



CXD multi-measurements and theoretical approaches in the estimation of the Earth magnetic shielding along GPS orbit during the 11th September 2005 Solar Proton Event

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Solar protons access during a solar proton event (SPE) to the inner magnetosphere is of prime importance to better understand the proton radiation belts dynamics and to accurately protect spacecrafts. This poster aims at presenting CXD multi-measurements and theoretical approaches to estimate the Earth magnetic shielding, and then at comparing there results for the SPE of the 11th September 2005. First, a multi-spacecraft analysis has been developed at the Los Alamos National Laboratory using the GPS energetic particle detector constellation (9 GPS spacecrafts with the CXD instrument are currently deployed and 5 are available for the 11th September 2005 event) which allows an accurate estimation of the cutoff energy according to local time, K_p and L parameter. Both method and results are described. Then, a theoretical estimation of this same cutoff energy has been developed at ONERA, using an inverse ray tracing method. Results are plotted using different magnetic field models along GPS orbit. Finally, comparisons are performed, and highlight the worth of continuous multi-spacecraft measurements, such as GPS ones (the constellation will increase from 9 to 24 spacecrafts), in the accurate determination of the Earth magnetic shielding and its dependency according to local time and magnetic activity.