



The measurement of gaseous and particulate formaldehyde in Yangtze River Delta (YRD), China

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Formaldehyde (HCHO) is one of the most important intermediate products of atmospheric photochemical reactions and also a radical source promoting ozone formation. As the high solubility, HCHO is likely to exist in particulate form. In this work, gaseous HCHO (HCHO(gas)) and particulate HCHO (HCHO(par)) were separated and collected by a rotating wet annular denude (RWAD) and an aerosol growth chamber- coil aerosol cooler (AC). The collected HCHO from RWAD and AC are measured by two online Hantzsch method-based Formaldehyde Analyzer, respectively. The comprehensive campaign was held in Yangtze River Delta, China from 15 May to 18 July, 2018, which is during the harvest. Several biomass burning events were identified by using acetonitrile as a tracer. During the biomass burning influenced period, the mixing ratio of HCHO(gas) and HCHO(par) were 122% and 231% higher than that in other time. Enhancement ratio (EnR) of HCHO(gas) to acetonitrile obtained from this work generally agree with those from literature. Biomass burning contributed 14.8% to HCHO(gas), but the abundant fresh-discharged precursors emitted by it promoted the secondary production of HCHO(gas) greatly. We suppose that the high concentration of HCHO(par) during biomass burning period was from uptake of HCHO(gas) by aerosols during the transportation, and the aerosols emitted by biomass burning containing most organic component had low uptake coefficient γ . The liquid state particles are conducive to uptake HCHO(gas). High RH, low particle rebound fraction f as well as low temperature may result in higher γ .