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**Plain Language Summary:** An intercomparison study of four aerosol wet deposition schemes on the model was performed to simulate particulate Cs-137 in the emission scenario of the March 2011 accident at the Fukushima Dai-ichi Nuclear Power Plant. Additional tests were also conducted on the sensitivity of aerosol tuning parameters and the impact of aerosol-cloud interactions. It is found that a proper set of rainout parameterizations and tunings are as important as the accurate meteorological fields, i.e., wind and water vapor, in determining the reproducibility of Cs-137 aerosol simulations.

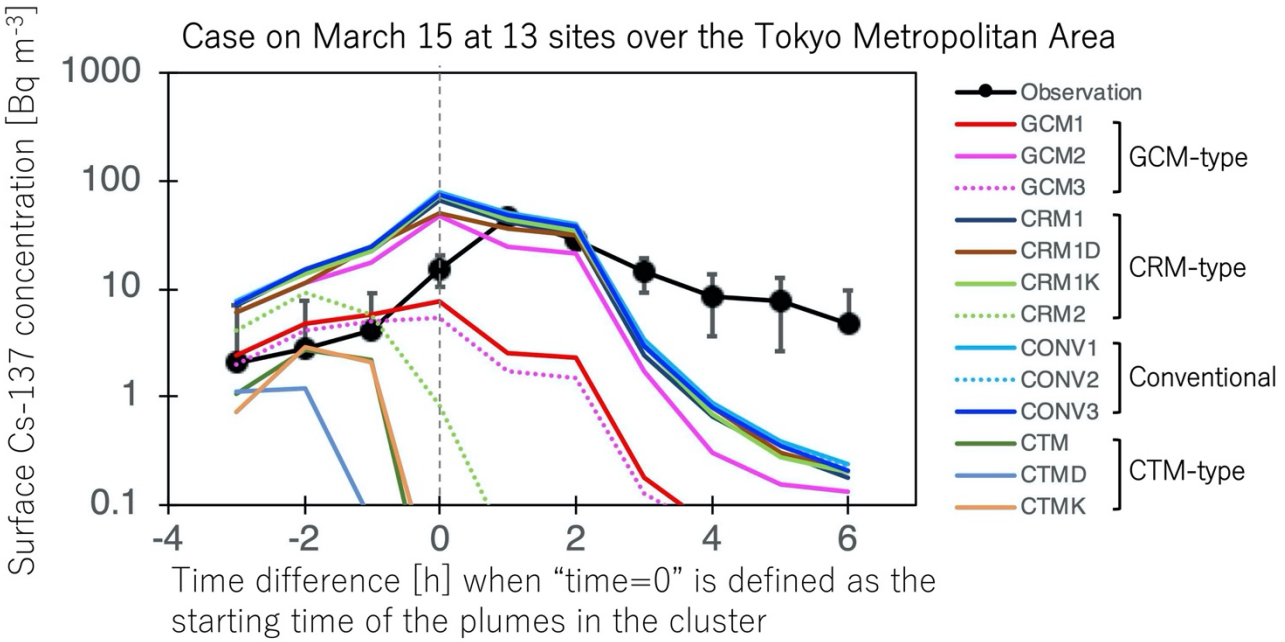


Figure 1. Temporal variations in the observed and simulated surface Cs-137 concentrations on 15 March at 13 sites over the Tokyo Metropolitan Area. The simulations with four different aerosol rainout schemes, i.e., GCM-type, CRM-type, Conventional and CTM-type, are defined at right of the figure. The sensitivities of tuning parameters and cloud microphysics are also examined, and are indicated in the numbers (1, 2 and 3) and the letters (D and K), respectively.

- When the tuning parameters are properly set, all the schemes except CTM-type, are capable of closely resembling the observation.
- The shortcomings of CTM-type may be rooted in the model tendency (of NICAM), which has unusually high cloud water-to-precipitation conversion rate.
- The sensitivity of cloud microphysics on the simulated Cs-137 concentration is smaller than that of the wet deposition schemes