Geophysical Research Abstracts
Vol. 20, EGU2018-2304, 2018
EGU General Assembly 2018

The negative effect of high relative humidity on secondary organic aerosols: observations at a back ground site in East China

Linlin Liang (1), Guenter Engling (2,3), and Wanyun Xu (1)

(1) Chinese Academy of Meteorological Sciences, China (lianglinlin@cma.gov.cn), (2) Department of Biomedical Engineering and Environmental Sciences, National Tsing Hua University, Hsinchu, Taiwan, (3) Now at: California Air Resources Board, El Monte, CA, USA

To investigate the impacts of relative humidity (RH) on secondary organic aerosol (SOA) concentrations and chemical reactions, carbonaceous aerosol components and isoprene SOA-tracers, i.e. 2-methyltetrols (2-methylthreitol and 2-methylerythritol, 2-MT), were quantified in daily PM2.5 samples collected during summer at a background site of East China. SOC (secondary organic carbon) based on the EC-tracer method and 2-methyltetrols both demonstrated obvious negative relationships with RH higher than 60%. Moreover, SOC/EC and 2-MT/EC also exhibited obvious decreasing trends with increasing RH, indicating adverse effects for chemical production of SOA under high RH condition, in contrast to most previous chamber studies and ambient observations. This is due to high RH condition exerting weakening of photochemistry and gaseous oxidant concentrations, such as significantly decreased O_3 levels, leading to low production rates of SOA. Several possible reasons, i.e. acidity, viscosity, and photo-degradation of aerosol particles, are also speculated in relation to the negative effect of high RH on SOA formation based on our ambient measurements. In the real atmosphere, oxidant concentrations, reaction rates, airborne species, etc. are highly variable. How these factors affect SOA yield under different RH conditions warrants further detailed investigations.