

SENSAGRI proof-of-concept on irrigated/not-irrigated fields

The proof-of-concept demonstrates the use of the SENSAGRI Surface Soil Moisture (SSM) product to derive the spatio-temporal distribution of irrigated and **not-irrigated fields**. The method consists of a segmentation of the SSM product under the assumption that irrigated fields show higher SSM levels than not-irrigated ones. As a result, the service allows the **identification of the irrigation events** rather than the effects of the irrigation on the crop growth. In this respect, the proposed methodology is complementary to existing detection schemes based on optical data.

The segmentation algorithm is unsupervised and exploits the SSM statistics at two different spatial scales in order to detect anomalies in the SSM values related to irrigation.

The classified product is a binary pixel wise map in ENVI format containing a flag class (i.e. irrigated/not irrigated). The maps have a geographic lat/lon projection, WGS84 datum and a spatial pixel size of 0.0004° (~40m). The temporal resolution is the same of the SENSAGRI S1&S2 SSM product.

The **algorithm has been validated** over the Riaza irrigation district (Castile and León region, Spain), which stretches on 5,232 ha along a canal of 52 km that flows parallel to the Duero River. The validation consisted of comparing the binary masks with ground data available over the Riaza irrigation district in 2017 and 2018.

The algorithm performance strongly depends on the contrast existing between the SSM content of irrigated and not-irrigated fields, which in turn is a function of i) the timespan between the irrigation event and the S1 acquisition and ii) the phenologic stage of the various crops (i.e., the longer the timespan and/or the more developed are the crops the lower is, in general, the observed SSM contrast). Therefore, the contrast changes during the development of crops, particularly in the summer season.

A detailed analysis has been performed on specific crops, such as wheat, barley and maize. Results indicate that for winter crops the best performance is achieved before the flowering period, while for summer crops the most indicated period is early in the growing season. Under these conditions, the Producer Accuracy is higher than 80%. **This result suggests that irrigation detection by using high resolution SSM maps could be very useful for an early detection of irrigated areas, which can be valuable information for water management in case of shortage of water.**

Figure 1 shows an example of SENSAGRI S1&S2 SSM map and the correspondent irrigated/not-irrigated field map over the Riaza irrigation district.

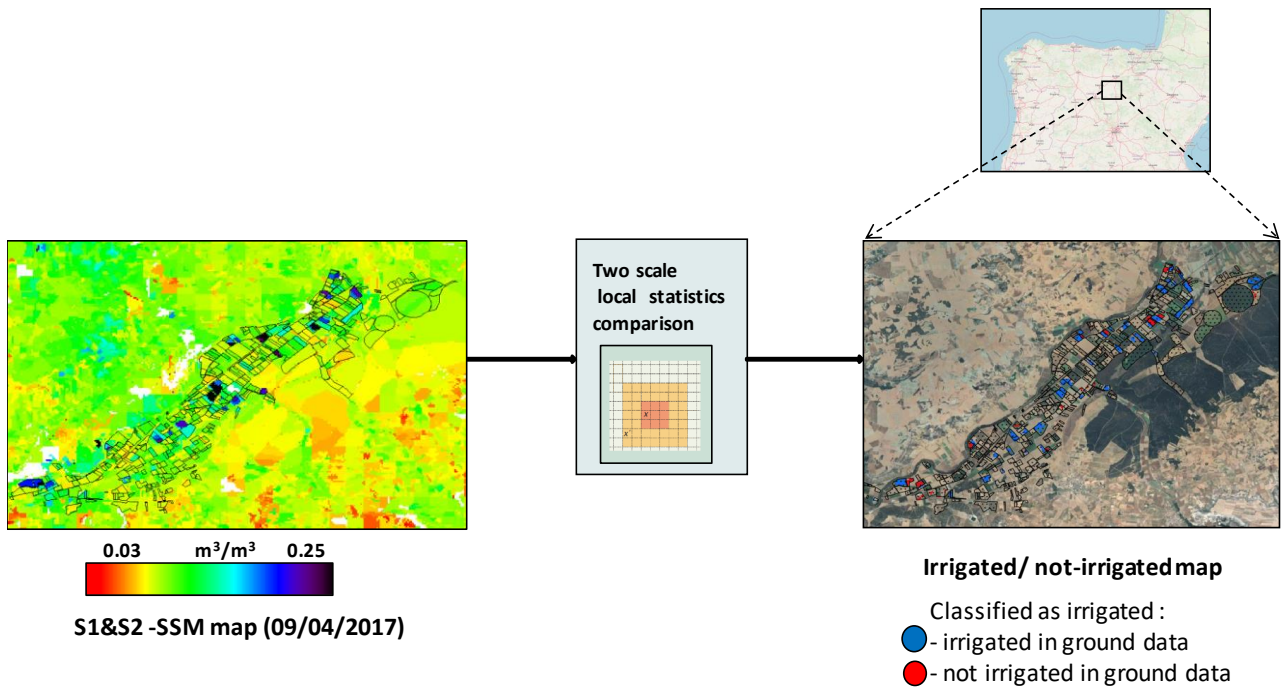


Figure 1. Example of SENSAGRI S1 &S2 SSM map on 09/04/2017 and the correspondent Irrigated/not-irrigated field map over the Riaza district, Castila and León (Spain).

References

- SENSAGRI deliverable D6.12: Proof-of-concept of irrigated/not-irrigated area product v.3.
- SENSAGRI deliverable D7.18: Second Validation of irrigated/not-irrigated maps.