Role of tides in the downward transport of NOx

Patrick Espy, Stefan Bender, Mathias Strupstad

The transport of aurorally produced nitric oxides (NOx) into the middle atmosphere has been recognized as an important, indirect source of particle precipitation induced chemistry during the polar winter. However, while it is tempting to think of the residual circulation transporting species poleward and downward from auroral altitudes into the middle atmosphere, the residual circulation actually reverses at around 90 km, producing a region of upward and equatorial flow. One way by which species can cross this “barrier” is through entrainment by tidal and gravity waves. In this work, we examine the ratio of NO at 70 km relative to that at 90 km over and its relation to wave activity as measured by a meteor radar station. In this way, it have been possible to quantify the role of dynamics in the transport of aurorally produced NOx into the middle atmosphere.