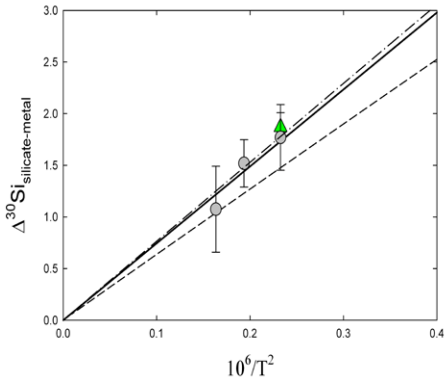
High pressure and temperature silicon isotope fractionation between metal and silicate

A. SHAHAR[1]*, V. HILLGREN[1], E. YOUNG[2], L. DENG[1], Y. FEI[1], C. MACRIS[2] AND R.B. GEORG[3]

[1]Geophysical Laboratory, Carnegie Institution of Washington, Washington D. C (*correspondence: ashahar@ciw.edu)
[2]Department of Earth and Space Sciences, UCLA, CA
[3]Water Quality Centre, Trent University, Peterborough, ON

The Si stable isotope fractionation between metal and silicate has been investigated experimentally in order to better constrain the amount of silicon present in the Earth's core. Experiments at 1800°C were conducted at 1 GPa, while those at 2000 and 2200°C were performed at 7 GPa. All experiments were in MgO capsules so that no silicon was lost during the run and the three-isotope technique was used to demonstrate equilibrium. The isotope analyses were measured by laser ablation MC-ICPMS as spatial resolution is a key parameter in analyzing experiments.



The temperature dependent silicon isotope fractionation is $\Delta^{30}Si_{silicate\text{-}metal} = 7.45\pm0.41*10^6/T^2$ shown in the figure above, experimental data points shown in circles along with best fit line (solid) and theoretical curve (dashed, [2]). The current experiments have: 1. duplicated our previous results [1] performed in a graphite capsule (triangle in figure above), demonstrating that several weight percent carbon in iron metal does not change the silicon isotope fractionation factor, as predicted; 2. shown that the silicon stable isotope fractionation between metal and silicate is insensitive to the structure and composition of the silicate as the fractionation between silicate melt and olivine is insignificant; and 3. shown that there is no pressure effect on isotope fractionation between 1 and 7 GPa (to within analytical uncertainty).

[1] Shahar *et al*. 2009 *EPSL* **228**, 228–234. [2] Georg *et al*. 2007 *Nature* **447** 1102–1106.

Nature and characteristics of metasedimentary rocks in Northern Sanandaj-Sirjan Zone

FATEMEH SHAJARI

School of Geology, College of Science, University of Tehran, Tehran, Iran (f.shajari@yahoo.com)

Upper Permian-Lower Trias sediments from the Sanandaj-Sirjan zone (SSZ) in western Iran record a cycle of Neotethyan oceanic basin opening and closure when the Central Iranian block separated from Gondwana and Arabia. Their studies could determine constraints of the geotectonic evolution of the area. The sediments were metamorphosed under mid-to-upper greenschist-facies conditions due to subsequent northeastward convergence of the oceanic domain below the Iran. Geochemical analysis implied that the studied metasedimentary rocks have relatively uniform chemical composition which may indicate differing from similar sedimentary rocks [1]. Davoudian *et al*. [2] however reported eclogite lenses from a locality near north of Shahrekord which indicate high pressure metamorphism in the SSZ and tectonic processes such as shearing leading to their exhumation during following continent–continent collision.

The granular and lepidoblastic to lepido-granoblastic textures are seen in the slates and phyllites, respectively. Andalusite and garnet are the major porphyroblasts in the schists. These rocks are composed of biotite, muscovite, quartz and feldspars. The schistosity of rocks is oriented in the NW-SE direction.

Major element data has a narrow range and enrichment in Al_2O_3, all of which can be interpreted as a reflection of a pelitic provenance. It is supported by low Cr and Ti concentrations that prevent a mafic source. In addition high aboundances of S-type granitoids that are penetrated into this metasedimentary country rocks reveal partial melting of metapelites to produce these felsic rocks.

[1] Ahadnejad, Hirt, Valizadeh & Bookani (2011) *Geologica Carpatica* doi: 10.2478/v10096-011-0004-5. [2] Davoudian, Genser, Dachs & Shabanian (2008) *Mineralogy & Petrology* **92**, 393–413.