

## The contribution of different mechanisms to the acceleration of the outer radiation belt electrons with using Arase and GOES satellite data

In this work, variations of relativistic electron fluxes and wave activity in the Earth magnetosphere are studied in order to determine the contribution of different acceleration mechanisms: ULF mechanism, VLF mechanism and mechanism proposed by Tverskoy. The registration of electron fluxes was carried out according to the data of the geostationary satellites GOES and the Japanese satellite Arase (ERG).

To characterize VLF wave activity in the magnetosphere, we used data from the Arase satellite (PWE instrument). The ULF index developed at the IPE RAS was used to characterize the wave activity of the magnetosphere in the Pc5 range. Cases without magnetic storms with high solar wind speed and intervals with magnetic storms are investigated. It is considered mostly strong geomagnetic storms during the satellite era – 27-29 May 2017, 7-10 September 2017, 25-28 August 2018.

The main feature of the action of various acceleration mechanisms is the growth of relativistic electron fluxes by 1.5-2 orders of magnitude 1-3 days after the growth of the ULF index, the growth of the power of VLF radiation. The analysis shows that the growth of VLF and ULF wave activity occurs approximately at the same time and coincides with the growth of substorm activity. Therefore, it is not easy to separate the contribution of these acceleration mechanisms.

It is shown that in the considered events, the values of relativistic electron fluxes depend on intensity of the geomagnetic storm contrary to some previous results. During magnetic storms (with an average solar wind speed) the MeV electron fluxes are greater than for intervals without magnetic storms with a high solar wind speed. Since during magnetic storms, the flux intensity maximum shifts to lower L-shells compared to intervals without magnetic storms. So high solar wind speed is not always necessary condition for the electron acceleration. The growth of the substorm activity (AE index) is necessary condition. The position of the flux intensity maximum corresponds well to the Tverskayarelation, and the acceleration mechanism associated with the injection of electrons into the region of the magnetic field weakened by the ring current and their subsequent adiabatic acceleration during the restoration of the magnetic field can work effectively. The advantages and disadvantages of various acceleration mechanisms are discussed.

### Секция

Радиационные пояса и кольцевой ток

**Primary authors:** BELAKHOVSKY, Vladimir (Polar Geophysical Institute); Prof. VJACHESLAV, Pilipenko (Institute of the physics of the Earth RAS, Moscow, Russia); ANTONOVA, Elizaveta (Scobeltsyn Institute of Nuclear Physics Moscow State University (SINP MSU)); Prof. MIYOSHI, Yoshizumu (ISEE, Nagoya, Japan); KASAHARA, Yoshiya (Kanazawa University, Japan); Dr KASAHARA, Satoshi (Tokyo University); Prof. HIGASHIO, Nana (JAXA, Japan)

**Presenter:** BELAKHOVSKY, Vladimir (Polar Geophysical Institute)