# Long-range Forecasts in JMA
## - Current status and future plan -

Kiyotoshi Takahashi

Japan Meteorological Agency (JMA)

JMA started one (three)-month forecast in 1942, and introduced the dynamical method into the forecast in 1996 (2002) operationally.   In addition to these forecasts, JMA currently issues the Early Warning Information on Extreme Weather and El-Nino outlook based on one-month model forecast and coupled GCM prediction, respectively. For the long-range forecast (beyond one month up to two years) , although statistical methods like OCN and CCA are still referred, dynamical model products are used in producing forecasts as main materials.

The current atmospheric GCM used for three-month/seasonal forecast is basically the low-resolution version (TL95L40) of the AGCM developed by the numerical prediction division (NPD).   The initial is the global analysis done in NPD, and perturbations for the ensemble system are produced with the singular vector method. The size of ensemble member is 51 including the control run. The SST given to the system is the prescribed data produced by merging persistent anomalies and statistically estimated global SST anomalies based on the predicted Nino-3 SST anomaly with the CGCM for El-Nino prediction.   The model performance is evaluated with the WMO Standard Verification System for the Long-Range Forecast. The guidance produced with the perfect prognostic method based on observation data is also used for the long-range forecast.

Towards the more accurate and reliable forecast, we continuously improve and develop the forecast system. In February 2010, Climate Prediction Division (CPD) will introduce a new CGCM into the long-range forecasts. The new CGCM is under development based on the current El-Nino prediction system.   Preliminary evaluation of the CGCM performance as a long-range forecast model was conducted using TFSP/WCRP experiment data with the current El-Nino model.   The results suggest the possibility of many improvements in long-range forecast performance, mainly in the tropical region, for example, predictability of SLP over the Pacific, the Webster-Yang index and so on.   However, there still remain problems in the predictability of MJO. JMA will replace the mainframe computer system in 2012, and CPD will further upgrade the forecast ensemble system by enhancement in its resolution and improving physical parameterizations.