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A European vision for hydrological observations and experimentation

Twenty years of hydrological observations at Fiumarella of Corleto basin: experimental data, analysis and modeling

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Hydrological observations provided by in situ monitoring networks are essential to better understand hydrological processes and to improve water resource management. This is even more precious for small basins where large spatial coverage or remotely sensed data are not enough to represent hydrological behavior in space and time. In addition, the availability of several years of hydrological data is particularly useful for the application of hydrological models that usually requires long calibration data series in order to provide reliable results. Starting from 2002 and continuing for the subsequent two decades, the "Fiumarella of Corleto" basin, which spans an area of 32.5 km^2 and is situated in the Basilicata region of Southern Italy, has been under observation (Manfreda et al., 2011). The basin is located on two slopes with differing land use patterns: the left slope is mostly comprised of agricultural land, while the right slope is predominantly covered by forests. The hydrometeorological network consists of three automated weather stations equipped with various sensors to monitor rainfall, snow depth, temperature, wind speed and direction, air temperature, relative humidity, solar radiation, atmospheric pressure, and hydrometric data. From 2006, a TDR100 system connected to 22 probes located at 11 different sampling sites was used to monitor soil moisture in the sub-basin. The system was set up along a transect measuring approximately 60 meters in length, with probes located at two different depths of 30 and 60 cm. In addition to this, a high-resolution (1x1 m) DSM of the basin was derived using LiDAR to provide a detailed characterization of the morphology of the two slopes. The catchment pedology was investigated through field campaigns and laboratory measurements to identify the primary soil types and units in the basin (Romano et al., 2002; Santini et al., 1999). Monitoring activities were conducted with reference to two different spatial scales: the entire basin (32.5 km^2) and the sub-basin (0.65 km^2). Hydrological signatures were used to characterize the hydrological behavior of the two drainage areas. Peak flow analyses were performed to define lag-time, soil moisture conditions before flood events evidencing the different hydrological responses of both basin and sub-basin. Some flow indicators (e.g., base flow and recession constant) were used to constrain a semi-distributed hydrological model in order to optimize performances in calibration and validation. In this contribution, an overview of the main

results of hydrological data analyses and modeling obtained at different spatial scales is presented.