

Nd-Sr isotopic and REY geochemistry of metalliferous sediments in a low-temperature off-axis hydrothermal environment

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Metalliferous sediments were found on the direct vicinity of a basaltic outcrop called «Dorado», located on the oceanic crust west of Nicoya Peninsula (Costa Rica). Based on heat flow data, this site is an area of active low temperature hydrothermal discharge. Our data are from core 50GC, composed of a mottled mixture of zeolitic clay and yellowish brown mud from 12 to 70 cm below seafloor (bsf), layers and patches of oxides and phosphates from 70 to 124 cm bsf, and scattered fragments of glassy basalt at the bottom of the core indicating the proximity of the basalt-sediment interface.

One of the aims of this study is to determine the origin of the fluids which interacted with sediments, leading to the precipitation of the newly formed mineral phases. The majority of the samples present chondrite-normalized REY patterns typical for a low-temperature hydrothermal or sub-oxic diagenetic origin, with negative Ce and Eu anomalies, and a positive Y anomaly. The only exception is the surface nodule with highest REE concentrations and a distribution pattern characteristic for hydrogenous nodules and a Sr isotopic composition identical to present-day seawater.

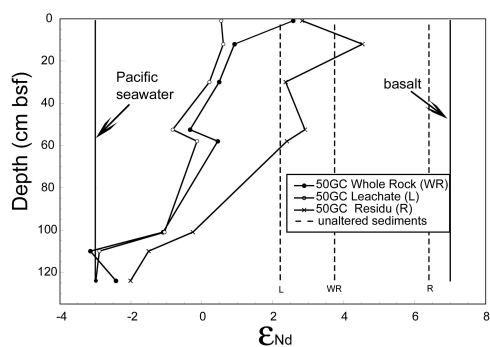


Fig. 1

Nd isotopic composition of the 50GC sediments were measured (whole rock, 1M HCl leachates and residues) and compared with average unaltered sediment, basalt and present-day Pacific seawater (Fig.1)

The evolution from a seawater-like Nd-isotopic composition of the sediments at the base towards a composition close to unaltered sediment near the surface suggests that the sediments have been altered by upflowing hydrothermal water which has not significantly exchanged with oceanic crust but conserved its initial seawater composition, and that the newly formed mineral phases precipitated by interaction with this fluid.