Detection of enzyme-labeled fluorescence phosphate (ELF-P) hydrolysis in the phytoplankton communities of North Pacific Subtropical Gyre

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Abstract

Currently the dynamic of phytoplankton and the role of nutrient remain unclear in the western part of North Pacific Subtropical Gyre (NPSG). Distribution of inorganic nutrients appears to be insufficient to support the growth of organisms in this oligotrophic condition. Alternative strategies or adaptation of low concentration of phosphate probably occurred in the euphotic layer. Utilization of dissolved organic phosphate (DOP) by the phytoplankton organisms can be one possibility to explain the growth of microphytoplankton in this area. In order to better apprehend the dynamic of remineralisation and the microbial food web, we investigated what microphytoplankton specie hydrolyse the enzyme-labelled fluorescence phosphate (ELF-P) in the euphotic layer. A new molecular probe (ELF®97) was essayed in view to identify the role of cyanobacteria and large microphytoplankton class size highly dependent to the nutrient inputs. Our results confirmed the hypothesis that microphytoplankton is phosphorus stressed in this oligotrophic condition. However, low number of cyanobacteria labelled by the probe highlighted the resistance of this cell to the P stress condition and the difficulty to monitor the nanopicoplankton stained cells. A pluri-disciplinary approaches as alkaline phosphatase activity is necessary to confirm this low abundance of cyanobacteria cells labelled.

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