Geophysical Research Abstracts
Vol. 15, EGU2013-9063, 2013
EGU General Assembly 2013

Improving governance action by an advanced water modelling system applied to the Po river basin in Italy

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In spite of the historical abundance of water due to rains and to huge storage capacity provided by alpine lakes, Po river basin, the most important Italian water district experienced in the past ten years five drought/water scarcity events respectively in 2003, 2006, 2007 and 2012 summers and in the 2011-2012 winter season. The basic approach to these crises was the observation and the post-event evaluation; from 2007 an advanced numerical modelling system, called Drought Early Warning System for the Po River (DEWS-Po) was developed, providing advanced tools to simulate the hydrological and anthropic processes that affect river flows and allowing to follow events with real-time evaluations. In early 2012 the same system enabled also forecasts. Dews-Po system gives a real-time representation of water distribution across the basin, characterized by high anthropogenic pressure, optimizing with specific tools water allocation in competing situations. The system represents an innovative approach in drought forecast and in water resource management in the Po basin, giving deterministic and probabilistic meteorological forecasts as input to a chain for numerical distributed modelling of hydrological and hydraulic simulations. The system architecture is designed to receive in input hydro-meteorological actually observed and forecasted variables: deterministic meteorological forecasts with a fifteen days lead time, withdrawals data for different uses, natural an artificial reservoirs storage and release data. The model details are very sharp, simulating also the interaction between Adriatic sea and Po river in the delta area in terms of salt intrusion forecasting. Calculation of return period through run-method and of drought stochastic-indicators are enabled to assess the characteristics of the on-going and forecasted event. An Inter-institutional Technical Board is constituted within the Po River Basin Authority since 2008 and meets regularly during water crises to act decisions regarding water management in order to prevent major impacts. The Board is made of experts from public administrations with a strong involvement of stakeholders representative of different uses. The Dews- Po was intensively used by the Technical Board as decision support system during the 2012 summer event, providing tools to understand the on-going situation of water availability and use across the basin, helping to evaluate water management choices in an objective way, through what-if scenarios considering withdrawals reduction and increased releases from regulated Alpine lakes. A description of the use of Dews- Po system within the Technical Board is given, especially focusing on those elements, prone to be considered “good management indicators”, which proved to be most useful in ensuring the success of governance action. Strength and improvement needs of the system are then described