



The relationship between the Meridional Overturning Circulation and winter storm activity over the North Atlantic on decadal time scales

K.M. Nissen (1), U. Ulbrich (1), and G.C. Leckebusch (2)

(1) Institute for Meteorology, Freie Universität Berlin, Germany (katrin.nissen@met.fu-berlin.de), (2) School of Geography, Earth and Environmental Sciences, University of Birmingham, UK

Previous model studies suggest that the Meridional Overturning Circulation (MOC) can influence the storm track (i.e. mean location of the region with the strongest baroclinic wave activity). In this study we focus on extremes and examine the relationship between the frequency of extreme wind storms affecting the North Atlantic/European sector in winter and variations in the MOC on the decadal time scale. The analysis is based on an ensemble of 3 240-year long simulations with the ECHAM5 MPIOM model. Investigated are signals with periods between 10-35 years.

On the decadal time scale the wind storm frequency over the North Atlantic/European sector in winter is statistically significantly enhanced during years, in which the speed of the MOC in the North Atlantic increases. A physical mechanism linking the MOC variations to wind storm activity is proposed and investigated: The MOC variations are associated with characteristic anomalies in the upper level ocean heat content of the North Atlantic. It is demonstrated that these anomalies are consistent with favourable conditions for cyclone intensification in the region, increasing the potential for the development of extreme wind storms.