



The missing information for hydrological modelling in agricultural areas: irrigation

Luca Brocca (1), Jacopo Dari (2), Paolo Filippucci (1), Angelica Tarpanelli (1), Pere Quintana-Seguí (3), Maria Jose Escorihuela (4), and Renato Morbidelli (2)

(1) National Research Council, Research Institute for Geo-Hydrological Protection, Perugia, Italy (luca.brocca@irpi.cnr.it), (2) University of Perugia, Department of Civil and Environmental Engineering, Perugia, Italy, (3) Ebro Observatory, Ramon Llull University - CSIC, Roquetes, Spain, (4) isardSAT, Parc Tecnològic Barcelona Activa, Barcelona, Spain

Hydrological models have been largely developed in the last 40 years achieving great advances in our capability to simulate hydrological processes at high resolution in the horizontal and vertical domains. In principle, physically-based hydrological models are able to reproduce fluxes and states with high accuracy. However, in the real world, our models strongly depend on the parameterization and on the input data used. Uncertainties in the parameterization and in the inputs are translated into the model, and even highly accurate models, in terms of physical representation of processes, will totally fail due to error in the parameterization and the inputs.

This well-known problem is much more important in locations and regions in which the human impact on the hydrological cycle is more pronounced. Specifically, irrigation is the larger consumer of water worldwide and, in some regions, irrigation during the summer season is by far the major component of the hydrological cycle (i.e. if compared with precipitation and evapotranspiration). In recent years, specific parameterizations for including the irrigation process have been added to hydrological and land surface models, but typically they rely on theoretical conditions (e.g., constant irrigation rates when soil moisture is below to certain values) that might not occur in the reality. Therefore, we strongly need irrigation observations for correctly simulate the hydrological cycle in these regions.

Very recently, we developed an approach for quantifying irrigation water from space by using satellite soil moisture observations (Brocca et al., 2018). The approach has been found successful at some locations in Iran, Spain, United States and Morocco, and now is being improved by using high resolution soil moisture products from Sentinel-1 and from downscaling techniques. The obtained irrigation estimates are used as input into hydrological modelling and their impact in terms of evapotranspiration and runoff fluxes is assessed. Results will be shown in basins in Spain and Italy, and presented at the conference.

REFERENCE

Brocca, L., Tarpanelli, A., Filippucci, P., Dorigo, W., Zaussinger, F., Gruber, A., Fernández-Prieto, D. (2018). How much water is used for irrigation? A new approach exploiting coarse resolution satellite soil moisture products. *International Journal of Applied Earth Observation and Geoinformation*, 73C, 752-766, doi:10.1016/j.jag.2018.08.023.