



Influence of CO₂, nitrate, phosphate, and silicate limitation on intracellular dimethylsulfoniopropionate in batch cultures of the coastal diatom *Thalassiosira pseudonana*

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ABSTRACT: We measured intracellular dimethyl sulfoniopropionate (DMSP) concentrations in nutrient-limited batch cultures of the coastal diatom *Thalassiosira pseudonana*. Under N, P, CO₂, and Si growth limitation, intracellular DMSP concentrations decreased to low values during the exponential phase of growth and increased under nutrient limitation. The intracellular DMSP concentration increased exponentially with decreasing growth rate and cellular chlorophyll *a*, in response to the type and degree of nutrient limitation. For a given growth rate, N-limited cells showed the greatest increase in cellular DMSP concentrations, CO₂ and Si limitation had an intermediate effect, and P limitation caused the smallest increase. The results demonstrate the importance of nutrient limitation in enhancing DMSP concentrations in marine algae. This enhancement may be linked in part to the role of DMSP as a cellular antioxidant and to increased oxidative stress within cells during nutrient limitation. The replacement of DMSP, a sulfur-containing osmolyte, for N-containing osmolytes such as proline may also explain at least some of the DMSP increase under N limitation. Our results also point to the possible importance of diatom blooms in global or regional sulfur cycles.

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