

ECMWF Model Description CY40R1

Name: ECMWF Ensemble

The S2S database contains real-time forecasts from ECMWF from **1st January 2015**, and the associated re-forecasts.

1. Ensemble version

Ensemble identifier code: CY40R1

Short Description: Global ensemble system that simulates initial uncertainties using singular vectors and ensemble of data assimilation and model uncertainties due to physical parameterizations using a stochastic scheme. based on 51 members, run twice a week (Monday and Thursday at 00Z) up to day 32.

Research or operational: Operational

Data time of first forecast run: 21/11/2013

2. Configuration of the EPS

Is the model coupled to an ocean model ? Yes from day 0

If yes, please describe ocean model briefly including frequency of coupling and any ensemble perturbation applied: Ocean model is NEMO3.4.1 with a 1 degree horizontal resolution, 42 vertical levels, initialized from ECMWF Ocean Analysis + 4 perturbed analyses produced by perturbing the wind field during the ocean analysis. Frequency of coupling is 3-hourly.

Is the model coupled to a sea ice model? No - Sea ice initial conditions are persisted up to day 15 and then relaxed to climatology up to day 45.

If yes, please describe sea-ice model briefly including any ensemble perturbation applied: -

Is the model coupled to a wave model? Yes

If yes, please describe wave model briefly including any ensemble perturbation applied: ECMWF wave model. No perturbation. Resolution is 0.5 degrees.

Ocean model: NEMO 1 degree resolution

Horizontal resolution of the atmospheric model: TL639 (about 32 km) up to day 10 and TL319 (about 64 km) after day 10

Number of model levels: 91

Top of model: 0.01 hPa

Type of model levels: sigma

Forecast length: 32 days (768 hours)

Run Frequency: twice a week (Monday 00Z and Thursday 00Z)

Is there an unperturbed control forecast included?: Yes

Number of perturbed ensemble members: 50

Integration time step: 20 minutes for day 0-10 and 45 minutes for day 10-30

3. Initial conditions and perturbations

Data assimilation method for control analysis: 4D Var

Resolution of model used to generate Control Analysis: TL1279L137

Ensemble initial perturbation strategy: Singular vectors + Ensemble Data Assimilation perturbations added to control analysis

Horizontal and vertical resolution of perturbations: T42L91 SVs+ T399L137 EDA perturbations

Perturbations in +/- pairs: Yes

4. Model Uncertainties perturbations:

Is model physics perturbed? If yes, briefly describe methods: Stochastic physics (SPPT and SKEB schemes).

Do all ensemble members use exactly the same model version? Same

Is model dynamics perturbed? Yes

Are the above model perturbations applied to the control forecast? Yes

5. Surface Boundary perturbations:

Perturbations to sea surface temperature? No

Perturbation to soil moisture? No

Perturbation to surface stress or roughness? No

Any other surface perturbation? No

Are the above surface perturbations applied to the Control forecast? NA

Additional comments

6. Other details of the models:

Description of model grid: Linear grid

List of model levels in appropriate coordinates: <http://www.ecmwf.int/en/forecasts/documentation-and-support/91-model-levels>

What kind of large scale dynamics is used? Spectral semi-lagrangian

What kind of boundary layer parameterization is used? Moist EDMF with Klein/Hartmann stratus/shallow convection criteria

What kind of convective parameterization is used? Tiedtke 89, Bechtold et al 2004 (QJ)

What kind of large-scale precipitation scheme is used?

What cloud scheme is used? Tiedtke 91 prognostic cloud fraction

What kind of land-surface scheme is used? HTESSEL

How is radiation parametrized? [CY40R1 Documentation Link](#)

Other relevant details?

7. Re-forecast Configuration

Number of years covered: 20 past years

Produced on the fly or fix re-forecasts? On the fly

Frequency: Produced on the fly once a week to calibrate the Thursday 00Z real-time forecasts. The re-forecasts consists of a 5-member ensemble starting the same day and month as the Thursday real-time forecasts for the past 20 years.

Ensemble size: 5 members

Initial conditions: ERA interim (T255L60) + Soil reanalysis (T255) + ORAS4 ocean initial conditions (1 degree)

Is the model physics and resolution the same as for the real-time forecasts: Yes

If not, what are the differences: NA

Is the ensemble generation the same as for real-time forecasts? Yes. Except for EDA perturbations which are taken from the most recent year.

If not, what are the differences: NA

Other relevant information:

ECMWF re-forecasts are produced on the fly. This means that every week a new set of re-forecasts is produced to calibrate the real-time ensemble forecast of the following week using the latest version of IFS. The ensemble re-forecasts consist of a 5-member ensemble starting the same day and month as a Thursday real-time forecast, but covering the past 20 years. For instance the first re-forecast set archived in the S2S database was the re-forecast used to calibrate the real-time forecast of 1st January 2015 (a Thursday). This set consisted of a 5-member ensemble starting on 1st January 1995, 1st January 1996, ... 1st January 2014 (20 years, 5 member ensemble = 100-member climate ensemble). The re-forecast dataset is therefore updated every week in the S2S archive, and **re-forecasts covering all the 4 seasons will only be available at the end of 2015.**

The ECMWF re-forecasts are archived in the S2S database using two dates: "date" and "hdate" (see examples below): hdate is the actual date of the re-forecast (e.g. 19950101) while date is the date of the real-time forecast (=ModelversionDate in grib2) associated to the re-forecast (20150101). The reason we need 2 dates is because the ECMWF re-forecasts are produced on the fly and we need to avoid the re-forecasts produced in the future years to overwrite the re-forecasts currently produced. Therefore ModelversionDate allows us to distinguish the re-forecasts produced in 2015 from those produced in 2016, 2017...

8. References:

Comprehensive description of the model physics: [CY40R1 Documentation Link](#)

Description of the extended range forecasts: <http://www.ecmwf.int/en/forecasts/documentation-and-support/extended-range-forecasts>