45th SYMPOSIUM ON SAFETY AND QUALITY IN SPACE ACTIVITIES (D5)
Space Weather and Effects: Prediction, Analysis and Protection (3)

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SOLAR CYCLE VARIATION OF "KILLER" ELECTRONS AT GEOSYNCHRONOUS ORBIT AND ELECTRON FLUX CORRELATION WITH THE SOLAR WIND PARAMETERS AND ULF WAVES INTENSITY

Abstract

To construct models for prediction of hazard from radiation belt particles to satellite electronics, one should know temporal behaviour of the particle fluxes. We analysed 11-year variation in relativistic electron flux ($E > 2$ MeV) at geosynchronous orbit using measurements made by GOES satellites during the 23rd sunspot cycle. As it is believed that electron flux enhancements are connected with the high-speed solar wind streams and ULF or/and VLF activity in the magnetosphere, we studied also solar cycle changes in rank order cross-correlation of the outer radiation belt electron flux with the solar wind speed and both interplanetary and on-ground wave intensity. Data from magnetometers and plasma sensors on board the spacecraft ACE and WIND, as well as magnetic measurements at two mid-latitude diametrically opposite INTERMAGNET observatories were used. Results obtained show that average value of relativistic electron flux at the decay and minimum phases of solar activity is one order higher than the flux during maximum sunspot activity. Of all solar wind parameters, only solar wind speed variation has significant correlation with changes in relativistic electron flux, taking the lead over the latter by two days. Variations in ULF amplitude advance changes in electron flux by three days. Results of the above study may be of interest for model makers developing forecast algorithms. The work was supported by RFBR grants 12-05-00007 and 10-05-00661.