



华东师范大学学报(自然科学版) » 2011, Vol. 2011 » Issue (1): 21-31 DOI:

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淀山湖蓝藻水华暴发的气象水文因素探讨

王铭玮, 徐启新, 车越, 杨凯

华东师范大学 上海市城市化生态过程与生态恢复重点实验室, 上海 200062

Research on the meteorological and hydrological factors of cyanobacteria bloom in Lake Dianshan

WANG Ming-wei, XU Qi-xin, CHE Yue, YANG Kai

Shanghai Key Laboratory of Urbanization and Ecological Restoration, East China Normal University, Shanghai 200062, China

- 摘要
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摘要 2007-2009年淀山湖的总氮和总磷年均浓度分别为 3.47~4.53 mg/L和0.18~0.24 mg/L, 明显高于富营养化水平, 成为蓝藻水华暴发的重要物质基础。MODIS影像分析结果表明, 2007-2009年蓝藻水华暴发频次分别为3, 6, 10 d, 呈逐年上升的趋势, 并且暴发后易于集中在湖中心、东北和东部水域。受黄浦江顶托和太浦河壅水作用影响, 淀山湖6-9月间平均水位较高, 换水周期较长。7-9月日均气象因素变化与暴发日气象条件的对照结果显示, 气温偏高(24.2~30.5 ℃)、日照时间长(大于5.9 h)的气象条件成为诱发蓝藻大规模增殖的气象条件; 低气压(小于1 015 hPa)、低风速(小于2.2 m/s)以及基本无降水的气象条件有利于蓝藻上浮形成水华; 强降水、高风速的气象条件则能够抑制蓝藻水华形成。水文气象因素是湖泊蓝藻水华暴发预测预警以及风险应急系统建立的重要内容。

关键词: 气象 水文 蓝藻水华暴发 淀山湖 气象 水文 蓝藻水华暴发 淀山湖

Abstract: The high total nitrogen and phosphorus concentration of Lake Dianshan was the key nutrient supply for cyanobacteria bloom and resulted in the eutrophication. The ranges were 3.47~4.53 mg/L and 0.18~0.24 mg/L during 2007-2009, respectively. The results of MODIS images analysis showed that cyanobacteria bloom in Lake Dianshan increased during 2007-2009, and the frequencies were 3 d, 6 d and 10 d, respectively. The results also showed that the main algae aggregation areas after bloom were the centre, the northeast and the east of the lake. The average water level of Lake Dianshan was higher and the water exchanging period extended from June to September, as a result of backwater effect from Huangpu River and Taipu River. The comparison results between the daily meteorological factors variations from July to September and that on the cyanobacteria bloom dates showed that, in summer, high temperature (24.2~30.5 ℃) and long illumination hours (more than 5.9 h) were likely to accelerate the proliferation rate of cyanobacteria; low air pressure (less than 1 015 hPa), low air velocity (slower than 2.2 m/s) and little precipitation were apt to accelerate the floating up rate of cyanobacteria; heavy precipitation and high air velocity would inhibit cyanobacteria bloom. The meteorological and hydrological factors would play a key role in a prediction and early-warning system of lake cyanobacteria bloom, and also be an important part of building a risk prevention system.

Key words: hydrological factor cyanobacteria bloom Lake Dianshan meteorological factor hydrological factor cyanobacteria bloom Lake Dianshan

收稿日期: 2010-09-01;

通讯作者: 徐启新

引用本文:

王铭玮,徐启新,车越等. 淀山湖蓝藻水华暴发的气象水文因素探讨[J]. 华东师范大学学报(自然科学版), 2011, 2011(1): 21-31.

WANG Mingwei, XU Qixin, CHE Yue et al. Research on the meteorological and hydrological factors of cyanobacteria bloom in Lake Dianshan[J]. Journal of East China Normal University(Natural Sc, 2011, 2011(1): 21-31.

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