



Observations and simulations of gravity wave induced turbulence

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The “breakdown” of gravity waves and inertia-gravity waves into turbulence has become to be recognized as a major source of aircraft turbulence encounters at all levels in the atmosphere. Several examples of observations of the linkage of gravity waves to aviation scale turbulence are provided. Turbulence information is derived from aircraft measurements, including data recorded on research aircraft, and flight data recorders and pilot reports of turbulence from commercial aircraft. The source of the gravity waves is varied, but includes shear related to jet streams and fronts, convection, and flow over topography. To better understand the linkage between gravity wave generation and propagation mechanisms and the resulting turbulence, high resolution (~ 100 s m) mesoscale simulations are provided that show a robust ability to reproduce observed turbulence events. The simulations use a multi-nested approach with the outer domains initialized with standard NWP model output to provide a realistic representation of the larger scales which force the gravity waves, and the innermost domains resolving turbulence scales that are relevant to aircraft motions.