

1. Cruise Summary

1-1 Cruise Information

Cruise Number	KH-09-5 Leg.4
Ship	R/V Hakuho-maru
Subject	Variation of mantle geochemistry and its implication for diversity in spreading style, Southwest Indian Ridge 34-40°E
Date	14 January 2010 - 26 January 2010
Port of call	Cape Town (South Africa) - Port Luis (Mauritius)
Area	Southwest Indian Ridge 35-39°E (see Figure 1)

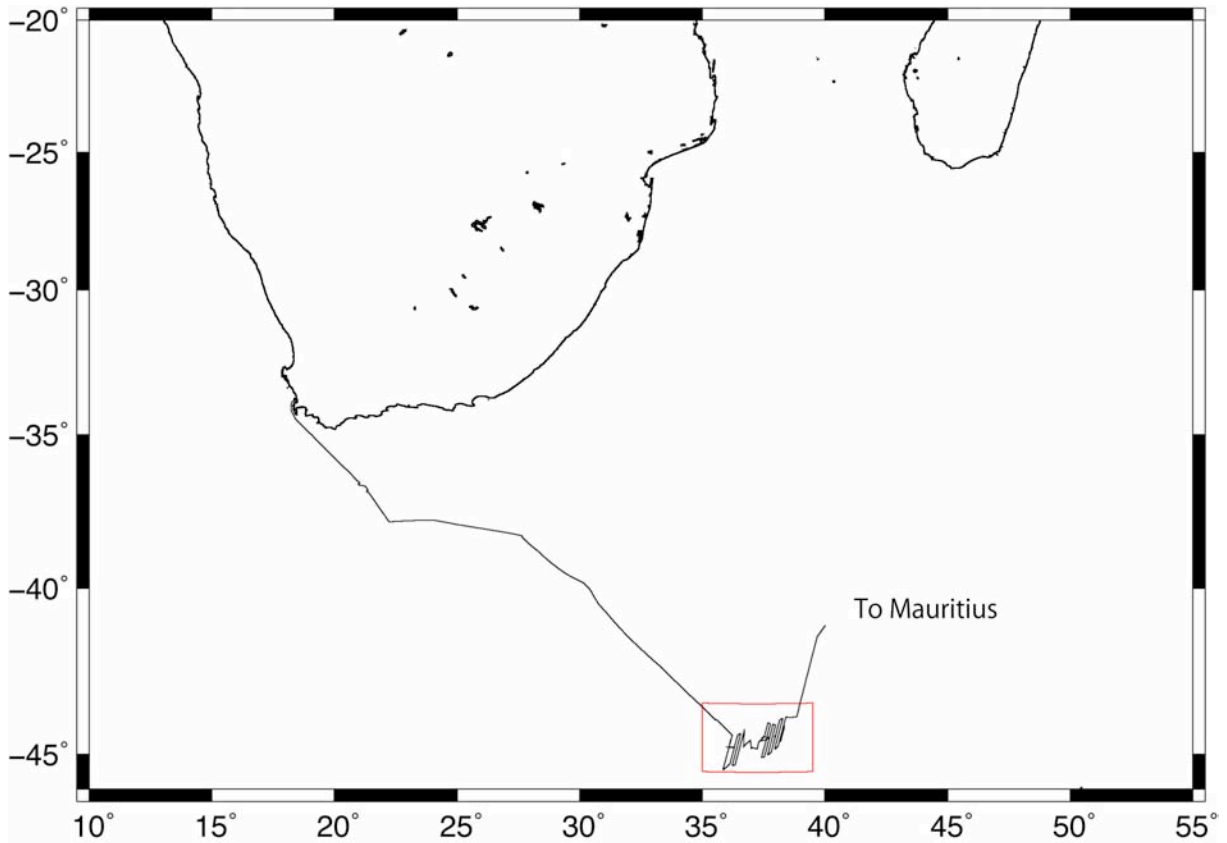
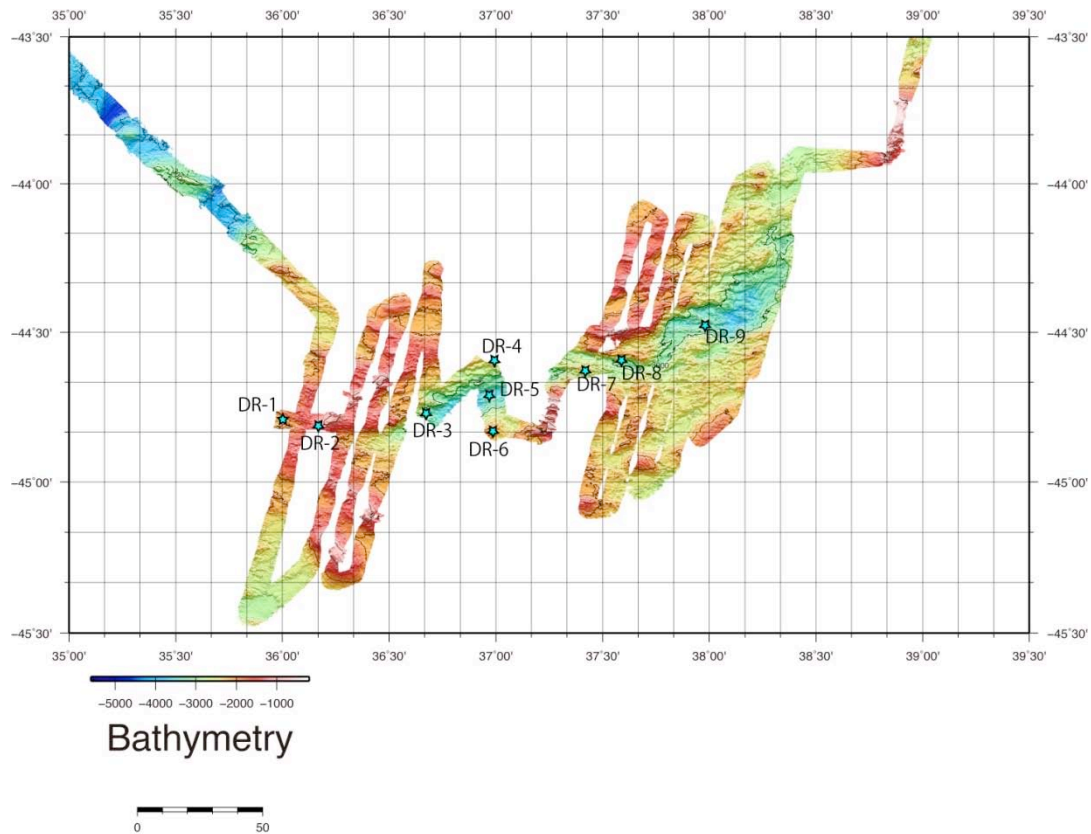


