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Regional predictions in ungauged basins through physiographical space-based interpolation

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The scientific literature recently proposed a physiographical space-based Kriging methodology for regional flood frequency estimation [Chokmani and Ouarda, WRR, 2004]. This methodology applies a well established geostatistical technique to interpolate flood quantiles on a continuous physiographical space, whose coordinates are a suitable set of geomorphological and climatic catchment descriptors. The original features of the proposed methodology are its suitability for ungaged sites and its capability to capture the spatial autocorrelation structure of the variables in the physiographical space.

The present analysis further investigates the applicability of spatial interpolation techniques for streamflow prediction in ungauged basins. In particular, the analysis focuses on the estimation of the probability weighted moments of annual maximum series of flood flows and applies several techniques that are either deterministic (e.g., inverse distance, Voronoy diagrams or Thiessen polygons, etc.) or geostatistical (e.g., Kriging). The study area consists of 58 unregulated catchments located in northern-central Italy, for which several geomorphological and climatic descriptors are available. The reliability of each technique is first assessed through a comprehensive cross-validation procedure that focuses on the estimation of the 10-, 50- and 100-year flood quantile, and secondly compared with the reliability of a regionalisation procedure based upon multiple regression.