SIMULTANEOUS LIDAR OBSERVATIONS OF TEMPERATURES, WAVES, AND PSCs ON BOTH SIDES OF THE SCANDINAVIAN MOUNTAINS

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Internal gravity waves play an important role in the energy budget and momentum flux of the middle atmosphere. These waves modify the thermal structure as well as the circulation. The Scandinavian mountain ridge is a major source for the excitation of gravity waves in the arctic polar atmosphere. Given an appropriate wind profile these orographic gravity waves will propagate well into the middle atmosphere. Observing the thermal structure of the atmosphere up- and downwind of the Scandinavian mountain ridge reveals the influence of these mountain waves.

The ALOMAR RMR Lidar at Andøya and the University of Bonn Lidar at the Esrange both can observe the signatures of atmospheric waves in the temperature structure of the stratosphere and mesosphere. During January and February of 2002 and 2003 two field campaigns, each lasting from mid-January to mid-February, were performed at the two lidar stations. The aim was to obtain simultaneous temperature soundings on both sides of the Scandinavian mountains and to study orographically induced atmospheric gravity waves. Each of the lidars conducted more than 40 measurement runs. Although these observations require clear sky conditions on both sides of the mountains, we obtained data in 20 simultaneous runs with durations of up to 15 hours. Temperature profiles were calculated and analysed for wave signatures, above 30 km altitude.

While the winter 2002 showed very little wave activity on both sides of the mountains, in winter 2003 there was large wave activity, which was observed at both lidar stations. Here we present the dual lidar measurements and show results from our analysis for both winters 2002 and 2003 focussing on the different wave activity observed during the two years and the effects of the mountains on the wave fields.

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