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Cocccolithophore contribution to carbonate export to the deep sea in the Australian-New Zealand sector of the subantarctic Southern Ocean

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Coccolithophores are ubiquitous marine unicellular algae belonging to the Class Prymnesiophyceae, division Haptophyta. They are distinct from other phytoplankton groups in their capacity to produce minute calcite platelets (termed coccoliths) with which they cover their cells. During the Cretaceous and throughout the Cenozoic era, pelagic sedimentation of carbonate was largely controlled by coccolithophores as evidenced by their major contribution to deep-sea oozes and chalks. In the modern Southern Ocean, coccolithophores represent an important component of the phytoplankton communities and carbon cycle. However, their contribution to total Particulate Inorganic Carbon (PIC) for large regions of the Southern Ocean remains undocumented.

Here we report the Particulate Inorganic Carbon (PIC) and coccolithophore fluxes collected over a year by sediment traps placed at two sites of the subantarctic Southern Ocean. We present coccolith mass estimates of the most abundant coccolithophore species and quantitatively partition annual PIC fluxes amongst heterotrophic calcifying plankton and coccolithophores. Our results reveal that coccolithophores account for approximately half of the annual PIC export in the subantarctic Southern Ocean. Moreover, in contrast to satellite estimations, that mainly reflect coccospheres and detached coccoliths of Emiliania huxleyi, less abundant but larger species make the largest contribution to $CaCO_3$. Lastly, comparison of our data with previous studies suggest that projected environmental change in the Southern Ocean may result in a decline of

coccolithophore PIC production and export.

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