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# Upper tropospheric divergence and its impact on pathways of severe extra-tropical storms under anthropogenic climate change conditions

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Extra tropical cyclones belong to the most important weather occurrences in the mid-latitudes implicating stormy winds, precipitation and temperature changes as they may leave irretrievable private and economical losses.
Studies based on observations and re-analysis data found an increasing number of severe cyclones in the second half of the past century (1960-1990) over the Northeast Atlantic and the adjacent European continent.
Under changed climate conditions (IPCC SRESA2, A1B) particularly over the British Isles studies revealed an increase in cyclone track density and intensity as well as the values of the jet stream in 250 hPa. From a dynamical perspective the vertical integrated upper troposheric divergence is related to the track of the cyclone.
Focusing on the severe cyclones and storms this study restrict itself to the winter months from October till March and makes use of 6h data at a extended time period of 40 years (1961 – 2000). ERA40 – Reanalysis Data are used for observational research and compared with the model data of ECHAM5-OM1. The prospective changes for the last decades of this century under anthropogenic climate impacts are analysed either.
By inspecting all individual track points it shows that during the lifetime of a cyclone its deep pressure consequently follows a domain of higher values of horizontal divergence. Especially during the highest deepening of the core pressure the influence is noticeable. Therefore for individual cyclones this moment is chosen and analysed separately creating a composit: The movement of the cyclone systems is influenced by the highest divergence values both in model and observational research. The actual maximum of the divergence field is about 500 km north and north east of the cyclone core. Severe cyclones pass through it within several hours. Lows with a higher core pressure reduce the extent of displacement and reach the actual minimum divergence place with their next track point 6 hours later.
In an anthropogenic future climate (IPCC SRES A2) the maximum of the divergence indicates a relative position more southerly than under actual climate conditions. Thus, the region of high upper tropospheric divergence is more to the east of the cyclone centre and its transition follows consequently the maximum of the divergence values comparable to recent times. A more zonally pathway of traks seems possible under anthropogenic climate conditions, affecting mostly western Central Europe.