



Dynamical origin of strong NO₂ enhancement in the polar stratosphere and mesosphere observed by GOMOS ion ENVISAT

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A strong enhancement of NO₂ has been observed by GOMOS/ENVISAT instrument in winter 2004 at high north latitude. A layer with high NO₂ concentration is detected at 65 km in Mid-January and goes down to the stratosphere in February. Such NO₂ enhancement has been already observed after a strong solar proton event. In the present case there is no particular particle precipitation event at the time of the NO₂ increase. We propose another explanation based on the dynamics of the middle atmosphere. If a strong air descent occurs in the polar mesosphere, for instance due to a wave breaking event, it will transport NO_x from the upper mesosphere/lower thermosphere at 65 km. The further descent of NO_x to the upper stratosphere is explained by the radiative diabatic descent into the winter polar vortex. This hypothesis is supported by temperature observations of SABER/TIMED showing a strong temperature increase around 70 km at high latitudes at the time of NO₂ increase. This increase is an indication of a strong adiabatic warming related to the air descent.