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Accumulation of Gel Particles in the Sea-Surface Microlayer during an Experimental Study with the Diatom *Thalassiosira weissflogii*

PDF (Size: 655KB) PP. 129-145 DOI : 10.4236/ijg.2013.41013

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ABSTRACT

Since the early 80's, the sea-surface microlayer (SML) has been hypothesized as being a gelatinous film. Recent studies have confirmed this characteristic, which confers properties that mediate mass and energy fluxes between ocean and atmosphere, including the emission of primary organic aerosols from marine systems. We investigated SML thickness and composition in five replicate indoor experiments between September and December 2010. During each experiment, the SML and underlying seawater were sampled from four seawater tanks: one served as control, and three were inoculated with *Thalassiosira weissflogii* grown in chemostats at 180, 380 and 780 ppm μCO_2 . We examined organic material enrichment factors in each tank, paying particular attention to gel particles accumulation such as polysaccharidic Transparent Exopolymer Particles (TEP) and the proteinaceous Coomassie Stainable Particles (CSP). While previous studies have observed carbohydrates and TEP enrichment in the microlayer, little is yet known about proteinaceous gel particles in the SML. Our experiments show that CSP dominate the gelatinous composition of the SML. We believe that the enrichment in CSP points to the importance of bacterial activity in the microlayer. Bacteria may play a pivotal role in mediating processes at the air-sea interface thanks to their exudates and protein content that can be released through cell disruption.

KEYWORDS

Sea Surface Microlayer; Extracellular Polymeric Substances; Organic Matter; Bacterial Abundance; Polysaccharides; TEP; CSP

Cite this paper

 L. Galgani and A. Engel, "Accumulation of Gel Particles in the Sea-Surface Microlayer during an Experimental Study with the Diatom *Thalassiosira weissflogii*," *International Journal of Geosciences*, Vol. 4 No. 1, 2013, pp. 129-145. doi: 10.4236/ijg.2013.41013.

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