Release of Phosphorus from Sediment into Pore Water

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As global climate change becomes an increasing problem, it is important to understand the effects that it may cause. One possible set of effects are changes in solubility of various pollutants in aqueous systems. Phosphorus (P) and nitrogen are two important nutrients that become pollutants when present at elevated concentrations. Phosphorus is particularly worrisome because it is generally the nutrient that limits plant growth. It also binds to particles and is difficult to eliminate from aqueous systems. In collaboration with researchers at Zhejiang University, we determined the total amount of phosphorus released from six different types of wetland sediment into pore water as a function of temperature. Sediment samples were obtained from six different wetland areas of eastern China and experiments were setup outdoors. To simulate two different climate scenarios, the temperature of control samples were allowed to fluctuate in unison with the outside temperatures, while the other set of samples was maintained at 5°C above the outdoor temperature to mimic the anticipated temperature effect of global climate change. The amount of phosphorus released from the sediment by the two groups of samples differed only slightly. However, there were greater differences in the amount and range of P released by the different types of soils. Our results suggest that an increase of 5°C in temperature will likely cause only a modest change in P in pore water of wetland sediments. Our results indicate that that the amount of phosphorus released is much more strongly dependent on the type of soil present. This suggests that there are areas that will be more affected by the temperature increase than others. As a result, as global climate change continues, careful attention will need to be paid to the types of sediment present in wetland environments to determine the severity of the increased temperature on the availability of P in wetlands.

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