Environment of seafloor hydrothermal systems

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Seafloor hydrothermal system involves the transportation of heat and chemical compositions, which are regarded as 'thermal/chemical factories'. The hydrothermal systems play significant roles in the Earth system evolution in many aspects.

1. A place where heat and chemical energies supplies:
Hydrothermal heat flux discharges 30% of the total Earth heat flux. Chemical fluxes contributes to maintain the chemical composition of seawater. The hydrothermal systems affects both the transportation of energy and chemical composition.

2. A place where the oxidation and reduction environments coexist:
At the subsurface region of the hydrothermal system, high-temperature reducing hydrothermal fluids are close to low-temperature oxidative seawater. This steep gradient of chemical potential supply energy to subsurface ecosystems.

3. A place where the ocean and solid-Earth are connected:
Chemical flux of the hydrothermal system is involved in the global circulation of chemical materials. For example, precipitation of hydrothermal calcium carbonate is related to biomass production at the surface ocean or weathering processes at land.

We would like to review the hydrothermal processes of energy and chemical transportations, and discuss the role of the system to the earth evolution. We will also introduce our modeling approach to understanding the thermo-chemical reactions at the hydrothermal system.