A Study of Quasi-millennial Extratropical Cyclone Activity Using Tracking and Clustering Methods

L. Xia (1), F. Feser (1), M. Zahn (2), and H. von Storch (1)

(1) Centre for Coastal Research, Helmholtz-Zentrum Geesthacht, Geesthacht, Germany, (2) NCEO (NERC Centre for Earth Observation) ,University of Reading, Reading, United Kingdom

There is growing interest in knowing the impact of climate change on extratropical northern hemisphere cyclone activity. In a warming global climate, properties of extratropical storms such as intensity, frequency, and distribution of genesis regions are expected to differ from nowadays climate.

To analyze long-term change of these properties, mean sea level pressure fields (MSLP) of a quasi-millennial (1000-1990) global climate simulation by ECHO-G are applied to track storm events using a previously developed tracking algorithm (Hodges 1996). For validation reasons tracks gained from ECHO-G simulations are compared to those from NCEP/NCAR reanalysis data. The numbers of tracks from the ECHO-G simulation data are on a similar level as those derived from the NCEP/NCAR reanalysis data. Densities for genesis regions representing the origins of storm tracks are also compared.

Storm tracks are clustered as several groups using the K_mean clustering method. Climatological changes of extratropical cyclones including frequency, density and lifespan are analyzed for each group. And storm track activity of different clusters is studied with the dominant patterns of atmospheric variability by canonical correlation analysis (CCA).