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Spatial variation of biologically available strontium isotopes ($^{87}\text{Sr}/^{86}\text{Sr}$) in an archipelagic setting: a case study from the Caribbean

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Abstract

This paper presents the results of strontium (Sr) isotope analysis of modern and archaeological animal remains and modern plant samples from the Caribbean region. The goal is to assess if patterns of human mobility can be determined from the archaeological record in an archipelagic setting. The range of variability and spatial distribution of biologically available strontium isotope signatures is reported and data evaluated to determine if sufficient heterogeneity exists to permit the identification of mobility despite the presence of potentially large contributions of marine strontium in island and coastal ecosystems. The (is)landscape is divided into several sub-regions

based on the age and lithology of underlying geology and the variability of $^{87}\text{Sr}/^{86}\text{Sr}$ ratios is reported as; mean $^{87}\text{Sr}/^{86}\text{Sr} \pm 2$ standard deviations, number of samples: 1) Volcanic and Intrusive rocks (0.7077 ± 0.0019 ; $n = 162$); 2) Cretaceous–Miocene Limestone (0.7085 ± 0.0009 ; $n = 50$); 3) Pliocene–Quaternary Limestone (0.7091 ± 0.0004 ; $n = 54$); 4) Sedimentary Deposits (0.7094 ± 0.0015 ; $n = 16$); 5) Metamorphic Deposits (0.7104 ± 0.0014 ; $n = 6$). There are substantial differences between expected $^{87}\text{Sr}/^{86}\text{Sr}$ values based on associated geology and measured $^{87}\text{Sr}/^{86}\text{Sr}$ in flora and fauna samples. These differences emphasize the importance of focusing on bioavailable strontium, as opposed to geological proxies, for estimations of Sr isotope ranges, especially in archipelagic environments. While some overlap exists between the $^{87}\text{Sr}/^{86}\text{Sr}$ ranges of certain sub-regions, other sub-regions possessed limited variation and could be distinguished based on strontium isotope data. This spatial patterning of biologically available strontium indicates that strontium isotope analyses can be successfully applied to the archaeological study of human mobility within the Caribbean region.

Highlights

- We report strontium (Sr) isotope results of plants and animals from the Caribbean.
- We evaluate these Sr isotope data relative to underlying geology.
- Large differences found between geological and biological Sr isotope ranges.
- Clear spatial patterning of bioavailable Sr isotopes relative to geology.
- Spatial variation of bioavailable Sr is promising for studies of ancient mobility.



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Keywords

Strontium isotope; Bioavailable strontium; Caribbean; Antilles; Migration; Mobility

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