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合肥地区沙尘暴降尘过程的大气细粒子谱观测研究

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Particle number size distribution of dustfall aerosol in the suburban area of Hefei

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摘要

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摘要 2010年3月20日至3月28日,利用大气细粒子谱分析仪对合肥地区大气细粒子谱进行连续在线观测.观测过程涵盖整个沙尘暴降尘期、间歇性降雨期及晴好天气粒子浓度增长期.颗粒物数浓度分析表明,沙尘暴降尘期内核模态(Nucleation mode, 5~20 nm)、爱根核模态(Aitken mode, 20~100 nm)和积聚模态(Accumulation mode, 100~1000 nm)粒子浓度分别为 898 cm^{-3} 、 3424 cm^{-3} 、 1587 cm^{-3} ,并未明显高于间歇性降雨期(粒子浓度分别为 255 cm^{-3} 、 1509 cm^{-3} 、 1213 cm^{-3})和晴好天气粒子浓度增长期(粒子浓度分别为 706 cm^{-3} 、 4891 cm^{-3} 、 2468 cm^{-3});沙尘暴降尘期粗粒子模态(Coarse mode, 1~10 μm)粒子值达到 48 cm^{-3} ,浓度远高于其他观测期.粒谱分析表明:合肥地区大气细粒子谱呈典型双峰结构,第一峰值出现在10~20 nm之间,第二峰值出现在100 nm左右,而且不同天气条件下细粒子谱峰值位置略有不同;沙尘暴降尘期,粒径10 nm以下和400 nm以上粒子浓度值高于间歇性降雨期和晴好天气粒子浓度增长期,而非只有粗粒子模态粒子浓度高于其他时段.

关键词: 沙尘暴 降尘期 合肥地区 大气细粒子谱

Abstract: The observation of particle number concentration and size distribution was performed from March 20 to 28, 2010 in Hefei suburban area. The observation period includes the entire sequence of dustfall period, intermittent rainy period, and sunny period which is benefit for the formation of new particles. The analysis of particle number concentration shows that the concentration of Nucleation mode (5~20 nm), Aitken mode (20~100 nm) and Accumulation mode (100~1000 nm) particles during dustfall period was 898 cm^{-3} , 3424 cm^{-3} , and 1587 cm^{-3} , respectively, not obviously higher than those of intermittent rainy (255 cm^{-3} , 1509 cm^{-3} , 1213 cm^{-3}) and sunny period (706 cm^{-3} , 4891 cm^{-3} , 2468 cm^{-3}), but the concentration of Coarse mode particles during dustfall period (48 cm^{-3}) was much higher than that in other periods. The observational results also show that the curves of aerosol particle number size distribution of Hefei are in two-peak pattern. The first peak appears between 10~20 nm, while the second peak appears near 100 nm. The peaks appear at slightly different positions under different weather conditions. During dustfall period, the number concentration of particle with diameter below 10 nm and above 400 nm is higher than those of other period, not just for Coarse mode particles with diameter above 1 μm .

Keywords: Sandstorm Dustfall period Hefei Particle number size distribution

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