

Seismicity at the Kairei Hydrothermal Vent Field Near the Rodriguez Triple Junction in the Indian Ocean: Part 2

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1. Introduction

In the first segment of the central Indian Ridge from the Rodriguez triple junction, the Kairei hydrothermal vent field exists and discharges hydrothermal fluid with rich hydrogen. Serpentinized peridotite and troctolites, and gabbroic rocks were discovered on the seafloor around the Kairei hydrothermal field. These rocks (originally situated at several kilometers beneath seafloor) exposed around the Kairei field may cause the rich hydrogen fluid. At the Kairei field, hydrogen-based various hydrothermal vent fauna were found. In the "TAIGA" Project (Trans-crustal Advection and In situ reaction of Global sub-seafloor Aquifer), this area is a representative field of "TAIGA" of hydrogen. To investigate how the deep-seated rocks are uplifted and exposed onto seafloor, and the hydrothermal fluid circulates in subsurface, we conducted a seismic refraction/reflection survey and seismicity observation with ocean bottom seismometers (OBSs).

In JpGU 2015, we reported that we found more than 5000 micro earthquakes in this area during the 50 days seismicity observation. A swarm of micro earthquakes exists at a location about 1-3 km northwest of the Kairei field. The depth of the swarm is up to about 8km. The focal mechanisms in the swarm are normal type. An another swarm exists at the first segment of the central Indian Ridge. The depth of the swarm is deeper than that near the Kairei field.

This presentation will show relocated hypocenter distributions by HypoDD program (Waldhauser, 2001) which can estimate relative location of earthquakes.

2. Observation and methods

We conducted a seismic survey around the Kairei hydrothermal field from January 27 to March 19 in 2013 using S/V Yokosuka of Jamstec (YK13-01, YK13-03). We used 21 OBSs.

We redetermined hypocenter locations by HypoDD program (Waldhauser, 2001). We used an averaged 1D velocity structure at the swarm areas from the 3D structure estimated by Takata et al. (2015).

3. Results

The depth of the swarm at the Kairei field is about 4-7km. The focal mechanisms in the swarm are normal type. The depth of the swarm at the first segment of the central Indian Ridge is about 6-8km. This swarm is divided into upper and lower parts, and both incline at about 60-70° toward west. The focal mechanisms in the swarm are normal type.

To determine more detailed 3D velocity structure, we will determine hypocenter distribution and velocity structure by TomoDD (Zhang and Thurber, 2003).

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