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The Confirmation of the Neoproterozoic Langshan Group in Inner Mongolia and Its Significance

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There is a large Mesoproterozoic rift at the northern margin of North China Craton (NCC), and one of China's most important metallogenic belts, the Langshan-Zhaertai Shan-Bayan Obo mesoproterozoic metallogenic belt is just located in this rift. This metallogenic belt contains some large or ultra-large ore deposits, such as the Bayan Obo iron deposits and ultra-large rare earth deposits, and the large Dongshengmiao Cu-Pb-Zn sulphide deposits.

The Zhaertai Group is composed of a set of metamorphic rocks, interbedded with thin ferruginous quartzite and manganese ore horizons (Fig.1). Its stratigraphic sequence in the Langshan region is similar to that in the Zhaertai Shan.

Recently, the project of "Properties and Metallogenic Specialization of Meso-Neopreterozoic Multiphases Rift in NCC", funded by the National Basic Research Program of China (grant No. 2012CB416604), has made great progress in the chronology of the Zhaertai Group (Hu et al., 2014). (1) The zircon U-Pb age of the Zhaertai Group meta-volcanic interlayers in Langshan is 804.1 ± 3.5 Ma; the detrital zircons from 5 epizonal meta-sedimentary rock samples show prominent ages from 1100 to 1230 Ma, while one of those samples show a minimum age peak at 810 Ma. In consideration of the previous meta-volcanic zircon age at 805.0±5.0Ma of Zhaertai Group in Langshan (Peng et al., 2010), it is inferred that this group was mainly deposited in Neoproterozoic around 800–1100Ma. (2) All detrital zircon ages of 5 meta-quartz sandstone samples from different layers of Zhaertai Group in Zhaertai Shan show 2 prominent age peaks at 1900Ma and 2500Ma. In combination with earlier researches, we believe that the Zhaertai Group in Zhaertai Shan formed in Mesoproterozoic.

It is therefore indicated that, the Zhaertai Group in Langshan is different from that in Zhaertai Shan, the Bayan Obo Group and the Huade Group. It is a set of rift sedimentary succession in Neoproterozoic. We suggest restoring the Langshan Group which refers solely to the

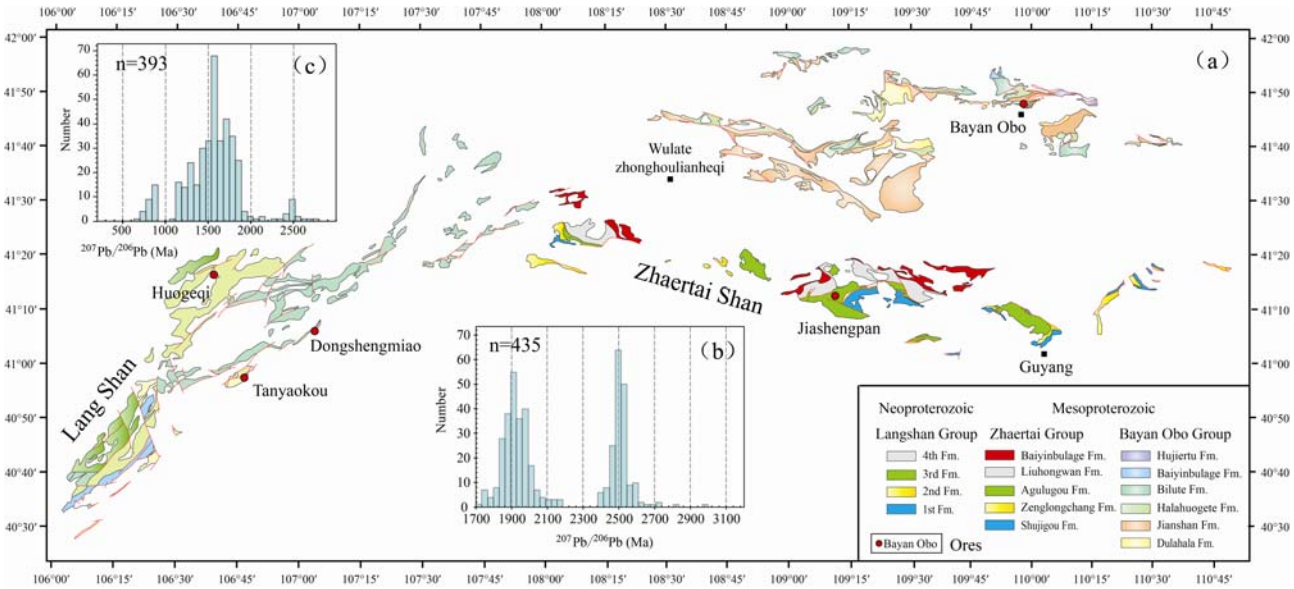

Fig. 1. (a)Meso-Neoproterozoic strata in Langshan, Zhaertai and Bayan Obo regions; (b)Detrital zircon U-Pb ages of Zhaertai Group; (c)Detrital zircon U-Pb ages of Langshan Group.

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Neoproterozoic succession in Langshan.

Hence, the Mesoproterozoic rift at the northern margin of NCC actually consists of the Zhaertai, Bayan Obo and Huade Groups deposited in Mesoproterozoic and the Langshan Group deposited in Neoproterozoic. The confirmation of the Neoproterozoic Langshan Group in Inner Mongolia has two significant meanings: (1)This discovery provides new evidence to prove the existence of Neoproterozoic rift in NCC; (2)The previous Mesoproterozoic Lanshan-Zhaertai-Bayan Obo metallogenic belt can be divided into two different Mesoproterozoic and Neoproterozoic metallogenic belts, and the mineralogenetic epoch of large submarine volcanic-exhalation-sedimentary deposits in Langshan Group (Peng et al., 2010) should be after Neoproterozoic.

In addition, the relationship between the Alxa Block and NCC has always been controversial. Previously, most researchers regarded Alxa Block as a part of NCC (Zhai and Santosh, 2011; Zhao et al., 2005), while some researchers considered that the basement of Alxa Block greatly differs from NCC (Geng et al., 2010； Yuan et al., 2014). The Neoproterozoic rift found in western Alxa Block and the Jinchuan nickel mine formed around 810Ma have not been discovered in NCC. Based on the confirmation of Neoproterozoic Langshan Group in Inner Mongolia, the characteristics of interbedded bimodal volcanic rocks and some related submarine volcanic-exhalation-sedimentary deposits, the tectonic setting of Langshan may contrast with the mineralization in the Neoproterozoic rift of western Alxa Block.

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