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MMM SEMINAR *NCAR*

Numerical Simulations of Instabilities and Turbulence Arising from Multi-Scale Gravity Wave Interactions

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Superpositions of larger-scale mid-frequency gravity waves (GWs) and smaller-scale low-frequency GWs or mean shears are common throughout the atmosphere and oceans. Such superpositions exhibit strong interactions and instabilities due to mutual deformation of their respective fields. Wave-wave interactions are strong when velocity perturbations are fully or partially aligned. Instability dynamics accompanying such multi-scale superpositions depart in significant ways from those due to monochromatic GWs or idealized shear flows. Smaller-scale GWs or mean motions having significant shear variance can have profound effects on both the evolution and the energetics of the larger- and smaller-scale flows. Consequences include 1) the occurrence of instabilities at smaller vertical scales than accompanying a single larger-scale GW, 2) strong wave-wave interactions, 3) a surprising dependence of GW and turbulence evolutions on the form and orientation of the small-scale GW or mean motion, and 4) formation of "sheet and layer" structures similar to those often seen in high-resolution atmospheric and oceanic profiles. Despite the simplicity of these initial results, predicted dissipation values agree well with observations in the stable boundary layer and near the mesopause. Local instabilities and turbulence arising in such flows are strongly suppressed if the Reynolds number is not sufficiently large.

**Ling Wang (GATS/Boulder) and Joe Werne (NWRA) also contributed.*

This seminar will be recorded and available to view via webcast at:
http://www.fin.ucar.edu/it/mms/fl2-live.htm

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Refreshments 3:15 PM
NCAR-Foothills Laboratory
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