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Toward non-stationary flood frequency analysis: case study in the Po river basin

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Abstract

Regional analyses are methods for runoff predictions in ungauged basins [1]. Traditional regionalization methods allow to estimate hydrological variables in stationary conditions: in a context of climate change it is fundamental to develop new techniques which take into account the non-stationarity of climate variables [2]. As part of a project in collaboration between universities and the Po basin authority, different approaches including regionalization procedures are used to characterize the hydrological extremes in the Po river basin. In particular, we use the Spatially Smooth Regional Estimation method, which is based on multiregressive estimation of L-moments without requiring the definition of homogeneous regions [3]. The regression models are based on morpho-climatic descriptors including climate variables such as the mean annual precipitation, and the coefficients of the IDF curves. The regression equations assume these variables to be stationary and the values used for each basin are averaged in time. By analyzing the multi-year variability of the climatic variables in each basin we aim at: (i) comparing the trends of the climatic variables and the trend of the different design discharges, (ii) analyzing the sensitivity of the regression equations to changes in time of these variables. The first results of these analyses, which are designed to obtain regression equations more suitable to describe design discharge in ungauged basins in a non-stationary setting, will be presented at the conference.

References

[1] Blöschl, G., Sivapalan, M., Wagener, T., Viglione, A., & Savenije, H. (Eds.) (2013) *Runoff Prediction in Ungauged Basins: Synthesis across Processes, Places and Scales*. Cambridge: Cambridge University Press. doi:10.1017/CBO9781139235761

[2] Yang, X., Magnusson, J., and Xu, C. (2019) Transferability of regionalization methods under changing climate. *Journal of Hydrology*, 568, 67-81, doi:10.1016/j.jhydrol.2018.10.030

[3] Laio, F., D. Ganora, P. Claps, and G. Galeati (2011) Spatially smooth regional estimation of the flood frequency curve (with uncertainty), *Journal of Hydrology*, 408, 67-77. doi:10.1016/j.jhydrol.2011.07.022