

Hygroscopicity of aerosols and its link to size-resolved chemical composition in urban area: results from KORUS-AQ campaign

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Hygroscopic behavior of aerosols is closely associated with cloud condensation nuclei (CCN) activity and visibility in high polluted area so it is considered as important factors of climate change and air quality. Hygroscopicity of aerosol is known to be influenced by physicochemical properties of aerosol and can be changed by chemical processes involving aerosol species. In this study, physicochemical properties of submicron aerosols and its link to hygroscopicity are examined based on results from KOREa-United States Air Quality study (KORUS-AQ). KORUS-AQ is an international collaborative field campaign that is aimed at understanding various aspects affecting on air quality in Korean Peninsula during May-June 2016.

The measurement was conducted in Olympic Park, one of supersites of the campaign, located in Seoul where local sources from highly urbanized area and transported sources are intermingled. During the campaign, size-resolved chemical composition and hygroscopicity were measured by aerosol mass spectrometer (HR-ToF-AMS) and hygroscopic tandem differential mobility analyzer (HTDMA), respectively. Also, data from other instruments are used to analyze the physicochemical properties of aerosol.

During the campaign, average values of four dry diameters (30, 50, 100 and 150 nm) ranged 0.11 to 0.24 with distinct diurnal pattern. Sharp increase of in the afternoon is closely associated with change in physicochemical properties of aerosol by photochemical reaction. Also, good agreement between GF-derived κ from HTDMA and AMS-based κ implies that aerosol hygroscopicity is related to aerosol chemical composition. In this study, size-resolved chemical composition data is used for more detailed analysis of hygroscopicity as well as mixing state that can't be explained only with bulk data. Particularly, variation of for small particle can be described by divided organic factors with size-resolved AMS data. More detailed analysis will be discussed in the conference.