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Poster
This work introduces and evaluates an index mapping strategy aimed at improving the forecast accuracy of estimated Ap and F10.7—key geomagnetic activity and solar flux indices, respectively—by jointly leveraging Issued Ap, F10.7, and time-lagged values of the estimated indices. The estimated Ap and F10.7 are the result of data assimilation methods that are described in another poster. We conduct a comprehensive exploration of time-series modeling approaches—including linear regressions with lagged features, ARIMAX, NARX, and machine learning methods such as long short-term memory (LSTM) neural networks—to illustrate how effectively harnessing combinations of time-lagged, data-assimilated solar and geomagnetic drivers (each forecasted separately) alongside issued indices leads to more precise predictions. Methodological steps for data preparation, feature construction, model training, and systematic performance comparisons (via RMSE and other key metrics) are detailed. Our results underscore the importance of integrating assimilation-based estimates of geomagnetic and solar flux data into robust forecasting solutions, ultimately guiding practitioners toward achieving higher predictive accuracy and enhanced interpretability in space weather modeling.

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