

H16b - Floods: Processes, Forecasts, Probabilities, Impact Assessments and Management

Abstract: IUGG19-4656

Prediction of extreme flood events in Brazil: accounting for uncertainty and (non)stationarity

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Recent climate change and the development of non-stationary models for flood frequency analysis has prompted several discussions on under what circumstances those models should be applied when a trend is detected. Our objective was to compare the use of Akaike and Bayesian information criteria (AIC e BIC) to a Bayesian framework that accounts for uncertainty in parameter inference when selecting stationary or non-stationary models. We analyzed annual floods from 275 catchments across Brazil with a complete 40-year record (1976 – 2015). While Brazil has one of the greatest flood loss potential among the emergent countries, flood studies in the country are still scarce. We used the first 30 years of record to fit a GEV distribution and the subsequently 10 years for model testing. In the fitting period, we found that the non-stationary model would be preferred 142 (82 negative and 60 positive trends) when using AIC and 42 time with BIC (42 negative and 11 positive trends). In the validation period, 28 out of the 60 models selected by AIC would actually be non-stationary; and 10 out of the 11 models selected by BIC would be non-stationary. When using a Bayesian framework for the consideration of uncertainty in parameter inference, 146 models would be non-stationary with 47 of them with a positive trend. Out of this 47, 27 would support an updated stationary thesis and 20 a non-stationary. Overall, we found that floods are becoming more intense in wetter regions and less intense in drier ones.