EMS Annual Meeting Abstracts
Vol. 11, EMS2014-457, 2014
14th EMS / 10th ECAC

Importance of latent heat release for the transformation of cyclones to severe storms over the North Atlantic in dependence of spatial resolution

Simon Wild, Daniel J. Befort, and Gregor C. Leckebusch

University of Birmingham, School of Geography, Earth and Environmental Sciences, Birmingham, United Kingdom (sbw206@bham.ac.uk)

The development of European surface wind storms out of normal mid-latitude cyclones is substantially influenced by upstream tropospheric growth factors over the Northern Atlantic. The main factors include divergence and vorticity advection in the upper troposphere, latent heat release and the presence of instabilities of baroclinic waves of suitable wave lengths.
In this study we examine the latent heat release as an example of these growth factors and its importance for the transformation of extra-tropical cyclones into severe damage prone surface storm systems.

Previous studies have shown links between diabatic processes and surface wind storms related to extreme cyclones. In our study we investigate latent heat release, its temporal variability and its spatial coherence with other growth factors favouring the development of surface storms. We will discuss the effect of spatial resolution of different reanalysis data sets (e.g. ERA Interim, ERA40, NOAA 20CR etc.) on the magnitude of latent heat release and on the link between latent heat release in the troposphere and related surface storms.

Firstly we will examine the relation of the magnitude of an upstream growth factor anomaly to the strength of the storm system. Secondly we will analyse the influence and variability of the positions of these anomalies and their relation to the location of a surface storm event in dependence of the resolution of the investigated data set. We thus address the question whether the link between storm intensity and related growth factor anomalies taking into account their spatial variability can be quantified and whether a certain spatial resolution is needed to detect such a link.

Using ERA Interim Reanalysis from 1979-2013 for an extended winter season (October to March), first results show enhanced latent heat release over the mid North Atlantic previously to the occurrence of some wind storms while other events seem to develop mainly due to an increase of different factors such as baroclinicity. Thus a clear relation between the magnitude of latent heat release and the resulting cyclone intensity has yet to be established. Large scale factors steering these anomalies will also be investigated including the link to hemispheric anomaly patterns such as the North Atlantic Oscillation.