NO_2 column variations during May 1998 solar proton event from ground-based measurements at high latitudes

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The large solar proton event of Ground Level Event (GLE) type (2 May 1998) caused considerable stratospheric NOx enhancement at high latitudes. Measurements of NO_2 were made by ground-based UV-visible spectrometer installed at Murmansk (68°58N, 33°03E). Increases of NO_2 slant column with maximum magnitude about 40% have been detected by this device. The results of model calculations showed significant NO_2 enhancement due to May 1998 GLE. Moreover, model results showed an ozone total content decrease (more than 10%) initiated by this GLE through additional NOx production that seems contrary to experimental evidence.

The GLE of May 2, 1998 was very anisotropic one, and to investigate inhomogeneity of NOx variations we've attracted nitrogen dioxide column measurements made at Sodankyla (67°20N, 26°E). In analysis of meteorological situation during the event stratospheric temperature data were used.

In the paper the role of NOx constituents in ozone destruction and validity of gas-phase photochemical theory in the light of our experimental results is discussed.