

Daily observations by profiling floats and numerical simulations on typhoons during 2011-2012 typhoon seasons

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Advances in observational technologies, data assimilation systems and numerical modeling have enabled us to predict tropical cyclones (TC) more precisely. There has, however, been little progress in predicting tropical-cyclone (TC) intensity in spite of the notable improvement in TC track prediction over the decades. The interactions between TCs and the ocean play a crucial role in TC intensification and their incorporation into an atmospheric prediction system would be desired. In order to construct the coupled oceanic and atmospheric TC prediction system, understanding of the TC-ocean interactions is indispensable.

Japan Meteorological Agency deployed three profiling floats to the Northwestern Pacific Ocean on June 2011 and observed the upper ocean everyday during 2011-2012 typhoon seasons in order to seek the possibility of daily variation in temperature and salinity on the improvement of TC predictions. Observations by the three profiling floats could capture TC-induced sea-surface cooling and salinity variation due to precipitation, vertical turbulent mixing and TC-induced advection. The observations were also used to validate results of numerical simulations of T1106 (Ma-on), T1112 (Talas) and others performed by an atmosphere-wave-ocean coupled model. This study presents the effect of salinity variation on TC intensity, intensification and structural change (T1106) and that of sea-surface cooling on T1112 and the generation of subsequent TC.

Keywords: Typhoon, Profiling float, Atmosphere-wave-ocean coupled model