BOSTON UNIVERSITY

Boston University College of Arts & Sciences
Center for Space Physics

2020—2021 SPACE PHYSICS SEMINAR SERIES

New Results on the Lunar Sodium Tail

The lunar surface is constantly bombarded by the solar wind, photons, and meteoroids, which can liberate atoms from the regolith. The most readily observable atoms liberated from the Moon are sodium (Na). These ejected atoms are subsequently accelerated by solar photon pressure to form a long comet-like tail opposite the sun. Near new moon, these atoms encounter the Earth, where they are deflected by the Earth's gravity and "focused" into a beam of significantly enhanced density. This beam, when viewed from the night side of the Earth, appears as a ~3o diameter diffuse spot with a peak brightness ~80 Rayleighs. The Sodium Moon Spot (SMS) appears routinely in the images recorded by All-Sky-Imagers (ASIs) operated by Boston University. Data from the ASI at the El Leoncito Observatory (Argentina) have been analyzed for changes in the SMS shape and brightness using a rigorous set of image processing protocols. New geometry-based relationships have been found that affect the SMS brightness. After removing these effects, the data were analyzed for long term and seasonal patterns that could be attributed to changes in source mechanisms. No correlation was found between the SMS brightness and the 11 year solar-cycle, but an annual pattern was found. A 0.75 correlation was found between the SMS brightness and the apex radar meteor rates at Earth, suggesting a cause-and-effect. The new insights gained from this long-term study put new constraints on the variability of the potential sources of the Na atoms coming from the Moon.

Thursday, October 22nd

4:00-5:00 p.m.

See website for Zoom information

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