



PRESTIGRIS: an operational system for water resources and droughts management on Tuscany, Central Italy

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In the last years the problems of water management faced by local administration due to the growing demand of the territory and to the changes in terms of availability became more and more important. Also in view of problems issued by the Climate Change, it is necessary to have the availability of information about the present and the future state of the water resources on the territory, both in terms of stress of the water bodies and of trends in the near-future. In this respect, an adequate management and planning of the water resources can make use of meteorological seasonal forecasts (one-three month) for the assessment of the primary sources of fresh water in a given region. The PRESTIGRIS project (PREvisioni STagionali Idrologiche per la Gestione della Risorsa Idrica e della Siccità - hydrologic seasonal forecasts for water resources and droughts management), implemented at the University of Florence in collaboration with Eumechanos Environmental Engineering and LaMMa (Laboratorio di Monitoraggio e Modellistica ambientale, Laboratory for Environmental Monitoring and Modeling), is aimed to provide hydrological seasonal forecasts on the territory of the Tuscany Region, Central Italy, basing on the seasonal meteorological forecasts available at different Weather Services (NOAA, IRI, etc.). The PRESTIGRIS system is based on a stochastic disaggregation of the monthly seasonal forecasts of minimum and maximum air temperature at the ground and of the total rainfall height. Through an analysis based on Principal Component Analysis (PCA) techniques, the forecasts are disaggregated in daily maps at a spatial resolution (500 m) compatible with a complete hydrological balance simulation, performed on the entire Tuscany region (about 22000 km²) by the distributed hydrological model MOBIDIC (MOdello di Bilancio Distribuito e Continuo), developed at the Department of Civil and Environmental Engineering of the University of Florence. Given a single seasonal forecast, the system performs an ensemble of 50 hydrological simulations. Basing on the results of the simulations, significant quantiles of the main variables of interest (soil saturation, discharge flows in the stream network, evapotranspiration) are mapped on the territory. The results of the simulations for the year 2003, in particular during the severe drought occurred during the summer, are shown as an example of the capabilities of the system.