Phosphorus biogeochemistry: New approaches, new insights

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Phosphorus is an essential element for life, being a structural and functional component of all organisms. Phosphorus availability can impact primary production as well as species distribution and ecosystem structure. In some systems phosphorus availability is considered the proximal macronutrient that limits primary production. On the other hand phosphorus use as a fertilizer can result in contamination of waterways and eutrophication. Unlike nitrogen, phosphorus cannot be fixed from the atmosphere. Thus, over geologic time scales, it is often considered to be the ultimate limiting macronutrient in marine ecosystems. Because phosphorus has only one stable isotope and is present predominately in one oxidation state, it is not trivial to study phosphorus transformations and cycling in nature.

In recent years a wide array of innovative techniques and approaches have been developed and used to shed light on phosphorus cycling, utilization, biochemistry and geochemical transformations. This has resulted in considerable new insight and new appreciation of the dynamic phosphorus cycle in nature and its relation to life, climate, and human's wellbeing. A brief report on the recent advances in phosphorus research and directions for the future will be discussed.