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Employing ensemble sensitivity studies to investigate the energy dispersion from a transitioning tropical cyclone into the extratropical flow

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The extratropical transition (ET) of a tropical cyclone may strongly influence the mid-latitude wave pattern by amplifying or triggering a Rossby wave train and thus may even facilitate high impact weather events in regions lying far downstream of the transitioning TC. The processes involved during the transitioning and interaction process are often not well represented in numerical weather prediction (NWP) systems. As a result, predictability for downstream regions is typically reduced during ET. A better understanding of the processes involved and their representation in NWP systems may help to overcome those predictability issues.
A suitable way to examine the impact of a transitioning TC on the amplification of the extratropical wave pattern is provided by investigating an eddy kinetic energy budget. In this framework, the wave trains and the transitioning TC emerge as maxima of kinetic energy. Interactions between the energy maxima take place in terms of eddy kinetic energy source and flux terms, which allow conclusions to be drawn about the underlying processes. In the present study we apply an ensemble sensitivity analysis to the eddy kinetic energy budget, calculated for ensemble forecasts of the European Centre for Medium-Range Weather Forecasts (ECMWF), to identify connections between the several budget terms and the amplification of the subsequent wave pattern. By determining the sensitivities to the energy fluxes, which emanate from the storm or the upstream midlatitude flow, we are able to identify the contribution of these respective features to the amplification of the downstream wave pattern. Furthermore, we investigate the impact of the energy fluxes on the reduction of predictability in downstream regions. We will present results highlighting the impact of different TCs on the observed downstream development and draw first links to predictability aspects.