

Exploring magmatic controls on hydrothermal fluxes at slow-spreading ridges

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Estimating hydrothermal fluxes at mid-ocean ridges (MORs) is relevant both in terms of heat transfer and the thermal state of the axial lithosphere, and in terms of chemical fluxes from the solid Earth to the oceans. MOR hydrothermal systems, however, are complex and their activity varies over relatively short time scales. This is particularly the case for slow spreading MORs, where three distinct types of hydrothermal vent fields have been recognized: basalt (Lucky Strike-type) or ultramafic (Rainbow-type) hosted black smoker vent fields, and ultramafic hosted alkaline vent fields (Lost City-type). Black smoker vents have very high fluid fluxes, extracting a lot of heat, and in the case of Rainbow-type fields, resulting from high rates of serpentinization in the substratum. Lost City-type vents by contrast have very low fluid and heat fluxes. This presentation explores the links between hydrothermal heat and chemical fluxes at slow-spreading MORs, and the flux and depth of emplacement of magma in the axial lithosphere. It builds on published and on-going works that address the time-integrated heat loss at the scale of the ridge axis, then hydrothermal field scale fluxes, in relation to the local magmatic context.