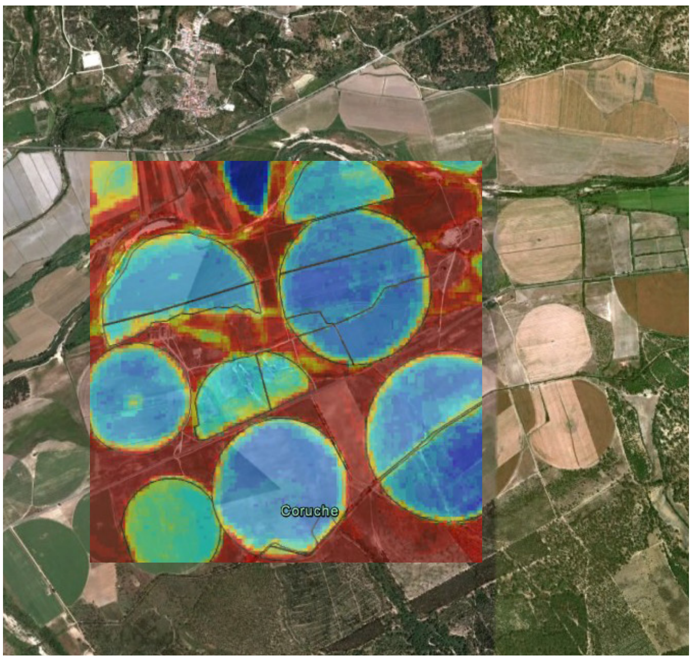
ISSUE 35 / SEPTEMBER 2013

FOOD WATCH FROM SPACE – HOW SATELLITES SUPPORT AGRICULTURE

Agriculture forms the basis of our food supply. However, it is subject to several challenges, from increasing pressure on soils, water availability, vagaries of weather and climate to unsustainable farming practices. Farmers often face challenges because of water shortages, expensive fertilisers and other chemical products, which also have a negative impact on the environment. Satellite-based imagery can be helpful in pinpointing problematic areas and drive specific hot-spot surveys. Also, they can highlight trend anomalies when comparing different years. When these data are integrated into agronomic models, crop yields can be forecasted. At continental and global levels, the capability of anticipating variations in crop yield is key to anticipating swings in the markets and therefore enhancing the governance of 'price and food' crises.

Copernicus satellites support the timely and accurate monitoring of agricultural land use state and changes at European national and regional levels.

Agricultural monitoring is based on a combination of satellite observations, meteorological data, agro-meteorological and biophysical modelling as well as statistical analyses. High to low resolution multispectral optical sensors allow the monitoring of several parameters related to crop and vegetative health, such as crop type and area, Leaf Area Index or Normalised Difference Vegetation Index. By assimilating these parameters into models, evapotranspiration rates can be derived that help to optimise irrigation and the use of fertilisers. Multi-temporal SAR data are increasingly being used for the continuous monitoring of other important soil properties, such as roughness and soil moisture content. Solar radiation and snow cover are other parameters that are used in crop growth and evapotranspiration models.



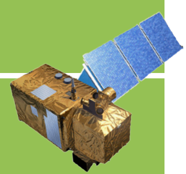
The map shows the Leaf Area Index (LAI) near Coruche, Portugal, in August 2008 on an optical image background. Red shades in the figure correspond to lowest, whereas blue shades correspond to highest values of LAI. The circular shape indicates that central-pivot irrigation is being employed in the fields.

LAI is an important parameter for determining vegetative health, biomass, photosynthesis and evapotranspiration. It is used for modelling of crop yield and water needs.

Source: AQUAPATH-SOIL project; Marine Environment Technology Center - Instituto Superior Técnico (MARETEC-IST) and DEIMOS Engenharia SA
Background Image: GoogleEarth based on GeoEye and DigitalGlobe

Facts

- In 2011, there were around 10 million people employed in the EU agricultural sector (equivalent annual working units)
- In 2011, the gross value of the total crop production in the EU was estimated at about 205 billion euros
- According to the EU, the forecast for EU total wheat production in 2014 is equal to 137 million tonnes, the same as 2012
- According to the World Bank, global food prices soared by 10% in July 2012 from a month ago, with maize and soybean reaching all-time peaks owing to drought and high temperatures



Benefits

Satellite data:

- provide timely, independent and continuous input of global biophysical parameters for crop monitoring and yield forecasting
- allow for regular assessment of crop area, type and health at regional and global scales
- provide parameters useful for agricultural management such as estimated irrigation needs and crop status

Policy Objectives

- Common Agricultural Policy
- Food Security Thematic Programme
- EU Strategy for Food Security

Copernicus services

The Copernicus Land Monitoring Service provides geographical information on land cover, land use and change, thereby supporting rural development, agricultural and food security applications.

Example products:

> High-resolution land cover and land-cover change maps, including agricultural zones

> Ten-daily near-real time biophysical variables at a global scales such as state of vegetation, energy budget and water cycle

Sentinel contribution

Sentinel-1, -2 and -3 will deliver data for agricultural monitoring by providing:

> frequent coverage from C-band radar (Sentinel-1)

> multispectral optical imaging for land applications (Sentinel-2)

> continued acquisition and short revisit time over land surfaces with a very large swath of 290 km (Sentinel-2)

> multispectral optical imaging with 21 bands at 300 m resolution over all surfaces (Sentinel-3)

> long-term continuity and rapid data dissemination (all)

Next steps

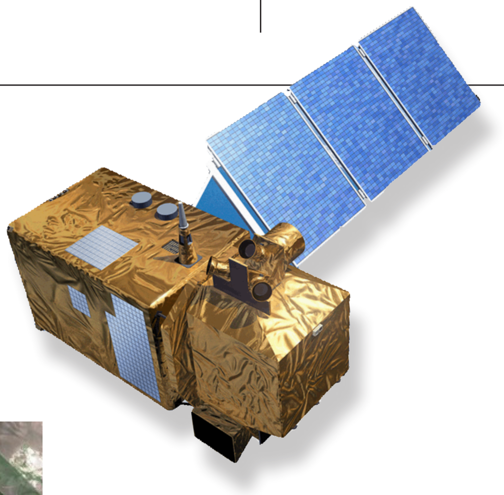
> Foster the availability and usability of satellite-based techniques and information products in industrial agricultural practices

> Develop quantitative pasture monitoring

> Work towards global agricultural monitoring capacities and standards

> Improve monitoring methods, tools and systems for vulnerable agricultural systems

> Harmonise, connect and strengthen existing agricultural monitoring systems



Sentinel-2

Monitoring crops from space

Sustainable food production remains a pressing challenge. Data from Sentinel-2 will benefit services associated with land management and agriculture. Designed to generate high-spatial resolution (10 to 20 m) operational products, Sentinel-2 will carry an optical payload with 13 spectral bands. This guarantees consistent time series to show variability in the condition of the land surface.

Agricultural applications will benefit greatly from Sentinel-2 imagery. The short revisit time (5 days at Equator with two satellites) and geographical coverage are especially useful for monitoring crops where growth and management practices mean that they are constantly changing.

The first Sentinel-2 satellite will be ready for launch in 2014, soon followed by a twin satellite to ensure the coverage needed for Copernicus.

This image captures the meticulously cultivated landscape of Saragossa, Spain in August 2006. The image is from SPOT-5, a Copernicus Contributing Mission providing observations similar to Sentinel-2.

Source: Astrium