Geophysical Research Abstracts
Vol. 21, EGU2019-16906, 2019
EGU General Assembly 2019

The role of upper vs. lower tropospheric baroclinicity for the development of severe storms over the North Atlantic in climate scenarios

Lisa Degenhardt (1), Thomas Moran (1), Jens Grieger (1), Haraldur Ólafsson (2,3), and Uwe Ulbrich (1)

(1) Institute of Meteorology, Freie Universität Berlin, Berlin, Germany, (2) The Reykjavik School of Meteorology, University of Iceland, Reykjavík, Iceland, (3) Icelandic Meteorological Office, Reykjavík, Iceland

The development of severe storms affecting Europe is dependent on various factors. Studies analyzed factors like Sea Surface Temperature gradient or the baroclinicity over the North Atlantic which could influence the strength of a cyclone and thus a resulting wind storm. This study is focusing on the baroclinicity using the Maximum Eady Growth Rate for its quantification.
Cyclones and winter wind storms are identified and tracked in simulations runs for present and potential future climate. The ERA interim reanalysis is used as reference and the MPI-LR model is analyzed for the historical and RCP 4.5 climate scenario experiments. Severe wind storms are matched with causative cyclones, so that all storm and cyclone parameters can be used for statistical analysis, e.g. Storm Severity Index for storms and minimum pressure for cyclones. Thus, the most influential parameters in the developing phase of the cyclone or storm can be identified, improving our knowledge of the development of destructive cyclones. Our research focuses on severe wind storms over Central Europe and Iceland.
Cyclones forming windstorms which cross over the Central European region are more likely to generate in the West of the North Atlantic (South of Newfoundland) or near the Mediterranean region. Calculations show an influence of the baroclinicity on the track of a severe storm. High lower tropospheric Eady Growth Rates are required over the British Isles and the Central European region produce a severe storm over the same region. This is clearly evident, both in the reanalysis and in both climate scenarios in the. High values of the growth rates in the upper troposphere are found in the northwest of the specific region.