Geophysical Research Abstracts
Vol. 20, EGU2018-6729-2, 2018
EGU General Assembly 2018

Dynamics of Rossby Wave Initiation Events in a quantitative PV framework

Franziska Teubler (1), Matthias Röthlisberger (2,3), Michael Riemer (1), Olivia Martius (2,3,4)

(1) Institute for Atmospheric Physics, Johannes Gutenberg-University, Mainz, Germany (f.teubler@uni-mainz.de), (2) Institute of Geography, University of Bern, Bern, Switzerland, (3) Oeschger Centre for Climate Change Research, University of Bern, Bern, Switzerland, (4) Mobiliar Lab for Natural Risks, University of Bern, Bern, Switzerland

Rossby wave packets (RWPs) are a fundamental ingredient of midlatitude dynamics and constrain the evolution of surface weather on various scales. The initiation and growing phase of RWPs is of special relevance for weather forecasting, as a poorly forecasted RWP initiation can be expected to strongly deteriorate the final forecast quality.

In an attempt to further our understanding of RWP initiation, Röthlisberger et al. 2018 recently compiled a climatology of Rossby wave initiation (RWI) events and described key ingredients of the composite RWI: upper-level potential vorticity (PV) features (and their relative position), latent heating and baroclinic growth.

Here we go beyond a synoptic and climatological description of RWI events and aim at quantifying the relative importance of the relevant processes for two selected RWI events, each following a distinct synoptic storyline. The first case involves a tropopause polar vortex (TPV) interacting with a baroclinic zone and the second case low-level moisture and ridge building to the north and downstream of a large convective system. Using the quantitative PV - potential temperature framework of Teubler and Riemer we quantitatively assess the relative contributions of near-tropopause dynamics, baroclinic growth, and the impact of upper-tropospheric divergent outflow to the considered RWI events. Here, divergent outflow is interpreted as an indirect diabatic process associated with latent heat release below.

The analysis reveals that for each of the considered RWI events the co-occurence of at least two processes is important for the first initiation, epecially over the first 6 to 12 hours.