

Chemistry of hydrothermal vent fluids from the Dragon Flag(Longqi-1) Field, SWIR

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The Dragon Flag(Longqi-1) Field at 49°39'E, 37°47'S, was the first active hydrothermal field found along the ultraslow-spreading Southwest Indian Ridge[1]. It was indicated that the scale of Longqi-1 vent system is one of the largest hydrothermal venting system in the Mid-Ocean Ridges[2]. The maximum temperature at vent site DFF6 of 'M zone' rise up to 379.3°C. Here we report vent fluids were firstly sampled by using submersible Jiaolong in this Cruise.

The high temperature hydrothermal vent fluids are uniformly characterized by high dissolved Cl (~600 mm/kg) and Fe (~13 mm/kg) concentrations. Dissolved H₂, H₂S, and CH₄, however, are largely in keeping with basalt/gabbro-hosted hydrothermal systems. Along with Fe, dissolved Ca largely balances well-known quantitative removal of seawater derived Mg and sulfate. These data, together with moderately high dissolved Si (17 mm/kg), suggest phase equilibria involving plagioclase, chlorite, and perhaps epidote solid solutions and quartz, which help to account for the low pH measured vent fluid pH (~3.15-3.6). Application of the experimentally calibrated Fe/Mn geothermometer[3], while assuming quartz-fluid equilibria, suggest temperatures and pressures of approximately, 425°C, and 400 bars, respectively, which are in close proximity of the two-phase boundary for the NaCl-H₂O system, for a fluid with the observed chloride concentration. Assuming hydrostatic pressure, the predicted depth below the seafloor is approximately 1-1.3km. Further analysis of vent fluid chemical and isotopic data is needed before unambiguous constraints can be imposed on the chemical and physical conditions controlling heat and mass transfer processes at the Dragon Flag Field hydrothermal system.

[1]Tao, C. *et al.*, (2012), *Geology*, v. **40**, no. 1, p. 47-50. [2] Chunhui Tao *et al.*,(2015), <http://www.interridge.org/node/117201>. [3]Pester, N. *et al.* (2011), *Geochim Cosmochim Acta* **75**, 7881-7892.