What is the impact of brines conditions on the biogenic DMSP and DMSO production? A cell culture approach

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Sea ice is an extreme environment known to host microbial communities which produce dimethylsulfoniopropionate (DMSP) and dimethylsulfoxyde (DMSO), two biogenic precursors of the climate cooling gas dimethylsulfide (DMS). Despite decades of research, drivers and pathways of the sea ice DMS cycle remain largely unknown. This study quantifies for the first time the production of the metabolites DMSP and DMSO by the diatom *Fragilariopsis cylindrus* and the prymnesiophyceae *Phaeocystis antarctica* under changes of temperature and salinity typically encountered in the sea ice brine habitat. Salinity 75 and salinity 100 experiments suggest an osmolyte function of both dimethyled sulfur compounds in the diatom cell. A stronger salinity shift to 150 induces an osmotic shock and ultimately cell death. Decreases of temperature combined with increases of salinity reveal similar trends and suggest that the cryoprotectant function of DMSP and DMSO is not relevant in our cultures. Through this study, we improve our knowledge and the modelling capabilities of the sea ice DMS cycle.