ROBUST SATELLITE TECHNIQUES FOR EARLY DETECTION OF HYDROLOGICAL STRESS IN CULTIVATED AREAS: THE CASE OF BASILICATA (ITALY) REGION

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The amount and continuity of water resources has a crucial role on vegetation growth and is every day more affected by climatological changes. From this point of view, continuous monitoring of vegetation conditions can help not just to timely identify climatological forcing but also to adjust water management practices in cultivated areas.

To this aim global observations from satellite Earth Observing systems - and particularly (since the 80s) from LANDSAT missions and (since 2015) from Sentinel-2 constellation which significantly improved temporal (up to 5 days) and spatial (up to 10 meter) resolutions – play a major role.

To timely identify those variations possibly related to medium-long term climatological forcing and to distinguish them from the occasional, short-term, ones however affecting cultivated areas management, long-term analyses of satellite observations are required.

In this paper the general change detection approach, named Robust Satellite Techniques (RST) is applied which identifies "anomalous" spatial-temporal patterns on the base of a preliminary computation of its behavior (in terms of expected value and variability) as historically observed at each location in similar (same period of the year, same time of observation, etc.) observational conditions.

To this aim long-term time-series of LANDSAT (for investigating possible climatological forcing) and Sentinel-2 (for short-term analyses) satellite data have been analyzed to investigate water stress conditions in cultivated areas of Basilicata Region. Preliminarily results achieved in the framework of the OD4SA (On Demand Services For Smart Agriculture) Project will be presented.

H13 Vegetation and Hydrology Interactions: A Remote Sensing Perspective

Convener(s): *María J. Polo (ICRS, Spain)*

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Description

The dynamic role of vegetation in the water cycle adds complexity for modelling hydrological processes in a warmer and prone-to-extreme climate. Not only direct interactions due to water absorption from roots and transpiration to the atmosphere, but also indirect impacts of changes in the vegetation cover, like post-fire conditions or modified surface roughness after severe drought

periods, can exert a significant control on water and energy fluxes, and eventually become drivers of tipping points on the local and global scales. Remote sensing has already achieved relevant progress in observing vegetation conditions and their changes that help to understand and model such interactions. This symposium focuses on the remote sensing capabilities for the dynamic modelling of these two-way water-vegetation feedbacks and aims to bring discussion on RS-supported observation/simulation of critical conditions and both seasonal and long-term processes, and their relationship. As examples, the interactions of vegetation dynamics with snow accumulation/ablation, infiltration/runoff partition and the critical zone, flood extents and recovery potential, evapotranspiration and water-stress controls, groundwater depletion and recharge, among others. Works are welcome to highlight man-induced and/or global warming critical changes, combination of different remote sensing sources, generation of long term time series of vegetation-water processes descriptors/models parameters, combined data assimilation for dynamic modelling of such feedbacks, or early detection of potential tipping points in the water balance and their impacts on different time/spatial scales.