2.049 A simplified approach for estimating cooking organic aerosol from Q-ACSM measurements in Beijing, China.

Early Career Scientist

Presenting Author:

Yao He, State Key Laboratory of Atmospheric Boundary Layer Physics and Atmospheric Chemistry, Institute of Atmospheric Physics, Chinese Academy of Sciences, Beijing 100029, China, jay-yaoyao@qq.com

Co-Authors:

Qingqing Wang, State Key Laboratory of Atmospheric Boundary Layer Physics and Atmospheric Chemistry, Institute of Atmospheric Physics, Chinese Academy of Sciences, Beijing 100029, China

Wei Zhou, State Key Laboratory of Atmospheric Boundary Layer Physics and Atmospheric Chemistry, Institute of Atmospheric Physics, Chinese Academy of Sciences, Beijing 100029, China

Jian Zhao, State Key Laboratory of Atmospheric Boundary Layer Physics and Atmospheric Chemistry, Institute of Atmospheric Physics, Chinese Academy of Sciences, Beijing 100029, China

Yele Sun, State Key Laboratory of Atmospheric Boundary Layer Physics and Atmospheric Chemistry, Institute of Atmospheric Physics, Chinese Academy of Sciences, Beijing 100029, China

Abstract:

Cooking organic aerosol (COA) constitutes a considerable fraction of total organic aerosol (OA) in megacities worldwide. However, it is very challenging to separate COA from traffic-related hydrocarbon-like OA (HOA) in summer through positive matrix factorization of unit mass resolution (UMR) spectra of quadrupole aerosol mass spectrometer (AMS) or aerosol chemical speciation monitor (ACSM). Here we present a simplified approach to estimate COA from the total primary OA (POA, mainly COA and HOA in summer) using black carbon as a tracer (BC). This assumption is rational because BC is dominantly from traffic emissions in summer in Beijing. By applying this approach to two ACSM datasets in summer in Beijing, we found that COA on average contributed 27 and 13% to OA in 2011 and 2012. These results agree reasonably well with previous PMF results from high-resolution AMS, and also those estimated using maker *m/z*'s of 55, 57 and 44. While this approach has the best accuracy for estimation of COA in summer, it can also be applied to other seasons although some uncertainties were observed due to additional sources of BC, e.g., biomass burning and coal combustion. Our approach has a significant implication in source apportionment of POA in urban areas considering the widely deployed Q-ACSM in the field during the past five years.