Contribution ID: **527** Type: **Oral Presentation**

The Alento hydrological observatory: An advanced open-air laboratory to evaluate the impact of anthropogenic disturbances on ecosystem services in a Mediterranean catchment.

Monday, 31 May 2021 19:00 (15 minutes)

Across the Mediterranean region, there is a need to obtain an in-depth understanding of the impacts of climate seasonality (drought) and land-use (including wildfires) on ecosystem services related to the hydrological cycle (contaminant transport, soil erosion, etc.), especially in hilly-mountainous catchments that can be more sensitive to imbalances in the management of land and water resources. A valid contribution to the development of sustainable management strategies and the prediction of the future condition is the integration of ground-, proximal-, and remote sensing-based monitoring activities together with diverse scientific expertise in the "Alento"hydrological observatory (southern Italy). This observatory was established in 2016 to provide large soil and hydrological datasets for Mediterranean environments and comprises two study sites (MFC2, agricultural use on clay soil; GOR1, forested site on loamy andic soil) instrumented with soil sensor networks (SoilNet) and cosmic-ray neutron probes (CRNP). Hundreds of disturbed and undisturbed soil samples were collected along transects in the catchment and also in the test sites at the nodes of regular 25-m□25-m grids to determine soil physical and hydraulic properties in these test sites. Here we will present the most recent investigations underway in the Alento observatory.
Data retrieved from the ground-based sensing systems are being integrated with dual polarimetric Sentinel-1 Synthetic Aperture Radar (SAR) data to provide effective identification of field-scale soil hydrological responses of sites with different characteristics. These activities have been firstly devoted to the development of a simplified calibration procedure of SAR-based parameters using local terrain attributes and sparse surficial soil moisture values. The developed site-specific calibration-dependent model was tested in MFC2 only for a short period in November 2018. Preliminary results show that the combined SAR + terrain model (R^2 89%, RMSE 2.49 vol%) slightly outperforms the SAR-based model (R^2 86%, RMSE 2.23 vol%) in terms of accuracy and agreement between observed and estimated values of near-surface soil moisture. Ongoing activities in MFC2 focus on the inverse modeling in Hydrus-1D to simulate two supporting variables to calibrate SAR-based parameters: (i) sparse soil moisture data measured at the soil depths of 15 cm and 30 cm over the SoilNet locations, and (ii) downscaled field-scale soil moisture monitored with the CRNP. This task aims primarily at highlighting the effectiveness of integrating SAR-based measurements, topographic attributes, and CRNP data for mapping the near-surface soil moisture at a small scale with the advantage of being non-invasive and easy to maintain. Space-borne information on biophysical properties (i.e., vegetation) adds to the current efforts to enlarge the dataset. In both MFC2 and GOR1, systematic campaigns are carried out to measure the water isotope compositions of rain, soil, plant, shallow aquifer, and streamflow. This dataset helps verify the hypothesis of ecohydrological separation whereby distinct soil water pools supply either plant transpiration or groundwater recharge and surface runoff. Finally, this bulk of integrated sets of soil and hydrological data will serve as input into one- or three-dimensional hydrological models to investigate the interactions and feedback in the soil-vegetation-atmosphere continuum and obtain reliable scenario-based projections.

Time Block Preference

Time Block B (14:00-17:00 CET)

References

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