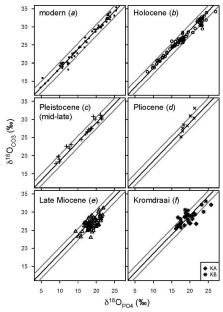
Comparison of Phosphate Oxygen Isotopes by SIMS and TC/EA-IRMS in Pleistocene Enamel

NOREEN TUROSS* AND LINDA M. REYNARD[1]

[1]Department of Human Evolutionary Biology, Harvard University, Cambridge, MA, USA (*correspondence: tuross@fas.harvard.edu; lreynard@fas.harvard.edu)

Oxygen isotopic composition in fossil calcified tissue contains information about past environments, seasonality, and resource utilization. Several issues have complicated the analysis of oxygen isotopes in tissues such as vertebrate enamel. Enamel mineral hydroxylapatite has three sources of oxygen, the phosphate and hydroxyl groups, as well as carbonate that is substituted into the apatite lattice. Carbonate oxygen has been the major source of oxygen isotopic data from enamel due to the relative simplicity of the measurement, but as suggested by Iacumin *et al* [1], a literature and current comparison of carbonate vs. phosphate oxygen isotopes from the same individuals suggests carbonate oxygen values may be diagenetically altered in older material.



(Figure 2 from Reynard et al., submitted)

Additional issues in enamel oxygen isotopic measurements are the need for high spatial resolution and the question whether techniques such as SIMS reflect the phosphate oxygen isotope values obtained via the TC/EA-IRMS method. By comparing phosphate oxygen isotope values in early Pleistocene bovid and primate teeth by TC/EA-IRMS and SIMS, we demonstrate that the isotopic differences observed in the two animal groups are the same by both analytical methods. The diagenetic changes in the carbonate oxygen and the unknown impact of hydroxyl oxygen do not obscure the SIMS data differences.

[1]Iacumin *et al*., 1996. Earth Planet. Sci. Lett. 142, 1-6.

This abstract is too long to be accepted for publication. Please revise it so that it fits into the column on one page.