



The effects of 20th century climatic perturbation on calcareous algae in the Santa Barbara Basin (California)

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Decadal- and interannual modes of atmosphere-ocean variability are well-known from instrumental observations in the Pacific region. These fluctuations are associated with the Pacific Decadal Oscillation (PDO) and greatly impact marine ecosystems along the California coastline. However, it is currently unclear how the effects of recent warming on different marine taxa may be similar or different from past PDO variations. The PDO has basin-wide effects on sea-surface temperature (SST) and thermocline slope that are similar to El Niño but on longer time scales. A laminated box core from the Santa Barbara anoxic Basin reveals that coccolithophore assemblage fluctuations can be related to climatic and paleoceanographic changes during the last century. In our study, the main oceanographic parameters controlling the distribution of coccolithophore assemblages are temperature and water stratification, since nitrate and phosphate are relatively high throughout the study period. Variations in abundance of two warm water affinity species (*Florisphaera profunda* and *Umbilicosphaera sibogae*) show different patterns with respect to the PDO and warming trend. *U. sibogae* reflects decadal-scale fluctuations associated with the PDO during the 20th century while *F. profunda* has relatively low abundances during a positive phase of the PDO from 1935-1945 but increases in abundance during the last two decades, in associa-

tion with the warming trend. While variations in abundance of other species may also reflect the PDO, there appears to be an influence of the 20th century warming trend on some aspects of the coccolithophore assemblage shift during the last 20 years. We will discuss the coccolithophore response to the apparently superimposed anthropogenic effect.