Nd and Sr isotope geochemistry of sediments and associated biota from Tagus and Sado estuaries (Portugal)

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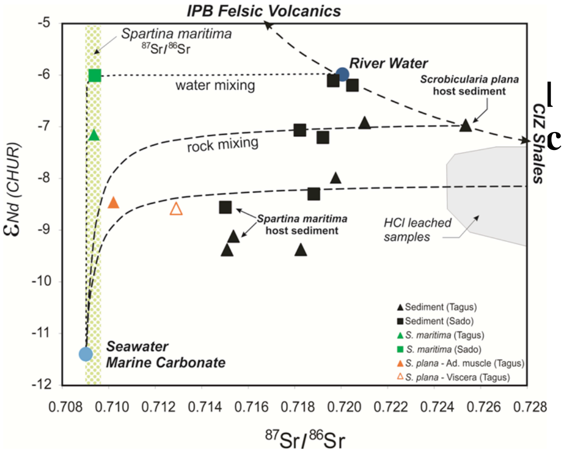
This study reports on Nd and Sr isotopes and elemental geochemistry of sediments and associated biota (*Spartina maritima*; *Scrobicularia plana*) collected in the intertidal domain of Sado and Tagus estuaries. Sediments display UCC type REE patterns, but variable ^{143}Nd/^{144}Nd (0.512171–0.512325) and ^{87}Sr/^{86}Sr (0.715367–0.725351) isotopic ratios, which tend to decrease with increasing Ca/Al and Si/Al values. The observed variations of isotopic ratios suggest that Nd and Sr in the Tagus and Sado estuarine sediments were mainly derived from an heterogeneous UCC source (e.g., old recycled CIZ shales + juvenile IPB volcanics) with variable inputs from relatively unradiogenic, Ca, Si – rich, marine components. *S.maritima* and *S.plana* tissues have ^{143}Nd/^{144}Nd isotopic ratios (0.512272–0.512330 and 0.512197–0.512204, respectively), which are similar to those of their host sediments; however, ^{87}Sr/^{86}Sr values (0.709193–0.709408 and 0.709321–0.710204, respectively; excepting visceras of *S.plana* bearing lithic particles = 0.712855) are much lower then those of their sedimentary substrate. These results indicate that Sr and REE in *S.maritima* and *S.plana* tissues had distinct sources; metabolic Sr was mostly derived from seawater, whereas REE were bio-processed from sources identical to those of the estuarine sediments.



Speciation study in the sulfamethoxazole-copper-pH-soil system: Implications for antibiotic retention prediction in soils

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Most antibiotic substances are acid-base reactive and metal complexing. These characteristics determine specific chemical relationships for the prediction of their retention in soils, aquifers, and suspended matters. The results for Sulfamethoxazole (SMX), a persistent sulfonamide antibiotic commonly found in natural waters, is presented. The speciation of the SMX - Cu(II) - H^+ system in solution and the combined sorption of these components on a natural vineyard whole soil were investigated by acid base titrimetry and Infrared Spectroscopy. Cu(II) is considered to represent a strongly complexing trace element cation (such as Cd^{2+}, Zn^{+2}, Pb^{+2}, Ni^{+2}, etc.) in comparison to major but more weakly binding cations (such as Ca^{++} and Mg^{++}). The analysis showed that SMX is a medium to weak copper complexing agent and it also qualifies as a weak to medium soil sorbate at pH 6. However, the sorption of SMX in soil increases strongly in the presence of copper. This strongly supports the hypothetical formation of ternary SMX-Cu-soil complexes, especially when considering the almost quantitative sorption of the strongly sorbing copper. The data were successfully modelled with the assumption of the existence of binary and ternary surface complexes in equilibrium with aqueous Cu, SMX and Cu-SMX complexes. It is thought that other strongly complexing cations such as Cd(II), Ni(II), Zn(II), Pb(II), Fe(II/III), Mn(II/IV) and Al(III) present on the surface of reactive organic and mineral soil phases affect the solid/solution partitioning of SMX, and that the sorption strength may be estimated from existing sorption constant relationships. This study thus suggests that the state of surface-adsorbed cations significantly affects the sorption strength of SMX, and that the interactions may be predicted by combining equilibrium analysis and modeling studies.

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