Geophysical Research Abstracts
Vol. 14, EGU2012-3027, 2012
EGU General Assembly 2012

Long-lived Rossby wave trains as precursors to strong surface cyclones over Central Europe

V. Wirth and J. Eichhorn

Universität Mainz, Institut für Physik der Atmosphäre, Mainz, Germany (vwirth@uni-mainz.de, +49 (0)6131 392-3532)

It is well known that strong surface cyclones over Central Europe can, in specific cases, be preceded by long-lived upper tropospheric Rossby wave trains. This study investigates to what extent this is true in a climatological sense. The analysis is based on 40 years of 12-hourly reanalysis (ERA-40) data. Composites are computed by selecting the dates with the lowest 5% of surface pressure at a specific point in central Europe.

The composite meridional wind at 300 hPa shows a pronounced wave train. It originates over the Pacific ocean and travels eastward; after crossing Europe it splits following two distinct tracks over the Asian continent. The wave train is statistically significant as early as 10 days prior to the strong surface cyclone, although it has a small amplitude at that time. The composite wave train generally has a westward tilt with height. An index is constructed that projects any given map of the 300 hPa meridional wind onto a target pattern corresponding to the composite wave train. The index is used to quantify the amount of variability which is hidden in the composite picture. A high index value on a given day increases the likelihood of a strong surface cyclone a few days later.