2.018 Interactions at the aqueous aerosol surface.

Presenting Author:

Lin Du, Environment Research Institute, Shandong University, Shanda South Road 27, Jinan, 250100, China, lindu@sdu.edu.cn

Co-Authors:

Siyang Li, Environment Research Institute, Shandong University, Shanda South Road 27, Jinan, 250100, China

Abstract:

Atmospheric aerosols are commonly composed of a mixture of organic and inorganic compounds and constitute an important fraction of air pollutants. Adsorption of volatile species onto aqueous aerosol surface results in aqueous aerosols coated by organic films. Such organic coatings may affect the chemical and physical properties of aerosol particles, which in turn might have effects on different atmospheric processes. The role of surfactants in nucleating cloud droplets has acquired growing interest recently. In this study, the interactions of common atmospheric cations (Ag^{+}, Zn^{2+}, Fe^{3+}, Ca^{2+} and Al^{3+}), anions (Br^{-}, Cl^{-}, NO_3^{-} and SO_4^{2-}) with lipid molecules (fatty acids and phospholipids) and the binary mixture of two lipid molecules at air-aqueous interface were investigated by Langmuir methods and infrared reflection absorption spectroscopy (IRRAS). In the presence of different ions, surface pressure-area isotherms showed the change of phase behaviors and the compressed or expanded characteristics of the organic monolayers. IRRAS spectra confirmed that the existence of inorganic ions in the lipid monolayer changes the surface properties of aqueous-phase aerosols. Formation of different coordination types of carboxylates at the air-water interface alters the dissolution and partitioning behavior. The miscibility and thermodynamic stability of mixed monolayer are dependent on the molar ratio of components. The surface organization of organic film and the change of surface to bulk partitioning may have significant impacts on the transport of volatile species, the evaporation of water vapor and nucleating cloud droplets. Our work displays the relationship between surface structure and properties for aqueous-phase aerosols and implies an efficient method for further understanding of their formation mechanism and potential atmospheric implications.