JMA's New Seasonal Ensemble Prediction System (JMA/MRI-CPS2)

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Abstract

The Japan Meteorological Agency (JMA) has upgraded the seasonal ensemble prediction system in June 2015. The outline of upgrade in new operational forecast system (JMA/MRI-CPS2) is as follows: 1) increase of horizontal and vertical resolution in atmospheric model (TL159L60) and oceanic model; 2) introduction of interactive sea-ice model and expansion of the oceanic model into a global domain with the tri-polar grid; 3) new initial conditions for atmosphere and land surface from a JMA new reanalysis (JRA-55), and ocean from a new ocean data assimilation system (MOVE/MRI.COM-G2); 4) more sophisticated description of greenhouse gases (6 gases prescribed with RCP4.5 scenario); 5) introduction of a stochastic physics scheme for better representation of model uncertainty; and lots of improvements in physics parameterization both in atmospheric and oceanic models.

The verification results using the re-forecast for 36 years from 1979 to 2014 indicate that the sea-ice model represents its interannual variability and reduction trend in the Arctic region. It is also suggested that the introduction of sea-ice model contributes to the improvement of prediction skill for 2-m temperature over the Arctic region. The land initialization with JRA-55 and better description of greenhouse gases contribute to improvement of the prediction skill and the warming trend of 2-m temperature over land, respectively. The MV-EOF analysis shows the feature of East Asian Summer Monsoon circulation associated with convective activity in the tropics seen in the reanalysis can be well reproduced in the model. The overall performance and prediction skill of SST associated with El Niño-Southern Oscillation, 2-m temperature and precipitation are improved.