



Copernicus is the European Union's Earth Observation (EO) program of the European Commission in partnership with the European Space Agency, the EU Member States and EU Agencies.

Copernicus uses a constellation of satellites —Sentinels— to fulfil revisit and coverage requirements of agricultural applications of EO, providing robust datasets for Copernicus Services. The Sentinels carry a range of technologies, such as radar and multi-spectral imaging instruments for land monitoring.

The COALA project will advance the Copernicus Sentinel experience in developing Copernicus-based products and services brought by the European partners of the project, to support a more sustainable use of water and nutrients in irrigated agricultural systems of Australia.

COALA is funded by the European Commission under the Horizon 2020 programme (Research and Innovation Framework Programme).

The project will be delivered over 4 years (2020-2023) by a consortium of 11 Universities and SMEs from Europe (Spain, Austria, Italy, Belgium) and Australia (UNSW, University of Melbourne, Irrigation Research and Extension Committee, and Birchip Cropping Group); it has the support of Geoscience Australia and the Murray Darling Basin Authority.

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The Sentinel-2

## Services for

# Water management and monitoring of water use at the district scale

**COALA** integrates satellite time series acquisitions, crop water balance modelling, weather forecast and field measurements to provide innovative services for evaluating crop water needs from farm to district scale. The service aims to:

- Comparing **irrigation water requirements** Vs **actual irrigation water uptake** over the years.
- Detect **illegal water use**.
- Optimizing water allocation and requests.

## The key products that will sustain these services are:

### MAPS OF IRRIGATED AREAS

#### Key points:

Georeferenced information aggregated over:

- **time** (from weeks to a whole season)
- **space** (10 by 10 meters pixel size)

The product is operational in **Victoria** and **NSW**

**Actual irrigated area** is not always known accurately. Oftentimes it varies during the irrigation season. This information is the basis for calculating irrigation water requirements at paddock, district, and basin scales.

This map – combined with the water entitlement maps - allows to **detect illegal water use**.

### SPATIAL DISTRIBUTION OF IRRIGATION WATER REQUIREMENTS

#### Key points:

Georeferenced information aggregated over:

- **time** (daily to whole season) and
- **space** (10 by 10 meters pixel to basin scale)

This product is operational in **Victoria** and **NSW**

Real-time information on crop water requirements at different spatial (property level, irrigation district, sub-catchment) is needed to support better water allocation.

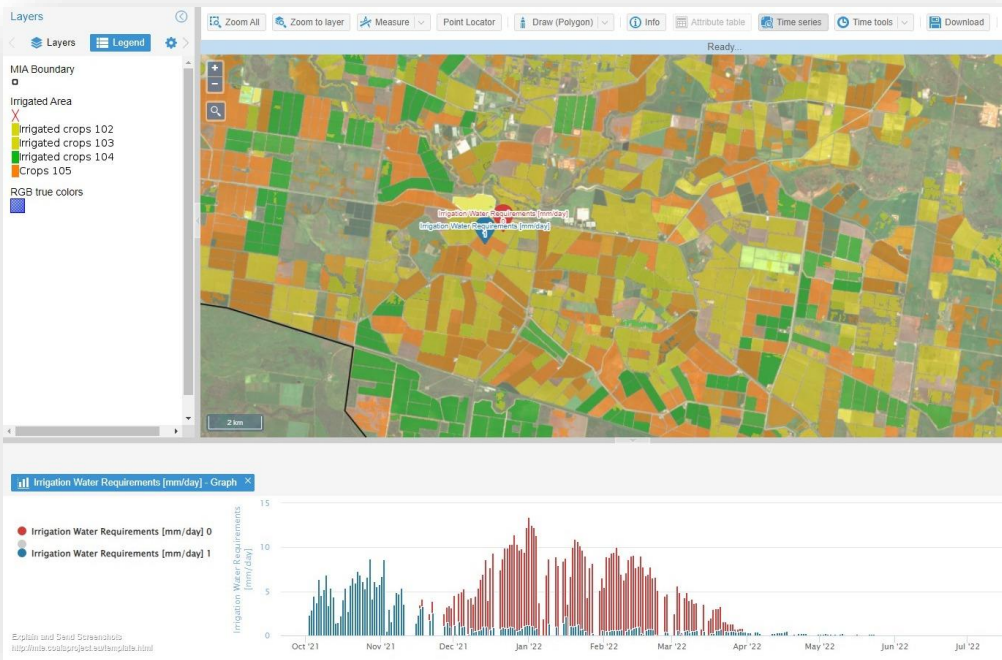
The product is derived by monitoring the actual crop development and irrigation status as a result of environmental conditions and agricultural practices.

## Data as a Service

COALA adopts the concept of Data as a Service (DaaS) so that products developed can be immediately adopted by users (within their existing platforms) using a variety of communication technologies and processing standards. It means that georeferenced information can be integrated into existing platforms that provide services to farm businesses by using standard communication protocols M2M (machine to machine). The DaaS approach makes easier the integration of Earth Observation with field data (e.g. soil samples and farmer's data input into the service).

## USER CASE EXAMPLE

Evaluate of irrigation efficiency and detect of illegal water use by comparing crop water requirements vs irrigation water uptake in space and time.




Irrigation Infrastructure Operators and Water Managers can compare crop water requirements of farms, sectors, and districts with the actual water volume measured by the delivery system. Underpinned by the experience of previous projects funded by the European Union for detection of illegal water abstraction and to control irrigation volumes delivered, COALA services can provide a map of actual irrigation and time-series of daily Crop Water Requirement with a spatial resolution of 10 meters that can be scaled (aggregated) from paddock to districts. Moreover,, the COALA services enables estimating efficiency of the delivering system, dection of illegal water use, ranging from district to farm scale. In the figure example of data available for an irrigated Area in the New South Wales: **Irrigated Area Map, irrigation water requirement**.

## KEY FEATURES

The Sentinel-2 satellites provide free, full, and open access images. With the ability to revisit the same place on Earth every 5 days, at a spatial resolution of 10 m, using a multispectral instrument with 12 channels covering the visible and infrared light range, the images underpin value-added products relating to vegetation and crop status.

Frequency acquisition	1 image every 5 days
Satellite data updating	A Few hours after acquisition
Satellite products available	n. 11 RGB (false and true colour), NDVI, LAI, Albedo, Fcover, Fapar, STR, SWCI, Etc, CWR, Irrigated areas.
Evaluation intraplot (pixel based)	Available
API integration	Available also for further implementation based on user's requirement

Feature	Systems based only on crop water balance	COALA
Actual irrigated area	Input data to be provided to the system based on historical, statistical data	 <p><b>Retrieved from Satellite time series data</b></p>
Irrigated Crop map	Not supplied	
Crop Water Development	Based on standard crop coefficients, it is necessary to provide the list of crops, presumed sowing and harvesting period	<p><b>Temporal and spatial aggregation is always available</b></p>
Crop Water Requirement, Irrigation water requirement	Based on standard crop coefficients & statistics	
Aggregation of Results	At the scale of the calculation framework. Generally, it is not possible to disaggregate the data	

