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Development of algorithms based on the integration of meteorological data and remote sensing indices for the identification of low-productivity agricultural areas

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Agricultural areas of Mediterranean regions host an extraordinary wealth of biodiversity and represent the source of income for a large population often living below the average economic conditions of the most advanced regions of Europe. In these areas, the semi-arid climates, the impact of climate change, the parcelization of land property, and the poor soils, contribute to create widespread conditions of low profitability of agricultural areas. This is likely to have an impact on the increasing occurrence of land abandonment phenomena and on growing hydrogeological risk linked to the lack of land maintenance.

The productivity estimation of these agricultural areas represents a crucial information to detect hotspots of degradation helping policy makers in taking specific actions to increase productivity and reduce migration fluxes.

In this work, realized in the framework of the ODESSA (On DEmand Services for Smart Agriculture) project (financed by the European Regional Development Fund Operational Programme 2014-2020 of Basilicata Region), the procedure adopted involves the use of climate and vegetation geospatial data, including both direct observational data (temperature, rainfall, etc.) and satellite-derived vegetation indexes. For the climatic component, we exploited a database of daily temperature and rainfall data (2000-2021) acquired by the agrometeorological network of ALSIA (Lucana Agency for Development and Innovation in Agriculture) and the CHIRPS (Climate Hazards Group InfraRed Precipitation with Station data) dataset providing rainfall data (1981-2020) at a spatial resolution of 0.05^0 to produce different diagnostic indices able to capture low-productivity areas. We tested this procedure in two districts of Basilicata (Southern Italy): the Vulture-Melfese and the Metapontino, representing the core areas of regional agricultural specialization for vineyards and intensive fruit and vegetable crops, respectively.