Calcium isotopes;
Pre-treatment method for paleontological samples and diet reconstruction of the Neanderthal Regourdou 1.

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The calcium isotopic composition ($\delta^{44/42}$Ca) of bone and tooth enamel can be used for paleo-ecological reconstructions of extinct mammals. Under experimental conditions, the $\delta^{44/42}$Ca value of bones and teeth varies as a function of diet with a constant isotope offset of about -0.6‰. The archaeological and paleontological remains are subjected to numerous diagenetic processes, resulting, among other, in the addition of exogenous elements that overprint the original values.

Ca is resistant to diagenesis but its composition can be impacted by the incorporation of Ca carbonate within the micro-porosities of the studied tissue. In order to better characterize these inclusions and the pre-treatment applied to eliminate them, we analyzed synthetic samples of bone and calcium carbonate, as well as archaeological samples of enamel and bone.

Analysis by Raman spectroscopy proved to be effective in detecting and quantifying Ca carbonate inclusions in synthetic and archaeological samples. Analysis of element concentration and Ca isotopic composition revealed that the acetic acid leaching method was effective in removing Ca carbonates without altering the isotopic Ca composition of the archaeological samples, but could alter the original concentration of other elements.

The application of this treatment method allowed the reconstruction of the European food web from Ca isotopes in the presence of Ca Carbonate. The results show that the $\delta^{44/42}$Ca value of the circa 90kyr old Neanderthal Regourdou 1, and that of most carnivores in the Regourdou deposit are lower than herbivore which can be explained by the ingestion of meat and bone marrow containing at least 1% trabecular bone.

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