

Changes in coccolith weight in the northern South China Sea and their environmental controls

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Coccolithophores are one of the most abundant and widespread groups of calcifying plankton and have attracted extensive study in terms of their likely response to ocean acidification. Because of the minuteness of coccoliths, it is difficult to estimate their amount of calcite. Here we applied the SYRACO system (computational image analysis of smear slides) to analyze the morphology and weight of coccoliths produced by the dominant coccolithophore groups. We obtained high-resolution coccolith weight records for *Emiliana huxleyi* and *Gephyrocapsa* spp. from sediment core MD05-2904 in the northern South China Sea over the past 200ka. To compare climatic and environmental variables, the carbonate chemistry parameters, including pH, carbonate content, and bicarbonate content of sea water, were calculated using existing available data. The two sets

of coccolith weights showed different patterns over the last 200ka. The weight of *E. huxleyi* correlated with the seawater pH and pCO₂ variations, while the weight of *Gephyrocapsa* spp. was partly negatively related to the seawater pH variations. Both of the two time series showed great changes during the last two glacial terminations, which were characterized by a quick increase in atmospheric CO₂ concentration. Our data revealed that temperature and salinity were not strongly correlated with coccolith weight. Similar to most previous culture studies, the increasing of pCO₂ had a different impact on different coccolithophore species. Coccolithophore calcification is thought to be affected by multiple factors, including nutrient content, insolation, and carbonate chemistry, which have different influences depending upon the period of time.