**Integration of Bare Soil Reflectance Composites, Derived from Long-term Satellite Image Series, into the AMS Workflow**

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**Abstract**

The presentation is framed within the operational Area Monitoring System (AMS) of Castilla y León Paying Agency. The Regional Ministry of Agriculture of Castilla y Leon is one of the seventeen Paying Agencies in Spain that are coordinated by the Spanish Agrarian Guarantee Fund (FEGA). The agro-technological Institute of Castilla y Leon (ITACyL) is a public entity that gives technical support to the Regional Ministry of Agriculture and runs and manages the AMS in the Region. Castilla y Leon is the largest region in Spain (94,224 Km2) with more than five million hectares of cropland, distributed across more than 3.7 million parcels declared by around 56,000 thousand applicants for CAP subsidies (in 2025).

An AMS must provide evidence (markers) that enable the PA to make a fair judgment on the compliance of each declared parcel with the monitorable eligibility conditions. This evidence is mainly derived from the analysis of time series of Sentinel images throughout the season. In addition to being used in ML/DL algorithms, the expert analysis of such temporal series enables a better understanding of coverage behavior in the plot and supports the definition of thresholds to detect changes in coverage due to, for instance, agricultural practices. In this regard, having an adapted pattern for each parcel that characterizes the presence of a certain type of coverage is clearly valuable. However, identifying such patterns requires long-term studies, which are difficult to conduct in the context of an operational AMS.

In January 2025, the German Aerospace Center (DLR) and The Remote Sensing Technology Institute (IMF) published the *SoilSuite* *for Europe*. This suite offers a collection of image data products that provide information about the spectral and statistical properties of European soils. One of the available products is the Bare Surface Reflectance Composite (SRC) which contains Sentinel-2 mean reflectance values of all bare surface occurrences between 2018-2022.

Although this product was conceived as an input for digital soil mapping, it also provides valuable information for AMS. We believe that it enables the characterization of every parcel monitored by the AMS when bare soil conditions are present. Based on this hypothesis, we have prototyped a marker that relies on the similarity between the spectral signature of bare soil and the daily Sentinel-2 spectral response of the parcel. We expect this marker to enhance expert knowledge when defining thresholds for accepting or rejecting compliance with certain Eligibility Conditions—for instance, tentatively identifying agricultural activity on fallow land or the presence of seedbed conditions under direct seeding practices. Nevertheless, several challenges have arisen in designing the marker. The main one relates to fully understanding the surface described by the SRC product in arid and semi-arid conditions, as discussed in the literature.

**References**

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