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Panel Discussion of Gravity Waves

by Chester Gardner
University of Illinois

(3) GWD PARAMETERIZATIONS

- ## Lindzen (1981) parameterization:

  - linear monochromatic gravity waves propagating vertically on a height-dependent background wind.

  - growth of amplitude with height due to decreasing density.

  - gravity wave <u>breaks</u> when the total temperature lapse rate becomes convectively unstable.

  - turbulent diffusion is introduced above the breaking height to maintain neutral stability (i.e., <u>saturation</u>).

  - damped wave results in momentum flux divergence and a force on the zonal wind wind.

  - force drives the zonal wind to the phase speed of the gravity wave (i.e., $\bar{u} \to c$).

  - Lindzen parameterization appears in a modified form in orographic GWD schemes used in GCMs [e.g., McFarlane, 1987].