RESPONSE OF THE ATMOSPHERE ON THE SECOND DAY AFTER PARTICLE PRECIPITATION

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It is taking into account effect of electrons during minimum of solar wind and ground level effects of solar protons when an extreme solar energetic particle event leads to a greatly enhanced flux of energetic particles penetrating into the low polar atmosphere. The detailed analysis of some very extreme solar energetic particle ground level enhancements (GLEs) show formations of aerosol layers with maximum of the aerosol concentration on the second day after solar energetic particle penetration. This means that increasing of solar cosmic rays induction ionization (CRII) rate of polar atmosphere leads to changes of physical-chemical properties in this area. Formed aerosol layers during increasing CRII rate lead to formation of water vapor layers and then decreasing of ozone concentration. A statistical test confirms that the observed changes of the chemical and physical properties of the polar troposphere are significant and is unlikely to be related to a spatial or temporal independent fluctuation of the aerosol and others contents. Thus, the results of the present work suggest that an enhanced flux of solar energetic particles can lead to notable changes in the chemical and physical properties of the polar troposphere. The effect of electrons are connected to changes of vorticity over the polar atmosphere. The low atmosphere needs at least two days for the maximum responding to partcile precipitation.

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