

Chloé PRETET*¹, Kirsten MOELLER², Elias SAMANKASSOU³, Stéphanie REYNAUD⁴, Thomas F. NÄGLER²

¹Department of Environmental Geosciences, University of Vienna, Austria *(chloe.pretet@univie.ac.at);
²University of Bern, Switzerland; ³University of Geneva, Switzerland; ⁴Centre Scientifique de Monaco, Monaco

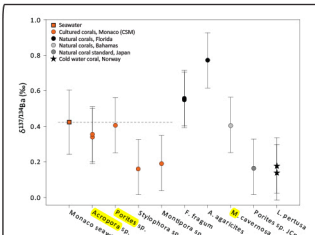


Background:

- Barium (Ba) in seawater:
 - Concentration profile similar to nutrients (e.g.)
 - Used as paleoproductivity proxy
- Limitation of the proxy:
 - Ba cycle not fully constrained
 - Various Ba sources

Aim:

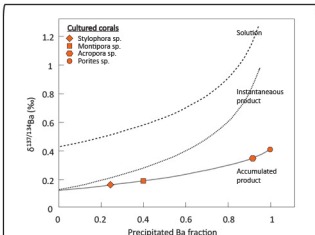
- Investigate Ba isotope composition of aragonitic coral skeleton
- Reconstruct Ba isotope composition of seawater
- Increase the knowledge of Ba marine cycle
- Resolve limitation of the use of Ba as paleoproductivity proxy



Ba isotope composition of coral skeletons shows variations between:

- All corals studied (from 0.14 ± 0.08 (2SD) ‰ to 0.77 ± 0.07 (2SE) ‰)
- Different location / same species (*Porites* sp.)
Hypothesis → Seawater composition
- Same location / different species (Cultured samples from Monaco)
Hypothesis → "Vital effect"

Different fractionation between seawater and coral skeleton within the same location (*Acropora* sp./*Porites* sp. vs *Stylophora* sp./*Montipora* sp.)



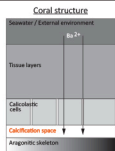
Rayleigh effect influences Ba isotope composition of the skeleton:

- "semi-closed" compartment induces a Rayleigh effect
- Various Ba amount in aragonite precipitated from a batch of seawater
- Different fractionation compared to seawater (0.42 ± 0.18 ‰, 2SD)
- This model does not explain Ba isotope composition of natural corals from other location (e.g. *A. agaricites*)
- Initial seawater composition must vary between locations

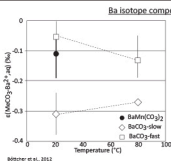
Conclusion:

- Ba isotope composition of coral skeleton varies due to (1) seawater heterogeneity and (2) Rayleigh effect during aragonite precipitation
- Coral skeleton isotope composition allows reconstruction of seawater Ba isotope composition through time and space
- This study contributes to better constrain Ba cycle in marine environment

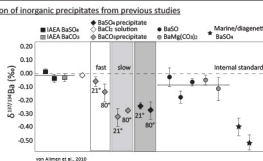
To discuss further with images...



Modified from Böhm et al., 2004



Böttcher et al., 2012



von Almen et al., 2010

Method:

- $\delta^{137/134}\text{Ba}$ (‰), Double spike; ^{130}Ba - ^{135}Ba
- Reproducibility: ± 0.1 (2SE) ‰
- Cation exchange column (Dowex® SOWX8)
- MC-ICP-MS (Nu plasma) with Apex-Q; Interferences: Xe, Te

Funding:

This research is supported by the Swiss Nation Science Foundation (Grant n° 20 MA21-115944)

References:

Böhm et al., 2006; Böttcher et al., 2012; von Almen et al., 2010