

100 years of scientific forecasting

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The forecast system used today results directly from experiments carried out in the trenches of WW1.

Met Office mathematician Lewis Fry Richardson recognised that pre-First World War weather forecasting practices were fundamentally unscientific, merely matching current weather phenomena with historic records. While volunteering for the Friends Ambulance Unit at Passchendaele he conducted a series of weather experiments.

Richardson broke new ground with a gridded approach to forecasting, and while it took him more than six weeks to calculate a six-hour forecast for a single location, this mathematical approach to weather forecasting has become the basis on which today's forecasting system has been built. What took six weeks to produce 100 years ago can now be accessed in seconds via an app on our mobile phone.

Lewis Fry Richardson and his Forecast Factory



Research, technological developments and advances in computer power have allowed forecast grid sizes to be cut (i.e. over the last 30 years our Global Model grid sizes have reduced from 90km down to 10km) and improvements in our forecast accuracy. Our four day forecast is now as accurate as our one day forecast was 30 years ago.

Met Office Deputy Director of Weather Science Dale Barker said “Recent significant improvements to our modelling and forecast system include increased resolution of our global models and a greater number of [ensemble](#) members to support forecasting for high impact events. We have also enhanced the physics in our UK models and added new hourly updates to the UK forecast from the first 12 hours.

MODEL UPGRADES SEPTEMBER 2017

Our new supercomputer's increased computational capacity helps us unlock new science and provide even more accurate data and forecasts



GLOBAL NUMERICAL WEATHER PREDICTION MODEL

Provides medium-range UK forecasts and short-range weather forecasts for all around the world.

INCREASED HORIZONTAL RESOLUTION

From ~17km to ~10km in mid-latitudes

- ✓ Improves model outputs
- ✓ Improves medium and short term forecast accuracy
 - particularly near the surface
 - during snow-melt
- ✓ Better representation of coastlines & topography
- ✓ Enhanced representation of tropical cyclones

UK HIGH RESOLUTION MODEL

Provides detailed accurate weather information to the UK

INTRODUCTION OF HOURLY 12 HOUR FORECASTS

- ✓ Improves very short-period forecasts

CHANGE FROM 3 TO 4 DIMENSIONAL ANALYSIS SYSTEM (4D-VAR)

- ✓ Uses observations more intelligently to produce more accurate forecasts

ENHANCED PHYSICS

Provides detailed accurate weather information to the UK

- ✓ Improves forecasting of cloud and precipitation
- ✓ Helps with more accurate rainfall information, in support of flood forecasting

HIGHER RESOLUTION LATERAL BOUNDARIES

Now at global 10km resolution

- ✓ Gives us better information about weather coming in to the UK model

MET OFFICE GLOBAL AND REGIONAL ENSEMBLE PREDICTION SYSTEM (MOGREPS-G)

Allows users to estimate the risk of high impact weather events

GREATER NUMBER OF ENSEMBLE MEMBERS

Increased from 12 members to 18 every 6 hours, making a 36 member ensemble when time lagged with previous runs

- ✓ Makes our 48 hour forecast as good as our 36 hour forecast was previously
- ✓ Enables us to provide better guidance for probability of higher impact weather events

INCREASED HORIZONTAL RESOLUTION

From ~33km to ~20km in mid-latitudes

- ✓ Improvement in forecast accuracy of near surface variables

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“We have the world’s largest [supercomputer](#) dedicated to weather and climate science here at the Met Office. This allows us to continually pull through cutting edge mathematical and scientific developments into our forecast models meaning we are able to produce more detailed and accurate forecasts, helping maintain our world-leading position in weather and climate prediction”.

Our global [NWP model](#), the foundation of our accurate weather provision, is recognised as a world leading National Met Service model verified using standards defined by the [World Meteorological Organisation](#). The high level of trust in our forecast accuracy is underlined by the fact that our model is used under licence by six other forecast centres and over 50 research centres around the world.

Over the last 100 years, developments in our science and technology have led to many step changes in forecasting. The continual improvement in accuracy of our weather forecasts has ensured they have become a trusted tool, embedded in decision-making for government, industry and the public.

As we remember the work of Lewis Fry Richardson we also pay tribute to the thousands of British troops who fought, were injured or who died at Passchendaele, particularly the Battle of Menin Road (20 to 25 September 1917) whose anniversary falls this week.

Our latest global model improvements

