1.196 Long-range transport of NH3 deduced from continuous observation at Tottori, Japan.

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Abstract:

Ammonia (NH_3), the dominant volatile base in the atmosphere, plays an important role in atmospheric chemistry. Considering changes in the balance of acidic gases and ammonia emissions in East Asia especially in China, ammonia concentration with phase partitioning in the leeward area, such as Japan, will also change with their emission balance. Concentrations of NH_3 and NH_4^+ in fine particles were continuously monitored by micro-flow NH_4^+ analyzer with denuder differential method (Osada et al., 2011) at the Arid Land Research Center, Tottori University, located near the coast of the Sea of Japan from September 2016 to October 2017. Hourly sampling of fine and coarse particles using a tape sampler and various auxiliary measurements (optical black carbon, SO_2, O_3, CO, HNO_3, NO_y) were also conducted at the site. The observation site is suitable to exclude domestic contaminations from Japan using sea and land breeze winds. NH_3 concentration was high in warm season (April to September) and low in cold season (November to February). NH_4^+ concentration was high from November to July with large variability and low from August to October. The NH_3 concentration was higher in the sea breeze winds during the warm season. HNO_3 concentrations were also high in sea breeze condition during warm season (May to August) but low in the cold season. Although high HNO_3 concentration during sea breeze in the warm season is mainly caused by in-situ photochemical production in daytime, decomposition of NH_4NO_3 particles might also contribute to the increase. However, products of gaseous concentrations were constantly well below equilibrium to form NH_4NO_3 particles in warm season. Therefore, these results suggest possibility of long-range transport of NH_3 in gas phase during these months.