

## **STABLE ISOTOPIC EVIDENCE AND IMPLICATIONS OF EARLY-MIDDLE CRETACEOUS EQUATORIAL OCEAN TEMPERATURE VARIATION**

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Stable isotopic measurements have been made on planktonic foraminifera (including *Hedbergella delrioensis* and *Rotalipora appenninica*) and coccolithic-rich sediments of early-middle Cretaceous age from a number of DSDP/ODP sites. The degree of alteration of the foraminifera has been assessed through the application of chemical analyses, cathodoluminescence (CL) and Scanning Electron Microscopy (SEM). The hedbergellid foraminifera display consistently lighter oxygen and heavier carbon isotopic values than do the rotaliporid foraminifera and hence provide isotopically-derived palaeotemperatures consistent with a thermally stratified ocean. The isotopic results suggest that middle Cretaceous equatorial oceans were possibly only as warm (or slightly warmer) as those of the present day but did not reach the high temperatures claimed in earlier literature. Investigation of changes in polar heat transport and latitudinal sea surface temperature gradients suggest that globally warmer climates were likely to have had reduced temperature gradients (i.e. were more equable), whilst in contrast cold climates were characterised by increased equator-to-pole temperature gradients and warmer equatorial temperatures. A potential scenario may be envisaged for early Cretaceous cool episodes when an absence of (or limited) poleward heat transport resulted in the tropical regions being as warm or warmer than they are today.