Plinius Conference Abstracts,
Vol. 11, Plinius11-58, 2009
11th Plinius Conference on Mediterranean Storms

Integrated modelling of hydrological processes and groundwater dynamics at the river basin scale

G. Ravazzani (1), M. Mancini (2), M. Bergamaschi (3), and D. Rametta (4)

(1) Politecnico di Milano, DIIAR, Milan, Italy (giovanni.ravazzani@polimi.it), (2) Politecnico di Milano, DIIAR, Milan, Italy (marco.mancini@polimi.it), (3) Politecnico di Milano, DIIAR, Milan, Italy, (4) ENI, San Donato Milanese (MI), Italy

In recent years, the rising demand for water has led to water scarcity condition also in those areas traditionally rich of water such as the river Po valley in Italy. On the other hand, the frequency of intense rainfall events has increased during the last years in mid and high latitudes due to the impact of climate change, causing destruction or much damage. These negative effects on human activities were also due to the lack of knowledge of the hydrological processes of the water balance at the river basin scale in an integrated perspective as requested by European Water Framework Directive.

With the aim to improve the understanding of water balance related hydrological processes, sophisticated continuous hydrologic models have been developed for the simulation of soil water dynamic and river discharge also for mountain basins with complex topography. However, some uncertainties still remain. Some of the main uncertainties lie in the understanding of how the water balance of the upper river catchment can affect water resources and floods of the downstream lowland and in the importance of the interactions between the shallow groundwater and surface waters for water balance processes of alluvial plans.

For this purpose a raster based distributed model was developed that allow the simulation of the processes regulating the water fluxes between soil, vegetation and atmosphere, the spatial patterns and temporal dynamics of groundwater-surface water interactions, and river discharge. The model was applied to the river Serio basin, in northern Italy.