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Real time soil moisture forecasts for irrigation management: the Pre.G.I. project

A. Ceppi (1), G. Ravazzani (1), M. Mancini (1), and R. Salerno (2)

(1) Politecnico di Milano, DIIAR, Milan, Italy (alessandro.ceppi@mail.polimi.it, +390223996207), (2) Epson Meteo Centre, Via de Vizzi 93/95, 20092, Cinisello Balsamo (Mi), Italy

In recent years frequent periods of water scarcity have enhanced the need to use water more carefully. Future climate change scenarios, combined with limited water resources require better irrigation management and planning for farmers' water cooperatives. This has occurred also in areas traditionally rich of water as Lombardy Region, in the North of Italy.

In this study we show the development and implementation of a real-time drought forecasting system with a soil moisture hydrological alert, in particular we describe preliminary results of the Pre.G.I. Project, an Italian acronym that stands for "Hydro-Meteorological forecast for irrigation management", funded by Lombardy Region.

The project develops a support decision system based on an ensemble weather prediction in the medium-long range (up to 30 days) with hydrological simulation of water balance to forecast the soil water content in every parcel over the Consorzio Muzza basin, in order to use the irrigation water in a wiser and thriftier way. The studied area covers 74,000 ha in the middle of the Po Valley, near Lodi city.

The hydrological ensemble forecasts are based on 20 meteorological members of a modified version of the non-hydrostatic WRF model, with multiple nesting to scale to the region of interest. Different physical schemes are also used to take into account a larger variability; these data are provided by Epson Meteo Centre. The hydrological model used to generate the soil moisture and water table simulations is the rainfall-runoff distributed FEST-WB model, developed at Politecnico di Milano.

The analysis shows the system reliability based on most significant case-studies occurred in the recent years.