



Verification of solar flare forecasts at the UK Met Office

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The Met Office Space Weather Operations Centre (MOSWOC) has been issuing space weather forecasts, operationally, since 2014. These forecasts help build resilience to space weather for UK infrastructure and effected industries. Space weather impacts include power outages caused by geomagnetically induced currents, and radio communication loss due to ionospheric disturbances.

The twice daily MOSWOC guidance documents, include probability forecasts for the next three days for geomagnetic storms, X-ray flares, high energy proton events and high energy electron events. It is crucial for forecasters, users, modellers and stakeholders, to understand the strengths and weaknesses of models and forecasts, and to appreciate how forecasters can add value to model output. It is therefore important to verify forecasts against observations, and to understand forecast performance by comparing against a benchmark, for example a climatology or persistence model.

Here we focus on flare forecast verification. MOSWOC forecasts are assessed using terrestrial verification techniques. Reliability diagrams are plotted to show how well forecasted probabilities of an event correspond to observed frequencies. Relative Operating Characteristic plots are calculated to show the ability of a forecast to discriminate between events and non-events. Near real-time forecast verification has been undertaken through the adaptation of a terrestrial weather verification system.

It is also important to compare results and coordinate research with key international partners in order to assess relative performance and drive further improvements. The Met Office is working with other members of the International Space Environment Service on coordinated forecast verification efforts, and works with NASA CCMC on the implementation of the Flare Scoreboard; a system enabling automated upload of flare predictions, and immediate intercomparison of forecast results from all participating organisations. The Met Office has also been involved with the EU project FLARE Likelihood And Region Eruption (FLARECAST) to develop an automated flare forecasting system with verification.