Air pollution characteristics in China based on long-term measurement and case study from Mount Tai field campaign in June 2006

Pakpong Pochanart[1]; Yu Liu[2]; Yugo Kanaya[2]; Yuichi Komazaki[3]; Hajime Akimoto[2]; Zifa Wang[4]

[1] FRCGC, JAMSTEC; [2] FRCGC/JAMSTEC; [3] none; [4] IAP/CAS

The atmospheric pollution resulted from rapid industrialization and urbanization in China is increasing over a large-scale and is a matter of concern to atmospheric scientists and policy makers at both domestic and international levels. Transport and dispersion of these air pollutants lead to problems of air quality degradation on a local, regional or even continental scale. Since 2003, four surface ozone observatories at different rural mountain regions in China have been established in order to gain long-term insight on regional scale atmospheric pollution and air quality. Our observatories are placed at Mt. Tai, (36 15N, 117 06E, 1538 m above sea level) in Shandong Province, eastern China, Mt. Huang (30 08N, 118 09E, 1841 m asl) in Anhui Province, southeastern China, Mt. Hua (34 28N, 110 04E, 2065 m asl) in Shaanxi Province, central eastern China, and Tianchi Lake (43 54N, 88 07E, 1925 m asl) in Tianshan mountains, Xinjiang Uygur autonomous region, western China. Some of the observatories also provide carbon monoxide and black carbon measurements. Besides, in June 2006 an intensive field campaign was carried out at the summit of Mt. Tai. During the campaign period, measurements of several other atmospheric components were made. In this work, we characterize the regional-scale variations of ozone and its related species using both information from long-term observation and the intensive filed campaign. Our results indicate that ozone maximum, frequently exceeded 100 ppb, have been consistently observed during early summer at most sites. The highest concentrations of ozone, CO and BC are observed at Mt. Tai, especially during the campaign period when these air pollutants could be found exceeded 120 ppb, 1 ppm, and 10 ug/m^3, respectively. At other sites, although such high concentrations of ozone, CO and BC have not been usually observed, relatively good correlations between the observed species at most sites indicate strong influences from anthropogenic sources in regional-scale. In particular, significantly high ozone, CO and black carbon (PM1) concentrations have been observed during the period when regional post-harvested agricultural residue burning are intensified, and appear in accordance with a large numbers of biomass burning AVHRR hot spots in the region. Apart from anthropogenic sources, atmospheric boundary layer movement and uplifting of air masses also have a major role contributing the strong diurnal cycles of trace gases observed at the observatories.