

SF	Collaborative Research: Magma Generation in the Early Mariana Arc System Revisited	
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These grants helped to advance the capabilities of the isotope geochemistry research center at San Diego State University. In January 2003 a multi-collector inductively coupled plasma source mass spectrometer was installed at SDSU. The acquisition was funded (Oceanographic Instrumentation 0079943) through the MRI program with contributions from OCE, including MARGINS and ODP. Funding from the MARGINS project “Magma Generation in the Early Mariana Arc System Revisited” was used to import the Hf isotope separation chemistry technique of Janne Blichert-Toft from the laboratoire des Sciences de la Terre, Ecole Normale Supérieure de Lyon, France, to SDSU. The Hf chemical procedures and the Nu Plasma, which MARGINS helped to fund, are being used by a wide cross-section of national and international collaborators and students. As shown by the examples below, the SDSU isotope geochemistry research center, “The Baylor Brooks Institute,” has contributed to a wide range of NSF supported research and data collection, to the establishment of national and international collaboration, and to support of undergraduate, graduate, and post doctoral education and research.

- Twenty-Three Mariana basalts were analyzed for Sr, Nd, Hf and Pb isotopes for “Magma Generation in the Early Mariana Arc System Revisited.” And the data was presented at the Fall 2003 AGU (Reagan *et al.*, 2003). Analysis of additional samples is currently underway. This project supported a new collaborative effort between Mark Reagan, Rosemary Hickey, and Barry Hanan.
- The Hf isotope chemical procedures were employed extensively by post-doctoral investigator Jeorg Geldmacher, GEOMAR, Kiel, Germany. Dr. Geldmacher was at SDSU from August, 2000 to December 2003. The German Research Foundation supported his salary. Research costs were supported in part by the Baylor Brooks Institute and NSF OCE. During his stay at SDSU Dr. Geldmacher separated Hf from 284 basalts for Hf isotope analyses. The analyses will provide data for a number of projects with GEOMAR (Hoernle, Hauff, Warner) studying mantle geochemistry in the Canaries, the British Tertiary province, and the Galapagos Plume track and Caribbean Large Igneous Province. Geldmacher participated collaboratively in several projects with Hanan and co-workers (Iceland, Galapagos Spreading Center, Pacific-Antarctic Ridge). He will return to San Diego in 2004 for several weeks to help finish up the Hf mass spectrometry and publication of results. This work has led to several abstracts and a published paper (Geldmacher *et al.*, 2003).
- Thirty-two samples from the Pacific-Antarctic Ridge are being analyzed for Hf isotopes in collaboration with Laure Dosso, INFREMER, Brest, France. Hanan will participate in a French supported cruise to the PAC Ridge in early 2005.
- Biltan Kurkcaoglu, a post doc from Turkey spent six weeks at SDSU as part of a TUBITAK fellowship analyzing basalts from Turkey for Sr, and Nd isotopes. This work is a collaborative effort between Biltan Kurkcaoglu & Tanya Furman (Penn State) and Barry Hanan.
- Julie Bryce and Tanya Furman analyzed 24 Southeast African Rift basalts for Nd, Sr, and Pb isotopes and ran the Pb and Nd on the Nu Plasma. The analytical work is

supported by NSF EAR. The preliminary results were presented at the Fall 2003 AGU (Bryce *et al.*, 2003).

- Forty-five basalts from the AAD were analyzed for Pb and Hf isotopes. The results were presented at the Fall 2003 AGU (Hanan *et al.*, 2003). This represents a collaborative effort between Janne Blichert-Toft (Ecole Normale Supérieure de Lyon [ENS]), Dave Christie (Oregon State University), and Doug Pyle (University of Hawaii). This work is supported by NSF OCE and ENS.
- UCSD Scripps Institute of Oceanography PhD student Jasper Konter is doing isotope analyses for his thesis research, on the Jasper Seamounts, in the Baylor Brooks Institute under the direction of Hanan. Hubert Staudigel at UCSD supervises Jasper. Jasper is using the Hf lab chemistry and Nu Plasma.
- Dr. Tomomi Kani, Kumamoto University, Japan, will be doing Nd, Sr, Pb and Hf isotope analyses at SDSU during the Spring semester, 2004. She is studying the origin of Hawaiian Arch Type alkali-basalt under the auspices of a JSPS fellowship.
- The state-of-the-art analytical facilities at the Baylor Brooks Institute have led to new collaborations and helped to attract excellent new faculty (e.g., Aaron Pietruska) and students to SDSU. For example, in addition to the projects underway with Hubert Staudigel, UCSD faculty David Hilton and Paterno Castillo and SDSU faculty Hanan and Pietruska have several NSF proposals pending to support graduate student research and further collaboration.

Publications and Presentations

Bryce, Julia G, Furman, Tanya, Hanan, Barry B, Yirgu, Gezahegn, Magma Genesis during Continental Rifting: Isotopic Constraints from Quaternary lavas of the Main Ethiopian Rift, Vol. 84, No. 46, p. F1142, 2003.

Geldmacher, J., B. B. Hanan, J. Blichert-Toft, K. Hoernle, K. Harpp, F. Hauff, R. Werner and A. Kerr, Hafnium isotopic variations in volcanic rocks from the Caribbean, Large Igneous Province and Galápagos paleo-hotspot track, Vol. 4, No. 7, doi: 10.1029/2002GC000477, 19 July 2003.

Hanan, Barry B., Blichert-Toft, Janne, Pyle, Douglas, Christi, David M., Origin of Upper Mantle MORB Source Isotope Signatures: Hafnium and Lead Isotope Constraints, *Eos, Transactions, American Geophysical Union*, Vol. 84, No. 46, p. F1023, 2003.

Reagan, M. K., Mohler, D., Brian, H., Hickey-Vargas, R., Hanan, B., Changes in Lava Compositions and With Time From the Eocene Through the Miocene for the Mariana Forearc, *Eos Trans. AGU*, 84(46), Fall Meet. Suppl., Abstract T31A-0, 2003