



AWSFL008-DS3

NSF Award Abstract
- #0305218

**Collaborative Research: Constraining the Volatile
and Slab Flux in the
Izu-Bonin-Mariana MARGIN using Geothermal
Fluids, Phenocrysts and Melt
Inclusions**

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Award Instrument Standard Grant

Program Manager Rodey Batiza
OCE DIVISION OF OCEAN
SCIENCES
GEO DIRECTORATE FOR
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Investigator Tobias P. Fischer fischer@unm.edu
(Principal Investigator current)

Sponsor University of New Mexico
MSC05 3370
Albuquerque, NM 87131
505/277-2256

NSF Program 1620 MARINE GEOLOGY AND
GEOPHYSICS

Abstract

Under this award, the PIs will carry out an integrated study of volatiles in the Izu-Bonin-Marianas margin that includes the analyses of specific volatiles (H₂O, CO₂, Cl, S) and fluid soluble elements (Li, B, K, Rb, Ba and others) as well as their stable isotope ($\delta^2\text{D}$, $\delta^{11}\text{B}$, $\delta^{13}\text{C}$, $\delta^{18}\text{O}$, $\delta^{34}\text{S}$) systematics utilizing SIMS measurements of melt inclusions of recently erupted tephra. This data set will be complemented by CO₂ and He abundance and isotopic measurements ($\delta^{13}\text{C}$ and $^3\text{He}/^4\text{He}$) in erupted phenocrysts and discharging volcanic and hydrothermal fluids. Additionally, the study will measure the complete gas composition and the N-isotopes of the hydrothermal fluids in order to determine the present-day total volatile flux from the entire arc through normalization to ground-based SO₂ remote sensing measurements. The combined data set will allow the PIs to quantify the slab flux in terms of volatile composition (melt inclusion data), the source of the slab flux in terms of oceanic basement, subducted carbonates or organic sediments (CO₂-He and N₂-He systematics), the present day volatile flux to the atmosphere from the slab and mantle wedge (SO₂ flux and volcanic gas compositions). The study addresses the flux and composition of volatiles into and out of the IBM system and the distribution of volatiles in the mantle and its geochemical evolution through time.

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