Microbial molecular processes involved in biogeochemical P cycle in the water column of Lake Pavin (Massif Central, France).

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Phosphorus (P) is an essential element for life and a limiting nutrient in many ecosystems [1] [2]. Phosphorites (sedimentary deposits usually composed of carbonated fluoroapatite, a Ca-phosphate phase) are the main long-term sink in the biogeochemical P cycle. Despite their importance, the processes involved in their formation remain poorly understood.

It is now well recognized that microorganisms are involved in the P cycle, by their ability to actively store (as intracellular polyphosphates, Poly-P) or release inorganic phosphate (Pi or orthophosphate H_3PO_4). Pi is subsequently available for the biosphere or trapped by the biomineralization of mineral phases such as calcium or iron phosphates (or other metals e.g.,Pb, Cr, U…). Yet, the microbial molecular processes involved in the phosphatogenesis, their evolution over geological time, and their relationship to the environmental conditions remain unknown.

We aim to establish a biogeochemical model of the formation of phosphate deposits. We focus at first on an analytical characterization (enzymatic assays, quantification of different P species, microscopy) of environmental samples and cultures of microorganisms isolated from different depths in the water column of Lake Pavin (Massif Central, France). This is a meromictic, permanently stratified lake, with anoxic deep waters in which iron phosphates currently form [3-5].

The preliminary results and next challenge goals will be presented.

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