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Spatial-energy dependencies of maximum electron fluxes of the outer radiation belt during geomagnetic activity

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The Earth’s outer radiation belt (EORB) is highly dynamical domain in the

magnetosphere. The most significant changes of the outer radiation belt are influenced by solar wind and accompanied by geomagnetic disturbances. During such events strong variations of the energetic electron fluxes by several orders of magnitude can be observed. The outer radiation belt spatial parameters like EORB maximum or its high latitude boundary are also changed.

Dynamical changes of trapped (in the orbit of the Van Allen Probes A spacecraft) and quasi-trapped (in the low polar orbit of the Meteor M2 satellite) EORB electron fluxes were studied at different phases of geomagnetic storms of different intensities. The temporal and spatial profiles of electron fluxes in different energetic ranges (>0.1, >0.7 and >2 MeV) were reconstructed from satellites measurements obtained during several radiation belt crossings.

It was found, that spatial location of the electron flux maxima and its dynamics depends on particle energy. During 10-16.10.2017 event a similarity was obtained in the dynamics of particle fluxes of the corresponding energies for two satellites. In the main phase of the storm, the lower-energy particle fluxes (E> 0.1 MeV) increased in the main phase of the storm and remain approximately constant. High-energy particle fluxes (E> 0.7 MeV and E> 2 MeV) dropped in the main phase of the storm and increased in the recovery phase. It was shown, that ongoing substorms produce VLF chorus waves and accelerate energetic electrons to higher energies, leading to an increase in particle fluxes of relativistic and subrelativistic energies. The new radiation belt maximum is formed at L about 4.8 during magnetic storm recovery. There exists a time delay in its formation for particles of different energies.

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