



## **Predicting high-impact weather using medium-range ensemble forecasts**

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To address the medium-range forecasting of high-impact weather, the Met Office is running an experimental global ensemble prediction system. 15-day forecasts are being run twice a day using an extended version of the Met Office Global and Regional Ensemble Prediction System (MOGREPS). The forecast results are contributing to the THORPEX Interactive Grand Global Ensemble (TIGGE), a framework for international collaboration in the development of ensemble prediction systems. Research is being undertaken both to compare the Met Office ensemble with other ensembles and on the combination of ensembles from different forecast models in a multi-model ensemble.

A key part of our THORPEX research is the development of a range of products to highlight when high-impact weather is forecast. In addition to the traditional methods of displaying ensemble forecasts such as probability charts, we have also developed a range of feature-based and regime-based post-processing tools. As much of the high-impact weather in the UK is associated with synoptic features, the ensemble forecast output is objectively analysed to identify fronts and extra-tropical cyclones at all life-cycle stages. The features are tracked over time, and interactive clickable maps show how each member is predicting a cyclone to develop, both in terms of track and intensity. At longer forecast ranges strike probability plots show the risk of a high-impact storm passing nearby in a certain time window. Other diagnostics have been developed to highlight persistent periods of weather such as heat waves or spells of wet weather. To show when changes of large-scale circulation patterns are forecast over Europe, a new objective method classifies the ensemble members at each forecast time into a set of weather regime types. In the tropics, tropical cyclones are identified and tracked in each ensemble member, and a series of products produced both for named storms, and

for those that are predicted to form during the forecast.

The high-impact weather products are being trialled in real time by forecasters in the Met Office Operations Centre, and are also being used as tools to analyse the performance of the Met Office 15-day ensemble in case studies of high-impact weather. In particular, analysis is focussing on evaluating the added benefit of having the TIGGE multi-model ensemble over and above a single model ensemble. Case studies being evaluated include severe extra-tropical and tropical cyclones, and high-profile changes of weather type, such as the end to a prolonged dry spell.