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Zircon LA-ICP-MS U-Pb Dating of Middle Permian Granite of Langshan Mountain in Northern Margin of the North China Platform and Its Indicating Significance

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1 Introduction

Langshan area widely distributed intermediate-acid magmatic rocks. The existing researches are collectively referred to as Hercynian composite rock mass but lack of accurate dating results (Peng RM, et al., 2007. Li JY, et al., 2009. Chen XF, et al., 2011. Pi QH, et al., 2010). This is the first report southwest Langshan Middle Permian granite of U-Pb age which could provide new evidence for the study with magmatism evolution in Langshan region and tectonic thermal event in the process of Central Asia orogenic, and help understand the age framework of the northern margin of the North China Platform. This research has an important geological significance.

2 Granite Characteristics

The Middle Permian granite in the southwestern of Langshan mountain distributed on NE. Granite has finegrained granitic texture and massive structure, which mainly composed of K-feldspar (25%~35%), Plagioclase (35%~40%), quartz (30%) and small amounts of biotite. The K-feldspar crystals are subhedral-allotriomorphic granular with grid twin, and grain size are 0.2~0.6mm (part of 0.6~1mm). Plagioclase are allotriomorphic granular with polysynthetic twin, and grain size are 0.1~0.6mm(part of 0.6~1mm). Biotite occur as scattered with flaky.

Table 1 Major elements of Middle Permian granite in the southwestern of Langshan mountain

	MIN	MAX	AVG
SiO ₂	73.32	75.21	74.56
Al ₂ O ₃	12.84	14.76	14
Fe ₂ O ₃	0.596	2.12	1.08
CaO	0.68	1.47	0.95
MgO	0.147	0.286	0.23
Na ₂ O	3.32	4.05	3.61
K ₂ O	4.55	5.12	4.84
TiO ₂	0.042	0.176	0.11
MnO	0.018	0.026	0.023
P ₂ O ₅	0.019	0.063	0.042

3 Zircon U-Pb Dating and Its Indicating Significance

Granite chemical composition shows in Table 1. In the TAS diagram of intrusive rocks, the samples fall on granite area which is consistent with petrographic observations. The values of Aluminum saturation index(A/CNK) are

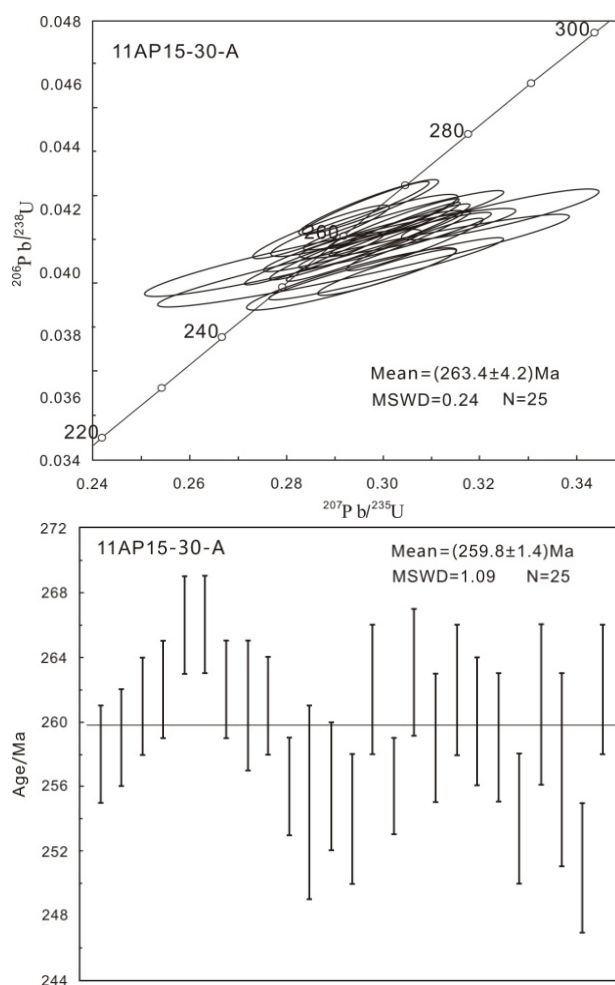


Fig.1. The zircon U-Pb Concordia diagrams of Middle Permian granite in the southwestern of Langshan mountain

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from 1.42 to 1.56 showing as peraluminous granite.

Total rare earth rock(Σ REE) is $100.6 \times 10^{-6} \sim 285.2 \times 10^{-6}$, showing there are rich in LREE and lack of HREE which indicated LREE and HREE have significant fractionation ($\Sigma Ce/\Sigma Y=12.0 \sim 21.5$). In addition, $(La/Yb)_N=18.0 \sim 30.0$, $(Gd/Yb)_N=18.0 \sim 30.0$, $(La/Sm)_N=3.8 \sim 7.3$, $\delta Eu=0.21 \sim 0.77$. These data show a typical feature of partial melting of granite which is a product of convergent plate edge. Negative anomalies of Eu shows that there remained plagioclase or had experienced a strong fractional crystallization with plagioclase and potassium feldspar in magma source region (Cullers R L, Henderson P, 1984).

After collected fresh samples, according to the standard process we selected zircon to carry on LA-ICP-MS U-Pb dating. In Concordia diagrams of $^{206}Pb/^{238}U$ - $^{207}Pb/^{235}U$ the age is 263.4 ± 4.2 Ma (Fig.1 above), and the weighted average age is 259.8 ± 1.4 Ma (Fig.1 below).

Central Asian Orogenic Belt is composed of many island arcs and micro ancient continent which has gone through subduction, aggregation and collision. It recorded the convergence and process of plate extinction. Langshan area has been a strong influence by the southward subduction of Siberian plate at Late Paleozoic suffering tectonic compression by north and south side accompanied with intermediate-acid magmatism intrusion (Peng Runmin, 2007). This article has obtained the age (263.4Ma) of granite in the southwestern Langshan mountain which is belongs to Middle Permian. The mineral association, geochemical features and isotopic dating with granite of Middle Permian in Langshan mountain all show the characteristic of after the collision /post-orogenic magmatism. The mineral composition high-K calc-alkaline granite. Accurate dating of Middle Permian granite in the

southwestern of Langshan mountain have provided new age limited for researching the late Paleozoic crustal deformation and acidic magma intrusion time. It also proved that the subduction caused by Paleo-Asian Ocean dived to Northern margin of north China platform and the history of extinction of the Palaeo-Asian ocean at Middle Permian. It has significance for researching age bridge and tectonic evolution in southwestern of Langshan mountain and even northern margin of north China platform.

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