GEOCHEMISTRY OF THE TRIASSIC BASALT IN THE LUHUO-DAOFU REGION, SOUTHWESTERN CHINA AND ITS TECTONIC SIGNIFICANCE. X. C. Wang, Z. R. Zhang, Institute of Geochemistry, Chinese Academy of Sciences, 73 Guanshui Road, Guiyang, Guizhou 550002, P.R. China

Studies of volcanic rock geochemistry have made important contributions to interpretations of tectonic setting as well as estimates of average deep crust composition and its evolution. The present abstract aims to document geochemical data for the Luhuo-Daofu Triassic basalt in western Sichuan, China, and to compare them with those from known distinct tectonic settings elsewhere, in an attempt to evaluate their type of tectonic setting.

Geological setting
The Luhuo-Daofu region is situated in central part of the Bayankala-Kekexili basin in which the Triassic strata are widespread. It is chiefly different from the remaining parts of Bayankala-Kekexili basin in its development of basic volcanic rocks, calcareous breccias and associated ophiolitic ultrabasic intrusives. The basic volcanic rocks consist mainly of basalt, basic volcanic breccias and tuffs. The basalts exhibit amygdaloidal, pillow and pelletoidal structures, and porphyritic, spherulitic textures. They are associated with radiolaria-bearing silicate, syngenetic tectosilicic breccias and flysch clastic rocks.

Major element geochemistry
Basalts collected from the Luhuo-Daofu region exhibit a large variation in their major compositions. They are plotted in the tholeiite range on the AFM diagram (Irvine and Baragar, 1977), in the ocean tholeiite range on the TiO₂-K₂O-P₂O₅ diagram (Pearce et al., 1975), and in the MORB range on the FeO⁺MgO-Al₂O₃ and FeO⁺MgO-TiO₂ diagrams (Pearce et al., 1977). They are high in TiO₂ similar to the basalts collected from the modern mid-ocean ridge (Dmitriev et al., 1989), and are also high in FeO+FeO⁺Al₂O₃ and MgO. Especially their contents of FeO+FeO⁺Al₂O₃ increase rapidly with decreasing MgO content. It shows a typical MORB evolution trend (Condie, 1989).

Trace element geochemistry
On the Ti/100-Zr-Y×3-Zr/Y-Zr, and Ti-Zr diagrams (Pearce and Cann, 1973; Pearce, 1982; Pearce and Norry, 1979), the Luhuo-Daofu basalts are plotted in the MORB range. REE analyses of basalts show that the samples have smooth chondrite-normalized REE abundance patterns, and are slightly rich in LREE. Their average ∑REE is 95.6±10²×10⁻⁶, with (La/Yb)ₑ of 4.35, positive Eu anomaly (δEu=1.19), and negative Ce anomaly (δCe=0.29). Most of them possess the characters of tholeiite, and their mantle source regions belong to that of the transitional-type mantle (Le Roex, 1983).

Lead isotope geochemistry
The ²⁰⁶Pb/²⁰⁴Pb, ²⁰⁷Pb/²⁰⁴Pb, and ²⁰⁸Pb/²⁰⁴Pb ratio for a sample of basalt are 18.76, 15.52, and 39.36 respectively. In ²⁰⁶Pb/²⁰⁴Pb, ²⁰⁷Pb/²⁰⁴Pb plot for different types of mantle rocks (Zindler and Hart, 1986), it is located in the MORB range, showing the mixing feature of DMM and EMII.

Discussion and Conclusion
Rock-association types of the basalts in the Luhuo-Daofu region are mainly pillow basalt, vesicle-amygdalaui basalt and massive basalt. They are dominated by tholeiite with respect to their chemical composition. Major, trace elements and lead isotope indicate their MORB character. The authors think that the initial ocean basin where the Luhuo-Daofu basalts were formed is an immature marginal ocean basin located in the Tethys island-sea pattern. Its formation mechanism is related to the activity of thermal mantle plumes in different parts in the opening process of Tethys ocean. In Late Triassic the immature marginal ocean basin began subducting owing to continuous northeastward movement of the Indian Plate. Tectonic emplacement of ophiolitic shell components occurred and are kept on the secondary rifting belts as what we have seen at present.

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References