インターナショナルセッション（口頭発表） | セッション記号 S （固体地球科学） | S-IT　地球内部科学・地球惑星テクトニクス

[S-IT02_29PM2]Aqueous fluids and melts in subduction zones: Experiment, modeling, and geophysical observations

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2014年4月29日(火) 15:45 〜 17:00 211 (2F)

Characterization of the geophysical and geochemical interaction between minerals, fluid and magmatic liquid in subduction zone processes is central to our understanding of this environment. To this end, integrated observational, experimental, and theoretical studies are needed. Solubility and solution mechanisms of fluids in minerals and melts, and of silicate in fluids and linkages between solubility, solution mechanisms, chemical and physical properties of these materials under appropriate temperature, pressure, and redox conditions are needed. This session will bring together scientists with focus on current experimental, theoretical, and observational understanding of ?how to model physicochemical properties of subducting slabs including?spatial relation between intraslab seismicity such as slow-slip events and fluids pore pressure of fluids and their role in the weakening of shear strength of rocks?accumulation and transfer of fluids and melts ?solubility measurements of minor elements, trace elements, and stable isotopes in aqueous fluids and melts, ?how water and oxide components in aqueous fluids govern element and isotope partitioning between fluid, melt, and crystalline materials, and?linkages between solubility, partitioning, and rheological properties and solution mechanisms of water and silicate in minerals, melts, and fluids

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△[SIT02-P03_PG]Solution mechanism of water in depolymerized silicate melts

ポスター講演3分口頭発表枠

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キーワード：water speciation, hydrothermal diamond anvil cell, near-infrared spectroscopy, Raman spectroscopy

It is known that the effect of dissolved water on the viscosity of silicate melts is larger for polymerized melts than for depolymerized melts [*e.g.*, 1, 2]. Direct spectroscopic measurements of melt structure and water speciation at high temperature provide information about the mechanism of water dissolution and its influence on the physical properties of the melts. While *in situ* measurements of water speciation were widely conducted for rhyolitic melts and their analogues [*e.g.*, 3, 4, 5], only limited data are available for depolymerized silicate melts.

We performed high-temperature near-infrared and Raman spectroscopic measurements of hydrous $Na_2Si_2O_5$ melts (2.3-8.1wt% H_2O) using externally heated diamond anvil cell (HDAC). $Na_2Si_2O_5$ composition was chosen as a structural analogue of basaltic melt (anhydrous NBO/T = 1). Experimental pressure was monitored with the pressure- and temperature-dependent Raman shift of ^{13}C diamond [6]. Near-infrared spectra of the homogeneous liquid phase, observed above 820 degree C, 1.7GPa in the $Na_2Si_2O_5$+2.3wt%H_2O system and above 700 degree C, 1.6GPa in the $Na_2Si_2O_5$+8.1wt%H_2O system, contain absorption peaks

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corresponding to molecular H_2O (at ~5200 cm^{-1}) and structurally bound OH groups (at ~4500 cm^{-1}). At 900 degree C and 1.6-1.9GPa the ratio of these peaks height remains approximately constant (2.6-2.2), implying a constant (structurally bound OH)/(molecular H_2O) ratio for this range of water contents. This observation differs from the regularities reported for more polymerized melts (rapid decrease of OH/H_2O with total water content) [*e.g.*, 4, 7]. At the same time no pressure effect on the ratio of 4500 cm^{-1} peak height to 5200 cm^{-1} peak was observed below 2.4 GPa.

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