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

NSF Org OCE
Latest Amendment Date June 20, 2003
Award Number 0305218
Award Instrument Standard Grant
Program Manager Rodey Batiza
OCE DIVISION OF OCEAN SCIENCES
GEO DIRECTORATE FOR GEOSCIENCES
Start Date June 15, 2003
Expires May 31, 2006 (Estimated)
Expected Total Amount $149916 (Estimated)
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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 (δD, δ11B, δ13C, δ18O, δ34S) 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 (δ13C and 3He/4He) in erupted phenocysts 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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