CONTROL ID: 1502815

TITLE: Geochemistry of lavas from the Australian-Antarctic Ridge, easternmost Southeast Indian Ridge.

AUTHORS (FIRST NAME, LAST NAME): Sung-hyun Park[1, 5], Charles H Langmuir[2], Jian Lin[3], Seung-Sep Kim[4], Doshik Hahm[5, 1], Peter J Michael[6], Edward T Baker[7]

INSTITUTIONS (ALL): 1. Polar Earth System Sciences, Korea Polar Resarch Institute, Incheon, Korea, Republic of.
2. Earth and Planetary Sciences, Harvard University, Boston, MA, United States.
3. Geology and Geophysics, Woods Hole Oceanographic Institution, Falmouth, MA, United States.
4. Geology and Earth Environmental Sciences, Chungnam National University, Daejon, Korea, Republic of.
5. Polar Climate Research, Korea Polar Research Institute, Incheon, Korea, Republic of.
6. Geosciences, University of Tulsa, Tulsa, OK, United States.
7. Pacific Marine Environmental Laboratory, NOAA, Seattle, WA, United States.

ABSTRACT BODY: The intermediate spreading Australian-Antarctic Ridge (AAR), an easternmost extension of the South East Indian Ridge located in the south of Tasmania, is one of the largest unexplored regions of the global mid-ocean ridge system, owing to its remote location and a very limited workable weather window. In early and late 2011, the Korea Polar Research Institute (KOPRI) conducted two surveys of two segments at 160°E (KR1) and 152.5°E (KR2) using the icebreaker Araon, producing a multi-beam map, 48 rock core samples and a MAPR (Miniature Autonomous Plume Recorder) hydrothermal survey. The full spreading rate of the spreading center in this area is 68 mm/yr. The axial depth of KR1 is relatively shallow (~2,000m) and is a first-order segment bounded by two large offset transform faults. The axial morphology of KR1 varies substantially from an axial high plateau (Segment 1) in the west, to a small rift valley (Segment 2), to an axial high with graben (Segment 3), and to a substantial rift valley (Segment 4) in the east. These changes occur in the absence of marked offsets in the ridge, such as overlapping spreading centers. Even so, these segments can be divided still further into shorter scale segments based on small discontinuities in the linearity of the axis and variations in rock chemistry. Small offsets in bathymetry can be associated with large chemical changes, such as between Segments 2 and 3, where incompatible element abundances change by almost a factor of ten. Incompatible trace element ratios for basalts show a regular pattern that is nonetheless not a single gradient. Along Segments 1 and 2, an axial high changes to a modest rift, (La/Sm)N of basalts decreases from 0.9 to 0.5. Then there is an abrupt step in enrichment to (La/Sm)N of 1.5, associated with a shallower depths and the appearance of an off-axis seamount south of the axis. This enrichment persists eastwards and then declines progressively to values of (La/Sm) N of 0.7 in the pronounced rift valley of Segment 4. Plume signals indicating hydrothermal vents were found in the middle of KR1 where the most enriched basalts occur and the magma supply appears robust. The first- order segment KR2 can be divided into two segments -- an axial high western segment, and a rift valley eastern segment. Hydrothermal vent signals were mainly found in the western part of the segment. The KR2 samples are mostly depleted, but KR2 also contains enriched basalts, including an E-MORB with 0.65% K2O in the western segment. Enriched KR2 basalts have different ratios of alkalis to HFSE compared to KR1, suggesting they are not derived from the same enriched component. In general in this region, inflated axial morphology is associated with trace element enrichment, suggesting that magma flux is being influenced by changing mantle composition on the segment scale.

KEYWORDS: [1032] GEOCHEMISTRY / Mid-oceanic ridge processes.

(No Image Selected)

(No Table Selected)

Additional Details

Previously Presented Material: Only a part of the map and geochemical data was presented as poster in Goldschmidt2011.

Contact Details

CONTACT (NAME ONLY): Sung-hyun Park

CONTACT (E-MAIL ONLY): shpark314@kopri.re.kr

TITLE OF TEAM: