Speaker: Daniel Welling, University of Michigan

Date: Wednesday, October 8, 2014

Time: 1:30–2:30 pm

Location: CG1-South Auditorium
(Also webcast at http://www.fin.ucar.edu/it/mms/cg-live.htm)

Title: The Two-Way Relationship between Ionospheric Outflow and the Ring Current

Abstract:

Ionospheric outflow is now widely recognized as a critical source of plasma for the Earth's magnetosphere. Global simulations that include this source find that ionospheric hydrogen and oxygen play important roles in tail and inner magnetosphere dynamics. Recently, simulations that include causal outflow -- outflow that is directly driven by magnetospheric dynamics and not an a priori determined value -- can set up ionosphere-magnetosphere mass feedback loops in the tail, driving large-scale oscillations. This presentation explores how similar feedback relationships can be established between the ring current and the ionosphere using a system of coupled, first-principles-based numerical models. It is found that the region 2 field aligned currents generated by the ring current model increases ionospheric oxygen outflow by as much as a factor of six. The additional mass is energized and injected into the ring current, creating a non-linear feedback loop. This result confirms those of other recent studies: ionospheric outflow is not merely a source of magnetospheric plasma, but a key part of a tightly coupled, non-linear natural system.