3.126 Relationship between bioluminescence-based ecotoxicity and water-soluble compounds of fine and coarse aerosol in Jeju, Korea.

Early Career Scientist

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Abstract:
An ecotoxicity test was conducted to determine the ecological effects associated with water-soluble composition of ambient aerosol from Jeju, Korea (Gosan Climate Observatory, GCO). The water-soluble components were extracted from PM$_1$, PM$_{2.5}$, and PM$_{10}$ collected on the filters, and water-soluble ions and WSOC, organic carbon species and ecotoxicity were measured. Vibrio fischeri was used to measure bioluminescence inhibition and the EC10 value, 10% effect concentration, was derived from dose-response curves of each sample. The aerosol ecotoxicity in Jeju, background area, was lower than other studies of urban areas. Overall, bioluminescence inhibition (%) is most related to the major components of the aerosol mass composition, such as SO$_4^{2-}$, NH$_4^+$, and WSOC. Higher ecotoxicity levels were increase NO$_3^-$/SO$_4^{2-}$ ratio or WSOC concentration in PM$_1$ and PM$_{2.5}$ under nearby land outflows with stagnant condition. In several dust events, ecotoxicity was relatively well correlated with PM$_{10}$ mass, and the ecological impact was significantly higher when elevated NO$_3^-$ and NH$_4^+$ levels than when the soil component was increased. Interestingly, we found the ecotoxicity levels were slightly increase with increase abundances of nitrogen-bounded compounds in organic carbon species analyzed by GC-Tof-MS. The relationship between nitrogen containing compounds and ecotoxicity will be verified through the case study of the winter haze and the spring yellow dust events in Aewol, Jeju.