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An assessment of the feasibility of the use of satellite-only rainfall estimates for the hydrological monitoring in central Italy

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The need for accurate distributed hydrological modelling has constantly increased in last years for several purposes: agricultural applications, water resources management, hydrological balance at watershed scale, floods forecast. The main input for the hydrological numerical models is rainfall data that present, at the same time, a large availability of measures (in gauged regions, with respect to other micro-meteorological variables) and the most complex spatial patterns. While also in presence of densely gauged watersheds the spatial interpolation of the rainfall is a non-trivial problem, due to the spatial intermittence of the variable (especially at finer temporal scales), ungauged regions need an alternative source of rainfall data in order to perform the hydrological modelling. Such source can be constituted by the satellite-estimated rainfall fields, with reference to both geostationary and polar-orbit platforms. In this work the rainfall product obtained by the Aqua-AIRS sensor were used in order to assess the feasibility of the use of satellite-based rainfall as input for distributed hydrological modelling. The MOBIDIC (MOdello di BIlancio Distribuito e Continuo) model, developed at the Department of civil and Environmental Engineering of the University of Florence and operationally used by Tuscany Region and Umbria Region for flood prediction and management, was used for the experiments. In particular three experiments were carried on: a) hydrological simulation with the use of rain-gauges data, b) simulation with the use of satellite-only rainfall estimates, c) simulation with the combined use of the two sources of data in order to obtain an optimal estimate of the actual rainfall fields. The domain of the study was the central Italy. Several critical events occurred in the area were analyzed. A discussion of the results is provided.