

## The response of the middle atmosphere to energetic particle precipitation

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### Abstract

Accurate representation of odd-nitrogen species (NO<sub>x</sub>) in the winter polar middle atmosphere is an important factor in correctly predicting ozone in the upper stratosphere. The concentration of NO<sub>x</sub> depends on several factors, including the state of stratospheric winds, the strength of diffusive transport near the mesopause, and the deposition of energetic particles in the mesosphere and the lower thermosphere. This talk presents a series of model experiments using the NCAR Whole Atmosphere Community Climate Model that explores the sensitivity of NO<sub>x</sub> to these factors. Factor of 3 differences in NO<sub>x</sub> are found depending on the choice of Prandtl number used to calculate the diffusivity due to dissipation of gravity waves and whether or not medium energy electron (MEE) precipitation is included. In comparison to satellite observations the standard model significantly underestimates NO<sub>x</sub> and better agreement is achieved with higher values of eddy diffusivity and MEE precipitation. With these changes the amount of NO<sub>x</sub> entering the stratosphere is increased as well as the subsequent NO<sub>x</sub>-driven ozone loss, resulting in reductions in ozone during spring time. The talk concludes with discussion of the implications for correctly predicting the atmospheric response to the 11-year solar cycle.

**Monday, March 16th**

**10:15 a.m. - Refreshments**

**10:30 a.m. – Seminar**

**FL2-1022, Large Auditorium**