



Time-Referenced data Kriging (TREK): mapping hydrological statistics given their time of reference

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A major issue in water sciences is to predict runoff parameters at ungauged sites. Estimates can be obtained by various methods. Among them, geostatistical approaches provide interpolation methods that consequently use explicit assumptions on the variable of interest. Geostatistical techniques have been applied to precipitation and temperature fields and later extended to estimate runoff features considered as basin-support variates along the river network (e.g. Gottschalk, 1993; Sauquet et al., 2000; Skoien et al., 2006; Gottschalk et al., 2011).

To obtain robust estimations, the first step is to collect a relevant dataset. Sauquet et al. (2000) and Sauquet (2006) suggest including a large number of catchments with long and common observation periods to ensure both reliability and temporal consistency in runoff estimates. However most observation networks evolve with time. Several choices are thus possible to define an optimal reference period maximizing either spatial or temporal overlap. However, the constraints usually lead to discard a significant number of stations.

Time-Referenced data Kriging method (TREK) has been developed to overcome this issue. Here is proposed a method of geostatistical estimation considering the temporal support over which a hydrological statistic has been estimated. This allows attenuating the loss of data previously caused by the application of a strict reference period. The time reference remains for the targeted map itself. The weights depend on the observation period of the data included in the dataset and how near this is to the target period. In this presentation, the concepts of TREK will be introduced and thereafter illustrated to map mean annual runoff in France.

References

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