2017 Workshop: Suprathermal particles in the MI system

Long title
Generation and effects of suprathermal particles in aurora and SAPS/SAID
Conveners
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Description

Suprathermal particles in the energy range of a few eV to keV are ubiquitous in the auroral and subauroral geospace particularly during active periods. The objective of this workshop is to make an assessment of a wide range of nonlinear plasma processes that create suprathermal electrons and ions at subauroral and auroral latitudes and their effects in the ionosphere and magnetosphere. Possible topics of discussion will include (but not limited to): What is the role of suprathermal electrons in the energy/momentum transfer between the hemispheres in the quiet time and magnetosphere-ionosphere in the disturbed time? How significant are suprathermal electrons in ion outflow events and heating of ionosphere plasma? What are key generation mechanisms of suprathermal particles in the magnetosphere and ionosphere? Invited/solicited speakers will summarize recent progress in satellite and radar observations and theory/modeling and discuss future directions of research to advance better understanding of the role of suprathermal particles in the MI system.

Justification

In the auroral ionosphere, suprathermal electrons, the major cause of greatly enhanced incoherent backscatter plasma lines, appear during keV-range electron precipitations. Suprathermal ions, the seed particles for auroral ion conics, are related to intense small-scale auroral arcs. CRRES, Cluster, Polar, and DMSP observations link the enhancement of the suprathermal population in the plasmasphere to substorm ring current injections. Ion outflows in the region of subauroral polarization streams (SAPS) accompany strongly elevated electron temperatures apparently caused by suprathermal electron fluxes from the conjugate plasmasphere. By the same token, strong electron heating and acceleration of

suprathermal electrons in HF modification experiments result in fast ion outflows in the topside ionosphere detected by the DMSP and Demeter satellites. These and related observations raise a number of questions about the mechanisms of generation of suprathermal particles and of the energy/momentum transfer in the perturbed geospace. These questions remain of great interest for the CEDAR and GEM communities. This workshop will bring to bear satellite and radar observers and geospace plasma modelers to address these problems.

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