Response of polar atmosphere on recent solar proton events

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An analysis of satellite and surface measurements of ozone and odd nitrogen (NOx) during last solar proton events of Ground Level Event (GLE) type (2 May 1998, 14 July 2000 and 15 April 2001) are given. We used measurements of ozone and NO2 total content made by ground-based UV-visible spectrometers installed in Murmansk (Φ=64.5), Sodankyla (Φ=63.5) and Barentsburg (Φ=74.9). Satellite UARS and balloon data have also been used for analysis. Altitude distributions of NOx and CN (condensation nuclei) were calculated in frame of gas-phase photochemical theory and ion nucleation mechanism correspondingly. The results of model calculations seem to support the idea about ozone destruction during GLEs through ion nucleation mechanism and heterogeneous chemistry. It was shown bouth experimentally and theoretically, that only moderate GLEs can increase aerosol amount and decrease ozone content significantly. For example, model simulation showed a considerable increase of aerosol amount during moderate 21-24 May GLEs, when polar ozone "miniholes" have been measured. Other most powerful GLEs (2 May 1998 and 14 July 2000) caused no considerable changes in ozone layer and aerosol amount. Some aspects of gas-phase photochemical theory in connection with solar proton influence on polar atmosphere are discussed.