Geophysical Research Abstracts
Vol. 13, EGU2011-10012, 2011
EGU General Assembly 2011

Spatially smooth regional estimation of flow-duration curves using a 3D Canonical Kriging

Attilio Castellarin
University of Bologna, DICAM, Bologna, Italy (attilio.castellarin@unibo.it, +39 051 2093365)

The relationship between the magnitude and the frequency of daily streamflows over a number of years for a particular river basin is often termed long-term Flow-Duration Curve (FDC). FDCs have been advocated for use in a number of hydrologic studies such as: hydropower generation; water supply; irrigation planning; wasteload allocation; sedimentation studies; habitat suitability; etc. The scarcity of observed streamflow data is a diffuse problem in real world applications, and FDCs frequently need to be constructed for ungauged basins. The problem is addressed in this study by means of physiographical space-based interpolation (PSBI). The study refers to a group of catchments located in a broad geographical region of central Italy, for which several geomorphological and climatic descriptors are available. The analysis applies a 3D geostatistical technique (i.e. Canonical Kriging) for interpolating long-term dimensionless FDCs in the physiographical space. The x and y coordinates of the 3D space are the first and second canonical variables of the set of available catchment descriptors, respectively. The z coordinate is the duration expressed in terms of normal reduced variate. The geostatistical interpolation technique is applied to the empirical dimensionless streamflows (i.e. observed daily streamflows divided by the mean annual flow) associated with several preset durations. A jack-knife cross-validation procedure is used in order to quantify the accuracy of the proposed technique in ungauged basins, and to compare it to the accuracy of a regional model of FDCs proposed in the literature for the same study region. The results of the study point out that 3D Canonical Kriging is a viable approach for performing a smooth regional estimation of FDC in ungauged basins.