SF (MARGINS-related)	Li Isotopic Investigations Of The Crust And Mantle	
	Rudnick, Univ. of Maryland, College Park; McDonough; Tomascak	
	6/1/01-7/31/02 & 6/1/02–5/30/05	EAR 01-06719 & EAR 02-08012

Accomplishments:

- Demonstrated that alpine eclogites are isotopically light relative to MORB, suggesting that lithium is fractionated during dehydration of the slab (Zack *et al*., 2003).
- Demonstrated that the upper continental crust, as sampled by granites, shales and loess, has an isotopically light lithium isotopic composition (δ^7Li = 0 ± 3‰) relative to MORB (Teng *et al*., 2003). This has implications for the lithium isotopic composition of subducted terrigeneous sediments.
- Demonstrated extreme Li isotopic fractionation during continental weathering (down to -20‰) (Njo *et al*., 2003).
- Continued development of lithium isotope techniques at the University of Maryland
- Measurement of SIMS basalt standard for Etienne Deloule, CNRS, Nancy, France.
- International collaborations developed with
  - Michael Marks and Gregor Markl, Univ. Tübingen
  - Dimitri Ionov, Max-Plank-Inst. für Chemie, Mainz
  - Melaine Griselin and John Lassiter, Max-Plank-Inst. für Chemie, Mainz

Figures and Captions

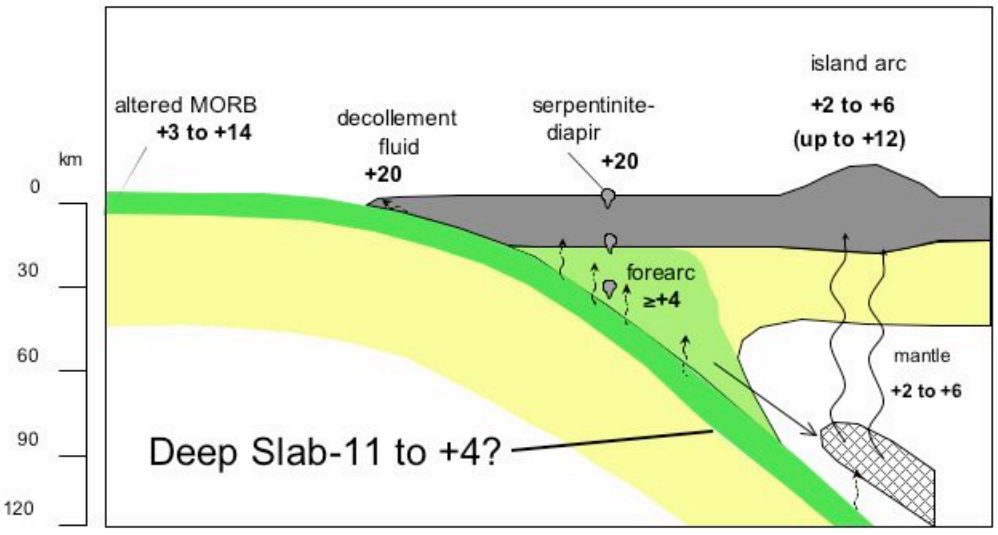

Figure 1: Schematic illustration of δ^7Li systematics in a subduction zone setting. Li isotopic fractionation during dehydration of altered MORB (+3 to +14‰) is evidenced by heavy Li in fluids from decollement zone and serpentinite diapir (both +20‰) and by light Li in eclogites (-11 to +4‰). The high δ^7Li of fluids escaping the slab at low temperatures likely enriches the forearc mantle wedge in ^{7}Li. Assuming δ^7Li of island arc magmas

represent the composition of the mantle underneath them (cross hatched region), large parts of the subarc mantle appear to be unaffected by slab Li (+2 to +6‰). High δ^7Li values in some arc magmas (up to +12‰) might be explained by the incorporation of the forearc mantle into the subarc mantle region. From Zack *et al*., 2003.

Publications and Presentations

Altogether, eleven abstracts and three papers have resulted from this work, highlights of which are:

McDonough, W. F., Teng, , Tomascak, P. B., Ash, R. D., Grossman, J. N., and Rudnick, R. L., (2003) Lithium isotopic composition of chondritic meteorites. *Lunar Planet. Sci. Conf. XXXIV*, Abstr., 1931.pdf.

Njo, H., Rudnick, R.L., and Tomascak, P.B. (2004) Lithium isotopic fractionation during continental weathering, *Chem. Geol. (to be submitted to "Lithium Isotope Geochemsistry" Special Issue, R.L. Rudnick and E. Nakamura, Guest Editors).*

Rudnick *et al*., (2001) Li Isotopic Composition of the Mantle. *Eos Trans. AGU*, 82(47), Abstr. V12C-0995

Rudnick, R.L., McDonough, W.F. Tomascak, P.B. and Baker, E. (2002) Lithium isotopic composition of xenolithic eclogites: implications for subduction zone processes, *EOS Trans., AGU, 83 Fall meeting,* F1428.

Teng, F.-Z., McDonough, W.F., Rudnick, R.L., Dalpè, C., Tomascak, P.B, Chapell, B.W. and Gao, S. (2004) Lithium isotopic composition and concentration of the upper continental crust, *Geochim. Cosmochim. Acta (in review).*

Zack, T., Tomascak, P.B., Rudnick, R.L., Dalpé, C. and McDonough, W.F. (2003) Extremely light Li in orogenic eclogites: The role of isotope fractionation during dehydration in subducted oceanic crust, *Earth Planet. Sci. Lett.* 208: 279-290.