LONG-TERM EVOLUTION OF THE EARTH RADIATION BELTS DURING SOLAR CYCLES 23–25

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Energetic electrons > 30 keV have a significant impact on the ionization of the upper atmosphere and the conductivity of the lower ionosphere. Being moving along the magnetic field lines energetic electrons allow tracing the configuration of the geomagnetic field by mapping fluxes of electrons trapped in the Earth's radiation belts (ERB). In the scope of Geomagnetic Field Variations (GM) we investigate long-lasting and solar cycle variations of the electrons trapped in the Earth's Radiation Belts (ERBs) for the time interval from 1998 to 2024 [1-4]. Experimental data were acquired from the NOAA/POES and METOP satellites with polar sun-synchronous orbits at an altitude of 850 km. In the inner ERP, it was found a significant decrease in the fluxes of energetic electrons in the region of the South Atlantic Anomaly (SAA) and a decrease in its area occurred in the 24th solar cycle. It was also found that in the 24th solar cycle, especially in the declining phase, starting from 2015, electron fluxes in the outer ERB increased significantly, and the belt anomalously shifted toward the equator in the Siberian region. Such dynamics can be explained by the nature of the connection between the magnetosphere and the influence of the solar wind, as well as by a sharp and strong change in the Earth's magnetic field (magnetic jerk) during the 24th cycle. The latter might led to an increase in the magnetic field in the SAA region and the rise of the inner belt to high altitudes. The rise frees up altitude areas below 350 km for the massive use of low-altitude missions. The equatorward shift of the outer ERB can contribute to the significant increase in the occurrence of mid-latitude discrete auroras over Russia.

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