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Title: Geological and Geophysical (& Biological) processes in Circum-Antarctic Ridges

Abstract Title: Geochemistry of basalt from the super-segment of the Australian-Antarctic Ridge

[2] 초록

Geochemistry of basalt from the super-segment of the Australian-Antarctic Ridge

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The 300-km-long super-segment in the middle of the Australian-Antarctic Ridge system is a first-order segment bounded by two large-offset transform faults, with an intermediate spreading rate (70 mm/yr) and relatively shallow axial depth (~2,000 m). This super-segment has only small offsets along its entire length, but there are large variations in axial morphology. From west to east, there is an axial high plateau, a small rift valley, a narrow axial high with small graben, a flat region with no high or valley, and a pronounced axial valley in the east. Magmatism is highly variable in its morphological expression along strike. Most recovered samples by wax coring are very fresh slightly phyric basaltic glasses. MgO contents of the lavas, indicative of eruption temperature, do not correlate well with axial depth. Sub-segments with an axial high in the middle of the segment tend to have MgO contents of less than 8 wt.%, while sub-segments with a rift valley are associated with MgO of around 8 wt.%. A few andesites were recovered from the western ridge-transform intersection (MgO < 4.3 wt.%), as well as a single recovery in the middle of the super-segment. This indicates the magmatic fractionation was intensively going on beneath the middle of the super-segment. The large variations of La/Sm and Sr-Nd-Pb-Hf isotopes indicate that the mantle beneath the super-segment is highly heterogeneous. Variations in axial morphology from axial high to rift valley

correspond with large changes in La/Sm and Sr-Nd-Pb-Hf isotopic composition, suggesting that mantle composition is influencing ridge morphology. However, several samples from the western sub-segments are isotopically enriched, but low in La/Sm similar to N-MORB, suggesting recent depletion processes were occurred in this section. Mantle heterogeneity and recent dynamic process beneath the super-segment might be strongly influenced to the geochemistry and morphology of the super-segment.