



Mountain waves and inertia-gravity waves during T-Rex experiment

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T-Rex observation campaign took place in Owens Valley during March and April 2006. Among other measurements, we are interested in radio soundings that took place on 25 March at 08 UTC (R1) and 01 April at 7.50 UTC (R2) both at 36.48 S, 118.44 W. These radio soundings include profiles of the horizontal wind components and temperature. They are supplemented by ECMWF analysis, and simulations using the WRF model. Above 16 km altitude, a wavelet analysis applied to the observed profiles shows a wave with a vertical wavelength around 3 km.

On the basis of this analysis, the profiles are filtered around the observed wavelength. The results show a wave with a long wavelength in the troposphere and a short one in the stratosphere, above a transition region. Using the ECMWF analysis, we found that the jet has a V-shaped pattern at 13 km altitude, above and close to the radio sounding launching site. The cross-stream Lagrangian Rossby number also shows values higher than 0.35. Other indications suggesting the presence of ageostrophic flow are found at higher altitudes where the wave amplitude reaches larger values.

The horizontal wind at 2-3 km altitude obtained using the mesoscale WRF model shows that on 25 March, the relationship of the wave with respect to the orography is more regular compared to the 1 April case. As a consequence, the altitude-latitude cross-section of the vertical velocity is more localized on 25 March. Furthermore, the vertical wavelength is clearly identified in the vertical velocity for both cases. In contrast to the vertical wind, cross-sections of the divergence of the horizontal wind show that the wave amplitude in the stratosphere is higher than that found in the troposphere. This indicates the presence of inertia-gravity waves at higher altitudes.