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Abstract

Marine storms - analysis, statistics and changes

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Storms represent the major geo-risk in marine and coastal environments – almost everywhere. They may cause significant damage both by their own wind-force but also indirectly through storm surges and ocean waves. Thus, knowledge about the statistics of marine storms and their current and possible future changes are of utmost interest not only for coastal and marine stakeholders but also for the public at large.

We consider three types of marine storms, tropical storms, extra-tropical baroclinic storms and polar lows. Because of changing observational capabilities, the observational record of the frequency of intensity of such storms is methodologically difficult; sometimes, conclusions about changing storminess are based on inhomogeneous data, due to changing local conditions, observation practices and instrumentation.

Homogenous statistics of storminess for sufficiently long times can be derived by combining two sources of knowledge, namely the “reconstruction” with regional climate models for the last six decades (during which global re-analyses are available), and the assemblage of long series of suitable proxy data. The availability of suitable regional climate models allows also the construction of consistent scenarios of possible future storm statistics.

Results for extra-tropical storms in Europe are given in some detail; first results for tropical storms in East Asia and North Atlantic polar lows are given as well.