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Gravity wave observation using high-resolution Rayleigh lidar measurements at different latitudes

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Gravity waves (GW) are an essential part of the dynamics of Earth's atmosphere. They transport energy and momentum from the lower to the middle atmosphere. The distribution of gravity wave energy is important for understanding the global circulation. The effects of GW are often described by parametrization schemes in global circulation models.
In the ARISE 2 project lidar measurements are performed at different sites covering low, middle and high latitudes. This allows to deduce gravity wave energies at different latitudes and orographic situations. By this we can extend and improve global maps of GW energy distribution that are also available from satellite observations. Compared to satellite data the lidar observations have a high temporal and vertical resolution which is beneficial for understanding the evolution of GW events.
Using lidar observations we study GW on vertical and temporal scales of a few hundred meters and a few minutes. We perform an inter-comparison of lidar measurements and the methods used to derive gravity wave parameters. We present results obtained for the short-term variability of temperature profiles measured by lidars located at middle to high latitudes.