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UK heavy precipitation events linked to upper-level features

A. Twitchett, C. Schwierz
University of Leeds, Institute of Atmospheric Science, UK

Rossby waves are large-scale waves in the atmosphere observed as meanders of the mid-latitude jet stream which contribute to seasonal and day-to-day weather patterns. Wave breaking can produce stratospheric air extending into the troposphere (and vice versa) resulting in potential vorticity (PV) streamer formation and high-impact weather such as heavy precipitation.

A strong link has previously been shown between stratospheric intrusions and Alpine heavy precipitation events. This study analyses the role of upper-level features in UK heavy precipitation events. A climatology of heavy and extreme precipitation days are drawn from the Met Office Hadley Centre HadUKP observational dataset of daily precipitation measurements. For these days, the ECMWF ERA-40 dataset is used to determine the presence and location of stratospheric and tropospheric streamers, as well as surface-level cyclones and anticyclones. The seasonal variability, location, distribution and statistical significance of the parameters are analysed and discussed, and a process-based interpretation of the results employs additional parameters such as humidity and stability.

Understanding links between dynamical precursor features and heavy precipitation events is important for future prediction of high-impact weather over the UK.