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Predictability of Rossby wave packets in the midlatitudes

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Rossby Wave Packets (RWPs) are linked to extreme weather events and exert a strong influence on the predictability of weather systems in the midlatitudes. Considering the whole wave packet, in the sense of the packet envelope, RWPs can be viewed as entities that describe variability of the atmosphere beyond the synoptic scale.

We here examine the predictability of RWPs as such entities. As a skill metric we used the so-called Displacement and Amplitude Score (DAS) applied to the envelope field of the midlatitude flow. The DAS is based on a field deforming method and, as one of its major advantages, avoids the “double-penalty” verification problem without the need to identify single RWP-objects. Object-based methods tend to be highly sensitive to the choice of thresholds used to identify the objects and conceptual issues arise when assigning forecast to analysis objects. We assess RWP predictability using NOAA GEF5V12 ensemble reforecasts for RWPs that have been previously tracked in ERA5 data, due to the higher available temporal resolution.

A prominent result is that RWP predictability depends on the stage of the RWP lifecycle: The propagation stage exhibits higher predictability than the decay or genesis stage. A small seasonal dependence is found, with summer being the least predictable season. No significant dependence is found on size and amplitude of RWPs or their geographical location. The presentation will further discuss the link of RWP predictability to different MJO-Phases as one means to better understand the role of the MJO in midlatitude predictability.