Geophysical Research Abstracts
Vol. 21, EGU2019-6987, 2019
EGU General Assembly 2019

On the variations of the magnetospheric field line resonance frequency during solar and seismic activity

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PAMELA (a Payload for Antimatter-Matter and Light-nuclei Astrophysics) and SAMPEX (Solar Anomalous and Magnetospheric Particle Explorer) data on low energy (tens of MeV) charged particles of both solar and galactic origin, contributed to study the magnetospheric particle populations which occasionally plunge into the middle atmosphere of the Earth. In this work a new insight on PAMELA-SAMPEX joint data is offered, performing a comparison between the modifications of the magnetospheric field line resonance eigenfrequency (FLR). FLR frequencies are detected using the standard technique based on cross-phase spectra from pairs of stations latitudinally separated with respect to the satellite footprint. Equatorial plasma mass densities are then inferred by solving the toroidal MHD wave equation using the TS05 Tsyganenko magnetic field model and assuming a 1/r dependence of the mass density along the field line. We found an increase of the FLR frequency during particle bursts caused by solar activity, as expected. On the other hand, we found a decrease of the FLR frequency during particle bursts caused by seismic activity.