

PRESSURE EFFECT ON SILICIC ACID REGENERATION MEDIATED BY PROKARYOTIC ACTIVITIES DURING A SINKING DIATOM SIMULATION THROUGHOUT THE WATER COLUMN OF THE OCEAN

Tamburini, C.¹, Dao, M.², Garcin, J.¹, Leblanc, K.^{3,4} & Kirchman, D.L.³

¹Laboratoire Microbiologie, Géochimie et Ecologie Marines, UMR 6117 CNRS - INSU, Université de la Méditerranée, COM, Campus de Luminy, Case 907, 13288 Marseille, Cedex 9, France

²Metro-Mesures S.V., 47 Bd Charles de Gaulle, 91540 Mennecy, France

³College of Marine Studies, University of Delaware, Lewes, 19958 Delaware, USA

⁴Laboratoire d'Océanographie et de Biogéochimie, UMR 6535 CNRS - INSU, Université de la Méditerranée, COM, Campus de Luminy, Case 901, 13288 Marseille, Cedex 9, France
Corresponding author e-mail: christian.tamburini@com.univ-mrs.fr

We examined the mineralization of diatom detritus (*Thalassiosira weissflogii*) and regeneration of silicic acid by natural prokaryotic assemblages in an experiment that simulates the sinking of particulate organic material from surface waters to the meso- and bathypelagic zones. Manufactured hyperbaric bottles were used to simulate the fall of particles during 8 days at the sinking rate of 150 m d^{-1} (increasing the hydrostatic pressure by 1.5 MPa each day) that we compared to experiment carried out at atmospheric pressure (Bidle & Azam, L&O 46,2001). We found that aminopeptidase activities were always lower under increasing pressure incubation than under atmospheric pressure incubation. Lower aminopeptidase activity under increasing pressure seems to affect biogenic silica dissolution at least in the first 800 m.

Increasing pressure in sterile controls alone did not lead to biogenic silica dissolution. No changes in community structure were observed due to the pressure. In contrast, input of fresh diatom detritus did induce a change in community structure composition where *Cytophaga-Flavobacter* cluster and gamma-Proteobacteria were the most abundant groups. Our results indicate that the increase of hydrostatic pressure does induce an inhibition of aminopeptidase activity rates and consequently influences, at least in the first 800 m, the silica dissolution.

A special device has been designed in order to simulate fall of particles throughout the water column of the Ocean. This device (PASS for PArticle Sinking Simulator) is constituted by (1) a pressure generator, (2) a pneumatic agitator for (3) hyperbaric bottles and (4) a temperature control system.