



Satellite soil moisture-derived rainfall for flood modelling in Italy

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Accurate precipitation estimates are paramount for the activities related to water management and risk assessment. Satellite-based rainfall estimates are generally obtained by an inversion of the atmospheric signals reflected or radiated by atmospheric hydrometeors, i.e., a “top-down” approach. The main drawback of this retrieval technique is related to the number of satellite overpasses, that may lead to a general underestimation of rainfall.

To overcome these issues, recently, some studies have investigated the possibility to integrate the state-of-the-art rainfall products with rainfall estimates obtained by a consolidated “bottom-up” approach, SM2RAIN (Brocca et al., 2014) exploiting satellite soil moisture observations for obtaining accumulated rainfall estimates. The integration between top-down and bottom-up estimates can produce a more reliable rainfall product for hydrological applications, characterized by better estimation of rainfall amounts and timing.

On this basis, the Satellite Application Facility on Support to Operational Hydrology and Water Management (H SAF) has started the development and the sharing of integrated datasets of top-down satellite-based precipitation and soil moisture-derived rainfall estimates.

During the Continuous Development and Operational Phase (CDOP) 3 and 4, the H SAF consortium planned to develop and provide several integrated products to the users for hydrological applications, also by taking advantages of the next EPS-SG instruments with enhanced retrieval capabilities.

In this study, the usefulness of integrated products for river discharge simulation is assessed in Italy. More in details, the integrated product between SM2RAIN-derived estimates and Passive Microwave auxiliary product H67 (H64), the gauge corrected version (H84) and the SM2RAIN-only derived product (H87), along with the parent products will be used to force a semidistributed rainfall-runoff model (MISDc) during the period 2016-2019. The obtained river discharge timeseries have been compared with observed ones in order to evaluate the skill of the investigated products showing confirming the added value of using an integrated rainfall product for hydrological applications. Moreover, the results will provide useful insight that will help in improving the integrated products.

The analysis provided good results, confirming the added value of using an integrated rainfall product for hydrological applications, allowing to overcome some of the limitations of the state-of-the-art precipitation datasets.