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Initial results for a new energy-based parameterization of non-orographic inertia-gravity waves

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Inertia-gravity waves have a strong influence on large-scale atmospheric dynamics (especially in the middle atmosphere due to wave breaking and drag), but General Circulation Models (GCMs) cannot resolve them because of their sub-grid scale. Consequently, these waves must be parameterized in GCMs. In this study, we use the approach of energy generated in non-orographic inertia-gravity wave (hereafter IGW) sources to parameterize them.
The relations we use for parameterization utilize the concept of imbalance flow in the vicinity of the IGW sources and also are based on the intrinsic nature of IGW sources (e.g. the lagrangian wind speed deceleration in the exit region of the jet stream, the concept of horizontal temperature gradients during the frontogenesis and the latent heat released during condensation in convective regions).
In order to achieve this aim, we utilize the ECMWF daily data (ERA5) in an offline test. Smoothing of primary meteorological fields (such as wind and temperature) is performed in order to diagnose imbalances in synoptic scales and remove signature of IGWs. For this purpose, a Cressman Filter is applied with a horizontal cutoff of 720 km and parametrized IGWs energy is estimated using these processed data. To test and verify the results and set the free parameters, we exploit the higher resolution raw data from the same dataset to determine the real IGWs characteristics.
Initial results show that the parametrized IGW energy in the troposphere approaches the real IGW energy with a dimensionless factor of C_gen=0.7.