Geophysical Research Abstracts
Vol. 18, EGU2016-12683, 2016
EGU General Assembly 2016

Water-soluble dicarboxylic acids and ω-oxocarboxylic acids in size-segregated aerosols over northern Japan during spring: sources and formation processes

Dhananjay Kumar Deshmukh (1), Kimitaka Kawamura (2), Minoru Kobayashi (3), and Divyavani Gowda (4)

(1) Institute of Low Temperature Science, Hokkaido University, Japan (dhananjaychem@yahoo.in), (2) Institute of Low Temperature Science, Hokkaido University, Japan (kawamura@lowtem.hokudai.ac.jp), (3) Institute of Low Temperature Science, Hokkaido University, Japan (kobayashi@pop.lowtem.hokudai.ac.jp) , (4) Institute of Low Temperature Science, Hokkaido University, Japan (divyavani@pop.lowtem.hokudai.ac.jp)

Seven sets (AF01-AF07) of size-segregated aerosol (12-sizes) samples were collected using a Micro-Orifice Uniform Deposit Impactor (MOUDI) in Sapporo, Japan during the spring of 2001 to understand the sources and atmospheric processes of water-soluble organic aerosols in the outflow region of Asian dusts. The samples were analyzed for dicarboxylic acids (C2-C12) and ω-oxocarboxylic acids as well as inorganic ions. The molecular distribution of diacids showed the predominance of oxalic acid (C2) followed by malonic and succinic acids whereas ω-oxoacids showed the predominance of glyoxylic acid (ωC2) in size-segregated aerosols. SO42- and NH4+ are enriched in submicron mode whereas NO_3- and Ca2+ are in supermicron mode. Most of diacids and ω-oxoacids are enriched in supermicron mode in the samples (AF01-AF03) influenced by the long-range transport of mineral dusts whereas enhanced presence in submicron mode was observed in other sample sets. The strong correlations of C2 with Ca2+ (r = 0.95-0.99) and NO_3- (r = 0.96-0.98) in supermicron mode in the samples AF01-AF03 suggest the adsorption or production of C2 diacid via heterogeneous reaction on the surface of mineral dust during long-range atmospheric transport. The preferential enrichment of diacids and ω-oxoacids in mineral dust has important implications for the solubility and cloud nucleation properties of the dominant fraction of water-soluble organic aerosols. This study demonstrates that biofuel and biomass burning and mineral dust originated in East Asia are two major factors to control the size distribution of diacids and related compounds over northern Japan.