

大气干湿沉降: 地下河多环芳烃的重要来源——以广西清水泉地下河为例

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中文摘要:为证实大气干湿沉降物是岩溶地下河中多环芳烃(PAHs)的来源, 研究选择了某城市典型的岩溶地下水源地作为研究地点, 采用大气干湿采样器、聚氨酯泡沫(PUF)大气被动采样器分别采集大气及其干湿沉降物样品, 同时采集地下水样和分层采集流域土壤, 利用气相色谱-质谱联用仪(GC-MS)测定了16种PAHs优先控制污染物。结果表明, 地下河流域大气干湿沉降中PAHs的干湿沉降通量为 $147.26 \text{ ng} \cdot (\text{m}^2 \cdot \text{d})^{-1}$, 流域PAHs沉降量为 1943.8 g ; 大气中的PAHs浓度为 $45.33 \text{ ng} \cdot \text{m}^{-3}$; 地下河水中PAHs浓度平均值为 $220.98 \text{ ng} \cdot \text{L}^{-1}$; 土壤中PAHs浓度为 $38.72 \text{ ng} \cdot \text{g}^{-1}$; 大气、降雨和土壤中PAHs组成以2~3环的萘、苊、菲、荧蒽、芘5种为主, 地下河水中以苊、菲、荧蒽、芘、苯并[a]蒽、苯并[a]芘6种为主。利用地下河多介质中的16种PAHs成分谱、特征比值结合它们的物理化学性质进行PAHs的源解析, 研究显示大气干湿沉降是岩溶地下河水中多环芳烃的主要污染源之一, 这归因于岩溶地区防污性能的脆弱性。

中文关键词:多环芳烃 地下河 大气干湿沉降 成分谱 多介质 污染源

Atmospheric Depositions, PAHs Sources of an Underground River: A Case Study of the Qingshuiquan Underground River

Abstract:In order to prove the viewpoint that atmospheric deposition of polycyclic aromatic hydrocarbons (PAHs) is one of the pollution sources in karst underground river, the authors chose a typical underground river which is used as drinking water source as a study object. The dry and wet depositions and air samples in the study area were collected by the dry and wet deposition sampler and the PUF-passive sampler, with water samples and soils collected in the same period, and then the samples were analyzed by using GC-MS for 16 EPA PAHs. The results showed that PAH depositional fluxes ranged from $147.26 \text{ ng} \cdot (\text{m}^2 \cdot \text{d})^{-1}$, and weight of PAHs deposited in the basin was 1943.8 g in two months. PAHs mean concentrations in air, dry and wet depositions and soils were $45.33 \text{ ng} \cdot \text{m}^{-3}$, $38.72 \text{ ng} \cdot \text{g}^{-1}$ and $220.98 \text{ ng} \cdot \text{L}^{-1}$ respectively, and their dominant PAH compounds were 2~3 rings PAHs such as naphthalene, fluorene, phenanthrene, fluoranthene and pyrene, whereas dominant PAH compounds in the underground river were fluorene, phenanthrene, fluoranthene, pyrene, benzo[a]anthracene and benzo[a]pyrene. Contrastive analysis was conducted in their component spectra, and the characteristic ratios as well as the chemical and physical properties of 16 kinds of PAHs prove that atmospheric deposition is one of the main pollution sources in the karst underground river because the vulnerability of groundwater to contamination in karst area is fragile.


keywords:[polycyclic aromatic hydrocarbons](#) [underground river](#) [atmospheric dry and wet deposition](#) [component spectrum](#) [multimedia](#) [pollution sources](#)

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