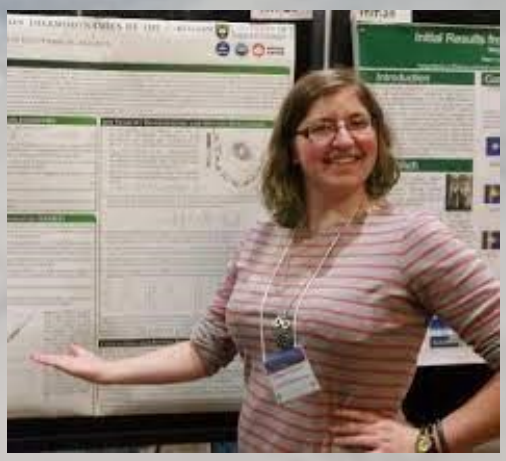
BOSTON UNIVERSITY

Boston University College of Arts & Sciences Center for Space Physics

2021—2022 SPACE PHYSICS SEMINAR SERIES

Sun to earth coupling in the creation, evolution, and properties of high-latitude ionospheric plasma

The earth's high-latitude ionosphere is replete with plasma density variations, also known as "irregularities". Irregularities can have properties vastly different from their surroundings and can alter the propagation of radio waves. By impacting radio communication and global navigation systems, irregularities play an important role in our modern lives. Although plasma density structures are a critically important space weather effect, the drivers of many of these irregularities, as well as their favorable conditions, locations, and scale-sizes, remains unclear. This presentation first examines high-latitude spacecraft measurements that show the first in situ observations that track the creation, structuring, and evolution of irregularities as they travel due to magnetospheric-ionospheric coupling. Next, spacecraft and ground-based imager data is presented that shows magnetospheric driving of localized electric field and precipitation systems associated with irregularities. Finally, to provide new insights into the impact of both solar and magnetospheric coupling on high-latitude plasma irregularities, "irregularity spectra" are computed using novel radar techniques. These spectra reveal the spatial-scales that result from different coupling processes at a higher spatiotemporal resolution than has been previously possible with ionospheric radars. In addition to having an unprecedented view of the size and occurrence of irregularities as they traverse the high-latitude ionosphere, we find irregularities 50 km and less become more prevalent when either the plasma density is low (below approximately 2.5e10 m-3 at 350 km altitude), or the plasma is on the nightside of the earth. This reflects the role of solar radiation in dominating high-latitude ionospheric structuring in the polar cap.



Monday, February 14th

3:30-4:30 p.m.

725 Commonwealth Ave | Room 502

Lindsay Goodwin

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