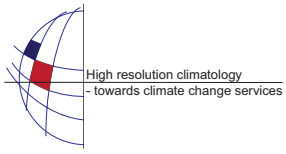
EMS Annual Meeting Abstracts
Vol. 7, EMS2010-258, 2010
10th EMS / 8th ECAC



Reducing uncertainty and optimizing flood forecasts in the Swiss Alps: Impact of improved mapping of meteorlogical fields

C. Tobin (1), L. Nicotina (1), A. Rinaldo (2), M.B. Parlange (3), and A. Berne (1)

(1) Laboratory of Ecohydrology ECHO/IEE/ENAC, EPFL, Lausanne, Switzerland, (2) Environmental Fluid Mechanics Laboratory EFLUM/IEE/ENAC, EPFL, Lausanne, Switzerland, (3) Environmental Remote Sensing Laboratory LTE/IEE/ENAC, EPFL, Lausanne, Switzerland

Within complex topography, the characteristic spatial scales of hydrologic forcings are poorly captured by sparse gauge measurements. Inadequate interpolation of meteorological fields has major impacts on the accuracy of hydrologic predictions, particularly during flood events. Three flood events in the Swiss Alps are analyzed to determine the geostatistical methods which best capture the distribution of intense, orographically-induced precipitation. The interpolation techniques comparatively examined include: Inverse Distance Weighting (IDW), Ordinary Kriging (OK), and Kriging with External Drift (KED). Two study catchments in the Valais region of Switzerland are used to test the results through the application of the GSM-SOCONT hydrological model, a semi-distributed model, operationally applied in the Swiss Alps. The GLUE methodology is used to study the sensitivity of the model and provide parameter calibration and sensitivity analysis by mean of extensive Monte-Carlo simulations. Results indicate that IDW underestimates rainfall volumes whereas OK and KED methods capture more precisely spatial patterns and rainfall volumes induced by storm advection because they include anisotropy. Also, the use of elevation as auxiliary information in KED of temperatures demonstrates minimal errors and provides instantaneous lapse rates which better capture snow/rainfall partitioning. Most significantly, according to the different performance criteria analyzed, the new input fields improve hydrologic performances in terms of capturing flood volumes and peaks and reduce calibration uncertainty.