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Responses of Middle Atmosphere Chemistry and Dynamics to Particle Precipitation simulated with ECHAM5/MESSy

A. J. G. Baumgaertner, Ch. Brühl, P. Jöckel
Max-Planck-Institute for Chemistry, Mainz, Germany

The state-of-the-art chemistry climate model system ECHAM5/MESSy has been used to investigate effects of enhanced particle precipitation in the middle atmosphere due to Solar Proton Events. A submodel that parametrizes the effects of precipitating protons, based on fluxes measured by GOES, was added to MESSy. The three dimensional study allows to investigate the production and transport of odd nitrogen (NOx) and odd hydrogen (HOx), effects on ozone concentrations, as well as interactions with dynamics. A description of the submodel and initial results from the period of the 2003 Halloween storms are presented. A comparison with MIPAS NOx measurements is shown and the model sensitivity to variations in several of the parameters related to the precipitation is discussed. This further allows discussion of the necessity to include additional sources of NOx, for example aurorae.