Horizontal distribution of fime-mode aerosol over the Kanto Area in summer, 2007

Yu Morino[1]; Toshimasa Ohara[1]; Shuichi Hasegawa[1]; Hiroshi Hayami[2]; Shinji Kobayashi[1]

[1] NIES; [2] CRIEPI

Chemical transport model (CTM) is a useful tool to quantify controlling factors and source-receptor relationship of fine-mode aerosols. However, results of CTM have large uncertainties, and thus, it is required to compare CTM results with observation carefully. We compared CTM results with observation of fine-mode aerosol at 4 measurement sites (Komae, Kisai, Maebashi, and Tsukuba) in the Kanto Area. Concentrations of PM2.5 species (ionic and carbonaceous species) were obtained with a time-resolution of 6 hours on weekdays from July 31 to August 16, 2007.

Observed results indicated that SO_4^{2-} and organic carbon (OC) had largest contributions (3.5-5.5 ugm^{-3}) at all 4 sites. NO_3^-, NH_4^+, and elemental carbon (EC) also had important contributions (1.0-2.5 ugm^{-3}). Average concentrations of SO_4^{2-} and OC differed only by a factor of 1.6 and 1.4 from site to site, respectively. This indicates that fine-mode aerosol distributed homogeneously over the Kanto Area. A CTM reproduced concentrations of secondary inorganic species (i.e., SO_4^{2-}, NO_3^-, and NH_4^+) within a factor of 2. However, a CTM underestimated EC at suburban sites. Also, OC concentrations were largely underestimated at all 4 sites. A CTM predicted that trans-boundary transport had large contributions to SO_4^{2-} concentrations. Primary particles (EC and primary OC) were predicted to be originated predominantly from motor vehicle emission at all 4 sites.