2012 Workshop: mid latitude coupling

Long title
Middle latitude Ionosphere-Atmosphere-Magnetosphere Coupling
Conveners
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Description

The overarching objective of this session is to improve consistent understanding of the coupling and possible interaction between the ionosphere-atmosphere and the magnetosphere in the middle latitudes. We encourage research topics that leverage the upcoming Radiation Belt Storm Probes mission scheduled for launch in August 2012. The main topics regarding the coupling include:

(1) Electrodynamics:

---Is there a consistent view of current closure in the ionosphere, including from sub-auroral polarization streams (e.g., ISR, SuperDARN, DMSP), region 1 and 2 currents (e.g., AMPERE), and the ring current?

---How well do ionospheric observations (e.g., ISR, SuperDARN, DMSP) correspond to those of the spacecraft in the inner magnetosphere (e.g., CRRES, Cluster, THEMIS)?

---How does the neutral wind impact the electrodynamic coupling to the inner magnetosphere?

---How will RBSP contribute to our understanding of electrodynamics?

(2) Plasma structures:

---How well do we understand the correspondence between TEC features in the ionosphere and structure in the inner magnetosphere (e.g., IMAGE EUV)?

---What are outstanding questions regarding the correspondence between the mid-latitude trough and the plasmapause?

---Investigations of ionospheric/plasmaspheric responses to substorms/storms (e.g., TEC).

---How is the plasma distributed along field lines between the ionosphere and plasmasphere, including response of the plasmasphere to ionospheric dynamics?

(3) Energetic particle precipitation:

---How much does the energetic particle precipitation (ring current and radiation belt) impact the energy budget of the upper/middle atmosphere?

---What are the consequences on chemistry in the upper/middle atmosphere?

---What is the consequence on the ionospheric conductivity and its possible feedback to the magnetosphere?

Integrated understanding of the different types of the coupling provides us with a broader and more consistent picture of ionosphere-magnetosphere interaction. We expect that spacecraft observations such as from the upcoming RBSP mission will significantly increase our understanding. We would like to invite your participation with free form discussions to address these questions and to seek new approaches.

Agenda

1. Introduction of the session (pdf)

What the CEDAR community can do to contribute to the RBSP science regarding the MIA coupling issues?

2. Geoff Reeves: RBSP collaboration--RBSP mission objectives and RB modeling (pdf)

3. Harlan Spence: RBSP collaboration--coordinated observations between ground and space (pdf)

How to use the near simultaneous obs. To improve our understanding of the coupling issues?

4. Larry Lyons: Flow Channels (pdf)

5. Shasha Zou: TEC response to substorms

6. Guiping Liu: Comparison of electric field between THEMIS satellites and their ionospheric conjugate points (pdf)

7. Toshi Nishimura: storm time interaction between SAPS & neutral wind

How to use coupled models effectively to address the coupling issues?

8. Joe Huba: SAMI3 plasmasphere

9. Wenbin Wang: The effect of SAPS on global thermosphere and ionosphere (pdf)

10. Stan Sazykin: RCM MI coupling

11. Aaron Ridley: Problem with modeling conductivity

12. Laura Holt: Modeling EPP and transport with WACCM (pdf)

Justification

This session addresses system level issues, that is, coupling and interaction between the ionosphere-atmosphere and the magnetosphere. In this session, we plan to target the three focused subtopics with compelling questions that are interconnected with each other. We expect that combining the three related topics in the same session would help us make an easier first step toward the system level approach and provide a more consistent picture of the coupling as a whole.

Summary

The final summary workshop report: White paper regarding Van Allen Probes Coordination with the CEDAR Community, version 20130615 (pdf)

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