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Statistical properties of inertia-gravity waves associated with poleward breaking Rossby waves

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Poleward breaking Rossby waves are frequently observed over Northern Europe in Winter. They form the background for the evolution of jet streaks, which may generate inertia-gravity waves in their exit region. The description of the related processes of spontaneous radiation (a generalisation of geostrophic adjustment), their parameterisation and statistics is necessary to understand the appearance of middle atmosphere inertia-gravity waves in the mid-latitudes. Reanalysis ERA40 data from ECMWF have been used to study the mean winter (DJF) circulation. A strong variability of the tropospheric jet is found which is a possible source for inertia-gravity waves. The mean zonal wind over Northern Germany increased from 15 m/s in the tropopause region to 70 m/s with height. This forms good conditions for upward propagation. Rossby wave breaking events were counted for the winters 1999 - 2003. More then 40% of winter days Northern Germany were under the influence of Rossby wave breaking events. In order to study the generation and propagation of inertia-gravity waves in such situations, simulations were done with the non-hydrostatic MM5 model. Ten field campaigns were conducted in Kuehlungsborn during the winters 1999 - 2002 and modelled accordingly. The modelled data have been used to test several parameterisations of the inertia-gravity wave energy in terms of the background flow. The latter has been obtained from smoothing the fields over 720 km horizontally and 10 km vertically. The exit region of the tropospheric jet streak could be diagnosed with the wind speed tendency of the background flow, which is corrsponding to the cross-jet ageostrophic flow. A parameterisation with this parameter showed good correlation to the variance in inertia-gravity wave energy.