Intrusion of energetic electrons into the polar atmosphere

G.A. Bazilevskaya, V.S. Makhmutov, A.K. Svirzhevskaya, N.S. Svirzhevsky,
Lebedev Physical Institute, 119991, Moscow, Leninsky pr., 53

E.V. Vashenyuk
Polar Geophysical Institute, Kola Scientific Centre, Apatity, Murmansk region

Cosmic Ray Group of Lebedev Physical Institute (LPI) carries out long-term cosmic ray measurements in the atmosphere with radiosounding since 1957 up to present. During quiet periods, the radiation in the atmosphere is due to galactic cosmic rays. The enhanced radiation level is observed at altitudes above 20 km during solar proton events and electron precipitation events. Protons penetrate rather deep in the atmosphere while electrons are absorbed at altitudes ~70-100 km. However, the bremsstrahlung X-rays generated by electrons may be detected by the radiosonde at altitudes of ~20-35 km. Some powerful electron intrusions are observed during solar proton events mainly simultaneously with geomagnetic disturbances. The latter electron intrusions appear to be more energetic and last longer. The rate of electron precipitation events (not associated with solar proton events) changes in the 11-year cycle with maximum at the descending branch of the sunspot cycle.