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Poster
We investigate whether incorporating the time evolution of active-region magnetic properties improves solar flare forecasting beyond models that use only a single-time magnetic snapshot. Using an SDO/HMI SHARP data set, we compare baseline classifiers trained on 20 SHARP-based parameters at one time with augmented classifiers that additionally include temporal-difference features, constructed over a range of pre-flare intervals. We evaluate three representative machine-learning models: a random forest classifier (RFC), quadratic discriminant analysis (QDA), and a support vector machine (SVM), for binary prediction of major (M/X) versus non-major (B/C and no-flare) events using leave-one-out cross-validation. Forecast skill is assessed with the True Skill Statistic (TSS) and Heidke skill score (HSS). We find that adding temporal-difference features improves performance for all three models, with the most consistent gains occurring when the endpoint of the delta construction is 23–24 hr before flare onset. The improvement is stronger and more robust for RFC and QDA, and more variable for SVM. TSS and HSS show consistent behavior, indicating that the benefit is not metric dependent. These results show that a compact representation of SHARP-parameter evolution provides useful predictive information beyond single-time-point features, and they identify a ~1-day pre-flare timescale as particularly informative for major-flare forecasting.
Poster session day
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Poster location
19
Meeting homepage
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