Project Details

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Project Title:
LWS: Inferring source regions of dispersed injections from Polar and LANL GEO particle data

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Summary:
Although the injection of particles at geosynchronous orbit is one of the most well known and well documented signatures of magnetospheric substorms and their occurrence have become one of the most routinely used indicators of substorm onset, the physical mechanism responsible for the observed dispersion features is not yet completely understood. A number of different classes of models have been proposed over the years including: the injection boundary model, the time-dependent Alfven boundary model, the convection surge model, and most recently the Earthward propagating magnetic field pulse type models. Despite the fact that the injection boundary model has been enormously successful in explaining and organizing the complicated dispersion patterns seen throughout the inner magnetosphere and demonstrates that an injection boundary like inner edge likely exists, the model is completely ad-hoc and does not explicitly invoke a physical mechanism for the particle energization. On the other hand, the propagating pulse type models do explicitly invoke a physical mechanism and have been shown to be capable of reproducing the observed dispersion over at least a limited range of energies. But, to date no attempt has been made to show that this type of model is capable of producing the complete dispersion signatures observed in the inner magnetosphere. We propose to make extensive use of LANL geosynchronous plasma and energetic particle data, together with Polar and Cluster energetic particle data in order to: (1) Test existing injection models using comprehensive, multi-point, pitch-angle-resolved observations of particle dispersion. (2) Determine the source locations for particles associated with injections. (3) Provide an empirical specification of particle source locations for input to physics-based ring current model. The datasets that we will use in this proposal include in-situ data from POLAR CEPPAD/IPS, and the LANL GEO spacecraft.

Publication References:

Summary: no summary

Reference:
Lui, A. T. Y.; Volwerk, M.; Dunlop, M. W.; Alexeev, I. V.; Fazakerley, A. N.; Walsh, A. P.; Lester, M.; Grocott, A.; Mouikis, C.; He nderson, M. G.; Kistler, L. M.; Shen, C.; Shi, J. K.; Zhang, T. L.; RèMe, H.; (2008), Near-Earth substorm features from multiple satellite observations, Journal of Geophysical Research: Space Physics, Volume 113, Issue A7, CiteID A07S26