Fluid mobile element budget in the "in-situ" serpentinized harzburgites from the Feather River Ophiolite .

ARNAUD AGRANIER[1], ZHENGXUE LI[1], CIN-TY LEE [1], WILLIAM LEEMAN[2]

1 Rice University, Dept. Earth Science, Houston; arnaud@rice.edu
2 National Science Foundation, Arlington VA22230; WLeeman@nsf.gov

To assess recycling of subducted lithospheric mantle at subduction zones, we analyzed contents of boron and platinum group elements and osmium isotopic composition of 18 serpentinites from the Feather River ophiolite (FRO) in northern California. Li and Lee [2] propose, on the basis of trace element evidence, that our samples were formed by "in-situ" serpentinization of spinel harzburgite in the lithospheric mantle at depths between 30-40 km due to infiltration of seawater-derived fluids along fracture zones B concentrations were measured using a standard addition technique on a Varian Vista Pro ICP-AES; PGE and Os compositions were obtained by isotope dilution on an Element 2 ICP-MS.

B contents (6.4-15.6 ppm) are significantly higher than those (ca. 0.1 to 0.25) estimated for primitive mantle [1], but not as high as measured for serpentinized peridotites dredged from the S. Sandwich frontal arc (40-140 ppm) or reported from Mariana forearc mud volcanoes (6.6-126, avg = 30 ppm, [4]). These differences could reflect (a) variable uptake of B during alteration, or (b) variable losses of B during metamorphism.

Because serpentinites may constitute a dominant sink for B in subduction zones and considering that B stabilization in olivine (after serpentine breakdown) can enable its recycling into the deep mantle [3], we use data for the FRO to estimate the flux of B recycled into the mantle by subduction of lithospheric mantle serpentinized at the neighborhood of fracture zones. Using the equations proposed by [2], assuming average numbers for fracture zone densities (0.002/km), age of subducting slab (75Ma), water diffusion in the mantle, subduction rate (62.3 km/Ma) and B content in the serpentinites (10 ppm), we calculate an average input of B into the mantle of the order of 10^{13} kg per million years. This strong input could produce chemical heterogeneities in the upper mantle and have to be compared to the quantity of B released in the crust by mantle melts. The same approach will be used for PGE and Os.

References

[1] Ryan JG, Leeman WP, Morris JD, and Langmuir CH (1996) *Geochim. Cosmochim. Acta*. **66**, 415-422.
[2] Li Z.X. and Lee C.T.A. (in revision) *Chem. Geol.*
[3] Tenthorey E. and Hermann J. (2004) *Geology* **32**, 10, 865-868.
[4] Benton LD, Ryan JG, Tera F (2001) *Earth Planet. Sci. Lett*. **187**, 273-282.