# Comparison of Ce isotopes in two oceanic arc systems: Lesser Antilles and Mariana

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The Rare Earth Elements (REE) include two radiogenic systems with long-lived, parents: $^{138}$La-$^{138}$Ce ($T_{1/2}$= 292.5 Ga) and $^{147}$Sm-$^{143}$Nd ($T_{1/2}$= 106 Ga). These four elements are incompatible but cerium displays a specific behavior in supergene environnments. At ambient oceanic conditions, Ce is oxidized into $Ce^{4+}$ and it is more quickly removed from seawater than the other tri-valent REE [1]. As a result, La and Ce are strongly decoupled in pelagic sediments and Fe-Mn nodules. Here, we present Ce-Nd isotope data measured on lavas and sediments from two different oceanic arc systems. Lavas from Martinique Island exhibit a large range of Sr-Nd-Hf-Pb isotopic compositions due to the involvement of crustal material in their source [2,3]. The isotopic composition of Mariana lavas is less heterogeneous, but the Ce anomalies identified in the REE pattern of some samples could be explained by the presence of subducted pelagic sediments [4,5].

The chemical separation and purification of Ce uses three different chemical steps and isotope ratios are measured on a TIMS instrument. The mean $^{138}$Ce/$^{142}$Ce for the Ames standard is 0.0225749±8 (n=64; 2σ=37ppm), whereas analyses performed on two chondrite samples gave a mean value of 0.0225654±7. All these results are in agreement with previous studies [6,7].

$^{138}$Ce/$^{142}$Ce ratios of Martinique lavas display a small but significant range (-0.5 to +1.8 $\varepsilon_{Ce}$, deviation to chondritic value $\times 10^4$). They correlate well with Nd, Sr and Pb isotopes [3] and provide a strong evidence for sedimentary effect on Ce isotopes in this arc. The 5 studied sediments yield $\varepsilon_{Ce}$ between +2.3 to +1.2. These values are consitent with the terrigeneous nature of the subducted sedimentary pile involved in the lava genesis. Ce and Nd isotope measurements of Mariana lavas and sediments from the ODP site 801 are currently in progress. We will present the first comparison of high precision Ce isotope measurements for these two oceanic arcs with contrasting geodynamic settings.

[1] Elderfield, 1982, *Nature* **296**. [2] Carpentier *et al* 2008, *EPSL* **272**. [3] Labanieh *et al* 2010, *EPSL* **298**. [4] Hole et al. 1984, *JGSL* **141**. [5] Elliott *et al* 1997, *JGR* **102**. [6] Willbold, 2007, *JAAS* **22**. [7] Makishima & Masuda, 1993, *Chem geol* **106**.