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Poster
Accurate thermospheric density specification and forecasting are essential for satellite drag modeling and space operations, but they remain challenging due to variability in solar radiative forcing and geomagnetic energy input. A solar irradiance proxy is a measurement of solar flux at a particular wavelength that is used as a surrogate for another wavelength due to strong correlations, whereas indices correspond to measurements of solar irradiance that are absorbed in the atmosphere and drive thermospheric density. While proxies provide operational stability, many are derived from ground-based observations that only indirectly represent the irradiances responsible for thermospheric heating.
This work presents an overview of Space Environment Technologies' (SET) real-time solar and geomagnetic index dataset, JBHSGI (Jacchia Bowman HASDM Solar and Geomagnetic Indices), which provides operational inputs to the High Accuracy Satellite Drag Model (HASDM) used by the U.S. Space Force. JBHSGI includes solar indices (F10, S10, M10, Y10) and geomagnetic indices (ap, Dst), capturing variability across the FUV, EUV, and XUV spectral bands and magnetosphere–thermosphere coupling. SET leverages space-based observations (e.g., GOES EUV, X-ray, and Mg II) to better represent spectral energy deposition, while automated quality control ensures a consistent nowcast time series. The system also provides 6-day forecasts using autoregressive, physics-based, and machine learning approaches to support forward-looking density prediction, delivering consistent, high-fidelity inputs for both government and commercial thermospheric density modeling applications. In support of these efforts, we will also share analysis of the newly extended HASDM density nowcast database, now spanning 2000-2025.5, publicly released in March 2026.
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