Hydrol. Earth Syst. Sci., 14, 1881-1893, 2010
www.hydrol-earth-syst-sci.net/14/1881/2010/
doi:10.5194/hess-14-1881-2010

Improving runoff prediction through the assimila of the ASCAT soil moisture product

L. Brocca[1], F. Melone[1], T. Moramarco[1], W. Wagner[2], V. Naeimi[2] Z. Bartalis[3], and S. Hasenauer[2]

[1]Research Institute for Geo-Hydrological Protection, National Research C Via Madonna Alta 126, 06128 Perugia, Italy

[2]Institute of Photogrammetry and Remote Sensing, Vienna University of Technology, Vienna, Austria

[3]European Space Agency, Centre for Earth Observation (ESA/ESRIN), Vi Galilei, 00044 Frascati, Italy

[4]German Remote Sensing Data Centre, DFD, of the German Aerospace (DLR, Wessling, Germany

Abstract. The role and the importance of soil moisture for meteoro agricultural and hydrological applications is widely known. Remote offers the unique capability to monitor soil moisture over large are (catchment scale) with, nowadays, a temporal resolution suitable f hydrological purposes. However, the accuracy of the remotely sens moisture estimates has to be carefully checked. The validation of t estimates with in-situ measurements is not straightforward due th known problems related to the spatial mismatch and the measurer accuracy. The analysis of the effects deriving from assimilating rem sensed soil moisture data into hydrological or meteorological mode represent a more valuable method to test their reliability. In partic assimilation of satellite-derived soil moisture estimates into rainfall models at different scales and over different regions represents ar important scientific and operational issue.

In this study, the soil wetness index (SWI) product derived from th Advanced SCATterometer (ASCAT) sensor onboard of the Metop sa was tested. The SWI was firstly compared with the soil moisture te pattern derived from a continuous rainfall-runoff model (MISDc) to its relationship with modeled data. Then, by using a simple data assimilation technique, the linearly rescaled SWI that matches the variability of modelled data (denoted as SWI*) was assimilated int and the model performance on flood estimation was analyzed. Mor three synthetic experiments considering errors on rainfall, model parameters and initial soil wetness conditions were carried out. Th experiments allowed to further investigate the SWI potential wher uncertain conditions take place. The most significant flood events, occurred in the period 2000–2009 on five subcatchments of the Up Tiber River in central Italy, ranging in extension between 100 and (were used as case studies. Results reveal that the SWI derived fro ASCAT sensor can be conveniently adopted to improve runoff predi the study area, mainly if the initial soil wetness conditions are unk

Final Revised Paper (PDF, 5149 KB) Discussion Paper (HESSD)

Citation: Brocca, L., Melone, F., Moramarco, T., Wagner, W., Naeimi Bartalis, Z., and Hasenauer, S.: Improving runoff prediction throug assimilation of the ASCAT soil moisture product, Hydrol. Earth Syst. 1881-1893, doi:10.5194/hess-14-1881-2010, 2010. Bibtex EndNote Reference Manager XML