Geochronology and Geochemistry of Late Permian to Early-Middle Triassic Collisional Granites in Xi U jimqin Banner, Inner Mongolia：Constraints on the Closure of the Paleo-Asian Ocean

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Abstract：The southern Central Asian Orogenic Belt (CAOB) is an important area to research the closing time and tectonic evolution of the Paleoasian Ocean. The tectonic settings of the southern CAOB in the late Paleozoic to early Mesozoic are controversial for a long time, which restrict the study of the palaeotopography tectonic evolution processes of the Paleoasian Ocean in Late Paleozoic-Early Mesozoic. The authors studied the granodiorite and biotite adamellite in Hanwula of Xi U jimqin Banner, Inner Mongolia (Fig.1) in such aspects as filed occurrence, structural geology, petrology, zircon U-Pb isotopic geochronology and geochemisty. The LA-ICP-MS U-Pb dating show that ages of the granodiorite are about 253.8±1.2Ma and 240.5±0.78Ma, biotite adamellite are about 249.6±1.7Ma and 240.4±0.59Ma respectively, and represent a tectono-magmatism event of the later of Late Permian to Early-Middle Triassic. Petrological and geochemical study indicate that the granodiorite belong to calk-alkaline I-type granite, with the aluminum saturation index (A/CNK) ranging from 0.89 to 1.13.The rock SiO_2 contents range between 65.97%–70.56% (＞56%), MgO contents range between 1.33%–1.70% (＜3%), Al_2O_3 contents range between 14.75%–15.01% (≈15%). The rock have high content of Sr (483.2–541.9ppm, ＞400ppm), low content of Y (10.46ppm–13.35ppm,＜18ppm) and Yb (0.77ppm~1.45ppm, ＜1.9ppm), and have notable fractionation between LREE and HREE, with $(La/Yb)_N$ varying between 12.07–33.05. In addition, there are inapparent negative Eu anomaly(δEu=0.78–0.89) in the chondrite-normalized REE pattern.All of the geochemical characteristics above indicate that the granodiorite belong to adakite. The biotite adamellite belong to peraluminous and high-K calc-alkaline series, and have the features of high silicon (SiO_2=72.73%–77.02%), high content of alkali (K_2O+Na_2O=7.36%–8.47%),low content of P_2O_5 (0.016%–0.085%) and CaO (0.38%–1.67%), enriched in Th、U、K、Nd、Hf, depleted in Ba、Nb、Ta、P、T and HREE element, significant negative Eu anomalies (δEu=0.08–0.61), and high degree of differentiation (DI=85.78–95.76). The P_2O_5 has the negative correlation with SiO_2 while the Y has the positive correlation with the Rb. In summary, the biotite adamellite show characteristics of highly fractional I-type granite. All the geochemical characteristics above indicate that the granites of Hanwula were probably the product of different batches of emplacement of crystallization/differentiation of magmas which formed by partial melting of the thickened crust under different depths. Based on the tectonic deformation feature, an important tectonic deformation phases at the Late Paleozoic-Early Mesozoic are identified in this research：the ductile shear zone in EW, SEE direction, formed in an extensional condition,were developed in the granites during Late Triassic. The shear zone were related to the extensional regime of post-collision settingafter the collision event between the Siberian plate and the North China plate. Combined with their petrological and geological features, the granites of the Late Permian to Early-Middle Triassic were most probably formed in the tectonic setting of collision triggered between the Siberian plate and North China plate after closure of the Paleoasian Ocean in the Later Permian.

Key words: the Central Asia Orogenic Belt (CAOB), Xi U jimqin Banner, Late Permian to Early-Middle Triassic, Adakite, high differentiation I-type granites

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References

Xiao Wenjiao, Windley B.F., Hao Jie and Zhai Mingguo, 2003. Accretion leading to collision and the Permian Solonker suture, Inner Mongolia, China: Termination of the Central Asian Orogenic Belt. *Tectonics*, 22(6): 1069–1089.

