1.102 Aircraft-based measurements of aerosol chemical composition in the outflow of Asian megacities during EMeRGe-Asia 2018.

Early Career Scientist

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Abstract:

The EMeRGe-Asia project investigates the atmospheric transport and processing of Asian megacity emissions. In March and April 2018, twelve scientific measurement flights were conducted with the German research aircraft HALO out of Tainan, Taiwan, covering the region between Thailand, the Philippines, South Korea and Japan.
We operated a compact time-of-flight aerosol mass spectrometer (C-ToF-AMS) to measure the composition of non-refractory submicron aerosol particles. Additionally, an optical particle spectrometer was used to measure number concentration and size distribution of particles between 250 nm and about 3 µm, the latter being determined by the transmission efficiency of the aerosol inlet.
The specific objectives of the individual research flights were chosen according to chemical weather forecast using a range of model prediction tools. Outflow from selected target regions, as for example the Pearl River Delta, the Yangtze River Delta, Manila, and Taipeh was successfully probed during several flights. Also, biomass burning outflow from South and East Asia was encountered, predominantly at higher altitudes (typically around 5 km). Although the research focus was set to lower altitudes (below 3 km), vertical profiles were conducted up to 12 km, where occasionally stratospheric influenced air masses (characterized by high ozone values) were found.
The aerosol was mainly dominated by sulfate, although organics and nitrate also contributed, depending on the air mass and the pollution source. For example, coal power plant emissions at Taiwan's west coast contributed more sulfate than organics to the submicron aerosol, whereas urban emissions from Manila were characterized by a higher organic content.
This poster will present first results on aerosol properties, emission types, and atmospheric processing especially of the organic aerosol.