ROLE OF PLANETARY WAVES, GRAVITY WAVES AND TIDES IN THE DOWNWARD TRANSPORT OF NITROGEN OXIDES DURING ELEVATED STRATOPAUSE EVENTS

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To represent the impact of energetic particle precipitation on the middle and lower atmosphere, a proper account of the downward transport of nitrogen oxides (NOx) produced in the mesosphere-lower thermosphere (MLT) region is needed. The occurrences of stratospheric sudden warmings accompanied by elevated stratopause events (ESEs) strongly modulate the inter-annual variability of the transport from the MLT into the polar stratosphere. During ESEs, the polar stratopause reforms at mesospheric altitudes before being brought down to its climatological position by a mean meridional circulation driven by planetary and gravity waves (Limpasuvan et al., 2016). The latter descent can strongly enhance polar stratospheric NOx abundances. We use the NCAR whole-atmosphere chemistry-climate model WACCM with nudged dynamics to examine dynamical processes during ESEs, with a particular focus on the event of January 2013, including the behavior of planetary waves, gravity waves and tides. We analyse the modelled transport of NO and the model defficiencies in quantitatively reproducing the very large NO descent observed by the SMR instrument aboard the Odin satellite. Ground-based meteor radar observations in Trondheim (64N) provide further insight on the behavior of tides and gravity waves during the event.

Key words: mesosphere-lower thermosphere, stratospheric sudden warming

Reference

Limpasuvan, V., Y. J. Orsolini, A. Chandran, R. R. Garcia, and A. K. Smith, 2016: On the Composite Response of the MLT to Major Sudden Stratospheric Warming Events with Elevated Stratopause, *J. Geophys. Res. Atmos*., **121**, doi:10.1002/2015JD024401.