

Update of JMA's One-month Ensemble Prediction System in March 2011

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Introduction

Since March 1996, the Japan Meteorological Agency (JMA) has operated the one-month ensemble prediction system (EPS), whose global numerical prediction model is a lower-resolution version of that used for the short-range prediction system (JMA-GSM). In a related development, the Agency formulated a global model with a new dynamical frame and adopted it in the operation of JMA-GSM (Miyamoto 2009). After the update, the one-month EPS was also updated on 4 March, 2011. However, no change was made to the main specifications, such as the resolution and ensemble size (TL159L60, 50 members).

Main changes from the old system

The main changes introduced by this update are outlined below.

* Implementation of a new dynamical frame (with reduced Gaussian grids)

A reduced spectral transformation (Juang, 2004; Miyamoto, 2006) was introduced, and the numbers of grid points and wave number components in the model were lowered to shorten its execution time. The precision of the dynamical process was also improved by setting a number of parameters for transformation between spectral and grid-point space as the quadruple-precision floating type and by refining other dynamical processes.

* Update of climatological aerosol total optical depth

The climatology for the aerosol total optical depth value used in estimating the direct effects of aerosols was updated. The data source for the climatology was expanded, the number of available satellite data was increased, and the method of performing estimation for data-poor areas such as high latitudes was improved.

* Minor change to land surface processes

Soil permeability was refined to improve the reproducibility of soil wetness in the snowmelt season.

* Extension of the hindcast period

Hindcast experiments have been executed using the new system with the target period extended from 1979 – 2004 to 1979 – 2009.

References

- Juang, H. -M. H., 2004: A Reduced Spectral Transform for the NCEP Seasonal Forecast Global Spectral Atmospheric Model. *Mon. Wea. Rev.*, **132**, 1019 – 1035.
- Miyamoto, K., 2006: Introduction of the Reduced Gaussian Grid into the Operational Global NWP Model at JMA. *CAS/JSC WGNE Research Activities in Atmospheric and Oceanic Modeling*, **36**, 06 – 09, 06 – 10.
- Miyamoto, K., 2009: Recent Improvements to the JMA Global NWP Model. *CAS/JSC WGNE Research Activities in Atmospheric and Oceanic Modeling*, **39**, 06 – 09, 06 – 10.