# 台風の降水・構造情報を用いた台風強度予報モデルSHIPSのさらなる精度改善

# Further Improvements to the Statistical Hurricane Intensity Prediction Scheme (SHIPS) Using Tropical Cyclone Rainfall and Structural Features

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The Statistical Hurricane Intensity Prediction Scheme (SHIPS) is a multiple regression model for forecasting tropical cyclone (TC) intensity. The version used by the Japan Meteorological Agency (JMA) includes the prediction of central pressure Pmin in addition to the maximum wind speed Vmax. SHIPS mainly uses predictors associated with environmental conditions. Recent studies, however, have shown that inner-core structural conditions also govern subsequent intensity change. In this study the effect of rainfall and wind structure information on SHIPS forecasts was investigated. We incorporated five new predictors associated with TC rainfall and structural features into SHIPS for the western North Pacific basin. Four of the five predictors were derived from the hourly Global Satellite Mapping of Precipitation (GSMaP) reanalysis product, which is a microwave satellite-derived rainfall dataset. The predictors include the axisymmetricity of the rainfall distribution around a TC, rainfall areal coverage, the radius of maximum azimuthal mean rainfall, and total volumetric rain. In addition, the Rossby number, defined as Vmax divided by the radius of 15 m $s^{-1}$ wind and the Coriolis parameter, was incorporated. Among these predictors, the axisymmetricity had the greatest impact on intensity change, in particular, at forecast times up to 42 h. The forecast results up to 5 days ahead showed that the mean absolute error (MAE) of the Pmin forecast in SHIPS with the new predictors was improved by up to near 7% in the first half of the forecast period. The MAE of Vmax forecast was also improved by up to near 4%. Regarding the Pmin forecast, the improvement was greatest for steady-state TCs, with little improvement for intensifying TCs. Finally, a real-time forecast experiment demonstrated that even the use of the hourly near-real time GSMaP product could improve the accuracy of SHIPS, confirming the feasibility for operational use.

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