EGU2020-5411
https://doi.org/10.5194/egusphere-egu2020-5411
EGU General Assembly 2020

Local diagnostics of Rossby wave packet properties – Seasonal variability and their role in temperature extremes

Georgios Fragkoulidis and Volkmar Wirth
Johannes Gutenberg University, Mainz, Institute for Atmospheric Physics, Physics, Mainz, Germany (gfragkou@uni-mainz.de)

Transient Rossby wave packets (RWPs) are a prominent feature of the synoptic to planetary upper-tropospheric flow at the mid-latitudes. This prompts the development of diagnostic methods to identify and investigate the spatiotemporal evolution of key RWP properties. Such properties include the RWP phase speed and group velocity, the diagnosis of which has so far remained non-local in space and/or time. To this end, a novel diagnostic approach is presented here, which is based on the analytic signal of upper-tropospheric meridional wind velocity and thus allows the evaluation of RWP properties locally in space and time. The detailed insight into these properties can be utilized toward a better understanding of the upper-tropospheric circulation, its interplay with local weather features, and its model representation. In particular, climatologies of RWP amplitude, wavenumber, phase speed, and group velocity are investigated using reanalysis data for the time period 1979 – 2018. Pronounced features of seasonal and interregional variability are highlighted. Moreover, the role of RWP amplitude and phase speed in the occurrence and duration of temperature extremes in Europe is explored. Finally, indications of systematic biases in medium-range forecasts of these fields suggest that a correct representation of the RWP evolution is crucial for the predictability of temperature extreme events.