World Academy of Science, Engineering and Technology
International Journal of Chemical and Molecular Engineering
Vol:10, No:04, 2016

Experimental Simulations of Aerosol Effect to Landfalling Tropical Cyclones over Philippine Coast: Virtual Seeding Using WRF Model

Authors : Bhenjamin Jordan L. Ona

Abstract : Weather modification is an act of altering weather systems that catches interest on scientific studies. Cloud seeding is a common form of weather alteration. On the same principle, tropical cyclone mitigation experiment follows the methods of cloud seeding with intensity to account for. This study will present the effects of aerosol to tropical cyclone cloud microphysics and intensity. The framework of Weather Research and Forecasting (WRF) model incorporated with Thompson aerosol-aware scheme is the prime host to support the aerosol-cloud microphysics calculations of cloud condensation nuclei (CCN) ingested into the tropical cyclones before making landfall over the Philippine coast. The coupled microphysical and radiative effects of aerosols will be analyzed using numerical data conditions of Tropical Storm Ketsana (2009), Tropical Storm Washi (2011), and Typhoon Haiyan (2013) associated with varying CCN number concentrations per simulation per typhoon: clean maritime, polluted, and very polluted having 300 cm-3, 1000 cm-3, and 2000 cm-3 aerosol number initial concentrations, respectively. Aerosol species like sulphates, sea salts, black carbon, and organic carbon will be used as cloud nuclei and mineral dust as ice nuclei (IN). To make the study as realistic as possible, investigation during the biomass burning due to forest fire in Indonesia starting October 2015 as Typhoons Mujigae/Kabayan and Koppu/Lando had been seeded with aerosol emissions mainly comprises with black carbon and organic carbon, will be considered. Emission data that will be used is from NASA's Moderate Resolution Imaging Spectroradiometer (MODIS). The physical mechanism/s of intensification or deintensification of tropical cyclones will be determined after the seeding experiment analyses.

Keywords : aerosol, CCN, IN, tropical cylone
Conference Title : ICAST 2016 : International Conference on Aerosol Science and Technology
Conference Location : Lisbon, Portugal
Conference Dates : April 14-15, 2016