

Including historical data on the Regional Analysis of extreme storm surges

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The occurrence of rare (up to 10^{-4} annual probability of occurrence) and extreme oceano-meteorological conditions is required to design effective coastal protections and to protect coastal areas from flooding. Statistical methods based on the extreme value theory are widely used for the characterisation of such events. Unfortunately, this was often performed from very short observations series (usually 30 years to 50 years long) and the uncertainties associated to the extrapolation are too wide to be used in a design approach. Nowadays, larger dataset are available, in particular when looking at the regional scale. Moreover, in several disciplines the historical evidence of extreme events observed before the systematic observation periods, has been provided by specific studies. In the framework, the combination between these two sources of information is shown to dramatically increase the reliability of the statistical extrapolation. Merge the two approaches is however challenging because of the need to define homogenous regions and to consider the fact that historical data are not continuous and exhaustive. Here, an overall methodology is presented which allows a robust estimation, including a selection an optimal sampling threshold and a definition a “regional credible duration”, which describe the amount of information available, taking into account the unknown period of observation associated with historical events. The Regional Historical Analysis is applied on a database of extreme skew storm surges and on a several extreme historical storm surges collected from different sources.