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Detection of gravity waves across the Snaefellsnes Peninsula: A case study

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In October 20th 2016 the FAAM BAE-146 aircraft conducted a flight to observe mountain waves over the Snæfellsnes peninsula, Iceland. The pattern of the vertical velocity suggests that the waves were generated by the air flow over the peninsula (waves parallel to the peninsula) as well as by Snæfellsnesjökull glacier at the tip of the peninsula. A horizontal wavelength of 12-15 km was observed. A series of nested simulations of this gravity wave event have been performed using the Weather Research & Forecasting (WRF) model initialised using GFS analyses. The studies have focused on the resolution required to accurately simulate the observed waves and to explore the role of cloud-microphysical processes on the wave generation. Simulations carried out at two horizontal resolutions (2 km and 400 m) have demonstrated that the wavelength and wave amplitude are well simulated at both resolutions but that details of the wave close to the mountains are sensitive to resolution. This sensitivity also affects the phase of the wave downstream of the mountains. In order to better understand how the physical processes close to the wave generation region affect the evolution of the wave, a series of model simulations have been undertaken with different cloud microphysics and boundary-layer schemes. We will compare each of these simulations with the aircraft data in order to better understand the influence of the detailed physical processes close to the wave generation region on the downstream wave structure.