

Project Details

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Program Element: Independent Investigation: LWS

Project Title:

Refining and understanding the auroral electrojet indices

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Project Member(s):

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Summary:

The rationale for the proposed research is based on the current understanding of the energy flow from the Sun via the solar wind through the magnetopause and into the upper atmosphere. Only a few percent of the kinetic energy available in the solar wind impinging on the dayside magnetopause is extracted by the magnetosphere yet this is the driver of the dynamic and steady state plasma processes in the earth's magnetosphere and ionosphere. After intermediate storage in the tail the primary sinks for this energy are the ring current and the ionosphere, where energy is dissipated in the form of Joule heating and particle heating. During substorms the ring current does not intensify and hence the ionosphere is the dominant energy sink. All of these sinks result in the creation of electric currents, the cross tail current, ring current in the heart of the magnetosphere, and ionospheric currents in the high latitude region. For many decades the latter two currents have been studied via the magnetic fields that the currents create, as measured by ground-based magnetometers. In the mid-1960s Sugiura and coworkers created magnetic indices in attempts to provide quantitative monitoring of the dominant current system, Dst for the ring current [Sugiura, 1964] and the auroral electrojet indices [Davis and Sugiura, 1966] for the horizontal ionospheric currents. Through their extensive use these indices play an important role in statistical studies as well as case studies of the complex solar wind-magnetosphere-ionosphere system. We show that a refinement and better understanding of the auroral electrojets and their indices is important for a number of scientific and practical reasons.

Publication References:

Summary: no summary

Reference: Gjerloev, J. W.; Hoffman, R. A.; Tanskanen, E.; Friel, M.; Frank, L. A.; Sigwarth, J. B.; (2003), Auroral electrojet configuration during substorm growth phase, Geophysical Research Letters, Volume 30, Issue 18, CitelD 1927, DOI 10.1029/2003GL017851, doi: 10.1029/2003GL017851

Summary: no summary

Reference: Gjerloev, J.; Hoffman, R.; Friel, M.; Frank, L.; Sigwarth, J.; (2004), Substorm behavior of the auroral electrojet indices, Annales Geophysicae, vol. 22, Issue 6, pp.2135-2149, doi: 10.5194/angeo-22-2135-2004