Geophysical Research Abstracts
Vol. 17, EGU2015-11425-2, 2015
EGU General Assembly 2015

ULF waves and relativistic electron acceleration and losses from the radiation belts: A superposed epoch analysis

Marina Georgiou (1), Ioannis Daglis (1), Eftyhia Zesta (2), Christos Katsavrias (1), Georgios Balasis (3), Ian Mann (4), Kanaris Tsinganos (1,3)

(1) Department of Physics, National and Kapodistrian University of Athens, Zografos, Greece, (2) Heliophysics Science Division, NASA Goddard Space Flight Center, Greenbelt, USA, (3) Institute for Astronomy, Astrophysics, Space Applications and Remote Sensing, National Observatory of Athens, Penteli, Greece, (4) Department of Physics, University of Alberta, Edmonton, Canada

Geospace magnetic storms are associated with either enhancements or decreases of the fluxes of electrons in the outer radiation belt. We examine the response of relativistic and ultra-relativistic electrons to 39 moderate and intense magnetic storms and compare these with concurrent observations of ULF wave power and of the plasmapause location. Following 27 of the magnetic storms, the ultra-relativistic electron population of the outer radiation belt was enhanced in the 2 - 6 MeV electron fluxes, as observed by SAMPEX. This enhancement was also seen in the electron phase space density derived from electron fluxes observed by the geosynchronous GOES satellites. On the other hand, the remaining 12 magnetic storms were not followed by enhancements in the relativistic electron population.

We compare relativistic and ultra-relativistic electrons observations with the concurrent latitudinal and global distribution of wave power enhancements at Pc5 frequencies as detected by the CARISMA and IMAGE magnetometer arrays, as well as by magnetic stations collaborating in SuperMAG. During the main phase of both sets of magnetic storms, there is a marked penetration of Pc5 wave power to L shells as low as 2 — especially during magnetic storms characterised by enhanced post-storm electron fluxes. Later in the recovery phase, Pc5 wave activity returns to more typical values and radial distribution with a peak at outer L shells. Pc5 wave activity was found to persist longer for the electron-enhanced storms than for those that do not produce such enhancements.

We put our Pc5 wave observations in the context of the plasmapause location, as determined by IMAGE EUV observations. Specifically, we discuss the growth and decay characteristics of Pc5 waves in association with the plasmapause location, as a controlling factor for wave power penetration deep into the magnetosphere.