



Identification and separation of the sources of inertia-gravity waves in the Andes Cordilera region

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By combining the ECMWF and NCEP-NCAR reanalyses, the satellite data, the radiosoundings data and the meso-scale WRF simulations in the Andes Cordillera region we identify the cases where only one of the three major sources of inertia-gravity waves, i.e. upper tropospheric jet-stream, convection, or topography is in action, although all of them are potentially present in this particular zone.

The comparison of the IGW characteristics for each source shows that the frequencies and the vertical wavelengths of the waves are close, but the horizontal wavelengths are quite different. A distinctive feature of the IGW emission by the jet-stream is a clear presence of both upward and downward propagating waves, which is not the case of the topographic source. The convective cell seems to be the only source that generates two distinctly different IGW events.

The IGW emission by the jet is associated with the geostrophic adjustment happening in the regions of the jet with large Lagrangian Rossby numbers. The IGW emission by the convective source is consistent with the "obstacle" mechanism, as it was accompanied by a strong shear at higher altitudes (other convective mechanisms are nevertheless not excluded). The IGW emission due to topography is triggered by the mountain wave activity (close to breaking), and is linked to the relaxation of this perturbed state towards the thermal wind balance.

The WRF simulations captured systematically the IGW, though quantitative agreement, especially on the amplitude of the emitted waves, was lacking.