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Real-time drought forecasting system for irrigation managment

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In recent years frequent periods of water scarcity have enhanced the need to use water more carefully, even in in European areas traditionally rich of water such as the Po Valley. In dry periods, the problem of water shortage can be enhanced by conflictual use of water such as irrigation, industrial and power production (hydroelectric and thermoelectric). Further, over the last decade the social perspective on this issue is increasing due to climate change and global warming scenarios which come out from the last IPCC Report. The increased frequency of dry periods has stimulated the improvement of irrigation and water management.
In this study we show the development and implementation of the real-time drought forecasting system Pre.G.I., an Italian acronym that stands for “Hydro-Meteorological forecast for irrigation management”.
The system is based on ensemble prediction at long range (30 days) with hydrological simulation of water balance to forecast the soil water content in every parcel over the Consorzio Muzza basin. The studied area covers 74,000 ha in the middle of the Po Valley, near the city of Lodi.
The hydrological ensemble forecasts are based on 20 meteorological members of the non-hydrostatic WRF model with 30 days as lead-time, provided by Epson Meteo Centre, while 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 hydrological model was validated against measurements of latent heat flux and soil moisture acquired by an eddy-covariance station. Reliability of the forecasting system and its benefits was assessed on some cases-study occurred in the recent years.