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Ocean acidification alters the nutritional value of Antarctic diatoms

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The cold waters of the Southern Ocean (SO) are acknowledged as a major hotspot for atmospheric CO2 uptake and is anticipated to be one of first regions to be affected by Ocean acidification (OA). Primary production in the SO is dominated by diatom-rich phytoplankton assemblages, whose individual physiologies and community composition are strongly shaped by the environment, yet knowledge on how diatoms allocate cellular energy in response to OA is limited. Using Synchrotron based FTIR-Microspectroscopy at the Australian Synchrotron, we analysed the macromolecular content of selected individual diatom taxa from a natural Antarctic phytoplankton community exposed to a gradient of fCO2 levels (288 – 1263 µatm). We found strong species-specific differences in macromolecular partitioning under OA. Larger taxa showed preferential energy allocation towards proteins, while smaller taxa increased both lipid and protein stores. Our study also revealed an OA-induced community shift towards smaller taxa and lower silicification rates at high fCO2. If these changes are representative of future Antarctic diatom physiology, we may expect a shift away from lipid rich large diatoms towards a community dominated by smaller, less silicified taxa, but with higher lipid and protein stores than their present-day contemporaries, a response that could have cascading effects on foodweb dynamics in the Antarctic marine ecosystem.

Level of Expertise

Student

Presenter Gender

Woman

Pronouns

She/Her

Which facility did you use for your research

Australian Synchrotron

Students Only - Are you interested in AINSE student funding

Yes

Do you wish to take part in the Student Poster Slam

Yes

Condition of submission

Yes

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