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On the effect of the sampling frequency of sea level measurements on return levels

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Studies on extreme sea levels are important for, primarily, two reasons. First, in the form of return periods they provide useful parameters for the design of coastal planning. Second, changes in the extreme distributions can be used as indicators of changes in the forcing characteristics and particularly linked with changes in storminess at a location.
The usual sampling frequency for sea level measurements has been for many years 1hr. However during the last years port authorities have started collecting data at higher sampling rates. These provide us with the opportunity to compare return levels from higher sampling rates to those obtained with hourly values. We explore the statistical relationship between these distributions and compare with theoretical estimates.