

快速检索

检索

高级检索

首页

稿约信息

编者论坛

编委会

关于本刊

订购本刊

下载中心

贲孝宇,石金辉,仇帅,姚小红,高会旺.青岛大气气溶胶中铁的溶解度及其影响因素[J].环境科学学报,2015,35(1):65-71

青岛大气气溶胶中铁的溶解度及其影响因素

Solubility of iron in atmospheric aerosols and related influence factors in Qingdao,China

关键词: [铁](#) [气溶胶](#) [溶解度](#) [酸化过程](#) [微量元素](#)

基金项目: [国家自然科学基金\(No.41176097.41210008\)](#); [国家重点基础研究发展计划\(973\)项目\(No.2011CB409802\)](#)

作者 单位

贲孝宇 中国海洋大学海洋环境学院, 青岛 266100

石金辉 1. 中国海洋大学海洋环境与生态教育部重点实验室, 青岛 266100; 2. 中国海洋大学环境科学与工程学院, 青岛 266100

仇帅 中国海洋大学环境科学与工程学院, 青岛 266100

姚小红 1. 中国海洋大学海洋环境与生态教育部重点实验室, 青岛 266100; 2. 中国海洋大学环境科学与工程学院, 青岛 266100

高会旺 1. 中国海洋大学海洋环境与生态教育部重点实验室, 青岛 266100; 2. 中国海洋大学环境科学与工程学院, 青岛 266100

摘要: 大气气溶胶的干湿沉降带来的铁对海洋初级生产和固碳能力有着重要影响,但这种影响从根本上决定于沉降铁的溶解度.本文利用2012年12月在青岛连续采集的31个总悬浮颗粒物(TSP)样品,分析了其中微量元素Fe的总浓度和溶解态浓度,讨论了颗粒物浓度、气溶胶来源及酸化过程对Fe溶解度的影响.结果表明,气溶胶中Fe的总浓度和溶解态浓度分别为 $(3248 \pm 1683) \text{ ng} \cdot \text{m}^{-3}$ 和 $(43.3 \pm 16.4) \text{ ng} \cdot \text{m}^{-3}$,溶解度为0.57%~4.86%,平均为 $1.63\% \pm 1.02\%$.随着气溶胶中总Fe浓度的增加,Fe溶解度呈现规律性降低.气溶胶中Fe的溶解度与富集因子(EF)无相关关系,而与无机和有机酸性离子存在显著正相关关系.气团后向轨迹的聚类分析显示,观测期间,64.5%的气溶胶样品主要受北方沙尘源(DS)影响,35.5%的样品主要受到华北城市群等人为源(AS)影响.AS样品中Fe的溶解度平均为2.06%,高于DS样品中的1.36%.两组样品中Fe的EF值相当,但AS样品中酸性离子与溶解度的相关关系明显好于DS组,表明酸化过程可能是造成两组样品Fe溶解度差异的主要原因.

Abstract: Atmospheric dry and wet deposition of iron aerosols to oceans had an important impact on marine primary production and carbon sequestration while iron solubility is one of the key factors to determine its bioavailability. In this study, 31 total suspended particulate (TSP) samples were continuously collected in December 2012 in Qingdao. The total and soluble concentrations of Fe were analyzed for an investigation of its solubility, sources and related influence factors. The average values of the total and soluble Fe concentrations were $(3248 \pm 1683) \text{ ng} \cdot \text{m}^{-3}$ and $(43.3 \pm 16.4) \text{ ng} \cdot \text{m}^{-3}$, respectively. Fe solubility ranged from 0.57% to 4.86% with the average value of $1.63\% \pm 1.02\%$. Moreover, our results also showed that, with the increase of the total concentration of Fe, Fe solubility decreased. No correlation was found between enrichment factor (EF) and Fe solubility, but Fe solubility exhibited a significantly positive correlation with acid species (inorganic and organic anions). According to the HYSPLIT cluster analysis, aerosol samples can be classified into two groups, i.e. 64.5% of samples were associated with Asian dust invasion with Fe solubility of 2.06% and the remaining by the regional transport of anthropogenic pollutants from cities in northern China with Fe solubility of 1.36%. Fe in the two groups had similar EF, but the correlation between Fe solubility and anions in the anthropogenic samples was higher than that in the dust samples, indicating that differences of Fe solubility between two groups were mainly determined by acidification processes.

Key words: [iron aerosol](#) [solubility](#) [acidification processes](#) [trace metals](#)

摘要点击次数: 1008 全文下载次数: 2471

关闭

下载PDF阅读器

您是第27542623位访问者

主办单位: 中国科学院生态环境研究中心

单位地址: 北京市海淀区双清路18号 邮编: 100085

服务热线: 010-62941073 传真: 010-62941073 Email: hjxxb@rcees.ac.cn

本系统由北京勤云科技发展有限公司设计