NCMRWF Global Ensemble Prediction System (NEPS-G)

The operational NCMRWF Global Ensemble Prediction System (NEPS-G), adapted from "UM Partnership", produce ensemble forecast operationally. The horizontal resolution of NEPS-G is 12 km and the model has 70 vertical levels reaching up to the height of 80 km. The forecast from NCMRWF global deterministic model (NCUM) of same resolution is used as its control member. The global deterministic analysis obtained from "Hybrid 4D-Var" assimilation system is used as the initial condition for the control model forecast. The initial condition perturbations for wind, temperature, humidity and pressure are generated by Ensemble Transform Kalman Filter (ETKF) method at four times a day (00, 06, 12 and 18 UTC). The ensemble perturbations are added to the global deterministic analysis by Incremental Analysis Update (IAU) method to prepare the initial conditions for perturbed ensemble members. The model uncertainties are taken care by Stochastic Kinetic Energy Backscattering (SKEB) and Random Parameter (RP) schemes (Tennant et al., 2011, https://doi.org/10.1002/qj.2202). In order to address the problem of lack of ensemble spread in the near surface variables, perturbation of sea surface temperature is included in this system. Long forecast (10 day forecast) of control and 11 perturbed ensemble members are generated from 00 UTC initial condition of current day and forecasts (10.5 days) of 11 perturbed members are generated based on previous day 12 UTC initial condition. These two sets of forecasts are used to prepare 23 members (11+11+1 control) lagged ensemble forecast for 10 days operationally. The configuration of NEPS-G is summarized in Table-1.

Table 1: Summary of NEPS-G configuration

Model Details	Initial Condition and Perturbations	Forecast length and Ensemble size
Model: Unified Model; Version 11.2 **Resolution:** 12 km, Levels 70 **Domain:** Global **Grid:** 2048 × 1536 **Time Step:** 5 minutes **Physical Parameterizations**: Based on GA7.2 **Dynamical Core:** ENDGame	**Initial condition:** Analysis from global deterministic "Hybrid 4D-Var" data assimilation system. **Initial Condition perturbations:** Perturbations are generated by Ensemble Transform Kalman Filter (ETKF). **Surface Perturbations:** SST perturbations **Model Perturbations:** Stochastic Kinetic Energy Backscatter (SKEB) scheme and Random Parameters (RP)	**Forecast length:** 10 days **Number of Ensemble members:** 22 +1 members lagged ensemble (11 members from current day 00 UTC and control + 11 members from previous day 12 UTC)