

Special Topic

**Modes of Transport in Geospace
Papers Presented at the 2001 Fall meeting
of the American Geophysical Union**

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FOREWORD

Recent missions have provided the space plasma physics community with multi-point perspectives of the mass, momentum, and energy transport that takes place continuously through Earth's space environment. It is timely to re-evaluate traditional concepts about the organization of transport in interacting plasma systems and the extent to which it is determined by large-scale vs. mesoscale geometry and parameters. The observations suggest that, between the extremes of laminar and turbulent flow, transport in many plasma regimes is organized in spatial modes whose identifiers include particle acceleration to high energies, bursty flows, and intense, filamentary currents. Several studies have initiated the mapping of transport regimes from microscale flows, to meso-scale structures, such as plasmoids and flux ropes, to global scales. One of the key issues is whether what is often termed "anomalous" transport is a result of long range correlations in a complex plasma system, or a result of a number of uncorrelated simultaneous mechanisms operating over disparate spatiotemporal scales. Also the relation between emerging structures and power-law distributions in plasma and/or field fluctuations (as observed in the plasma sheet, magnetopause, high-latitude ionosphere, geomagnetism, etc.) remains an open challenge. The more practical question of predictability of energy transport is currently limited to studies of the largest spatial modes and invites the question on how much it is extendable to smaller scales.

With these questions in mind we organized a session on observations of transport events in geospace, as well as modeling and theory in the Fall 2001 American Geophysical Union conference (San Francisco, December 10-14, 2001). This effort is in fact a continuation of similar focused sessions [Vassiliadis et al., 1999; Chang et al., 2001]. As before, this session was co-sponsored by the magnetospheric (SM), solar wind (SH), ionospheric/aeronomy (SA), and nonlinear geophysics (NG) sections of the Union, with the participation of the latter section highlighting new quantitative methods for analysis and modeling. The session featured 7 invited papers and 33 contributed ones. A sample of those reports is given here.

References

- Vassiliadis, D., D.N. Baker, H. Lundstedt, R.C. Davidson, Special topic: Nonlinear Methods in Space Plasma Physics, Papers Presented at the 1998 Fall Meeting of the American Geophysical Union – Foreword, *Phys. Plasmas* **6**, 11, III-IV, 1999.
- Chang, T.S., S.C. Chapman, and A.J. Klimas, Special issue: Forced and/or Self/Organized Criticality (FSOC) in Space Plasmas, Papers Presented at the 1999 Spring Meeting of the American Geophysical Union – Preface, *J. Atmos. Solar-Terr. Phys.* **63**, 13, 1359, 2001.