

6.190 Characteristics of atmospheric depositions of ionic and carbonaceous components in North and South East Asia.

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Abstract:

Atmospheric deposition process is important to evaluate lifetimes and budget of atmospheric components. Deposition amounts of sulfur and nitrogen compounds have been evaluated not only in East Asian region but also worldwide. On the other hand, atmospheric deposition of carbonaceous components including organic carbon (OC), elementary carbon (EC) were monitored only at a few sites in Europe, North America and Africa, which will obscure removal process and atmospheric concentration distribution of those components. In this study, ionic and carbonaceous components in precipitation and aerosol are monitored at urban, rural and remote sites in Japan and Thailand, and the characteristics of atmospheric deposition amounts were evaluated.

Field observations have been implemented at Japanese stations since May 2011 and Thailand stations since September 2015. Wet deposition samples were collected by rain samplers, and dry deposition samples were collected by low volume aerosol samplers. Concentrations of Cl^- , NO_3^- , SO_4^{2-} , NH_4^+ , Na^+ , K^+ , Mg^{2+} , Ca^{2+} were measured by ion chromatography, EC and OC by the IMPROVE protocol. Wet deposition amounts were calculated as the products of aqueous concentration and precipitation amounts, and dry deposition amounts were as the products of air concentrations and deposition velocity estimated by the Inferential Method.

Atmospheric deposition amounts of carbonaceous components of OC and EC at Sado (remote) and Tokyo (Urban) sites from 2011 to 2012 were 2199.1 mg/m², 166.0 mg/m² and 2272.6 mg/m², 80.0 mg/m², respectively. OC was largely occupied in dry and wet deposition of carbonaceous components. Wet deposition of carbonaceous and sulfur components accounted 70%-90% of total deposition. Anthropogenic EC emission in Japan was comparable with EC atmospheric deposition. On the other hand, anthropogenic OC emission was much lower than OC deposition. This implies that biogenic OC emission and transportation of OC from outside of the region would be significant.