

Project Details

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Project Title:

Energetic Ion Onset Fronts: Spatial/Temporal Variations In and Near Earth's Magnetosphere

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Summary:

The ISTP spacecraft constellation permits unprecedented detailed and multipoint examination of Solar Energetic Particles (SEPs) resulting from the large number of solar particle events produced in the recent Solar Cycle maximum as they approach and interact with Earth's magnetosphere. Abrupt SEP onset fronts can be used to test current understanding of interplanetary ion and electron propagation because they are initiated in localized solar events and have a simple transport history. Some SEP ions enter the magnetosphere and interact with communication satellites, interrupt communications, and/or disable those spacecraft. Other SEP ions precipitate in polar regions, ionize neutral atoms causing aurorae and ion outflow, and, at high flux levels, contribute to surface communication disruptions. We propose a multicasel/multipoint study of ~0.4-45 MeV SEPs using instruments on the ACE (at L1 ~230 Earth radii, Re) and nearer-Earth (~6.6-44 Re) Geotail, IMP-8, and GOES spacecraft, to examine spatial/temporal variability of SEP ion onsets observed near Earth since 1997 (ACE launch). The study organizes into Tasks to: evaluate the spaceweather monitoring effectiveness of a single spacecraft at L1; test whether the more abundant energetic ~0.4-5 MeV SEP ions have similar access to the inner magnetosphere (