

Inner magnetosphere-ionosphere coupling report

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One of the biggest problems facing the geoscience and heliophysics communities is the splintering of research efforts into individual system domains despite the acknowledgment that we live in a tightly coupled system. Even within sub-groups, we often focus our attention on individual aspects of the coupled system (the radiation belts, ring current or plasmasphere) or even on different measurements (waves, DC fields, particles of various energies). More detrimental to our understanding is that the ionosphere and magnetospheric communities attend different meetings, train our students at different institutions, and usually don't read each other's research.

The goal of the IMC was to attempt to bring together folks from the different communities to learn what observations each community are making that are relevant to understanding radiation belt dynamics. The magnetosphere-ionosphere coupling session described many ionospheric parameters that are routinely measured that can provide important context to space-based observations of magnetospheric dynamics - including heavy ion outflow observations, ionospheric boundaries that map to magnetospheric boundaries of interest including the plasmopause and auroral boundaries, ionospheric convection maps inferred from radar and magnetometer inversions, global ULF wave power intensity, estimates of mass density using ULF resonance observations, and vertical profiles of the topside ionosphere and plasmasphere using GPS tomographic techniques.

Discussions included how to incorporate routine ionospheric measurements into future radiation belt mission data analysis and questions of the role of ionospheric plasmas on a wide variety of magnetospheric processes including plasma sheet density, ring current evolution, and dayside reconnection.