

## Hydrothermal fluids in the North Fiji Basin and Lesser Antilles

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### Introduction

Hydrothermal fluids were sampled in the North Fiji Basin and in the Lesser Antilles island arc during two cruises with R/V Sonne (SO 134 and SO 154) funded by the "Bundesministerium für Bildung und Forschung" (grant nos. 03G0134 and 03G0154). In both cases, the low-temperature fluids emanate diffusely from the seafloor and show a distinct geochemical signature.

### North Fiji Basin

The fluids were significantly enriched in CO<sub>2</sub>, Si, Li, Rb, Cs, Ba, Mn, and several trace metals compared to ambient seawater, had high CH<sub>4</sub> and H<sub>2</sub>S concentrations and a slightly decreased salinity (Koschinsky et al., 2002). Increased concentrations of Cr(III) compared to Cr(IV) indicate the reducing potential. The fluids derive from vapor-phase fluids produced by sub-seafloor boiling and phase separation, diluted with cold seawater. Compared to hot vents from other regions, trace metal concentrations are low. The fluids support high bioproductivity, but no precipitation of sulfide mineral, as indicated by a very low Fe/H<sub>2</sub>S ratio.

### Lesser Antilles island arc

Though indications for active venting were less pronounced than in the North Fiji Basin, again distinct hydrothermal signals such as increased methane and Cr(III) concentrations were found at various locations. Fluids at the Kick'em Jenny submarine volcano appear to derive from phase-separated fluids as well and represent the condensed vapor phase. However, in contrast to the North Fiji Basin fluids, they are not enriched in H<sub>2</sub>S and are not associated with a rich hydrothermal fauna.

### Conclusions

In both study areas, phase separation has a major importance for the distinct geochemical composition (low metal and high gas concentrations) of the hydrothermal fluids and the overlying water column. Hydrothermal vents can be an important source for reduced metal species.

### References

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## Isotopic composition of Li in foraminifera and their host sediments

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Tests of planktonic and benthic foraminifera have been extensively utilised as recorders of chemical composition of ancient seawater. Here we explore the utility of foraminiferal calcite as an archive of Li isotopic composition of past oceans. Specifically, we address the effects of temperature on Li isotopic fractionation and present the first well-constrained record of temporal variations in the isotopic composition of Li in foraminiferal carbonate and in the bulk host sediment.

We have successfully analysed 5–10 mg samples of planktonic and benthic foraminiferal tests (*Orbulina universa*, *Pulleniatina obliquiloculata*, *Globigerinoides sacculifer*, *Globoquadrina venezuelana*, *Globigerina bulloides* and *Pyrgo anomala*) collected from surface sediments of the North Atlantic and fossil samples from the ODP Hole 926A in western equatorial Atlantic. The North Atlantic samples, rigorously checked for Holocene age, are from the coretop collection of Pflaumann *et al.* (1996). The ODP samples were taken from 32.5 to 304.5 mbsf corresponding to the age of 1.8 to 15.8 Ma. To avoid contamination by the host sediment, the foraminifera were crushed to break open their chambers and ultrasonically and chemically cleaned prior to dissolution and analysis by ICPMS (Kosler *et al.* 2001)

Li isotopic composition of the studied tests and their host sediments from ODP 926A varies from ca -30 to -15 ‰ and from 0 to +5 ‰, respectively. The data suggest that there was no significant isotopic equilibration of Li isotopes between the foraminiferal carbonate and the host sediment. Comparison of Li isotopes in recent foraminiferal tests from the North Atlantic with previously published results from the equatorial Atlantic and Pacific oceans was used to evaluate a potential role of temperature on Li isotopic fractionation between seawater and foraminiferal carbonate. Our data suggest that ambient water temperature does not appear to have any systematic effect on the isotopic composition of Li in foraminiferal carbonate, whilst we have observed systematic long-term changes in the Li isotopic composition of foraminiferal carbonate that may reflect changes in the composition of the oceanic Li reservoir.

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