
New advances in U-Th dating of Quaternary materials through the use of isotopic mapping obtained by La-Fs HR-ICP-MS coupling

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Résumé

Uranium series dating is a well-known method that has proven its worth for many years. However, the conventional protocol of total dissolution of the sample with double spike is not suitable for small samples, with very low uranium contents (ultra-trace levels) and poorly preserved (open systems). Nevertheless, this type of sample is very present on most archaeological sites (ostrich egg shells, teeth, shells...) and have a potential for geochronology that is still unexploited.

Recent advances in both laser ablation techniques and inductively coupled plasma mass spectrometry allow us today to consider U/Th dating in a new way, through high resolution and accurate isotopic mapping in various quaternary materials, even for concentrations below ppt.

Images of different biominerals were obtained by LA-Fs HR-ICP-MS coupling. Appropriate image processing (isotopic mapping) makes it possible to date minerals and biocarbonates, even for samples with a poor state of preservation. No prior chemical preparation steps are required, which reduces the risk of contamination. Image analysis allows the identification of leached or contaminated areas, as well as the correction for the incorporation of detrital thorium. The small quantity of material required to carry out this protocol (mg or even less) thus makes this method particularly relevant for the dating of precious samples, or those that have been neglected until now because of their small size.

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