

# ECMWF Feature article

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METEOROLOGY

## Forecast performance 2012



[www.ecmwf.int/en/about/news-centre/media-resources](http://www.ecmwf.int/en/about/news-centre/media-resources)

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## Forecast performance 2012

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Each year, comprehensive verification statistics are prepared to evaluate the accuracy of the forecasts. A summary of verification results is presented to ECMWF's Technical Advisory Committee. Their views about this year's performance of the operational forecasting system are given in Box A.

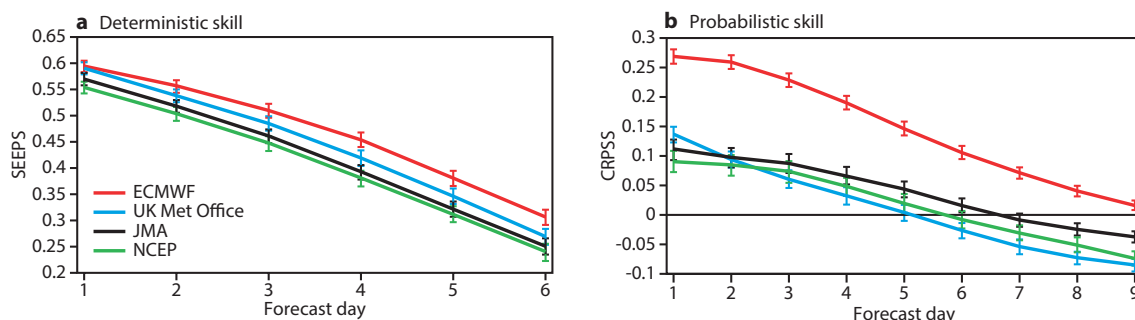
ECMWF has begun a routine comparison of the precipitation forecast skill of ECMWF and other centres for both the high-resolution forecast and the ensemble forecasts using the TIGGE data archived in the Meteorological Archival and Retrieval System (MARS). Results using ECMWF's headline scores for precipitation for the last 12 months show a consistent clear lead for ECMWF with respect to the other centres (Figure 1). The headline scores are SEEPS (Stable Equitable Error in Probability Space) for the high-resolution forecast and CRPSS (Continuous Ranked Probability Skill Score) for the ensemble.

Compared to other global models, the ECMWF precipitation forecast shows a relative weakness in the first day of the forecast. It is most visible in the scores for Europe but can also be seen in the extra-tropics in general (Figure 1a). While ECMWF has the best forecast from day 2 onwards, it drops behind the Met Office model at day 1 during the non-convective season. This does not occur in the tropics, where the lead of ECMWF relative to the other models is consistent throughout the six-day forecast range.

The relative weakness of extra-tropical ECMWF SEEPS scores at day 1 is related to an over-forecasting of light precipitation events when no precipitation was observed. The frequency distribution of ECMWF forecasts at day 2 is closer to the observed distribution than it is at day 1. Both the convective and the large-scale part of the precipitation forecast contribute to the problem. This behaviour (too often forecasting light precipitation at the short range) is not so apparent for the models from the UK Met Office or JMA (Japan Meteorological Agency). The model developers at ECMWF are working on a model upgrade to address this issue, scheduled for implementation later this year.

*ECMWF Newsletter No. 128* contains an article about the SEEPS score used for the deterministic verification of the precipitation forecasts.

The complete set of annual results is available in *ECMWF Tech. Memo. No. 688* on 'Verification statistics and evaluations of ECMWF forecasts in 2011–2012', downloadable from <http://www.ecmwf.int/publications/library>. This document presents recent verification statistics and evaluations of ECMWF forecasts (including weather, waves and severe weather events) along with information about changes to the data assimilation/forecasting and post-processing system. Also the performance of the monthly and seasonal forecasting systems is assessed.



**Figure 1** Comparison of precipitation forecast skill for ECMWF, UK Met Office, JMA (Japan Meteorological Agency) and NCEP (National Centers for Environmental Prediction) using the supplementary headline scores for precipitation: (a) deterministic skill (SEEPS) and (b) probabilistic skill (CRPSS). Curves show the skill computed over all available synoptic stations in the extra-tropics for forecasts from August 2011 to July 2012. Bars indicate 95% confidence intervals.

**Overall view of ECMWF's Technical Advisory Committee, 18–19 October 2012****A**

With regard to its overall view of the operational forecasting system the Committee congratulated ECMWF on the very high performance level of its weather forecasting system and the reliability of its product delivery service;

- i. took note of ECMWF's continued world leading position in medium-range forecasting and encouraged ECMWF to continue developments to maintain this lead;
- ii. welcomed the introduction of the scorecard to summarise the impact of new cycles and publication of this together with additional information on a dedicated web page for each new model cycle, together with the provision of real-time test data;
- iii. with respect to the assimilation system, noted with interest the improvements resulting from the introduction of new background error statistics and the increased quality of the snow analysis;
- iv. welcomed the recent improvements to the model, in particular the modifications to convection and clouds which resulted in better precipitation forecasts, while noting that light precipitation still occurs too often in the model;
- v. congratulated ECMWF for forecasting the genesis and accurately predicting the track and intensification of tropical storm Isaac into a category 1 hurricane just before the landfall near New Orleans in August 2012;
- vi. acknowledged the improvement of the monthly forecasts while noting the challenge with capturing regime changes beyond two weeks ahead, and encouraged ECMWF to continue to develop its capability in regime change prediction;
- vii. appreciated the extension of the EFI to include additional parameters and forecast steps and noted the high skill of the EFI in predicting severe weather events several days ahead, for instance heavy rainfall in western Europe in April 2012 or heat wave in south-east Europe in August 2012;
- viii. expressed its appreciation with regard to the introduction of seasonal forecasting system 4;
- ix. welcomed ECMWF's efforts to provide a better understanding of the performance in forecasting weather regimes as part of the new clustering scheme;
- x. appreciated ECMWF's in-depth study of occasional poor forecasts over Europe ("busts");
- xi. appreciated ECMWF responsiveness to Member State concerns, for instance the successful ECMWF efforts to improve the cloud scheme to correct 2 m temperature cold bias in winter over northern European countries, whilst noting that there are still some problems in the spring in Nordic regions;
- xii. noted with satisfaction that the ecCharts interactive web-based service for forecasters is now supported 24 hours per day and 7 days per week and that several new parameters have been added to ecCharts in response to Member State requests;
- xiii. encouraged ECMWF to continue to develop verification procedures that relate to weather impact (rainfall, wind, temperature) including for severe events, and to understand local variations in performance.

### Further reading

Verification pages have been created on the ECMWF web server and are regularly updated. Currently they are accessible at the following addresses:

**Medium range:** <http://www.ecmwf.int/products/forecasts/d/charts/medium/verification/>

**Monthly range:** <http://www.ecmwf.int/products/forecasts/d/charts/mofc/verification/>

**Seasonal range:** <http://www.ecmwf.int/products/forecasts/d/charts/seasonal/verification/>

Note: All forecasting system cycle changes since 1985 are described and updated at: [http://www.ecmwf.int/products/data/operational\\_system/index.html](http://www.ecmwf.int/products/data/operational_system/index.html)

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