

Primary Study on the Characteristics of Trace Gases in a Clean Area of North China

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From 22 May, 2005 to 30 June, 2006, continuous measurements of O_3 , NO_x (NO , NO_2), CO_2 , and SO_2 , were conducted at the Xinglong station (150 km NE of Beijing) of the Chinese Academy of Sciences atmospheric background observation network. In general, O_3 displayed higher concentration in June and September, and the lowest concentration in December. NO_x concentrations were lowest in August slowly increased through to December. The ratio of NO to NO_x was very low. SO_2 showed the lowest concentrations in July, and then increased gradually. CO_2 exhibited the lowest concentrations in August. During September 10 to November 11 of 2005, solar spectral radiation was also measured at the Xinglong station. UV radiation, an energy source for ozone production and depletion, displayed obvious diurnal and daily variations. Though UV and O_3 have some similar diurnal and daily variations, no good correlation can be found between them during the period of September to November, which shows their relationship is complicated. In more detail, daily maximum hourly averages of UV were generally earlier than those of O_3 , which indicates that UV energy is the triggering energy for O_3 formation. In order to better understand O_3 chemistry and photochemistry, solar radiation, O_3 and its precursors of NO_x , VOC_s , and aerosols should be measured simultaneously.

Based on present observations, better air quality occurs in July and August at the Xinglong station. Recent, rapid development of industry, agriculture, and traffic in Beijing City and its surroundings will bring changes in trace gas and aerosol concentrations in these areas. Xinglong station can be considered a good and unique atmospheric background station for the comprehensive study of solar radiation, atmospheric chemistry, and aerosols (especially secondary organic compounds), and how and to what extent human activities influence these parameters. Thus, it is important to carry out long-term monitoring and to study the basic physical, chemical and photochemical processes in the real atmosphere. Meanwhile, reliable and long-term integrated datasets are valuable for input to models and model validation. Collaboration, especially international collaboration, is a good way for us to focus additional resources towards understanding the physical, chemical and photochemical processes in the North China atmosphere, and elsewhere around the world.

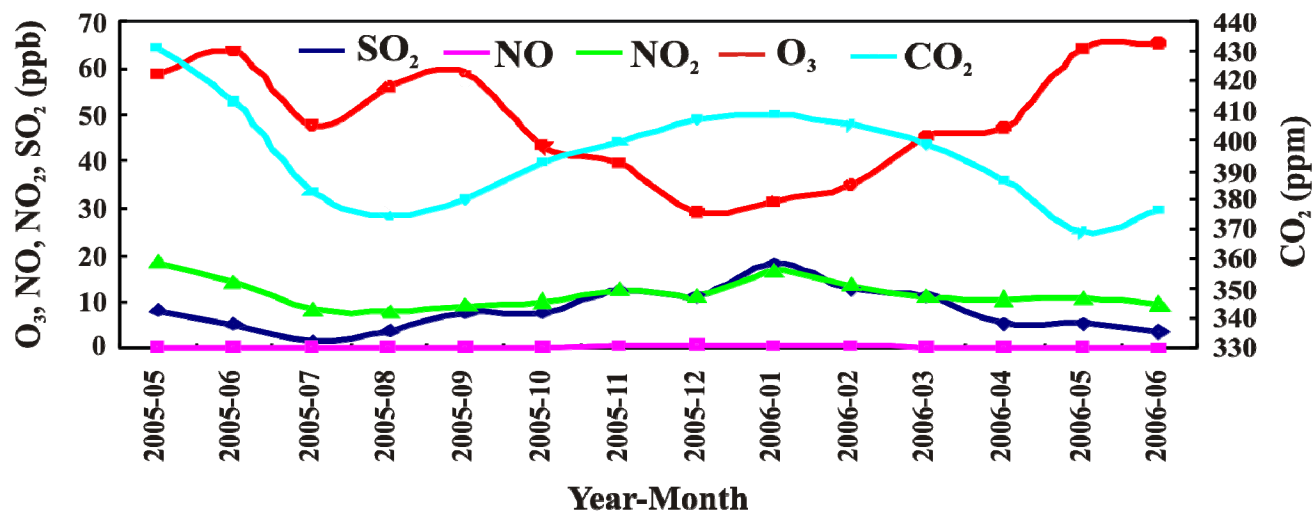


Figure 1. Monthly average concentrations of trace gases at the Xinglong background station 150 km NE of Beijing, China.