

Late Quaternary coccolith weight variations in the South China Sea and their environmental implications

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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. Conflicting results concerning coccolithophore calcification have been reported from both experimental and field studies. Due to their minute size, it is difficult to estimate the amount of calcite in coccoliths. Here we apply the SYRACO system to analyzing the weights and lengths of coccoliths produced by the dominant coccolithophore family Noëlaerhabdaceae. We obtain high-resolution coccolith weight and length records of GEO (*Gephyrocapsa oceanica*) and SPC (*Emiliania huxleyi* and small *Gephyrocapsa* spp.) groups from sediment core MD05-2904 in the northern South China Sea (SCS) over the past 200 kyr. A calcification index (CI) based on the coccolith weight and length is applied to evaluate the changes in coccolithophore calcification. The two groups of coccolith weights / CIs show different patterns on long term variations and during the last two terminations. We compare the coccolith weight and CI records with the environmental variables and carbonate chemistry parameters calculated in the same core. Our data reveals that sea surface temperature and insolation have weak correlations to coccolith weight and CI on long-term variations. The SPC weight / CI are correlated with the seawater pH and $p\text{CO}_2$ variations while the GEO weight/ CI are more related to the nutrient variations. This implies a more significant role of ocean carbonate chemistry in the calcification of less calcified coccolithophores and nutrient concentration in the heavier calcifying coccolithophores.