Pre-35 Ma Na-rich magmatic events in the Yardoi area, southern Tibet

LI-E GAO[1], LINGSEN ZENG[1]*, JING LIU[2] AND KEJIA XIE[2]

[1]Institute of Geology, Chinese Academy of Geological Sciences, Beijing 100037, China (*correspondence: changting1970@yahoo.com)

[2]Institute of Tibetan Plateau Research, Chinese Academy of Sciences, Beijing 100871. China

The Yardoi gneiss dome, the easternmost one of the Northern Himalayan Gneiss Dome (NHGD), is composed of Cenozoic granites in the core rimed by high grade metapelites with subordinated metabasites. SHRIMP zircon U/Pb dating on granitic rocks shows that the leucogranite formed at 35.3±1.1 Ma [1], and the two-mica granite at 42.6±1.1 Ma. Both suites of granites are substantially older than those to the west. The two-mica granite has similar age of formation and geochemistry to those of the Dala pluton [2, 3]. Most of the leucogranites as well as the two-mica granites from the Yardoi area are of peraluminous, Na-rich (A/CNK>0.99, $Na_2O/K_2O>1$). High Sr/Y(>45.0) and La/Yb(>43.0), low Y(<10 ppm) and Yb(<1 ppm) indicate that they are adakite-like magmas. As compared to those in the garnet amphibolite, both suites of granites have similar Sr ($^{87}Sr/^{86}Sr(t)$ = 0.7133~0.7193), but unradiogenic Nd ($\varepsilon_{Nd}(t)$ =-8.9~-14.9) isotope compositions. Metapelites have highly radiogenic Sr ($^{87}Sr/^{86}Sr(t)$= 0.8581~0.9591) and unradiogenic Nd ($\varepsilon_{Nd}(t)$ =-11.3~-16.6) values. These data indicate that (1) the Yardoi area had experienced at least two episodes of Na-rich granitic magmatism; (2) high-pressure partial melting of a source consisting dominantly of amphibolite with subordinated metapelite was responsible for the generation of adakite-like melts; (3) amphibolite partial melting overwhelmed the melting of metapelite. Pre-35 Ma melting events that produced adakitic magmas suggest that melting of the overthickened continental crust might be a major factor that initiated the extension and formation of the Southern Tibet Detachment System (STDS) and the rapid extrusion of the High Himalayan metamorphic wedge.

[1] Zeng L.S. *et al.* (2009) *Chinese Science Bulletin* **54** (1), 104-112. [2] Qi X.X. *et al.* (2008) *Acta Petrol Sin*. **24** (7), 1501-1507. [3] Aikman, Harrison & Ding (2008) *Earth and Planetary Science Letters* **274**, 14-23.

Towards a 3-D view of the melt geometry in partially molten dunite

GORDANA GARAPIC SIFTAR AND ULRICH FAUL*

Department of Earth Sciences, Boston University, Boston, USA. (*correspondence: ufaul@bu.edu)

Models of the melt geometry in partially molten rocks generally are based on observations from 2-D polished surfaces. The three-dimensional shape of the melt pockets, and hence also the degree of interconnectedness, are inferred from approximations of the complex shape of the interstitial melt pockets in two dimensions. To resolve existing controversies, in particular whether two-grain boundaries are wetted by melt, we are conducting a program of serial sectioning and high resolution imaging on a partially molten sample with a moderate amount of melt (~ 4%). The sample was run in a piston cylinder at 1350°C and 1 GPa for 432 hours. During this time the grain size increased from ~ 1 micron to 33 microns, resulting in a steady state grain size distribution (Faul and Scott, Contrib. Mineral. Petrol., 2006). The sample is polished to a final polish with colloidal silica to enable high resolution imaging with a Field Emission SEM. The amount of material removed at each polishing step is determined interferometrically by measuring the depth of an initially ~ 30 micron deep laser pit. The average thickness of the removed layers is about 1.5 micron. Initial results show that larger pockets in individual 2-D sections change relatively rapidly with depth, while thin, elongate inclusions, separating two neighboring grains, persist over a depth corresponding to the size of the grains. This confirms that wetted two-grain boundaries exist under conditions of steady state grain growth in partially molten upper mantle rocks. This will affect seismic properties, as well as permeability, particularly for volatile-rich melts in subduction zones.