

Simulation of sea salt transport and deposition assuming salt damage by typhoon using NHM-Chem

*Mirai Abe¹, Yoshiaki Miyamoto¹, Mizuo Kajino²

1. Keio University, 2. Meteorological Research Institute, Japan Meteorological Agency

Typhoons occur and develop over the southern seas of Japan, approach and make landfall in Japan in summer and autumn, and cause severe disasters by strong winds and heavy rains. Due to the strong winds associated with typhoons, a large number of sea salt particles is generated from the sea surface, transported by the wind, and deposited on the ground. The deposition of sea salt particles on crops and buildings can cause salt damage. There are three deposition processes: wet deposition, dry deposition, and fog deposition. Despite of the severeness of salt damage, there remains many unknown processes on the transport of sea-salt aerosols by typhoons.

This study investigates the emission, transportation, and deposition processes of sea salt in Typhoon No. 9 in August 2016 based on the results of the numerical simulation using the regional-scale nonhydrostatic meteorology-chemistry model (NHM-Chem) (Kajino et al., 2019).

The result of simulation indicated that the spatial distributions of wet deposition, dry deposition, and fog deposition are remarkably different from each other. The percentages of deposition by the dry, wet, and fog depositions were about 35%, 65%, and less than 1%, respectively. Dry deposition was concentrated in the coastal areas, but wet deposition was also observed inland. Surprisingly, fog deposition was observed associated with the simulated typhoon in the eastern part of Hokkaido. There are few previous studies on the salt damage caused by fog and the relationship between fog and typhoons. The results of our analyses suggest that approaching typhoon can produce fog, and that the deposition of sea salt by the fog can cause salt damage.

Reference:

Kajino, M., et al. 2019: NHM-Chem, the Japan Meteorological Agency's Regional Meteorology -Chemistry Model: Model Evaluations toward the Consistent Predictions of the Chemical, Physical, and Optical Properties of Aerosols, *J. Meteor. Soc. Japan*, 97(2), 337-374.

Keywords: Thphoon, Chemical transport model, fog, sea salt, salt damage