

耿頔,杨芬,韦朝阳,季宏兵.风浪扰动对太湖水体中砷在水相-悬浮物相之间分配的影响[J].环境科学学报,2015,35(5):1358-1365

风浪扰动对太湖水体中砷在水相-悬浮物相之间分配的影响

### Effects of wind-wave disturbance on the partition of arsenic between the water-suspended solids phase of Lake Taihu

关键词: [风浪扰动](#) [悬浮物](#) [砷](#) [分配系数](#)

基金项目: [国家自然科学基金项目\(No.41271447\)](#)

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**摘要:** 在太湖冬季不同风速下(0.8、1.8、2.7、3.2、4.0 m·s<sup>-1</sup>)采集了不同深度(水深0.1、1.0和1.8 m,分别记为上、中和下层)的水样,测定了水体和悬浮物中的砷含量及水质参数,计算了砷在两相之间的分配系数,以期了解在太湖生物活动最低的阶段,风浪扰动作用对砷在水相和悬浮物相之间分配的影响.结果显示,随着风浪作用的加强,水体总砷含量有所增加,相应的悬浮物总砷含量及砷的分配系数降低,说明风浪作用可以降低悬浮物吸附砷的能力,以至于促进砷从悬浮物中的释放,进而使水体中的溶解态砷增加.相关性分析及变化趋势比较分析发现,砷分配系数的降低与在风浪扰动的影响下悬浮物浓度和溶解氧的增加,以及叶绿素a浓度的下降有关.不同风速下各参数的垂向分布变化显示,风浪扰动对中层砷分配系数以及中层的悬浮物砷含量影响较大;风速变大时,中层溶解态砷含量升高,上层与下层溶解态砷含量降低;而风浪扰动作用对水体总砷的分层变化影响不大.悬浮物浓度、砷浓度及分配系数均在3~4 m·s<sup>-1</sup>风速下发生变化,且呈现与之前不同的分层特征.4 m·s<sup>-1</sup>可能是一个临界风速,在4 m·s<sup>-1</sup>以上的风速下风浪占主导作用,而4 m·s<sup>-1</sup>以下是湖流与风浪共同作用的结果.

**Abstract:** Water samples were collected at a site in Lake Taihu in January 2014 at the depth of 0.1 m, 1.0 m and 1.8 m, representing the surface, middle and bottom layer, respectively, with wind speeds of 0.8, 1.8, 2.7, 3.2 m·s<sup>-1</sup> and 4.0 m·s<sup>-1</sup>. The water quality parameters and arsenic contents in water and suspended solids were determined and the partition coefficients of arsenic in two phases were obtained to understand the effects of wind-wave disturbance on the partition of arsenic between the water and suspended solids phase at the lowest stage of the biological activity of Lake Taihu. The results showed increased dissolved arsenic and decreased arsenic in suspended solids and partition coefficients with the increase of wind speeds, indicating that wind wave reduced the particle adsorption ability of arsenic, thereby promoting the release of arsenic from particulate matter and increasing the dissolved arsenic in water body. Correlation analysis suggested that the reduction of partition coefficient of arsenic was related with increased suspended solids contents and dissolved oxygen and decreased chlorophyll-a contents under the influence of wind wave disturbance. In the vertical profile of the sampling site, wind-wave disturbance had greater impact on the partition coefficient in the middle and bottom layer water and arsenic in suspended solids in middle layer water, as compared to the other one and two corresponding layers, respectively. The dissolved arsenic content increased in middle layer water and decreased in surface and bottom layer water, when the wind speed increased, while wind-wave disturbance did not affect the stratification of total arsenic. Suspended solids and arsenic content, as well as the partition coefficient differed in stratification characteristics, mostly in 3~4 m·s<sup>-1</sup> wind speed. The value of 4 m·s<sup>-1</sup> may probably be a critical wind speed, with greater wind speeds playing dominant role on wind-wave disturbance while lower wind speed affecting the wind-wave disturbance together with lake flow function.

**Key words:** [wind-wave disturbance](#) [suspended solids](#) [arsenic](#) [partition coefficient](#)

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