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DISTRIBUTION OF BIOAVAILABLE PHOSPHORUS BETWEEN OVERLYING WATER AND SPM UNDER ABRUPT EXPANSION CONDITION*

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Abstract: Experiments on Phosphorus (P) fraction characteristics in sediment resuspension were performed under adequate hydrodynamic conditions. It is found that the concentration of Suspended Particulate Matter (SPM) in the eddy current region exhibits the "Matthew effect". Velocity is an impact factor of the Equilibrium Phosphate Concentration (EPC), which is related to other hydraulic conditions. Overall bioavailable dissolved P in the SPM causes migration to overlying water and sediment, eventually being converted into a chemical speciation of P. Conditions of resuspension promote Al-P of SPM that migrated to the sediment and water. Concentrations of Al-P in SPM are reduced. P is released from SPM to water bodies, mainly through conversion into particulate P and dissolved total P. Meanwhile, exchange between SPM and sediments occur mainly through Ca-P migration. Al-P and BD-P possess similar geochemical characteristics or source. Ca-P and Al-P exhibit a negative correlation between migration and conversion.

Key words: bioavailable phosphorus, Suspended Particulate Matter (SPM), abrupt expansion flow, resuspension

Introduction

Suspended Particulate Matter (SPM), no matter whether delivers from external sources or causes by riverine autochthonous production, discharge, or sediment resuspension, has a major impact on the ecological function of a river system[1] Phosphorus (P) is a limiting nutrient in algae growth. Even if the external source is under the control of case load, sediment release of endogenous P is a source of nutrients for bloom and lake eutrophication[2,3]. River mouth that connects to a lake is considered as the main input channel for P deposition, algal blooms usually focus in this area[4]. The characteristics of P burial are closely related to the power cycle of lake nutrients[5,6].

Sorption and desorption of P in lake sediment have been sufficiently investigated, particularly because of their importance in regulating P concentration in stream water[7,8] . In contrast, little has been reported on P fluxes caused by resuspension events associated with changing flow conditions[9]. Consequently, the effect of hydrodynamic conditions on the extent of P fractions, both in magnitude and source strength from the sediment, is poorly documented.

The importance of P fractions has been observed in numerous laboratory studies[10-12]. However, these experimental approaches have not adequately considered hydrodynamic conditions. Majority of these studies employed full stirring of water using plungers, stirrers, or oscillating grids, which do not occur in nature. Consequently, the rates of P entrainment are likely overestimated and restricted.

Annular flume systems have been extensively used to investigate sediment transport[13,14]. Annular flumes enable control over experimental conditions,

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