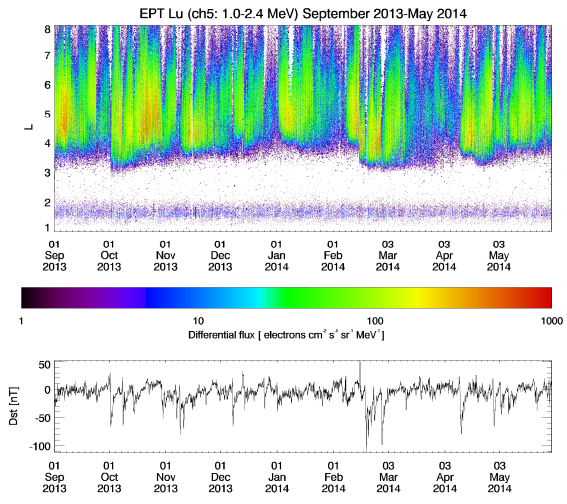
Space weather effects in the inner magnetosphere: plasmasphere and radiation belts dynamics during geomagnetic storms

V. Pierrard[(1,2)], F. Darrouzet[(1),] K. Borremans[(1)], G. Lopez Rosson[(1)]
(1) Belgian Institute for Space Aeronomy, 3 avenue circulaire, B-1180 Brussels, Belgium
(2) Université Catholique de Louvain, TECLIM, Earth and Life Institute, Place Louis Pasteur 3 bte L4.03.08, 1348 Louvain-La-Neuve, Belgium

The dynamics of the plasmapause position and of the electron outer belt boundaries is studied with satellite observations and then compared with physics-based dynamical simulations. The plasmapause position is determined using the instrument WHISPER (Waves of HIgh frequency and Sounder for Probing of Electron density by Relaxation) onboard the CLUSTER satellites. The relationship between plasmapause positions, solar wind parameters and geomagnetic indices is analyzed at highest correlation time-lag. The results show a short time delay in the post-midnight sector, but a time delay increasing with the MLT sector, in good agreement with the simulations of plasmapause formation based on the quasi-interchange mechanism. These plasmapause positions are also compared with the boundaries of the outer electron belt, as determined by CIS and RAPID instruments on CLUSTER. These different plasma populations of the inner magnetosphere are found to be closely related, especially during storm events when the plasmapause and the inner edge of the outer belts move simultaneously closer to the Earth. The dynamics of the radiation belts is also analyzed with the observations of the Energetic Particle Telescope (EPT) instrument, a new compact and modular ionizing particle spectrometer that was launched in May 2013 on board the PROBA-V satellite to a LEO polar orbit at an altitude of 820 km (Pierrard et al., *Space Sci. Rev.*, **184**, 2014, pp 87-106). This instrument performs direct electron, proton and heavy ion discrimination with a high resolution, allowing us to obtain maps of particle fluxes in the South Atlantic Anomaly and in the high latitude horns. Electron dropout events are observed during the main phase of geomagnetic storms, generally followed by a flux increase after the minimum value of Dst.



Electron flux observed by the EPT instrument