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SMOS+RAINFALL: Evaluating the ability of different methodologies to improve rainfall estimations using soil moisture data from SMOS

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Recent studies have demonstrated the usefulness of soil moisture retrieved from satellite for improving rainfall estimations of satellite based precipitation products (SBPP). The real-time version of these products are known to be biased from the real precipitation observed at the ground. Therefore, the information contained in soil moisture can be used to correct the inaccuracy and uncertainty of these products, since the value and behavior of this soil variable preserve the information of a rain event even for several days. In this work, we take advantage of the soil moisture data from the Soil Moisture and Ocean Salinity (SMOS) satellite, which provides information with a quite appropriate temporal and spatial resolution for correcting rainfall events. Specifically, we test and compare the ability of three different methodologies for this aim: 1) SM2RAIN, which directly relate changes in soil moisture to rainfall quantities; 2) The LMAA methodology, which is based on the assimilation of soil moisture in two models of different complexity (see EGU2017-5324 in this same session); 3) The SMART method, based on the assimilation of soil moisture in a simple hydrological model with a different assimilation/modelling technique. The results are tested for 6 years over 10 sites around the world with different features (land surface, rainfall climatology, orography complexity, etc.). These preliminary and promising results are shown here for the first time to the scientific community, as also the observed limitations of the different methodologies. Specific remarks on the technical configurations, filtering/smoothing of SMOS soil moisture or re-scaling techniques are also provided from the results of different sensitivity experiments.