

唐杨,韩贵琳,徐志方.北京及其北部地区大气降尘中的黑碳含量特征[J].环境科学学报,2013,33(2):332-338

北京及其北部地区大气降尘中的黑碳含量特征

Black carbon in the atmospheric dust of Beijing City and its north area

关键词: [降尘](#) [黑碳](#) [热化学氧化法\(CTO\)](#) [通量](#)

基金项目: [国家自然科学基金项目\(No. 40973088\)](#); [贵州省自然科学基金项目\(No. 2012GZ60511\)](#)

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摘要: 在北京及其北部地区的10个采样点开展了为期一年的大气降尘样品采集,并测定了降尘样品中的黑碳含量.结果表明:该地区大气降尘中黑碳含量的时空差异明显,变化范围在 $1.21\text{--}50.10\text{ mg}\cdot\text{g}^{-1}$ 之间.研究区总体平均月降尘黑碳含量最低、最高值分别为5月份的 $3.32\text{ mg}\cdot\text{g}^{-1}$ 和9月份的 $10.40\text{ mg}\cdot\text{g}^{-1}$.总体而言,整个研究区夏秋季节降尘中黑碳含量普遍高于春冬季节.这主要是由于冬春季节,沙尘天气频发,降尘中表土来源比例增多,对降尘的黑碳浓度起到"稀释"作用.研究区各点降尘中黑碳的年通量在 $1659\text{ mg}\cdot\text{m}^{-2}\cdot\text{a}^{-1}$ (北京城区)和 $761\text{ mg}\cdot\text{m}^{-2}\cdot\text{a}^{-1}$ (丰宁)之间.主要黑碳排放源强度的常年持续性,决定了城市地区的降尘中黑碳通量季节间差异较小.而在一些受沙尘天气影响大的地区,沙尘暴主导的月份里降尘量较多,也产生了相对高的黑碳通量.

Abstract: The black carbon (BC) is widely concerned for its adverse environmental effects. In this study, atmospheric dust samples were collected from ten sites in Beijing and surrounding areas, and the BC concentrations were analyzed. The monthly average BC concentrations of dust samples ranged from $1.21\text{ mg}\cdot\text{g}^{-1}$ to $50.10\text{ mg}\cdot\text{g}^{-1}$, with the lowest and highest BC concentrations recorded as $3.32\text{ mg}\cdot\text{g}^{-1}$ in May and $10.40\text{ mg}\cdot\text{g}^{-1}$ in September, respectively. Generally, BC concentrations of dust was lower in winter and spring, which might be resulted from the "dilution" of abundant local topsoil and sand imported in winter and spring. Annual BC flux of dust among all sites ranged from $761\text{ mg}\cdot\text{m}^{-2}\cdot\text{a}^{-1}$ (Fengning) to $1659\text{ mg}\cdot\text{m}^{-2}\cdot\text{a}^{-1}$ (Beijing). Seasonal dust BC flux distribution patterns were more uniform in urban area because of the temporal consistency of BC sources. Though urban dust had higher BC concentrations than that of most rural sites, frequent dust weather might also bring high dust BC flux to some outfield areas.

Key words: [dust](#) [black carbon](#) [chemical thermal oxidation](#) [flux](#)

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