Geophysical Research Abstracts, Vol. 7, 07227, 2005
SRef-ID: 1607-7962/gra/EGU05-A-07227

A Montecarlo evaluation of flood statistics and land-use impacts through continuous geomorphological model

T. Settin, G. Botter, A. Alvaro, A. Uccelli, E. Alessi Celegon, M. Marani and A. Rinaldo

University of Padova, Dept. IMAGE and International Center for Hydrology "D. Tonini", Padova, Italy (settin@idra.unipd.it / Fax: +39 049 8275446 / Phone: +39 049 8275445)

A continuous geomorphological Montecarlo model of the hydrologic response is applied to a test catchment in North-Eastern Italy (53 km^2), which is characterized by a significant complexity in its hydraulic and hydrologic functioning. Runoff production is modelled via a Green-Ampt approach incorporating the key information obtained from remote sensing techniques which provide the spatial distribution of soil use. The temporal evolution of soil moisture is modelled by the use of the Green-Ampt model accounting for evapotranspiration processes in continuous time by means of the FAO-Penman-Monteith approach. The Lagrangian theory of the hydrologic response by travel time distribution is used to tackle arbitrary patterns of rainfall in a spatially distributed framework (which is, however, lumped in its dynamical specification). The model has been applied to a continuous runoff simulation within a gauged catchment assessing the predictive capabilities, the flexibility and robustness of the tools developed. The increasing urbanization pressure over the past few decades, which characterizes wide areas in northern Italy, has impacted the natural hydrological functioning of hydraulic systems at different spatial scales. A proper analysis of these effects plays a decisive role for a sustainable territorial management, with the objective of improving the hydraulic safety against flood risk. The effect of the changes of land use occurred over the past fifty years and possible future scenarios has thus been assessed in a Montecarlo framework. The statistical analysis of measured climatic time series allows the generation of rainfall series stochastically distributed in time by means of a Bartlett-Lewis non stationary model, thereby allowing the practical derivation of the occurrence of exceedences of peak flows, volumes etc. In this context the tools developed represent a useful and robust support to decision and policy-making for

catchment management.