



The ARPS Stratospheric Gravity Wave Simulation over Greenland during 24 January 2005

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The Advanced Regional Prediction Systems (ARPS) forecast model is extended up to the stratopause and over the entire hemisphere to simulate gravity waves during 24 January 2005. With a 15-km horizontal resolution, the simulation produces realistic gravity wave features related to tropospheric jet deceleration over the Labrador Sea and flow over the Greenland terrain. In the stratosphere, wave signatures appear near the region of strongest flow in the polar vortex, where negative vertical flux of horizontal momentum is pronounced. Flux divergence associated with horizontal flow acceleration of 0.5-15 m/s/hour coincides with areas of depleted wind speed, suggesting strong interactions between gravity waves and the polar vortex. Simulated wave perturbations compare favorably with radiance perturbations from NASA AIRS observations. Coarser simulation using 50-km horizontal resolution produces gravity waves of significantly weaker amplitudes.