Geophysical Research Abstracts
Vol. 20, EGU2018-17613, 2018
EGU General Assembly 2018

Exploiting In Situ and Remotely Sensed Data for Enhancing Hydrological Models Simulations

Luca Cenci (1,2), Flavio Pignone (2,3), Nicola Rebora (2), Francesco Silvestro (2), Simone Gabellani (2), Giorgio Boni (2,3)

(1) DIET, Sapienza University of Rome, Rome, Italy, (2) CIMA Research Foundation, Savona, Italy (luca.cenci@cimafoundation.org), (3) DIBRIS, University of Genoa, Genoa, Italy

The objective of the presented analysis is the evaluation of the impact of two calibration methods and five precipitation inputs on the performances of the Continuum hydrological model (Silvestro et al., 2013) to predict river discharge data. The latter is a time-continuous, spatially-distributed, physically-based hydrological model, currently used in Italy by the Civil Protection Department (DPC) for flood forecasts. Concerning the calibration methods, the first consisted in a standard approach based only on in situ observations of streamflow data. The second was based on a Multi-Objective (MO) approach that, with respect to the previous one, also accounted for satellite-based observations of land surface temperature and soil moisture (Silvestro et al., 2015). Concerning the precipitation inputs, the first was obtained by spatially interpolating in situ precipitation data collected by rain gauges. To this aim, the GRISO interpolator (Pignone and Rebora, 2014b), with a constant length of spatial correlation, was used. The second and the third inputs were obtained by using the abovementioned approach, with a variable correlation length. The latter was allowed to vary according to external precipitation maps that were, respectively, the EUMETSAT-HSAF H05 product (PR-OBS-5; HSAF, 2017) and the precipitation maps produced by the observations of the Italian Radar Network of the DPC (this product will be hereinafter referred as DPC Rainfall Product). The fourth precipitation input was obtained by using the Modified Conditional Merging (MCM) approach (Pignone and Rebora, 2014a), which merged the rainfall data collected by pluviometers with the DPC Rainfall Product. The fifth input consisted in the DPC Rainfall Product. Ten model simulations were thus run for a time period ranging from November 2014 to November 2016. The study area selected for the analysis was the Orba River Catchment. Results were evaluated by comparing the modelled discharge data against those observed by the hydrometer of the Casal Cermelli station, which is located at the closing section of the catchment. Particular emphasis was placed on the analysis of higher flows data, in order to evaluate the performances for Civil Protection applications (i.e. flood early warning). Findings showed that more accurate results were obtained by using the MO calibration approach and the third precipitation input. In both cases, the combination of in situ and remotely sensed data produced an added-value to the model performances.

References:
- HSAF, 2017: http://hsaf.meteoam.it/description-pr-obs-5.php - Accessed 10/01/2018
- Pignone, F. and Rebora, N.: Estimation of rainfall field by combining radar data and raingauge observations: the modified conditional merging technique, Geophys. Res. Abstr. EGU Gen. Assem. 2014, 16, EGU2014-13967, 2014a.
- Pignone, F. and Rebora, N.: GRISO: Rainfall Generator of Spatial Interpolation from Observation, Geophys. Res. Abstr. EGU Gen. Assem. 2014, 16, EGU2014-13946, 2014b.
- Silvestro, F., et al.,: Exploiting remote sensing land surface temperature in distributed hydrological modelling: the example of the Continuum model, Hydrol. Earth Syst. Sci., 17(1), 39–62, doi:10.5194/hess-17-39-2013, 2013.
- Silvestro, F., et al.,: Uncertainty reduction and parameters estimation of a distributed hydrological model with ground and remote sensing data, Hydrol. Earth Syst. Sci., 19(4), 1727–1751, doi:10.5194/hess-19-1727-2015, 2015.