Rocas Atoll, a promising site of climate oscillation record in the South Atlantic: ENSO event register in C and O-isotopes from corals

N.S. PEREIRA[1,3]*, A.N. SIAL[1], R.K.P. KIKUCHI[2], AND V.P. FERREIRA[1]

[1]NEG-LABISE, Federal University of Pernambuco, Recife, 50670-000, Brazil (*correspondence: nspereira@uneb.br)
[2]RECOR, Institute of Geosciences, Federal University of Bahia, Salvador, 40210-340 Brazil
[3]LAGES, Bahia State University, Paulo Afonso, 48608-240, Brazil

Coral skeleton records isotope ratios, minor and trace element fluctuations as a response to environmental conditions while it grows in shallow tropical oceans. C- and O-isotope ratios from corals are extensively used as proxies to identify environmental factors in tropical shallow water. The Rocas Atoll is an isolated oceanic reef located in the western part of the South Atlantic and offers a great opportunity to investigate global and local phenomena. Being a pristine reef, as this atoll does not undergo terrestrial outputs, most chemical information from the Rocas Atoll corals portrays ocean-atmosphere interaction. Two colonies of Porites *sp.* (PC2 and PT2) were collected in tidal pools in this atoll. The colonies were cut in slabs and X-radiographied. Sclerochronology was done in scanned X-ray negative images using the software CoralXDS. C- and O-isotope analyses were done along the growth axis of each colony. Both *Porite* colonies display anomalous negative $\delta^{18}O$ (up to -1‰ over the mean value) and slightly positive $\delta^{13}C$ (up to +0.4‰, PC2 and +1‰, PT2 above the respective mean values). Sclerochronology indicated the anomalous values as coincident with the ENSO event of 2009/2010 that led to a coral bleaching event worldwide [1]. Also, a signal of endolithic algae bloom is imprinted in PC2 where anomalous values of $\delta^{18}O$ ocurrs. This is highly related to loss of zooxanthellae (coral bleaching) caused by stress events [2], in this case, probably a thermal stress, since $\delta^{18}O$ depletion points out to an increase of sea-surface temperature. The observed anomalous behavior of carbon and oxygen isotopes in this study makes the Rocas Atoll a promising place for monitoring major climate oscillation in the Tropical South Atlantic Ocean.

[1] Krishnan *et al* (2012) Current Science, **100**:111–117. [2] Hartmann *et al* (2010) Coral Reefs **29**:1079–1089.

Impact of organic acids and siderophores on dissolution of basaltic glasses in ultrapure water at 25°C and pH 6.3

ANNE PEREZ.[1], STÉPHANIE ROSSANO[1], NICOLAS TRCERA[2], DAVID HUGUENOT[1], ERIC VAN HULLEBUSCH[1], AURÉLIE VERNEY-CARON[3] AND LOLA SARRASIN[1]

[1]Université Paris-Est, Laboratoire Géomatériaux et Environnement (EA 4508), UPEMLV, 77454 Marne-la-Vallée, France (anne.perez@univ-mlv.fr)
[2]Synchrotron Soleil, ligne Lucia, 91190 Gif-sur-Yvette, France
[3]Université Paris-Est Créteil Val de Marne, Laboratoire Interuniversitaire des Systèmes Atmosphériques (UMR CNRS 7583), UPEC, 94010 Créteil, France

Although microorganisms seem to play an important role in the alteration processes of basaltic glasses in solution, the elementary mechanisms leading to silicate phases alteration remain unclear as well as the respective role of organic acids, siderophores, water chemistry. In order to link the observed degradations to microbial activities or to the bulk solution properties, abiotic and biotic alteration experiments of synthetic basaltic glasses have been performed. Monolitic and powdered samples were placed in 40mL flasks of buffered solution (pH=6.3) containing additionnaly oxalic acid (0.01M), pyoverdine (Pvd), or micoorganisms (the heterotrophic bacterial strain *Pseudomonas aeruginosa* was chosen) during various alteration times ranging from a few hours to 25 days. Elements release from the glass into the solution was measured by Inductive Coupled Plasma Optic Emission Spectroscopy analysis and their distribution was studied regarding the structure of the alteration layer with Scanning Electron Microscopy coupled to an Energy Dispersive X-Ray Detector. Oxalic acid and Pvd are both able to form water-soluble or -insoluble metallo-organic complexes. Organic acids and siderophores (two bioproducts from bacteria) have been shown to dissolve framework ions of severals minerals 10 to 1000 times more readily than water does. Measuring their impact on dissolution in abiotic conditions without any secondary interactions between glass and bacteria allowed to quantify more precisely and for each bioproduct separatly this improvement in terms of dissolution rates and to define how their presence can impact on dissolution mecanisms already established for ultrapure water. Finally, experiments involving bacteria allowed to complete those results in more complex systems and to identify the distinctive surface pattern of bioalteration.

www.minersoc.org
DOI:10.1180/minmag.2013.077.5.16