Coccolithophore abundance, degree of calcification, and their contribution to particulate inorganic carbon in the South China Sea

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Particulate inorganic carbon (PIC) production and export to deep oceans are important processes in water column carbonate cycling. Biochemical investigations have shown that seawater PIC in eutrophic high-latitude waters is contributed by the marine calcifying algae coccolithophores, which are constituted almost entirely of individuals of the species *Emiliania huxleyi*. This allows a predictability of the seawater PIC in these high fertility regions based on satellite remote sensing. However, in low surface PIC productivity waters, which account for 70% of the global ocean area, the subsurface PIC maximum may not be well constrained by satellite.

Here, using samples from a biochemistry cruise in the South China Sea, we investigated seawater coccolithophore cell and coccolith abundances, the degree of *E. huxleyi* coccolith calcification, and PIC concentrations in the deep chlorophyll maximum layers, aiming to improve our understanding of PIC production in these low productivity regions. Our results demonstrate the control of water column nutrient levels on the geographical (horizontal) distribution of Noelaerhabdaceae coccolithophores (*E. huxleyi* and *Gephyrocapsa oceanica*) in the investigated area, and also indicate an insensitive response of degree of calcification in *E. huxleyi* coccoliths to carbonate chemistry. Although Noelaerhabdaceae coccoliths are the major components of deep-sea sediment carbonate, they on average contribute <18% of suspended PIC in the investigated seawater samples, indicating multiple sources to the highly variable suspended PIC in the subsurface oligotrophic water. The production of Noelaerhabdaceae coccoliths greatly depends on local environmental conditions, and this highlights the importance of field investigations in low fertility areas in order to evaluate global PIC productivity.