

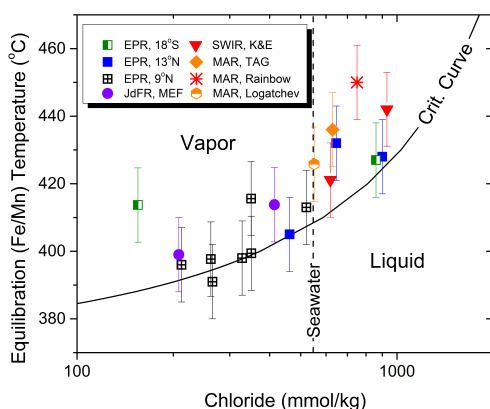
## Experimental constraints on hydrothermal circulation in mid-ocean ridges

N. J. PESTER<sup>1</sup>, A. T. SCHAEEN<sup>2</sup>, K. DING<sup>2</sup>  
AND W. E. SEYFRIED, JR.<sup>2</sup>

<sup>1</sup>Earth Sciences Division, Lawrence Berkeley National Laboratory, Berkeley, CA, U.S.A. (njpester@lbl.gov)

<sup>2</sup>Department of Earth Sciences, University of Minnesota, Minneapolis, MN, U.S. A.

Cl variability is ubiquitous in deep-sea hydrothermal fluids, indicating they routinely intersect the two-phase boundary, represented by the critical curve in the NaCl-H<sub>2</sub>O system. Silica concentrations in these fluids are frequently used to constrain P or T of subsurface reactions. We have performed experiments to evaluate salinity effects (0–2M NaCl) on quartz solubility at P-T conditions coincident with the NaCl-H<sub>2</sub>O critical curve (374–500 °C). Model calibration allows more accurate pressure constraint when used in conjunction with Fe/Mn geothermometry. P and T of equilibration independently coincide with the NaCl-H<sub>2</sub>O



critical curve using the database of fluid chemistry from basalt-hosted hydrothermal systems. This enhances the significance of a broader T-chlorinity relationship, demonstrating fluids with chlorinities greater than seawater should be considered vapors (see Fig.). These data agree with the notion that the physicochemical properties of the fluids limit maximum circulation temperatures to those along the critical curve, where these maxima increase with increasing salinity and/or P. Application of vapor-liquid partition coefficients for Sr suggest fluids with distinctly different chlorinities and Sr/Cl ratios venting in close proximity are still consistent with having been derived from a similar higher chlorinity source fluid.