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Occurrence of deep-seated rocks around the Kairei hydrothermal field in the Central Indian Ridge Segment 1

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Since the first discovery of hydrothermal vent site at the Galapagos Spreading Center in 1977 (Corliss et al., 1979), it has been revealed that seafloor hydrothermal systems host a variety of vent-endemic biological communities (e.g., Van Dover, 2000; Wilcock et al., 2004). The principal source of primary productivity in the vent ecosystems is chemolithoautotrophic microorganisms that obtain energy from inorganic substances, such as H_2S, CO_2, H_2, and CH_4derived from hydrothermal vent fluids (e.g., Jannasch and Mottl, 1985). Recently, particular attention has been paid to H_2-enriched hydrothermal fluids supporting archaeal methanogens, because this type of hydrothermalism and microbial ecosystem is considered to be an important modern analogue to the early life on Earth (e.g., Takai et al., 2006).

The Kairei hydrothermal field, located in the first segment of the Central Indian Ridge (CIR), is known to be characterized by unusually H_2-rich hydrothermal vent fluids (Van Dover et al., 2001; Gallant and Von Damm, 2006). Similar H_2-enriched hydrothermal vent fluids have also been reported from several hydrothermal vent fields along the Mid-Atlantic Ridge (MAR) (e.g., Charlou et al., 2002, 2007; Melchert et al., 2008). Based on geological and petrological observations at the MAR hydrothermal vent sites, H_2in the hydrothermal fluids is considered to be derived from serpentinization of ultramafic rocks that have been tectonically uplifted and emplaced near the hydrothermal vent fields (Charlou et al., 2002; Douville et al., 2002). However, ultramafic rocks have not previously been recognized around the Kairei hydrothermal field and thus, several researchers have considered that H_2in the Kairei fluids are not derived from serpentinization of ultramafic rocks.

In January 2006, we discovered serpentinized troctolitic rocks from the Uraniwa-Hills near the Kairei hydrothermal field (Kumagai et al., 2008), and demonstrated that serpentinization of the Uraniwa troctolites can produce enough H_2into the Kairei hydrothermal fluids (Nakamura et al., 20 09). There is, however, still another possible source region of H_2in the Kairei hydrothermal fluids, which have not been investigated yet. On bathymetric image, an approximately 10 x 10 km size gentle hill is observable in an inside corner of the CIR Segment 1, northern part of the Hakho-knoll. In November 2009, we conducted a Yokosuka/Shinkai6500 YK09-13 Leg2 cruise to clarify the occurrence and distribution of deep-seated (lower crustal and upper mantle) rocks around the Kairei hydrothermal field. In this presentation, we report the first result of the YK09-13 Leg2 cruise.