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Space weather phenomena can affect everything from satellite trajectories to power grids. With proper forecasting and preparation, harmful effects can be avoided or mitigated. But reliable forecasting of space weather events and their severity is quite challenging, as the upper atmosphere is a highly driven, nonlinear system over an immense scale. Predictions based solely on physics-based models quickly diverge from reality. To address this, data assimilation (DA) techniques integrate observations, model predictions, and their uncertainties to improve state estimations and enhance forecast accuracy.

One of the most crucial elements of DA for space weather is thermospheric observations. NASA's GOLD mission provides observations of integrated thermospheric temperature which have proven to improve model forecasting in the DART DA framework [Laskar, 2021]. In this project we hope to extend this work to add GOLD temperature observations to a more generalized DA framework called JEDI (Joint Effort for DA Integration). This would allow the community to utilize these observations in a broader range of DA methods such as variational and hybrid. We also look to analyse the uncertainty of these observations for better use in DA systems.

Laskar, F. I., et al. "Impact of gold retrieved thermospheric temperatures on a whole atmosphere data assimilation model." Journal of Geophysical Research: Space Physics, vol. 126, no. 1, Jan. 2021, https://doi.org/10.1029/2020ja028646

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