MULTI-ISOTOPES APPROACH ($\delta^{44/40}$CA, $\delta^{88/86}$SR AND ^{87}SR/^{86}SR) OF RHIZOLITHS FORMATION MECHANISMS IN TERRESTRIAL SEDIMENTS OF NUSSLOCH (GERMANY)

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Carbonates in loess-paleosol sequences are considered as a good paleo-environmental proxy for climate change during the Quaternary period. In this study, we present a new dataset of $\delta^{44/40}$Ca, $\delta^{88/86}$Sr and ^{87}Sr/^{86}Sr to understand the formation of rhizoliths (roots encrusted with $CaCO_3$) within these kinds of sequences from Nussloch region (Germany). Our results indicate that the leached fractions of rhizoliths (sampled at 3.2 m, 6.6 m, and 8.4 m depths and leached with HCl) have lower $\delta^{44/40}$Ca and $\delta^{88/86}$Sr, and higher ^{87}Sr/^{86}Sr isotopic values than the leached fractions of rhizosphere and loess of the same stratigraphic levels. Rhizoliths $CaCO_3$ reflect a mixture between loessic $CaCO_3$ from the stratigraphic level in which rhizoliths are found and $CaCO_3$ precipitated within the root itself, whose isotopic signatures are representative of a Holocene near-surface soil level (0.65 m depth).
A new scheme of the rhizolith formation mechanisms has been proposed involving: (1) deepest roots encrustation until the only roots available to uptake water and nutrients were located in the near-surface level, (2) a massive removal of Sr and Ca from the soil at 0.65 m depth, which represents the last available reservoir, (3) a translocation of Sr and Ca through the phloem in the lignin parts of the encrusted roots not yet decomposed, and (4) a $CaCO_3$ precipitation within the cells of the roots, whose isotopic signatures will be identical to the last level from which nutrients were collected.