

Further improvement in the JMA/GSM SHIPS by using GSMaP

Udai Shimada, Hiromi Owada, Munehiko Yamaguchi, Takeshi Iriguchi,
Masahiro Sawada, Kazumasa Aonashi and Mark DeMaria

The Japan Meteorological Agency (JMA) plans to operationalize the Statistical Hurricane Intensity Prediction Scheme (SHIPS) for improving tropical cyclone (TC) intensity forecasts as well as strengthening TC-related services as the Regional Specialized Meteorological Centre (RSMC). To achieve this, with great support of SHIPS developers in the US, the Meteorological Research Institute of JMA has transported SHIPS code with some modification so that the SHIPS can run from outputs of the JMA Global Spectral Model (JMA/GSM) and can forecast central pressure as well as maximum sustained wind up to 5 days ahead.

To further improve the accuracy of the SHIPS model, which is a multiple regression equation for forecasting tropical cyclone (TC) intensity (both the central pressure and the maximum wind speed), new predictors derived from the Global Satellite Mapping of Precipitation (GSMaP) data, a microwave satellite-derived rainfall product, were incorporated into the SHIPS. The GSMaP data were used because GSMaP_NOW, a quasi-realtime version of the GSMaP, is currently provided at 30-min intervals with almost no latency, which makes it possible to use microwave satellite-derived rainfall information (i.e., TC inner structure information) in the SHIPS. As a first step, the following four new predictors were incorporated; i) axisymmetry (AXIS), ii) rain area coverage within 300 km radius from the center (RCOV), iii) radius of maximum rainfall (RMAX), and iv) total volumetric rain within 100 km radius (RVOL). AXIS is a predictor that largely contributes to intensification in the first half of the forecast period up to 5 days when TC structure is more axisymmetric. As a result, the accuracy of the SHIPS for the central pressure forecast was improved by up to 5 % mainly in the first half of the forecast. The accuracy of the SHIPS for the maximum wind speed was slightly improved.