

# Gravity Waves excited during a Minor Sudden Stratospheric Warming

Andreas DÖRNBRACK<sup>1</sup>, Sonja GISINGER<sup>1</sup>, Natalie KAIFLER<sup>1</sup>, and Nedjeljka ŽAGAR<sup>2</sup>

<sup>1</sup> *Institut für Physik der Atmosphäre, DLR Oberpfaffenhofen, Oberpfaffenhofen, Germany*

<sup>2</sup> *University of Ljubljana, Faculty of Mathematics and Physics, Department of Physics, Ljubljana, Slovenia*

An exceptionally deep upper-air sounding launched from Kiruna airport (67.82°N, 20.33°E) on 30 January 2016 stimulated the current investigation of internal gravity waves excited during a minor sudden stratospheric warming (SSW) in the Arctic winter 2015/16. The analysis of the radiosonde profile revealed large kinetic and potential energies in the upper stratosphere without any simultaneous enhancement of upper tropospheric and lower stratospheric values. Upward propagating inertia-gravity waves in the upper stratosphere and downward propagating modes in the lower stratosphere indicated a region of gravity wave generation in the stratosphere. Two-dimensional wavelet analysis was applied to vertical time series of temperature fluctuations in order to determine the vertical propagation direction of the stratospheric gravity waves in one-hourly high-resolution meteorological analyses and short-term forecasts. The separation of up- and downward propagating waves provided further evidence for a stratospheric source of gravity waves. The scale-dependent decomposition of the flow into a balanced component and inertia-gravity waves showed that coherent wave packets preferentially occurred at the inner edge of the Arctic polar vortex where a sub-vortex formed during the minor SSW.

## References

Dörnbrack, A., Gisinger, S., Kaifler, N., Portele, T., Bramberger, M., Rapp, M., Gerding, M., Söder, J., Žagar, N., and Jelić, D.: Gravity Waves excited during a Minor Sudden Stratospheric Warming, *Atmos. Chem. Phys. Discuss.*, <https://doi.org/10.5194/acp-2018-228>, in review, 2018.