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An Overview of the 3C-STAR project

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Over the past three decades, city clusters have played a leading role in the economic growth of China, owing to their collective economic capacity and interdependency. However, pollution prevention lags behind the economic boom, led to a general decline in air quality in city clusters. As a result, industrial emissions and traffic exhausts together contribute to high levels of ozone (O3) and fine particulate matter (PM2.5) pollution problems ranging from urban to regional scale. Such high levels of both primary and secondary airborne pollutants lead to the development of a (perhaps typically Chinese) “air pollution complex” concept. Air pollution complex is particularly true and significant in Beijing-Tianjin area, Pearl River Delta (PRD) and Yangtze River Delta. The concurrent high concentrations of O3 and PM2.5 in PRD as well as in other China city clusters have led to rather unique pollution characteristics due to interactions between primary emissions and photochemical processes, between gaseous compounds and aerosol phase species, and between local and regional scale processes.

The knowledge and experience needed to find solutions to the unique pollution complex in China are still lacking. Starting from 2007, we launch a major project “Synthesized Prevention Techniques for Air Pollution Complex and Integrated Demonstration in Key City-Cluster Region” (3C-STAR) to address those problems scientifically and technically. The purpose of the project is to build up the capacity of regional air pollution control and to establish regional coordination mechanism for joint implementation of pollution control. The project includes a number of key components technically: regional air quality monitoring network and super-sites, regional dynamic emission inventory of multi-pollutants, regional ensemble air quality forecasting model system, and regional management system supported by decision making platform. The 3C-STAR project selected PRD as a core area to have technical demonstration, and thus provide opportunities as well as challenges for PRD to improve its regional air quality.

An integrated field measurement campaign 3C-STAR2008 was organized during October 15-November 19, 2008, including 3-D regional air quality monitoring network, two super-sites, and in-site meteorological and air quality forecasting. With the efforts of more than 100 scientists and students from 12 research institutes, the 3C-STAR2008 was conducted with great success. A great amount of data with rigorous QA/QC procedures has been obtained and data analysis is underway.

In this talk, an overview of the 3C-STAR project will be presented, together with major findings from previous PRD campaigns (PRD2004 and PRD2006).