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A Fully Distributed Model for Water Management and Flood Forecasting

F. Silvestro (1), S. Gabellani (1), F. Delogu (1), R. Rudari (1), G. Boni (1,2)
(1) CIMA Foundation, SAVONA, Italy (info@cimafoundation.org), (2) DIST, University of Genoa, GENOA, Italy

Complete and distribute models, based on physical equations, can be very useful in hydrology as they can be applied in different contexts and for a wide range of purposes: flood forecast, water management, drought forecast, prediction of impact on the hydrologic cycle due to natural and human changes of the territory. Since they must mimic a variety of processes they can end up to be very complex and with a high degree of parameterization. Furthermore these kind of models can be designed in order to assimilate data of different nature detected by ground stations and remote sensors.

In this work a model that balance the need of reproducing the physic of the processes and the practical goal of avoiding over-parameterization is presented. The model is developed to be easily applied in different contests contexts even in data scarce environments. All main hydrological phenomena are modeled in a fully distributed way: overland flow, infiltration, sub-surface flow, vegetation, deep flow, water table evolution and evapotranspiration. Complete mass balance and energy balance are introduced with the capability of soil surface temperature estimation.

Particular attention is set on the both comparison between simulated soil temperature and data from remote sensors and to the feedbacks that satellite data have in the developing of hydrological models.