

Joint precipitation and river discharge extreme value and trend analysis using high-resolution models.

The study focuses on two of the hydrological cycle's primary components connected with flooding. The area of interest includes the Southern New England states of Connecticut, Massachusetts, and Rhode Island, as well as New York and New Jersey, where the flood events' magnitude and frequency of occurrence have been growing due to climate change (Collins, 2019; Huang et al., 2017). The intended goal of this study is to leverage the principles of extremes in hydrology (Katz et al., 2002) and perform an extreme value and trend analysis for river discharge and precipitation, both separately and jointly. The evaluation of the hypotheses will be addressed by processing the output of two long-term, high-resolution models (Beck et al., 2019; Harrigan et al., 2020). The two datasets were selected primarily based on their homogeneity, as they both have the same spatial and temporal resolution, as well as the same number of available years of data. Examples of the model outputs are shown in Figures 1 and 2. Processing of the data will be performed in Python using the non-parametric Mann Kendall family of trend tests (Hussain & Mahmud, 2019) and the [pyextremes](#) library. The expected results of this study include the estimation of the univariate and multivariate return values in different return periods, the investigation, detection and mapping the spatial variability of trends and their statistical significance. The datasets have been preprocessed in single-file, GRIB and NetCDF formats and they will be publicly available along with the reproducible python scripts used for the analysis through github.

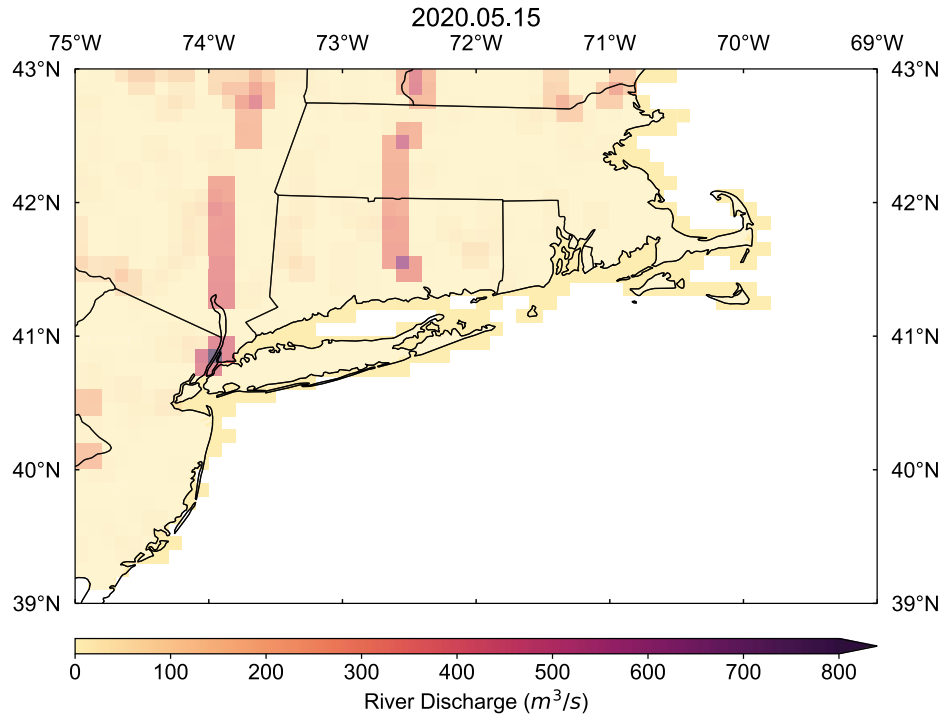


Figure 1. Output of the GloFAS daily mean river discharge dataset for May 15, 2020

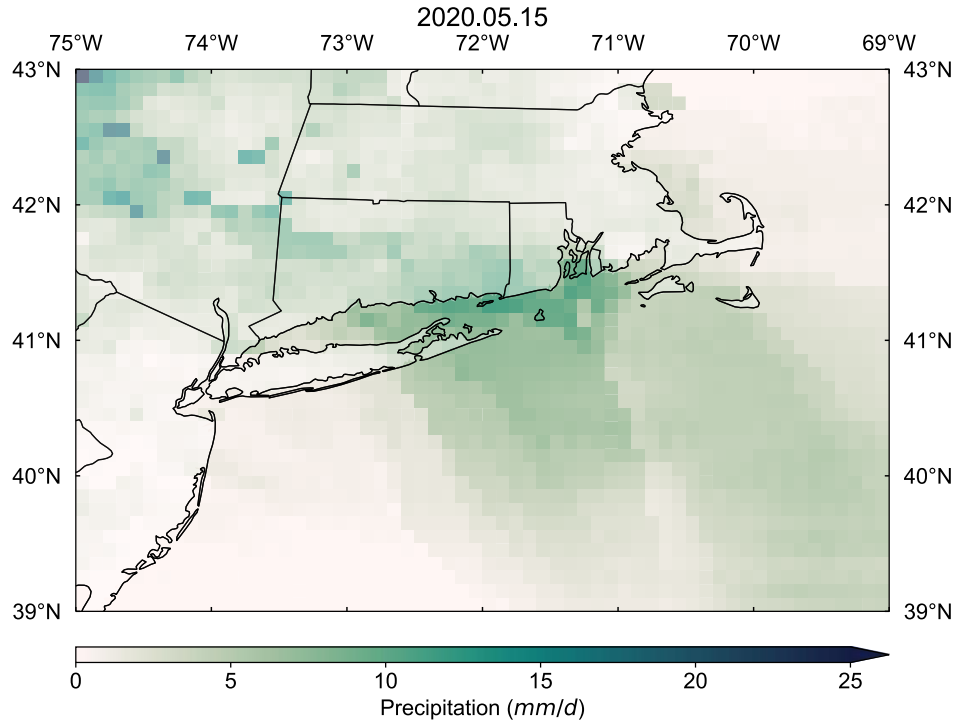


Figure 2. Output of the MSWEP daily precipitation dataset for May 15, 2020.

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