

EGU2020-6993

<https://doi.org/10.5194/egusphere-egu2020-6993>

EGU General Assembly 2020

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An antioxidant function for dimethylsulfonopropionate (DMSP) and dimethylsulfoxide (DMSO) within three different phytoplankton groups

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Dimethylsulfonopropionate (DMSP) and dimethylsulfoxide (DMSO) are two compounds involved in the carbon and sulfur cycle and are the precursors of the climate cooling gas dimethylsulfide (DMS). Despite decades of research, their role as osmoregulator, cryoprotector or antioxidant within the phytoplankton cells remains uncertain in some part. Since the antioxidant cascade system from the DMSP reported by Sunda & al. (2002), more investigation need to be conducted to confirm or accurate these interactions. This study aims to improve the knowledge about DMSP and DMSO and their hypothetic role of antioxidant on three different classes of phytoplankton (Dinophyceae – Prymnesiophyceae – diatom) and one diatom no-DMSP producer *Chaetoceros* sp. as negative control. Laboratory cultures were submitted to three oxidative stress to produce Reactive Oxygen Species (ROS) with (1) increasing light intensity from 100 to 600 and up to 1200 $\mu\text{mole/m}^2\text{s}$ for a global and natural oxidative stress; (2) using the menadone bisulfite (MSB) to generate $\cdot\text{O}_2$ and (3) using 3-(3,4-dichlorophenyl)-1,1-dimethylurea (DCMU) to inhibit the photosystem II (PSII). The PSII activity, the Chlorophyll a concentration (Chl a), the lipidic peroxidation (LOP), the ROS production and the pigment variation were analysed after 6h of incubation and related to the evolution of the DMSP and DMSO concentrations to better understand the cellular oxidative stress and its impact on the phytoplankton cell and DMSP and DMSO production.