New calorimetric data: Implications for ternary feldspar modelling

A. BENISEK[1], E. DACHS[1] AND H. KROLL[2]

[1]Universität Salzburg, Materialforschung und Physik
[2]Universität Münster, Institut für Mineralogie

A mixing model for ternary high structural state feldspars in the $NaAlSi_3O_8$-$KAlSi_3O_8$-$CaAl_2Si_2O_8$ system is presented, which was derived recently in Benisek *et al.* [1]. It is based exclusively on calorimetric and volumetric data. When compared to models based on phase equilibrium experiments distinct differences are revealed. The calorimetry based model shows less solubility for both K in Ca-rich plagioclase and Ca in K-rich alkali feldspar. On the other hand, the stability field of Na-rich feldspars is broadened.

The two approaches are tested on natural feldspar assemblages from different rocks. One of these rocks is the Klokken syenogabbro, South Greenland, which was thoroughly investigated by Parsons and Brown [2]. The rock contains two perthites whose bulk compositions should lie on the ~970°C/1kbar isotherm [2]. The figure below compares this isotherm calculated with different mixing models:

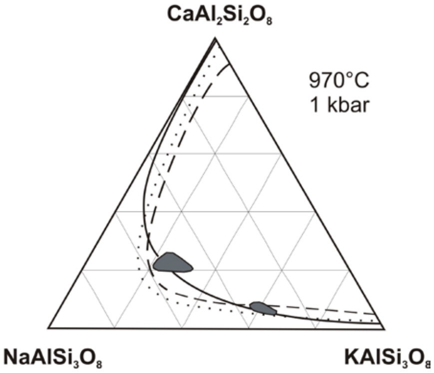


Figure 1: Compositions of the feldspars from the Klokken syenogabbro, South Greenland [2]. The 970°C/1kbar isotherm of this study (*solid line*) is compared to those resulting from phase equilibrium experiments [3, *dashed line*; 4 *dotted line*].

[1] Benisek *et al.* (2010) *Contrib. Mineral. Petrol.* DOI 10.1007/s 00410-009-0480-8. [2] Parsons & Brown (1983) *Contrib. Mineral. Petrol.* **82**, 1–12. [3] Fuhrman & Lindsley (1988) *Am. Min.* **73**, 544–559. [4] Elkins & Grove (1990) *Am. Min.* **75**, 544–559.

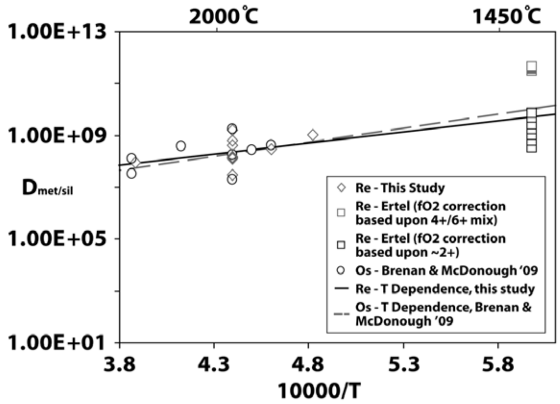
Metal-silicate partitioning of Re

N.R. BENNETT* AND J.M. BRENAN

Department of Geology, University of Toronto, Canada
(*correspondence: bennett@geology.utoronto.ca)

Os isotopes provide a time integrated constraint on Re/Os and Pt/Os ratios and provide the strongest evidence for a terrestrial mantle which evolved bearing a chondritic HSE composition. This result has been used to argue for a late accretion of chondritic material as a means to explain upper mantle HSE abundances. The possibility that chondritic Os isotopic evolution could arise from equilibrium core seperation has not been tested however, owing to a paucity of $D_{met/sil}$ values acquired at relevant conditions.

Here we present new data for Re in haplobasaltic melt, at 2GPa, high T and low fO_2, employing an Au surfactant that supresses micro-nugget formation and generates glass run products with uniform time resolved LA-ICP-MS spectra. A positive fO_2 and negative T dependence (Fig 1) are determined for $D_{met/sil}$ and extrapolation to lower T shows a reasonable match to the 1atm data of [1], suggesting little or no pressure effect between 1atm-2GPa. Carbon was not seen to enhance Re solubility. At 3000K and and ΔIW-2, the $D_{met/sil}$ for Re is ~5 orders of magnitude greater than required to explain the observed mantle abundance. Partitioning is however, comparable with recently acquired data for Os [2] suggesting little fractionation of these elements during core formation but predicting an initial mantle $^{187}Re/^{188}Os$ of ~0.695, still significantly higher than the value of 0.096 ±2% required by Os isotope systematics [3]. High $D_{met/sil}$ values and a superchondritic Re/Os ratio appear to preclude the mantle HSE budget being set solely by core formation.



[1] Ertel *et al.* (2008) *Chemical Geology* **248**, 119–139. [2] Brenan & McDonough (2009) *Nature Geoscience* **2**, 798–801. [3] Meisel *et al.* (2001) *GCA*, **65**, 1311–1323.