Figure 1-1 Ship track of KH09-5 Leg 4

1-2 Summary

The Southwest Indian Ridge (SWIR) is an ultraslow spreading system, whose spreading rate is 14-16 mm/yr. Ultraslow spreading ridges are characterized by their anomalously thin and/or irregular crust, existence of long oblique segment without typical transform faults, episodic vigorous volcanism and extensive melt-starved signatures. It is important to study the ultraslow system for better understanding of global variation of mid-ocean ridge process. The area between 34-40°E along the SWIR remains unexploited mainly due to its severe sea condition. The area is located about 250 km north of the Marion hotspot and the low Bouguer gravity anomalies indicate the effect of ridge-hotspot interaction. We planed to collect the geochemical and geophysical data of this area and to answer how the ultraslow spreading system works and how the mantle geochemistry controls the crustal structure and the evolution of the ridge.

A related previous cruise KH07-4-2 was conducted in January 2008, when the geophysical mapping, dredging, seismic reflection/refraction, and magnetotelluric surveys. During KH09-5-4, we conducted the surface geophysical mapping and dredge hauls mainly between the Prince Edward Fracture Zone and the Eric Simpson I Fracture Zone. Total 850 miles of multibeam bathymetry and imagery, sub-bottom profiles, scalar and vector magnetic forces, and gravity data were collected within the survey area. Preliminary results combined with bathymetry collected during KH07-4-2 shows that the segment consists of three short



orthogonal subsegments where relatively well-ordered abyssal hills were produced and two oblique subsegments or long non-transform discontinuities with elongated axial deeps. The off-axis area is morphologically asymmetric in general, especially in the area off- oblique axial deeps. A westward V shaped high possibly related to hotspot influence contacts the present ridge axis at the western subsegments. Nine dredge hauls were conducted successfully. The fresh basalt samples and/or glasses were collected at axial volcanic zone of each subsegment (DR1,2,3,5,7,8,9). Lava morphology ranges from sheet/lobate flow (DR-1,2,3) to pillow (DR-7), that may correlate with local slope and with effusion rate etc. Two dredge sites are located ridge flanks of axial deeps between western and central subsegments (DR-5 and 6) and some serpentized peridotite samples were dredged at DR-5, the northern ridge flank. We succeeded to collect both geochemical and geophysical datasets during two cruises and the integrated analysis will be done soon on land.

Figure 1-2 Preliminary results of SeaBeam2120 swath survey and dredge sites (blue star).

* We also continued the underway geophysical survey along the transit lines from Cape Town to the area and from the area to Port Luis except for Mauritian EEZ. The survey within the EEZ of the South Africa mainland was done by the request from SA continental shelf survey team and the data will be sent to the SA officials after the cruise.