

# **The Vertical Coupling of the Lower to Upper Atmosphere via Atmospheric Gravity Waves**

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In this talk, we briefly review the sources of gravity waves in the lower atmosphere. We then model the spectrum of gravity waves excited by a geostrophic adjustment of the jet stream in the troposphere and the stratosphere in the polar region. We show that an adjustment of the stratospheric jet having a width of 500 km and a duration of 6 hours, for example, excites inertial gravity waves having periods of 6 hours through the inertial period and horizontal wavelengths of 500 km to many thousands of km. Assuming negligible winds, we show that wave dispersion (and widely varying vertical group velocities within the spectrum) cause the gravity waves to arrive at and perturb the mesopause region from 1 to 3-4 days after their initial excitation. We also calculate the temperature and horizontal wind perturbations associated with these waves near the mesopause using typical amplitudes of jet stream adjustments obtained from models such as ECMWF and WACCM.

Key words: gravity wave, geostrophic adjustment