Japan Geoscience Union Meeting 2011
(May 22-27 2011 at Makuhari, Chiba, Japan)

SIT002-03 会場:301B 時間:5 月 27 日 09:15-09:30

Plume-ridge interaction beneath the central Gulf of Aden: Sr, Nd, Pb and Hf isotopic evidence from dredged basalts
Plume-ridge interaction beneath the central Gulf of Aden: Sr, Nd, Pb and Hf isotopic evidence from dredged basalts

Meshesha Daniel[1*], 新城 竜一 [1], 折橋 裕二 [2], 原口 悟 [3], 玉木 賢策 [4]
Daniel Meshesha[1*], Ryuichi Shinjo[1], Yuji Orihashi[2], Satoru Haraguchi[3], Kensaku Tamaki[4]

[1]Department of Physics and Earth Sciences, [2]Earthquake Research Institute, Universit, [3]Atmosphere and Ocean Research Institute,, [4]Frontier Research Center for Energy and
[1]Department of Physics and Earth Sciences, [2]Earthquake Research Institute, Universit, [3]Atmosphere and Ocean Research Institute,, [4]Frontier Research Center for Energy and

Gulf of Aden is one of the ideal places to investigate processes of continental break-up and the interaction of plume with oceanic spreading ridge system. The Afar plume has strongly been affecting the formation and evolution of the Gulf of Aden and the Red Sea. Indeed, plume material flow could have played a role in the opening of the Gulf of Aden. Therefore, to evaluate the involvement of plume material in the source of basalts we measured Sr-Nd-Pb and Hf isotopic compositions of tholeiitic basalts dredged along the central Gulf of Aden ridge (45.5E-49E). Based on their contrasting spatial geochemical signatures, two groups (Group 1 and 2) of tholeiitic basalts are identified. Group 1 basalts, dredged from east of 46.20E, have relatively wide variations of 87Sr/86Sr (0.70278-0.70304) and 206Pb/204Pb (18.21-19.03) and limited range of 143Nd/144Nd (0.51301-0.51309) and 176Hf/177Hf (0.283224-0.283276; eHf=15.98-17.83); analogous to the geochemical signature of enriched (E) to depleted normal-type mid-oceanic ridge basalts (N-MORB). In contrast, Group 2 basalts, dredged between 45.6E and 46.2E, have limited ranges of 87Sr/86Sr (0.70323-0.70341), 206Pb/204Pb (19.33-19.49), and 143Nd/144Nd (0.51285-0.51292) and wide range of 176Hf/177Hf (0.283020-0.283155; eHf=8.77-13.54). The geochemical variations reflect the involvement of at least three components in their mantle source; these are (1) depleted MORB-type mantle, (2) plume matrix of the Afar plume, and (3) blobs in the plume matrix. Mixing between the first and second components would have produced Group 1 basalts, while mixing between the second and third components produced Group 2 basalts. The spatial variations in isotopic composition of the basalts suggest that the Afar plume head extends upto 48E along the Aden Ridge.

キーワード: Gulf of Aden, Afar plume, ridge-plume interaction, Sr-Nd-Pb-Hf isotopes
Keywords: Gulf of Aden, Afar plume, ridge-plume interaction, Sr-Nd-Pb-Hf isotopes