

MODELLING PHOSPHORUS EXCHANGE AT THE SEDIMENT WATER INTERFACE OF A BRACKISH WATER BAY.

M. Thouvenot-Korppoo^{*}, T. Karvonen[†] and J. Järvelä^{*}

^{*} Water Engineering, Aalto University School of Science and Technology
P.O. Box 15300, FI-00076 Aalto, FINLAND.
e-mail: marie.thouvenot-korppoo@tkk.fi

[†] WaterHope, Munkkiniemen Puistotie 20 A 6, 00330 Helsinki, FINLAND.

Summary. Phosphorus plays a key role in the eutrophication of coastal waters. Despite this widespread agreement, its release mechanisms from the sediments (internal loading) still remain unclear. Phosphorus is present in the environment under various forms more or less refractory that can be classified as e.g. labile, organic phosphorus, redox-sensitive phosphorus and refractory. In northern Europe, the redox-sensitive part is significant and can play an important role in the release of phosphorus from the sediments (Hartikainen et al., 1996). In this study, we presented our preliminary results on the modelling of phosphorus processes in the sediments of a small brackish bay of the Baltic Sea (Finland). The mechanisms controlling phosphorus concentrations in the sediments of the bay and the release of phosphorus to the water column were identified as redox-conditions and iron and sulphur chemistry (Thouvenot-Korppoo et al., submitted). In this study, we presented a new modelling approach to link the phosphorus cycle to the oxygen, iron and sulphur cycles in the sediments. The new formulation allowed for the representation of the exchange processes between the sediments and the water concerning the three most reactive forms of phosphorus (dissolved, redox-sensitive and organic). The new model successfully simulated the profiles of phosphate, sulphate, iron ions, iron-bound phosphorus and ammonium concentrations in the sediments. Without the herein introduced reactions linking phosphorus to the iron and sulphur cycles, the model could not reproduce the low concentrations of phosphate in the top sediments.

Hartikainen H, Pitkänen M, Kairesalo T and Tuominen L, 1996. Co-occurrence and potential chemical competition of phosphorus and silicon in lake sediment. *Wat. Res.* 30 (10): 2472-2478.

Thouvenot-Korppoo M, Lukkari K, Leivuori M, Karvonen T and Stipa T. Sediment geochemistry and phosphorus release in a brackish water Bay of the Baltic Sea. *Biogeochemistry*, submitted.