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Observational study of influence of aerosol hygroscopic growth on scattering coefficient over rural area near Beijing mega-city

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Abstract. We investigated aerosol hygroscopic growth property and its influence on scattering coefficient using M9003 nephelometers in coupling with humidity controlled inlet system at a rural site near Beijing mega-city from 24 April to 15 May 2006. Inlet relative humidity was controlled in an increasing range of 40%–90% while aerosol hygroscopic growth factor of scattering coefficient, $f(\text{RH}=80\%)$ as ratio of scattering coefficient at $\text{RH}=80\%$ to "dry" scattering coefficient ($\text{RH}<40\%$) varied in a range of 1.07–2.35 during the measurement. Further analysis indicated that under dust episode, measured $f(\text{RH}=80\%)$ is 1.2 ± 0.02 , and estimated periodic mean value of $f(\text{RH}=80\%)$ was 1.31 ± 0.03 under clean periods; during urban pollution periods, the aerosol displayed relative strong water absorbing properties with $f(\text{RH}=80\%)$ of about 1.57 ± 0.02 . An examination of chemical composition of daily filter samples highlighted that aerosol hygroscopicity was generally depressed with the increasing ratio of organic matter (OMC)/ammonium sulfate (AS) in particle mass, similar with the results of many previous studies. However, a special case with high value of $f(\text{RH}=80\%)=2.21$ and high OMC/AS ratio was also observed, this exception reflected physico-chemical particularities of organic matter and its complex interaction with other compounds during this episode.

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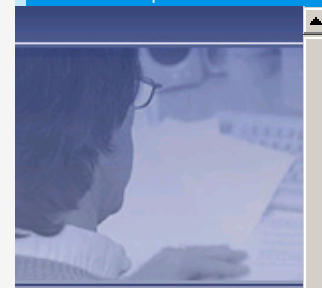
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