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# RADIOCARBON ANALYSIS OF CO-OCCURRING ALKENONES AND CRENARCHAEOL IN CONTINENTAL MARGIN SEDIMENTS

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Compound-class and compound-specific radiocarbon analyses of biomarkers have revealed systematic differences in the radiocarbon age of the lipids preserved in marine sediments. These differences in radiocarbon content, and the deduced radiocarbon age, appear to reflect differences in their resistance to degradation during lateral and vertical transport of the lipids to the sediments and within the upper cm to dm in the sediment (Mollenhauer & Eglinton, 2007).

We analysed the radiocarbon concentration of crenarchaeol, a glycol dialkyl glycerol tetraether (GDGTs) derived primarily from marine crenarchaeota. These organisms also produce the GDGTs whose concentration ratios are used in the $TEX_{86}$ proxy for sea surface temperature (SST) (Schouten et al., 2002). Radiocarbon concentrations of crenarchaeol were compared to existing data on radiocarbon concentrations of total organic carbon, planktic foraminifera, and alkenones (Mollenhauer et al., 2005). The latter also serve for the calculation of the widely applied $U^{K'}_{37}$-index also used for reconstruction of SST.

Samples were chosen from two continental margin sites with contrasting age relationships between foraminifera and alkenones. Off Southern Chile, alkenones were consistently depleted in radiocarbon with respect to foraminifera, implying substantial lateral supply of pre-aged organic matter to the core site. Radiocarbon concentrations of crenarchaeol samples from this core were identical within analytical error to those of the foraminifera. Off NW Africa, the age relationship of alkenones and foraminifera does not imply significant supply of pre-aged material, and crenarchaeol radiocarbon concentrations were similar to those of the other sediment constituents.

The results imply differences in the relative proportions of alkenones and crenarchaeol supplied by in-situ production vs. lateral advection. They have important implications regarding the resistance of the two types of compounds to degradation. Crenarchaeol being systematically enriched in radiocarbon with respect to alkenones, and its similarity to the radiocarbon concentrations of planktic foraminifera, implies that the preserved fraction of this compound derives primarily from the upper water column, even though crenarchaeol is also produced in deeper water. In this context, we will discuss export efficiency of crenarchaeol

from different water depths, and the potential biases associated with the SST reconstruction based on the two lipid-based indices $TEX_{86}$ and $U^{K'}_{37}$.

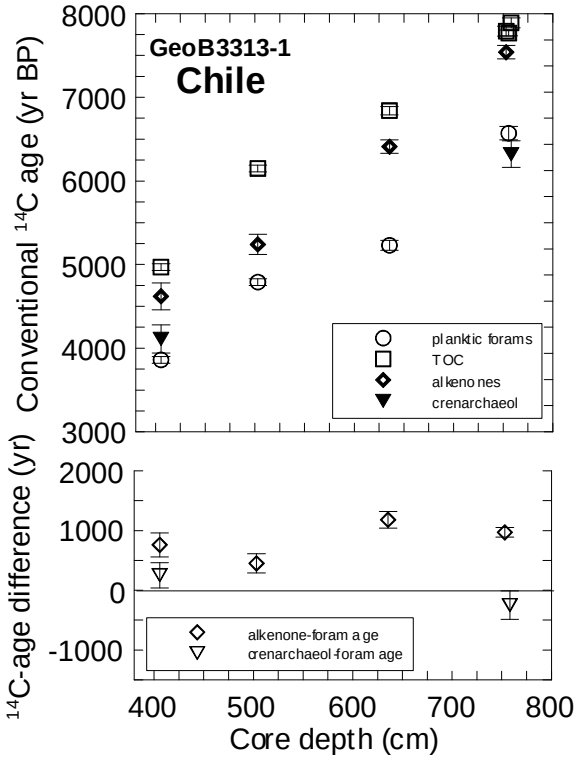


Figure 1. Radiocarbon age (top panel) of co-occurring sediment constituents, and age differences between lipid biomarkers and planktic foraminifera (bottom panel) in core GeoB3313-1 (41.00°S, 74.75°W, 852 m). Radiocarbon data for foraminifera, TOC and alkenones are from Mollenhauer et al. (2005).

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