



## **Spatio-temporal variations in storm surges along the North Atlantic coasts**

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Extreme sea levels along the coasts of the North Atlantic Ocean and the Gulf of Mexico have been investigated using hourly tide gauge records compiled in the recently released GESLA-2 data set ([www.gesla.org](http://www.gesla.org)). These regions are among the most densely monitored coasts worldwide, with more than 300 high frequency quality-controlled tide gauge time series available. Here we estimate the storm surge component of extreme sea levels using both tidal residuals and skew surges, for which we explore the spatial and temporal coherency of their intensities, duration and frequency. We quantify the relationship of extremes with dominant large scale climate patterns and discuss the impact of mean sea level changes. Finally, we test the assumption of stationarity of the probability of extreme occurrence and to which extent it holds when mean sea level changes are considered in combination with storm surges.