

## **How Good is it? New Approaches for Forecast Verification**

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Verification of meteorological and oceanographic forecasts is essential for monitoring their accuracy, understanding their errors, and making improvements in forecasting systems. Recent years have seen a growing interest in novel approaches for forecast verification, as evidenced by the rising number of publications on newly developed verification techniques. The increased resolution of numerical models has created a need for new and different diagnostic methods to understand their limitations. Ensemble prediction has become widespread, calling for ways to assess not only their spread but also the probabilistic and scenario products that can be generated from ensembles. Prediction of extreme weather, while always of interest, has taken on new importance in light of our improved understanding of weather and climate variability and change, requiring verification methods that are targeted to extreme and rare events. Forecasting applications based on meteorological predictions, for example, continuous streamflow, wildfire behaviour, crop yields, and renewable energy prediction, call for new ways of evaluating these forecasts that are more relevant to the downstream application.

Recent progress has been made in many areas including improved verification reporting, wider use of diagnostic verification, development of new scores and techniques for difficult problems, and evaluation of forecasts for applications using meteorological information. There are many interesting challenges, particularly the improvement of methods to verify high resolution ensemble forecasts, seamless predictions spanning multiple spatial and temporal scales, and multivariate forecasts. More work is also being done to make best use of new observations, investigate issues and opportunities linking data assimilation and verification, and develop better and more intuitive forecast verification products for end-users.