

A Cross-Model Validation Framework for Solar Flare Forecasting Using NASA CCMC Flare Scoreboard Predictions

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Solar flares are significant space weather phenomena that can impact satellites, communication systems, and many technological infrastructures, rendering accurate flare forecasting a crucial objective in heliophysics study. The NASA Community Coordinated Modeling Center (CCMC) Flare Scoreboard collects predictions from multiple solar flare forecasting models developed by different research groups. While this resource provides a useful platform for comparing different forecasting approaches, systematic validation of these models remains challenging because predictions are reported in different formats and are not easily comparable across models. In this work, we develop an automated framework to collect and organize flare forecasts from several models available in the CCMC Flare Scoreboard and convert them into a consistent dataset that allows direct comparison between models. The processed dataset includes predictions across multiple years and forecast windows. To evaluate model performance, we compare the predicted flare probabilities with observed flare events reported in the SolarSoft (SSW) Latest Events archive. By aligning forecast windows with actual flare occurrences, we establish a consistent approach for validating model predictions. This approach facilitates a systematic comparison of forecasting behaviour among various models and assists in identifying those that exhibit superior or inferior predicted ability. The resulting pipeline provides a reproducible way to analyze solar flare forecasting systems and supports future efforts to improve the reliability of space weather prediction methods.