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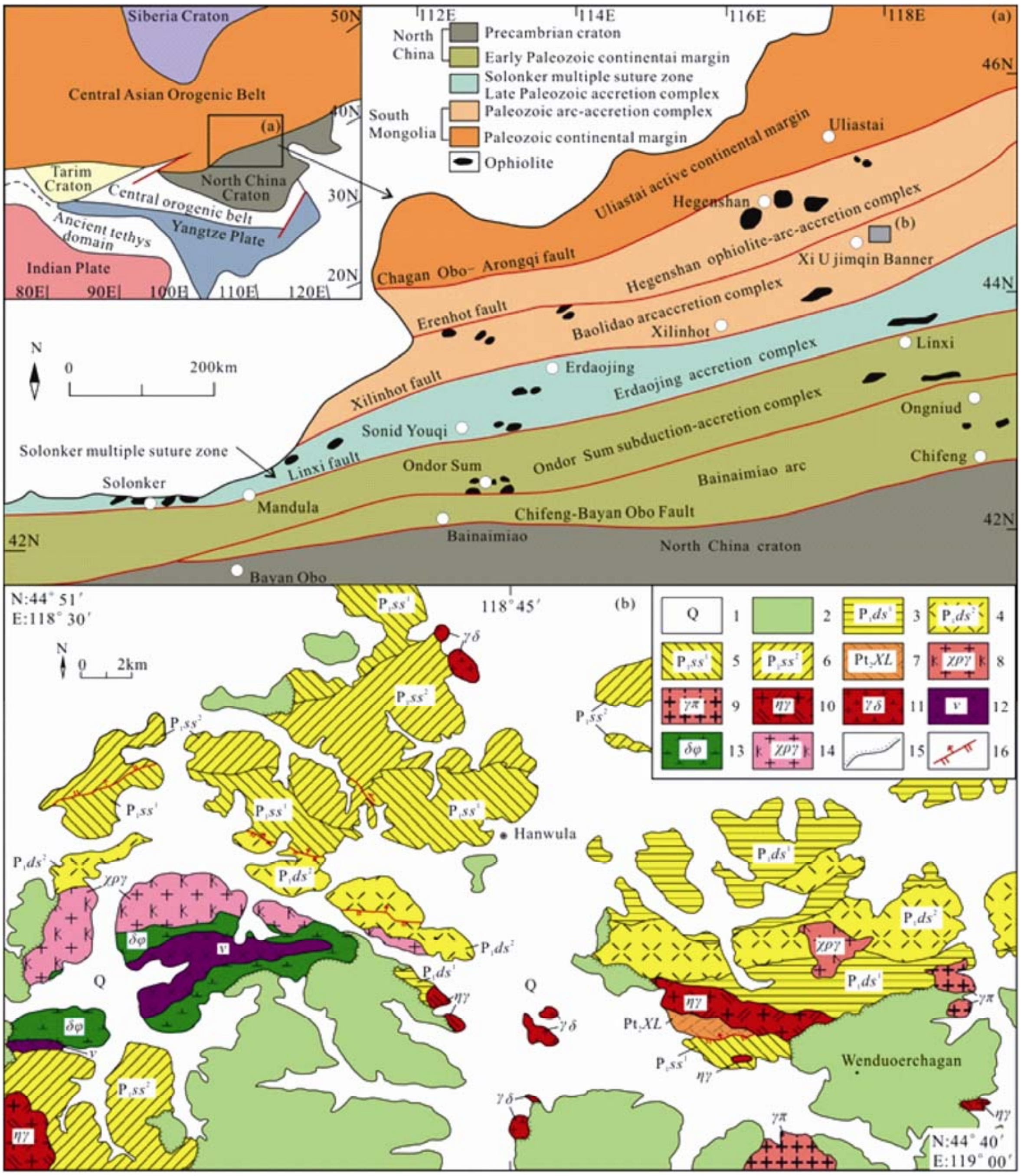

Fig. 1. Geological sketch map of Hanwula area in Xi U jimqin Banner, Inner Mongolia (a,after Xiao Wenjiao et al., 2003).
1—Quaternary; 2—Upper Jurassic—Lower Cretaceous volcanic rocks; 3—Lower Permian Dashizhai Formation 1st bed; 4—Lower Permian Dashizhai Formation 2nd bed; 5—Lower Permian Shoushangou Formation 1st bed; 6—Lower Permian Shoushangou Formation 2nd bed; 7—Middle Proterozoic Xilinhot Group; 8—Early Cretaceous alkali–feldspar granite; 9—Early Cretaceous granite porphyry; 10—Early−Middle Triassic biotite adamellite; 11—Late Permian−Middle Triassic granodiorite; 12—Early Permian gabbro; 13—Early Permian pyroxene diorite; 14—Early Permian alkali—feldspar granite; 15—ngular unconformity boundary; 16—measured fault

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