A Continuous hydrological model for operational flood forecast exploiting satellite observations

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When operational hydrologic forecast is of concern, models should have some important characteristics in order to obtain timely and reliable results for civil protection purposes. In particular, it should be continuous, distributed, robust and computationally fast. This work describes the implementation of the hydrologic model C-DriFt (Continuous Discharge River Forecast) that summarizes all previous properties. In the model are represented the most important soil processes such as infiltration, subflow, evapotranspiration and runoff routing. The peculiarity of the formulation is that the model has, among its state variables, Land Surface Temperature (LST). This is obtained evaluating Evapotranspiration through the evolution of LST as a response to the surface energy balance, modelled via the Force-Restore Equation, an approximation of heat diffusion in the soil. Coupling mass balance and energy balance via the force-restore equation allow the use of forcings, such as long and short wave radiations, available as operational satellite products. The introduction of LST as state variable makes the model suitable for implementation in data assimilation procedures (e.g. assimilation of observed LST). In this study, forcings are estimated using two different sources of information. Operational products of the LSA SAF (Land Surface Analysis - Satellite Applications Facility) data archive are used to describe the energy forcing. Ground observed data are used to describe meteo-hydrological forcings. The model is applied to the Casentino River using data recorded during the six-months period, from June to December 2005.