Magnetic signature of a tectonic-dominated hydrothermal area (49.25°E) at the ultra-slow spreading ocean ridge, SWIR

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Abstract

Particular reaction and alteration processes in hydrothermal areas located in the ocean ridges usually change rocks' magnetic properties, which in turn makes magnetism a useful method to study hydrothermal areas. Autonomous Underwater Vehicle (AUV) has been used to collect near-bottom magnetic data at a detachment-fault controlled hydrothermal area of Southwest Indian Ridge (SWIR). Original magnetic anomaly revealed that there are both negative anomaly and positive anomaly in this area. We used three-dimension inversion method to inverse its magnetization distribution and obtained tapered stockwork zone and cannular stockwork zone in negative anomaly site and positive anomaly site, respectively. Contacting with the evidences of rock properties and magnetic properties of rock samples, we concluded that this hydrothermal area is composed of both basalt-hosted site and ultramafic-hosted site and also summarized two situations that both kinds of hydrothermal areas can be seen in the tectonic-dominated segments.

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