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Poster
The Low Earth Orbit (LEO) regime is becoming more congested as the number of satellites continues to grow with the rising popularity and establishment of SmallSat constellations. In addition to a congested LEO space environment, the rapid rise of this solar cycle suggests that the current solar maximum occurring between 2024-2027 will be higher than the previous solar maximum, thus causing higher perturbations due to drag from atmospheric density on LEO satellites. Despite these increasingly hazardous conditions, there is still no consensus among agencies and companies on how to quantify and predict the thermospheric environment through which these objects are orbiting. This poster outlines current state-of-the-art thermospheric density models, describing their performance, computation time, required operational space weather input parameters, and notes for implementation. We include models that are at a technology readiness level of eight or nine, meaning that the model is currently being run on an operational system or the model has validated performance under operational conditions.
The models that are assessed in this work are as follows: DTM2020, HASDM, JB2008, MSIS2.0, TIE-GCM2.0, and WAM-IPE. An analysis is provided in which each model's performance is compared during quiet and storm conditions during the month of April 2023. Models are evaluated globally against HASDM densities and locally against GRACE-FO satellite accelerometer-derived density data. A propagation analysis is also included in which satellites are propagated through each model's density field during the April 2023 storm and quiet conditions. Overall, this presentation provides a comparison between state-of-the-art density models to identify possible areas of improvement for particular models and for thermospheric density modeling as a whole.

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