Geophysical Research Abstracts
Vol. 14, EGU2012-10883, 2012
EGU General Assembly 2012

Performance of topological and canonical kriging to traditional methods for design-flood prediction in ungauged basins in the southeast United States

S.A. Archfield (1), A. Pugliese (2), A. Castellarin (2), J.E. Kiang (3), and J.O. Skoien (4)

(1) U.S. Geological Survey, Massachusetts-Rhode Island Water Science Center, Northborough, United States (sarch@usgs.gov, +1.508.490.5068), (2) Department DICAM, School of Civil Engineering, University of Bologna, Bologna, Italy, (3) U.S. Geological Survey, Office of Surface Water, Reston, VA, United States, (4) Institute for Environment and Sustainability, Joint Research Centre, European Commission, Italy

In the United States, flood prediction has been largely based on regional regression techniques that relate measurable catchment characteristics to flood quantiles. More recently, spatial interpolation techniques of point data have been shown to be effectively applicable for predicting streamflow statistics (i.e. flood flows and low-flow indices) in ungauged basins. Literature reports successful applications of two techniques, Canonical kriging (or physiographical-space based interpolation, PSBI) and Topological kriging (or Top-kriging). PSBI performs the spatial interpolation of the streamflow statistic of interest in the two-dimensional space of catchment descriptors. Top-kriging predicts the index along river networks taking both the catchment area and nested nature of catchments into account. Recent analysis has shown that both PSBI and Top-kriging show promise as methods to estimate flood quantiles in the southeast United States, with Top-kriging doing particularly well at smaller catchments. It of interest to understand how these spatial interpolation methods compare with generalized-least squares (GLS) regression, which is the most common approach to estimate flood quantiles at ungauged locations in the United States. This study compares – by means of a leave-one-out cross validation procedure – the performance of PSBI and Top-kriging to GLS regression equations already developed for the prediction of the 10-, 50-, 100- and 500-year floods for 61 streamgauges in the southeast United States.