

Comments on 'High resolution satellite products improve hydrological modeling in northern Italy' by Alfieri et al.

This manuscript reports recent advances in the use of high-resolution satellite-based Earth observation data in hydrological modelling. A distributed hydrological model called the Continuum is used for the Po River Basin in a set of experiments using satellite precipitation and evaporation as forcing and assimilating satellite-derived soil moisture and snow depths. The general description of the experiments and the used datasets as well as evaluation of the simulation results are adequate. However it is felt that more technical details should be presented in order to fully understand the presented results.

1. While the results are presented in terms of statistical measures, the goodness in simulating high flows and low flows are obviously very different for different gauging stations. This is a major issue that needs attention and at least a discussion and some additional supplementary materials are required.

2. L88-89, the ECOCLIMAP (2013) was used for the vegetation coverage. There are obviously more recent data for the period of the simulations. A comparison and quantification of the uncertainty is needed.

3. The MS needs to report the used signal to noise ratio that determine the weights in eq. (1-2).

4. Datasets of different spatial resolution are mentioned, but what is the used spatial resolution in the hydrological modeling, 10km? How are they converted to the same resolution?

5. L163-165: The used RT1 model for soil moisture retrieval uses auxiliary Leaf Area Index (LAI) time series provided by ECMWF ERA5-Land reanalysis dataset to correct vegetation effects, but ERA5-Land assumes a fixed land cover and static monthly leaf area index (LAI) climatology. How does the actual LAI change, in particular in agricultural areas, impacts the soil moisture and the subsequent use of it in the hydrological modeling?

6. In eq. (4), G is assumed as 0.45, meaning the observation carries 45% information and the simulated background 55% information for all grids. This seems a gross simplification for different land cover types and needs at least a discussion and justification.

7. L314-316: *'Results denote a generally skillful reconstruction of river discharges for all experiments, with mean KGE at the 27 stations ranging between 0.13 (SM2RAIN+GLEAM) and 0.53 (C-SNOW), all well above the no-skill threshold of $KGE_0 = 1-21/2 \cong 0.41$ (see Knoben et al., 2019).'* Please explain how $0.13 > 0.41$?