

## **5.048 Using Wavelet Transform and Mobile Measurement of Air Pollutants to Evaluate Vehicle Emission Control Policies: a Case Study on the 2014 APEC summit in Beijing.**

Presenting Author:

**Tong Zhu**, Peking University, BIC-ESAT and SKL-ESPC, College of Environmental Sciences and Engineering, Beijing, China, [tzhu@pku.edu.cn](mailto:tzhu@pku.edu.cn)

Co-Authors:

**Yingruo Li**, Peking University, BIC-ESAT and SKL-ESPC, College of Environmental Sciences and Engineering, Beijing, China

**Ziqiang Tan**, Peking University, BIC-ESAT and SKL-ESPC, College of Environmental Sciences and Engineering, Beijing, China

**Chunxiang Ye**, Peking University, BIC-ESAT and SKL-ESPC, College of Environmental Sciences and Engineering, Beijing, China

**Junxia Wang**, Peking University, BIC-ESAT and SKL-ESPC, College of Environmental Sciences and Engineering, Beijing, China

**Yanwen Wang**, Peking University, BIC-ESAT and SKL-ESPC, College of Environmental Sciences and Engineering, Beijing, China

**Yi Zhu**, Peking University, BIC-ESAT and SKL-ESPC, College of Environmental Sciences and Engineering, Beijing, China

**Pengfei Liang**, Peking University, BIC-ESAT and SKL-ESPC, College of Environmental Sciences and Engineering, Beijing, China

**Xi Chen**, Peking University, BIC-ESAT and SKL-ESPC, College of Environmental Sciences and Engineering, Beijing, China

**Yanhua Fang**, Peking University, BIC-ESAT and SKL-ESPC, College of Environmental Sciences and Engineering, Beijing, China

**Yiqun Han**, Peking University, BIC-ESAT and SKL-ESPC, College of Environmental Sciences and Engineering, Beijing, China

**Qi Wang**, Peking University, BIC-ESAT and SKL-ESPC, College of Environmental Sciences and Engineering, Beijing, China

**Di He**, Environmental Meteorology Forecast Center of Beijing-Tianjin-Hebei, China Meteorological Administration, Beijing, China

**Yao Wang**, Environmental Meteorology Forecast Center of Beijing-Tianjin-Hebei, China Meteorological Administration, Beijing, China

Abstract:

Vehicular emission is a major source of air pollution in global cities, such as megacity Beijing. Various policies have been introduced to control vehicular emission, but there is lack of proper method to evaluate the effectiveness of these policies. Based on Wavelet Transform (WT) of on-road mobile measurement, we developed a method to decompose the high and low frequency components of the concentrations of air pollutants. Using the

high-frequency components of the concentrations of air pollutants to represent the immediate vehicular emissions, we are able to evaluate the vehicular emission control policies during the 2014 Asia-Pacific Economic Cooperation (APEC) summit in Beijing. The on-road mobile measurement was conducted during the periods of Pre-APEC (28 October to 2 November 2014), APEC (3 to 12 November 2014) and Post-APEC (13 to 22 November 2014) along the 4th Ring Road of Beijing to obtain the concentrations of NO, NO<sub>x</sub>, BC, CO, SO<sub>2</sub>, and O<sub>3</sub> with high time-resolution. Then WT was used to decompose the on-road mobile measured concentrations of pollutants to the low- and high- frequency components. Through comparing the WT results with other methods, we validated that the WT method is feasible and stable to assess vehicular emission control policies. We found in day time, the high-frequency components of the concentrations of NO, NO<sub>x</sub>, BC, CO during APEC were 19.4 %, 17.7 %, 0 %, and 50 % lower than that during Pre-APEC, and were 50 %, 47.3 %, 62.5 %, and 50 % lower than that during Post-APEC, respectively. In nighttime, the high-frequency components of the concentration of NO, NO<sub>x</sub>, BC, CO during APEC were 65.3 %, 65.4 %, 14.3 %, and 50 % lower than that during Post-APEC. The results indicate that the vehicular emission control policies were effective during APEC period.