Plume derived mantle heterogeneity beneath the Cameroon Volcanic Line, West Africa: A study of peridotite xenoliths

K.N. MATSUKAGE[1]* AND M. OYA[2]

[1]Geodynamics Research Center, Ehime University, 2-5 Bunkyo-cho, Matsuyama 790-8577, Japan (*correspondence: kmatsu@sci.ehime-u.ac.jp)
[2]Earth sciences, Ibaraki University, 2-1-1 Bunkyo, Mito, Ibaraki 310-8512, Japan

Mantle xenolithes give us direct information about the chemical evolution of crust and mantle in interior of the Earth. We studied petrolography and mineral chemistry of peridotite xenoliths of 90 samples from Cameroon volcanic lines (= CVL). The CVL are erupting in a unique tectonic setting with Passive margin between oceanic and continental crusts. This area is famous for upwelling and emplacement of deep mantle plume that was caused the separation of Africa from South America at about 120 Ma [1, 2]. Presently, the hotspot volcano from this plume locates at St. Helena, Antartic Ocean [3]. The age of CVL is younger than the plume emplacement, from tertiary to resent [4].

The xenoliths are composed of lherzolite, harzburgite, dunite, wehrlite and webstelite at the spinel stability field. Lherzolite and harzbugite has similar in texure, which is mainly coase granuler to porphyroclastic. The variations of modal and chemical compositions can be explained as residue by partial melting of pyrolitic lherzolite and melt extraction process(s) in shallow mantle at depth 30-80 km. On the other hand, dunite, wehrlite and webstelite were considered that cumulus rocks from basaltic magma because of higher concentrations of incompatible elements relative to the residual peridotites. The Cameoon mantle xenoliths is characterized by spatial heterogeneity. Bioko, located near the center of the CVL, characterized by large amount of cumulus rocks such as dunite, and by higher degree of partial melting of residual rocks about 25-30%, though that is almost 0-25% in other areas. The equilibium temperatures calculated by two pyroxene geothermometer are very high in Bioko, ~1000°C (maximum is ~1200°C), and gradually decrease to the margin, ~850°C. These results indicate that extensive magmatism had occurred at the upper mantle under the Bioko area. The spatial heterogeneity from center to margins of CVL mantle is considered to be formed by deep hot plume when Atrantic Ocean started opening at about 120 Ma [1].

[1] Burke & Dewet (1973) *J. Geol.* **81**, 406-443. [2] Halliday *et al.* (1990) *Nature* **347**,523-528.[3] Fitton (1980) *EPSL* **51**, 132-138. [4] Fitton & Dunlop (1985) *EPSL* **72**, 23-38.

Comparative study of heavy metal concentration of stream sediments on major rivers of Texas, USA and several rivers of Japan

I. MATSUMOTO[1], D. HOFFMAN[2], J. MCALISTER[2], J. WOLFE[2] AND H. ISHIGA[3]

[1]Faculty of Education, Shimane University, Matsue, 690- 8504, Japan (*correspondence:chromim@edu.shimane-u.ac.jp)
[2]Texas Agricultural Experiment Station/Blackland Research Center, Texas A&M University System, Temple Texas, USA
[3]Faculty of Science and Engineering, Shimane University, Matsue, 690- 8504, Japan

Introduction

Heavy metal concentration of stream sediments on major rivers which are the Trinity, the Colorado and the San Antonio rivers, Texas USA and several rivers of Japan which are the Tama, the Edo, the Tsurumi, the Ara, the Yamato, the Yodo, the Shonai, the Hii (including lakes Shinji and Nakaumi) rivers have been examined. Purpose of our study is clarify the quantitative estimation of ratio of influence given to river sediment of nature and human activity by using of heavy metals [1, 2, 3].

Results and Discussion

Sediment samples collected from various points along the upper and lower streams were subjected to content analysis and elution analysis (using liquate (flow) out test) on the heavy metals like Cd, CN, Pb, Cr, As, Hg, Ni, Zn and Cu from the river sediment for the purpose of environment assessment. Results show that heavy metal content through out the river stream is almost all below the recommended limits of Japan. However, the experimental results show clear impact of human population in some bigger cities on heavy metal concentrations in the river sediments as compared to smaller cities with low human population. It could be seen from the analysis that some heavy metals show relatively high content and high elution value in Dallas-Fort Worth, Tokyo, Osaka and Nagoya areas.

[1] Watanabe *et al*. (2005): *GCA*, Abstract Vol. **194** S66. [2] Matsumoto (2007): International Symposium Restoration and Sustainability of Estuaries and Coastal Lagoons (Matsue, Japan), Abstract Vol. 104-107. [3] Matsumoto *et al*. (2008): *GCA*, Abstract Vol. **55** A604.