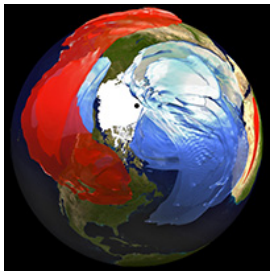

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Coupling convective sources to a transient gravity-wave parametrization in ICON

Convective sources are coupled to the Multi-Scale Gravity Wave Model (MS-GWaM) implemented in the upper atmosphere version of ICON to represent spatio-temporal variability and intermittency in parameterized gravity waves (GWs) in the model. The convective sources considered here have horizontal scales of a few kilometers, and GWs forced by these have horizontal wavelengths of 10–500 km. MS-GWaM describes the transient evolution of input GWs, which allows for the representation of the intermittency of GWs, particularly but not exclusively, when the wave sources are time-varying. It also parameterizes the direct interaction between the evolving GWs and the mean flow beyond the steady-state assumption which has been used in traditional GW parametrizations. Therefore, our objective is to quantify the intermittency of the parameterized GWs in connection with time variations in the convective activity and mean flow. The parameterized GW intermittency will be compared to that obtained from a steady-state GW parametrization coupled to the convective sources in ICON and, where available, to that from observations. We also present the modelled mean circulation of the middle atmosphere, forced by the GW momentum deposition via the direct GW-mean-flow interaction and wave dissipation, in comparison with that from the steady-state parametrization with the wave dissipation mechanism only.

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