

EGU21-12498

<https://doi.org/10.5194/egusphere-egu21-12498>

EGU General Assembly 2021

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Rice water requirements: local assessment based on remote sensing data in the Lower Mondego (Portugal)

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Irrigated rice agriculture, which is traditionally conducted applying continuous flooding, requires much more irrigation water than non-ponded crops. This can be a constraint in areas facing water scarcity issues, where the pursue for water resources optimization requires that water use efficiency is increased. Therefore, main local challenges for rice production are often to identify and apply more favorable and efficient irrigation and crop management practices, while guaranteeing high crop yields. For this purpose, the knowledge of rice crop water requirements is an important practical consideration. However, there are usually several limiting factors to obtain relevant data for the local conditions. Several recent approaches and methodologies based on remote sensing data, such as images obtained from satellites and Unmanned Aerial Systems (UAS), are offering attractive alternative routes to estimate crop evapotranspiration in a fast and easy way, including in rice fields.

For the rice producing area of the Lower Mondego region (Portugal), we report on exploring the usefulness of remote sensing tools for the local rice agriculture monitoring and management. Data include 25 land surface images of rice cultivated areas obtained from satellite Sentinel-2A during 2020, which together with weather data and crop parameters permits to calculate biophysical indicators and indices of vegetation water stress. Although remote sensing data available from satellite imagery presents some practical constraints (e.g. cloud cover, resolution), preliminary results from this study show that they allow to improve the characterization of the rice local cultivation conditions, therefore contributing to evaluate the impact of applying different irrigation and agriculture management practices, in particular those that have the potential to lead to significant savings of irrigation water.

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