Experimentally major and trace partitioning between calcitic melt and calcite at 1000 bars

C. DURAND* AND L. BAUMGARTNER

Institut de Minéralogie et Géochimie, Université de Lausanne, l'Anthropole, 1015 Lausanne, Switzerland
(*correspondence: Cyril.Durand@unil.ch)

The aim of this study is to understand the partitioning of major and trace elements between calcite and calcitic melts at near surface conditions (1000 bars) in the presence of water. Similar experiments have been already carried out by Wyllie and Tuttle [5]. Their study suggested a calcite melting temperature of 740°C. This calcite melting curve appears to be independent of the calcite/water ratio. The authors further suggest that hence, calcite melting could occur during contact metamorphism, as also suggested by studies on natural rocks [1, 2, 4]. Geochemical tracers could point towards the presence or absence of a carbonate melt in such an environment.

Our experiments were performed in rapid-quench cold-seal pressure vessels. Temperatures were varied in between 600 and 800°C. Gold capsules were charged with natural or artificial calcite. The letter was further enriched with different carbonates ($MgCO_3$, $FeCO_3$, $MnCO_3$, $BaCO_3$ and $SrCO_3$) as well as REE solution. Low calcite/water ratios were used to ensure enough melt for chemical analyses. Run durations vary in between 1.5 to 90h. Calcitic melts seem to be homogeneous without evidence for chemical zoning. Preliminary results show that Mn and Sr partition equally in between calcite and melt. All others chemical elements are preferentially enriched in the melt. The REE enrichment in the melt appears without fractionation between LREE and HREE. Hence, our initial experimental results indicate that the presence of melt can be unequivocally identified when it can be compared to the unmelted calcite, but it might be difficult to identify when the calcitic melt has migrated.

[1] P. Jutras *et al*. (2006) *Geol. J.* **41,** 23-48. [2] D.R. Lentz (1999) *Geology* **27,** 335-338. [3] I.V. Veksler *et al*. (2000) *Contrib. Miner. Petrol.* **138,** 27-34. [4] T. Wenzel *et al*. (2002) *J. Petrol.* **43,** 2049-2074. [5] P.J. Wyllie & O.F. Tuttle (1960) *J. Petrol.* **1,** 1-46.

The character and composition of fluid in equilibrium with peridotite in subduction zones

O. DVIR AND R. KESSEL

Institute of Earth Sciences, The Hebrew University of Jerusalem, Jerusalem Israel, 91904

Accurate determinations of the effect of water on the composition of liquid coexisting with peridotite are necessary to advance our understanting of the physical processes involved in melt generation at convergent plate margins. Experimental data bearing on hydrous peridotite dehydration and melting remain, however, sparse. We report experimental results of fluid and melt composition in equilibrium with peridotite measured using a novel freezing stage laser-ablation ICPMS following high pressure and temperature diamond-trap experiments on the rocking multi-anvil apparatus. We used this technique to directly characterize the fluid phase coexisting with synthetic (NCFMASH) peridotite at pressures of 4 and 6 GPa and temperatures between 700-800°C and determine the major element coomposition of all solid and fluid phases.

Our results indicate that at 4 and 5 GPa a fluid containing ~56 wt% H_2O coexists with peridotite up to 750°C while a hydrous melt containing 35 wt% H_2O is the stable phase at 800°C, indicating that the solidus lies between 750 and 800°C at this pressures. The solidus lies between 700 and 750°C at 5 GPa. These results indicate that the second critical endpoint is above 6 GPa.