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Estimation of streamflow by slope regional dependency function

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Abstract. Kriging is one of the most developed methodologies in the regional variable modeling. However, one of its drawbacks is that the influence radius can not be determined by this method. In which distance and in what ratio that pivot station is influenced from adjacent sites is rather often encountered problem in practical applications. Regional weighting functions obtained from available data consist of several broken lines. Each line has different slopes which represent the similarity and the contribution of adjacent stations as a weighting coefficient. The approach in this study is called as Slope Regional Dependency Function (SRDF). The main idea of this approach is to express the variability in value differences γ and distances together. Originally proposed SRDF and Trigonometric Point Cumulative Semi-Variogram (TPCSV) methods are used to predict streamflow. TPCSV and Point Cumulative Semi-Variogram (PCSV) approaches are also compared with each other. Prediction performance of all the three methods revealed a relative error less than 10% which is acceptable for most engineering applications. It is shown that SRDF outperforms PCSV and TPCSV with very high differences. It can be used for missing data completion, determination of measurement sites location, calculation of influence radius, and determination of regional variable potential. The proposed method is applied for the 38 stream flow measurement sites located in the Mississippi River basin.

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