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Chemical characteristics and sources of submicron aerosol in Xiamen during the 2017 BRICS summit.

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During the 2017 Xiamen BRICS summit, the chemical compositions (organics, sulfate, nitrate, ammonium, and chloride) of non-refractory submicron aerosol (NR-PM1) were measured by an Aerodyne Aerosol Chemical Speciation Monitor (ACSM). The field observation was conducted from 10 August to 30 September 2017 at the typical costal city Xiamen. Mean concentration of NR-PM1 was 17.56 μg m-3 with a range of 1.88 - 63.12 μg m-3. Organics was the most abundant component with a proportion of 43.15%, following by sulfate (34.44%), ammonium (12.73%), nitrate (9.00%), and chloride (0.68%). The concentrations of the NR-PM1 and its major chemical compositions reduced with the increasing of the control intensity and increased after the BRICS summit, which indicated to the significant effect of the control measures. Mass concentration of sulfate exceeded organics during the BRICS summit, which was different from other periods. Positive matrix factorization (PFM) analysis of organics obtained four components for organics, including HOA, BBOA, COA, and OOA. OOA account for 39.98% of the organic aerosols followed by COA (26.52%), BBOA (18.75%), and HOA (14.75%). The proportion OOA took increased obviously during the BRICS summit indicating to secondary formation enhanced. The episode (episode 1) observed in the early control period was contributed by organics and sulfate, while the other episode (episode 2) happened was mainly associated with organics and nitrate. A typhoon happened in the early control period, the high relative humidity after the typhoon promoted the heterogeneous reaction of secondary aerosols, which contributed a lot to the increasing of PM1 even under the control measures. The existence of nitrate can promote the formation of sulfate in episode 2. Regional transport and the formation of the secondary aerosols were the major contributors to episode 2. The result in this study helped to understand the formation mechanism and sources of submicron aerosol under the intense control measures and the normal status.