Geophysical Research Abstracts
Vol. 18, EGU2016-6371, 2016
EGU General Assembly 2016

Surface-active Substances in the biomass burning and atmospheric particles in the North China Plain, China

Zhijun Wu, Yao Bai, Yuechen Liu, Yujue Wang, Kai Qiao, Yusheng Wu, and Min Hu

Peking University, State Key Joint Laboratory of Environmental Simulation and Pollution Control, College of Environmental Sciences and Engineering, Beijing, China

Surface active materials, such as HUmic-LIke Substances (HULIS), play an important role in particle hygroscopicity and activation by taking up water and acting as surfactants. They account for large proportions of water soluble organic carbon. Currently, the information on the chemical composition, hygroscopicity, and surface active properties of HULIS is still very scarce in china, which is suffering from heavy air pollution. Therefore, we promoted this study to investigate the hygroscopic growth and CCN activity of HULIS particles using hygroscopicity tandem differential mobility analyser and condensation cloud nuclei counter and surface tension depression using contact angle meter (KRÜSS GmbH).

Two different types of particles were investigated in our study. One is the particles emitted from biomass burning. The wheat and corn straw residuals were burned in a lab burning simulator. The $PM_{2.5}$ samples were collected onto quartz filters. Another is $PM_{2.5}$ taken during the heavy hazy days. The HULIS were isolated from $PM_{2.5}$ samples by water exaction, C18 solid phase extraction (SPE), CH_3OH elution, and N_2 drying. Then, the water solution of HULIS was generated to particles using TSI atomizer. The hygroscopicity of HULIS particles were detected by hygroscopicity tandem differential mobility analyzer. The temperature dependency of HULIS surface tension was detected using contact angle meter. The primary results showed that $PM_{2.5}$ consists of a large amount of surface active materials during severe air pollution episodes. A clear temperature dependency of surface tension was observed. At temperature of 20 degree, the surface tension of HULIS exacted from ambient samples is around 50 N/m^2, which is much lower than that of pure water. The future investigations will include the effects of burning conditions on the HULIS concentration and surface tensions. In the presentation, a full picture of the hygroscopicity and CCN activity, and surface active properties of HULIS will be presented.

Acknowledgement

This work is supported by the following projects: National Natural Science Foundation of China (41475127), National Basic Research Program of China (2013CB228503), and the Nonprofit research projects of environmental protection department of China (201409010).