Impact of ocean coupling on typhoon prediction in high-resolution nonhydrostatic global model

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Accurate prediction of typhoon intensity and track is crucial to mitigate a typhoon disaster. An intercomparison of nonhydrostatic global atmospheric models has been conducted with the aim of improving typhoon prediction under the JAMSTEC Earth Simulator Strategic Project with Special Support. Three models (Double Fourier Series (DFS), Nonhydrostatic ICosahedral Atmospheric Model (NICAM), and Multi-Scale Simulator for Geo-Environment (MSSG)) were configured with a horizontal resolution of 7-km, and 52 forecast experiments during September-October 2013 were performed (see also Sawada et al. in the same session). In addition to that, we performed forecast experiments, where an ocean general circulation model is coupled in the MSSG, to investigate the impact of ocean coupling on typhoon prediction. It was found that the prediction error of typhoon intensity ranged between -10 to 10 hPa at a lead time of up to 60 hours in all models, while the typhoon intensity was under-predicted by 20 hPa in the JMA operational global model (20-km grid spacing). No marked difference was found in the predicted typhoon intensity at a lead time of up to 36 hours between MSSG simulations with and without ocean coupling; however, the predicted typhoon intensity was reduced after a lead time of 36 hours in the case where the ocean is coupled.

Keywords: typhoon, ocean coupling, nonhydrostatic global model

