Clustering time series of sea levels: an extreme value approach

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In this work, long (> 40 years) hourly tide gauge records from the North Atlantic are analyzed. A new time series clustering approach which combines Bayesian methodology, extreme value theory and classification techniques is adopted for the analysis of the regional variability of sea-level extremes. The tide gauge records are clustered on the basis of their corresponding predictive distributions for 25-, 50- and 100-years return values. The results of the cluster analysis show a clear distinction between the higher latitude stations for which the return values are largest and the remaining locations. This distinction reflects in the US east coast the transition between the Scottian shelf and Gulf of Maine area and the mid-Atlantic Bight area. For the stations at lower latitudes the results show a grouping based on return levels that is not a function of geographical proximity but reflects local effects in extreme sea-levels associated with the specific location of each tide gauge.