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Characteristics of the Paleogene Basic Dike Swarm in the Pingda Area, in Western Yunnan

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The basic dikes are mainly distributed between the central southern Pingda and Huanglianhe in the 1:5 million square survey area of Pingda map sheet, especially densely distributed near the Chahe and Huanglianhe village. The quantity of the dykes can be up to 7 or 8, or even more per square kilometer, but sporadicly outcrop in other areas. Mafic dikes are mainly diabase、diabase-prophyrite、volhynite and plagioclase-amphibole gneiss, also show a small amount of diorite dikes. The width of the dikes is generally in the range of 0.5-30m but the majority are 0.5-5m. The dikes are distributed in the Cambrian biotite granite batholith（Paleogene adamellite、granodiorite stock partially），and the strike is mainly nearly S-N and E-W, while a small amount is distributed in N-E and N-W. The inclination angle is almost nearly vertical, few gently dipping. Most of the dikes are superimposed with minor schisteous directional structure, but partially even formed a mylonization with strong dynamic metamorphism.

1 Geochemical Characteristics

Rare element analyses were conducted at the State Key Laboratory of Isotope Geochemistry, Guangzhou Institute of Geochemistry, Chinese Academy of Sciences. The results show that basite contains 45%-48% of SiO_2 and 6%-18.5% of MgO; Mg# is 48-83, which is very high. In the TAS diagram, most samples fall in the categories of either basalt or trachybasalt. A few samples are in the area of basaltic trachyandesite near the boundary line between alkaline to sub-alkaline. Our data indicates that the basite was mainly basaltic rocks with minor components of andesite in the low potassium-high sodium series. In the Hark diagram of major elements, TiO_2, Al_2O_3, FeO, P_2O_5, MgO are negatively related to SiO_2, and CaO is positive correlated with MgO. This implies that the crystallization differentiation was low during the formation of the basite.

2 ^{40}Ar-^{39}Ar Age Determination

Age determination was based on Ar-Ar dating. The standard sample was Biotite ZBH-2506with a age of 132Ma based on ^{40}Ar/^{39}Ar age dating method. Linear

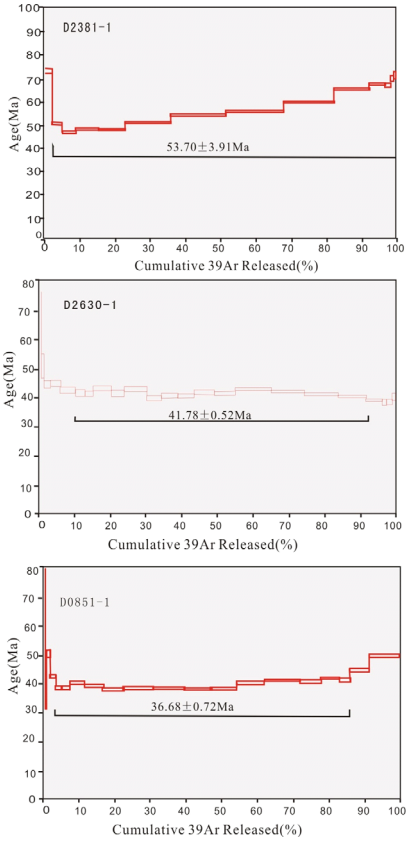

Fig. 1: Whole-rock ^{40}Ar/^{39}Ar age spectrat.

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variation of J-value ranges from 0.007166 to 0.009868 with a R^2 value of 0.978. Data was processed with the software ArArCALC v. 2.2. The plateau age increases steadily for the D2381-1 sample. In comparison, the plateau age is better for D2630-1 and D0851-1-1 except for the releases of excess Ar during the early stage. Estimated ages for the diabase dikes are between 36Ma and 53Ma(Fig.1).

3 The Mantle Source of Basic Dike Swarm

Before the discussion of the magma source and magma types, it is necessary to check if there are crustal contamination, crystallization differentiation and magmatic mixing during the emplacement of the magma because these processes might alter the geochemistry and the ratios of isotopic elements in the original magma and affect our interpretation. Based on the elemental analyses of the basic dike swarm, there is no noticeable crystallization differentiation due to the fact that large-ion lithophile elements were not enriched.

According to the identification chart of tectonic setting of basalts, our data fall in the zones of MORB and island arc tholeiite. Based on our geologic survey, Longrui area was not a typical MORB setting; rather, it was island arc setting in the Neo-Tethys Basin. However, the tectonic origin and timing for the suture zone-like Longrui Deep Fault Zone are still unclear. Our current hypothesis is that since Mesozoic and the closure of Neo-Tethys Basin the tectonic setting of Longrui area is in transition shifting from MORB to island arc tholeiite.

Key words: Pingda area in western Yunnan, basic dike swarm, geochemical, 40Ar/39Ar isotopic, structural environment