

## Spatially smooth regional estimation of design floods in northern Italy

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The estimation of flood quantiles in ungauged basins can be performed by means of regional flood frequency analysis methods. These methods can transfer hydrologic information detected at gauged river sections to ungauged ones. The lack of information in the latter ones is therefore compensated by using data from geographically different sites. The Spatially Smooth Regional Estimation (SSEM) method proposed by Laio et al., 2011 is here applied over the extended area of the Po River basin.

This regionalization procedure is based on the definition of a set of three generalized-least-squares regression models that are suitable for the estimation of the following quantities: the index-flood ( $Q_{ind}$ ) and two descriptors of the dimensionless growth curve, the L-coefficients of variation and skewness, LCV and LCA. The strength of this method lies in its ability to estimate L-moments without resorting to the definition of homogeneous regions and in the possibility to explicitly estimate model uncertainty. Moreover, the SSEM method allows, when flood discharge time series are available for the basin of interest, to obtain more robust estimates as the method automatically selects the sample L-moments or the regional L-moments, whichever has a lower estimation variance. Here, we used the historical flood discharge time series from 191 basins extracted from the publication *Catalogo delle Piene dei Corsi d'Acqua Italiani* (Claps et al, 2020), combined with a large dataset of geomorphoclimatic descriptors, to provide several models for estimating flood quantiles over the entire investigated area (about 70,000 km<sup>2</sup>).

### References

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