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## Rice monitoring in Lower Mondego (Portugal) using multi-temporal Sentinel-2 satellite images: comparison between different irrigation conditions

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Irrigated rice agriculture, if traditionally conducted applying continuous flooding, requires much more irrigation water than non-ponded crops. This is usually a constraint in areas facing water scarcity issues that might directly affect rice production and the competition for water. Climate change might furthermore amplify current difficulties, depending on the hydrological regime, the availability of irrigation infrastructures, rice variety and rice agronomic management practices, among other factors.

Whereas different water availability conditions determine differences in rice growth and yields, the response of this crop is not well established for the rice producing area of the Lower Mondego region (Portugal), which is identified as an area vulnerable to climate change, in particular with respect to increasing precipitation and temperature variability. In coastal areas' lowlands, the groundwater table (e.g., depth and quality) can also play an important role, namely under the influence of sea level rise. For this region, in the proximity of the Atlantic Ocean, we report on using remote sensing tools to assess irrigated rice growth, in areas i) served by a full gravity irrigation system, and ii) fed directly from a small, non-regulated, river. The data used in our study include land surface images of rice cultivated areas obtained from satellite Sentinel-2A during several years (including a particularly dry year). Although the remote sensing data available from satellite multispectral imagery present some practical constraints (e.g. cloud cover, resolution), results from this study show that remote sensing tools, including the Normalized Difference Vegetation Index (NDVI), are able to differentiate between established rice growth phases, which highlights their usefulness as rice monitoring tools and potential role in assessing the impact of applying different irrigation and agriculture management practices on rice cultivation.

This work was conducted under the umbrella of the international project MEDWATERICE ([www.medwaterice.org](http://www.medwaterice.org)) that focuses on improving the sustainable use of water in the Mediterranean rice agro-ecosystem and aims at exploring the opportunity to apply water-saving, alternative, rice irrigation methods.