

Mechanism and Quantitative Estimation for Typhoon-Induced Massive Transport of Sea-Salt Particles

Yoshiaki Miyamoto

Faculty of Environment and Information Studies, Keio University

Summary

Tropical cyclones (TCs) transport significant amount of sea-salt aerosols (SSAs) by strong winds to coastal regions, which causes severe damages through salinization of land. However, predicting transportation of SSAs by TC is a challenging issue, because transporting processes of SSA by TC are complicated and determined by many processes such as surface emission, gravitational fall, scavenging by rain droplets, and nucleation. Because of the importance, previous studies calculated the amount of SSAs transported by winds by developing a numerical model solving the processes that play a role in transporting SSAs. However, few studies have been conducted to examine transportation of SSAs by TC. This study aims to investigate the transportation of SSAs produced by winds associated with TC toward land by conducting a set of numerical simulations using a sophisticated chemical transport model and a widely used meteorological model.

The simulation realistically simulated a TC approaching Japan and transporting processes of SSA, production at the ocean surface, advection, and deposition. It is found that the amount of deposition due to gravity is largest near the coastal region. In land, the dry deposition is about one order of magnitude smaller than that of moist deposition. Meanwhile, the amount of moist deposition is largest not at the coast, but approximately 50 km from the coast. In the TC system, which is defined inside the 500-km radius from the center, the moist deposition is the largest contributor out of all terms in the SSA budget equation. More cases need to be examined for better understanding.