

Advances in *in-situ* Sr isotope analysis in tooth enamel using LA-MC-ICP-MS

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Strontium isotope analysis of teeth can provide important information about the dietary history of individuals. This can help characterize seasonal variations in nutritional behavior or reconstruction of migration patterns of the investigated species. The low requirements for sample preparation and the high spatial resolution that can be achieved by LA-MC-ICP-MS make this method an effective tool for tracing changes in ⁸⁷Sr/⁸⁶Sr. Many specimens can be analysed in a short time through easy sample exchange and flexible sample holders. In addition, analyses can be done parallel to growth zones directly on the enamel surface of the tooth, removing the need to embed or cut the specimen. This is especially important for unique archeological specimens where minimal damage is essential. In situ Sr analysis by LA-MC-ICP-MS has been successfully applied to teeth with a homogenous Sr isotope signature [1]. However, our ability to resolve – analytically and spatially – the typical variability in Sr isotope composition on the outer surface of the enamel has not yet been investigated.

Here we applied ⁸⁷Sr/⁸⁶Sr analysis by LA-MC-ICP-MS on the outer surface of tooth enamel from different species. For teeth showing significant variation across their surfaces, the results are compared to values obtained in different growth zones in cut and polished sections. The data are used to assess the analytical and spatial resolution of this new approach. In addition, we investigate the effect of diagenetic overprinting to enable a more robust framework for data interpretation and explore cleaning protocols to optimize analytical routines.

[1] Le Roux, P.J. et al. (2014), *Palaeogeogr. Palaeoclimatol. Palaeoecol.*, **416**, 142–149