Monitoring the ECMWF forecast system

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ECMWF operational forecasts

• High-resolution forecast (9 km grid, 137 levels) runs twice every day to 10 days

• Ensemble: same model but run at lower resolution (18 km, 91 levels; 36 km after day 15)
  – ensemble control (run from high-resolution analysis, no perturbation)
  – 50 perturbed members (account for initial and model uncertainties)
  – Ensemble coupled to ocean model from start of forecast

• Ensemble extended to 46 days twice per week for monthly forecast (00UTC Thursday, Monday)

• Seasonal forecast: once a month (coupled to ocean model) 51 members, ~36 km, 91 levels, to 7 months ahead
Products: a few examples

Medium-range

- Daily mean of total cloud cover (okta)
- Total precipitation (mm/24h)
- M-distribution of the distribution of 10m wind direction
- Daily distribution of 10m wind direction
- Daily mean of 10m wind speed (m/s)

ENS-Monthly Forecasting System 2m anomaly

- Global average temperatures
- Forecast of Aerosols Optical Depth

Seasonal Forecast
Observation Coverage

ECMWF data coverage (used observations) - RADIOSONDE
21/08/2020 00
Total number of obs = 642

ECMWF data coverage (used observations) - BUOY
21/08/2020 00
Total number of obs = 1190
Producing the new analysis
HRES Forecast
Ensemble forecast

ECMWF ENSEMBLE FORECASTS
Friday 21 August 2020 0000 UTC ECMWF forecast 1x120 VT Wednesday 26 August 2020 0000 UTC
MSLP (contour every 5hPa) Temperature at 500hPa (only 4 and 16 isolines are plotted)
Ensemble forecast

ENS Meteogram
Reading, United Kingdom 51.52°N 0.97°W (ENS land point) 81 m
High Resolution Forecast and ENS Distribution Friday 21 August 2020 00 UTC

Total Cloud Cover (oktas)

Total Precipitation (mm/6h)

10m Wind Speed (m/s)

2m Temperature (°C) reduced to 81 m (station height) from 85 m (HRES) and 84 m (ENS)

Daily mean of Total Cloud Cover (oktas)

Daily mean of Total Precipitation (mm/24h)

M-Climate of the distribution of 10m Wind Direction

Daily Distribution of 10m Wind Direction

Daily mean of 10m Wind Speed (m/s)

M-Climate of 2m Temperature (°C) reduced to 81 m (station height) from 84 m (ENS)

M-Climate: this stands for Model Climate. It is a function of lead time, data (+/-15 days), and model version. It is derived by running a 11 member ensemble over the last 10 years twice a week (1980 realisations). M-Climate is always from the same model version as the displayed ENS data.
Forecast evaluation
Diagnostics

Diagnostic tools are continuously reviewed and developed:

- EDA variance budgets
- EFI for water vapour transport
- Regime transitions
- Error tracking

The aim is to improve ECMWF’s abilities to access process-level information for diagnostic studies
Diagnostics – atmospheric rivers and extreme rainfall
Atmospheric rivers (EFI for Storm Dennis)

AR Reconnaissance

- a. IOP1 0000UTC 02 Feb. 2019
- b. IOP2 0000UTC 11 Feb. 2019
- c. IOP3 0000UTC 13 Feb. 2019
- d. IOP4 0000UTC 24 Feb. 2019
- e. IOP5 0000UTC 26 Feb. 2019
- f. IOP6 0000UTC 01 Mar. 2019

IVT (kg m⁻¹ s⁻¹)
Questions and thank you for listening