

研究论文

城市林地与非林地大气SO₂ 季节动态变化

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摘要 SO₂作为主要的大气污染物之一, 对人体与环境具有严重危害, 导致酸雨后危害更大, 尤其是长江以南省区污染严重。对长沙和株洲市区内2种类型区域——城市林地与城市非林地空气SO₂浓度通过近1 a (2004-01~2005-01)的同时进行对比定位观测, 用甲醛吸收副玫瑰苯胺分光光度法分析, 结果表明: 从两市2种类型采样地空气SO₂浓度水平总体与分别来看, SO₂浓度年内变化均具有明显季节性波动特征 (p=0.001), 冬季最高, 秋季最低; 除冬季二者SO₂浓度较为接近外, 其他各季株洲非林地观测区SO₂浓度均高于同季节长沙非林地观测区SO₂浓度。空气SO₂浓度季节性变化与当地的地理环境、气候条件、采暖期与工业生产布局等因素有较大的关系。其中, 燃煤、降水、风速风向和气温是影响空气SO₂浓度变化主要的污染源与气候条件因素。空气SO₂浓度水平还与所在地有无林木覆盖关系密切。无林地空气SO₂浓度年均值(0.18±0.08)mg/m³, 有林地空气SO₂浓度年均值(0.09±0.07)mg/m³, 二者间存在极其显著差异 (p=0.001)。林木生理活性季节性变化对植物调节空气SO₂浓度季节变化的能力有一定的影响。按林地SO₂浓度减缓效应大小排序, 依次是夏季 (55.4%) > 冬季 (54.1%) > 秋季 (49.3%) > 春季 (29.6%)。城市森林作为一种有效的生物措施在控制和治理城市大气SO₂污染实践中具有重要作用, 不失为一种经济可行、高效的环境保护措施, 应着力提高城市森林覆盖率。

关键词 城市有林地; 城市非林地; 大气SO₂浓度; 季节变化

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Seasonal change in atmospheric SO₂ concentration in forested and non-forested urban lands

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Abstract As one of the most dominant pollutants in the air, the pollution of sulfur dioxide can cause significant damage to the surrounding population and environment. The acid rain caused by sulfur dioxide do much more harm to environment than pollution of sulfur dioxide, which is endangering the most regions of south China. In order to assess the role played by forests in the urban ecosystems, the atmospheric SO₂ concentration was measured continually from Jan., 2004 to Jan., 2005 in specifically selected forested and non-forested sites of the campus within Changsha and Zhuzhou cities, Hunan Province, representing two types of area, respectively. The prosaniline formaldehyde spectrophotometric method was employed to determine atmospheric SO₂ content. The results showed that the atmospheric SO₂ concentration in both site categories exhibited a significant seasonal fluctuation (p=0.001) with the highest in winter and the lowest in autumn. The seasonal change in SO₂ concentration was closely related to local geographical condition, climatic characteristic, heating period, and distribution of urban industry district. It was found that coal burning was the dominant pollution source, and precipitation, wind speed and direction, and temperature were the dominant factors for affecting atmospheric SO₂ concentration in the cities. In addition, SO₂ concentration level in the atmosphere had a tight relationship with the urban forest cover

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r. The annual mean atmospheric SO₂ concentration was significantly higher in the non-forested sites ((0.18±0.08) mg/m³) than in the forest sites ((0.09±0.07) mg/m³). Tree physiological activities made a contribution in the decrease of the atmospheric SO₂ concentration in urban forest sites. According to the abating effect amount of atmospheric SO₂ concentration in forested sites, it ranked as summer (55.4%) > winter (54.1%) > autumn (49.3%) > spring (29.6%). Our results demonstrated that urban forest played an important role in controlling and reducing the atmospheric SO₂ concentration in urbanized areas. Therefore, to sustain urban forest resources and increase urban forest canopy cover will be benefit to improve environmental quality, enhance human health, and enrich urban beauty

Key words [urban forests](#) [urban ecosystems](#) [forest cover](#) [atmospheric SO₂ concentration](#) [seasonal change](#)

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