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Forecasting Monthly and Seasonal Rainfall Using a Suite of Global-Regional Climate Model

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Abstract:

The Hong Kong Observatory operated a regional climate model adapted from the Experimental Climate Prediction Center (ECPC) of the University California at San Diego since 2001 to support seasonal forecasting. The regional model was upgraded to a complete suite of global-regional climate adapted from ECPC in 2006. The global model has a horizontal resolution of about 200 km and a vertical resolution of 28 layers. It is initialized by re-analysis data provided by the National Centers for Environmental Protection (NCEP) or real-time data generated by the Global Forecast System of NCEP. The new global-regional climate model offers users the flexibility to adjust the horizontal resolution and coverage of the regional model domain. At present, the regional model is set up to run at a resolution of 15 km.

Rainfall data of nine weather stations in southern China, including Hong Kong and Macao, were used to verify the seasonal rainfall forecasts generated by the 15-km regional model. The verification results revealed that although the 15-km regional model had some skill in forecasting seasonal rainfall anomaly, it tended to grossly over-estimate the absolute rainfall amount. In an attempt to improve the regional model forecast, a bigger regional domain with a resolution of 60 km was constructed and tested. Initial findings indicated that the greater spatial domain was more beneficial to the rainfall forecast than higher model resolution. Thus even with reduced resolution, the model generated more reasonable rainfall forecasts and the skill in forecasting the seasonal rainfall was generally higher than the 15-km model. The potential of 60-km regional model in forecasting monthly rainfall in Hong Kong will be discussed in this paper.