Multidecadal climatological investigations of storms in the Northeast North Atlantic and in the North Sea

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At the Institute for Coastal Research (IfK) of the GKSS Research Centre numerical long-term reconstructions of atmospheric conditions have become an important tool to investigate long-term changes and variability of atmospheric and related marine conditions. Compared to other data sets such reconstructions are characterized by improved homogeneity making them suitable for these purposes. For an investigation of the storm climate in the Northeast Atlantic and the North Sea data gained from regional models driven by the National Center for Environmental Prediction's (NCEP's) weather re-analysis as well as satellite derived data and observations were used. The latter function as indicators of the models' capability to reproduce the state of the atmosphere in a proper way and evidence that simulated data are capable to derive good long term statistics on atmospheric parameters. Recent results using these models for analyses of the general storm pattern and forthcoming activities focusing mesoscale extreme weather are presented. Results for the general pattern include impact related storm indices such as the number of severe and moderate storms per year or the total number of storms and upper intra-annual percentiles of near-surface wind speed. Year-to-year variability of the frequency and changes in the average intensity of storm events are described. Analysis of these indices reveals that the average number of storms per year has increased near the exit of the North Atlantic Storm track and over the Southern North Sea since the beginning of the simulation period (1958), but the increase has attenuated later over the North Sea and the average number of storms per year is decreasing over the Northeast North Atlantic since about 1990-1995. In addition it will be shown that the regional atmosphere model reconstruction is also capable to represent mesoscale extreme weather events such as polar lows. Initial results towards long-term statistics for these events will be presented.