

Seminar über Microwave Physics and Atmospheric Physics

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Titel: Plasma-neutral coupling in the ionospheric dynamo region

Solar-terrestrial physics deals with the understanding, prediction and possible mitigation of space weather impacts on ground-based and satellite infrastructure. Space weather research requires investigation of multiple regions with very different physical properties (e.g., solar wind, magnetosphere, ionosphere, neutral Earth atmosphere). The coupling of these separate regions at the boundaries or overlap is especially difficult to understand and model. The coupling of neutral atmosphere and ionospheric plasma mainly takes place in the dynamo region at $\sim 90\text{--}150$ km altitude where plasma and neutral gas undergo a transition from being highly collisional to non-collisional. At high latitudes where the magnetic field lines are nearly vertical, the strong field aligned currents are closed in the dynamo region since the ionospheric conductivities maximize there. This allows for a direct energy transfer from the ionosphere to the neutral atmosphere. Since the plasma-neutral collision frequency depends mostly on the state of the neutral particles, atmospheric variability has a strong impact on the coupling process. Due to the lack of measurement methods suitable for the ionospheric transition region, especially at high-latitudes, these processes are not well understood. Incoherent Scatter Radars (e.g., the one operated by the EISCAT Scientific Association in Northern Scandinavia) provide the only opportunity to have measurements across the whole dynamo region with high resolution in both time and altitude. The co-located Nordic Meteor Radar Cluster can provide horizontally resolved measurements at the lower altitudes of the transition region. Combined observations of these two instruments allow for detailed measurements of different coupling processes like mixing of tidal modes or AGW-TIDs. We present case studies of such combined measurements and demonstrate their potential application for model verification or derivation of additional atmosphere-ionosphere parameters.

Zeit: Freitag, 16. Dezember 2022, 10:15 Uhr

Ort: Room A97, Sidlerstrasse 5, 3012 Bern
<https://unibe-ch.zoom.us/j/97081325603?pwd=d0ozME5xOS9pQVNxallLem81VHQyZz09>
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