Geophysical Research Abstracts
Vol. 19, EGU2017-1277-1, 2017
EGU General Assembly 2017

High-resolution reconstruction of extreme storm events over the North Sea during the Late Holocene: inferences from aeolian sand influx in coastal mires, Western Denmark.

Jerome Goslin and Lars B. Clemmensen
University of Copenhagen, IGN, Geology, København, Denmark (jego@ign.ku.dk)

Possessing long and accurate archives of storm events worldwide is the key for a better understanding of the atmospheric patterns driving these events and of the response of the coastal systems to storms. To be adequately addressed, the ongoing and potential future changes in wind regimes (including in particular the frequency and magnitude of storm events) have to be replaced in the context of long-time records of past storminess, i.e. longer than the century-scale records of instrumental weather data which do not allow the calculation of reliable return periods. During the last decade, several Holocene storminess chronologies have been based on storm-traces left by aeolian processes within coastal lakes, mires and peat bogs, (e.g. Björck and Clemmensen, 2004; De Jong et al., 2006; Clemmensen et al., 2009; Nielsen et al.; 2016; Orme et al., 2016). These data have shown to adequately complement the records which can be derived from the study of records related to wave-induced processes including e.g. washover deposits.

Previous works along the west coast of Jutland, Denmark have revealed four main periods of dune building during the last 4200 yrs (Clemmensen et al., 2001; 2009). These were shown to be in phase with periods of climate deterioration (cold periods) recognized elsewhere in Europe and the North Atlantic region and suggest periods of increased aeolian activity. Yet, doubts remain on whether these periods where characterized by several big short-lived storm events or rather by an overall increase in wind energy.

This study aims at constructing a high-resolution (centennial to multi-decadal) history of past storminess over the North Sea for the last millenaries. Plurimeter sequences of peat and gyttja have been retrieved from two coastal mires and were analyzed for their sand content. The quartz grains were systematically counted within centimetric slices (Aeolian Sand Influx method, Björck & Clemmensen, 2004), while the palaeo-environmental context and the source of the sand were evaluated by XRF measurements, microscopy observations and grain-size analyses.

Precise dating on the events will yield a high-resolution history of the aeolian activity for the region thus providing solid new data that will eventually allow to better understand (i) the links between past aeolian activity, wind climate and relative sea-level and (ii) the patterns of atmospheric circulation over the north-eastern Atlantic region during the Late Holocene.

keywords: storminess, aeolian, Holocene