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Study of wave structures observed in wintertime OH-airglow over the Alpine ridge

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In the winter of 2008/2009 airglow measurements were performed with the colocated ground based spectrometers (GRIPS 3, GRIPS 4 and GRIPS 5) at the German Environmental Research Station “Schneefernerhaus”, Zugspitze (47.4° N, 11° E). All instruments record the OH(3-1) P-band transitions near 1.55 μm. Rotational temperatures and relative spectral intensities are derived and utilized for analysis.

The evolution of wave structures within the gravity wave frequency range is analysed over several consecutive nights. Our analysis focuses on the time of occurrence, duration and amplitudes of temperature and intensity fluctuations caused by these waves. Therefore, power spectra of temperature and intensity fluctuations are calculated applying the Harmonic Analysis for the longer period waves and the Maximum Entropy Method in the short period range.

Additionally high temporal resolution measurements performed with the GRIPS 5 allow for a detailed study of fluctuations with periods well below the acoustic cut-off period.

Our results indicate that temperature perturbations due to dynamical forcing by gravity waves can undergo significant changes in amplitudes as well as periods from one night to another. Occurrence frequency and characteristics of gravity and infrasonic waves are presented.