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The Metallogenetic Epoch of Magnetite Deposits in Awulale Iron Belt, Western Tianshan Mountains

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The Awulale iron belt was concerned for its polydeposits and large scale by geologists in western Tianshan mountains, which was located in the southeast of Yining massif in China. The magnetite depostis and magnetite spots were mainly in the marine volcanic rock-volcanoclastic rock-sedimentary formation of Dahalajunshan formation in this belt, where the tuff was main mineral-bearing rock.

The age of main mineral-bearing formation was usually taken as the ones of mineralization because of iron ores lack of authorities dating minerals. Some viewpoints had been given that the metallogenetic epoch of the magnetite deposits was late Devonian(Zhu YF,et al., 2005) or early carbonifereous(Li YJ, et al., 2009) or late carbonifereous (Zhang Zuoheng, et al., 2012) or trias-Jura(Yang Zhi-hua, et al., 2004) in the Awulale iron belt for the differences in sample stations or volcanic cycles or lithology or analytic methods. It was undeniable that these studies were of positive significance for the evolution and the genesis of the Awulale belt.

1 Sample Station and Analytic Result

The analytic samples were dacite, albitite ,tuff and granite in Beizhan iron deposit. The first three were collected from the L3 ore body which were all the hosted rocks of ore bodies. The tuff was pay rock in it.The last sample came from the ZK009 hole. This granite mass was post metallogenetic mass that it had transected the ore bodies. The isotopic ages of the first three ones were respectively 300.4±2.2, 308.7±2.1 and 303.0±2.1 Ma and the ones of the last one was 299.0±2.5 Ma. These four ages were similar(Table 1).

The analytic samples were tuff and granite in Chagangnuoer iron deposit. The tuff was pay rock of ore bodies, which was from the No.1 iron belt in 3100 drift. The granite was clooected from the edge of No.2 iron belt, which contacted by the fault with the tuff. The granite mass was post metallogenetic ones, where some Cu, Pb and Zn mineralization had been found. The isotopic ages of the tuff and the granite were respectively 329.9±3.7 and 325.9±2.7 Ma. They were concordant.

The sample of Songhu iron deposit was tuff, which was collected from the edge of No.1 ore body. The tuff was pay rock. The isotopic age of this rock was 323.9±1.9 Ma.

The samples of andesite,dacite and tuff were collected from the middle ore nugget in Zhibo iron deposit, where the tuff was pay rock. The isotopic ages of these rocks were respectively 310.0±3.0, 307.0±3.0 and 336.0±4.0 Ma. The ones of volcanoclastic rock was obviously older than the volcanic lava.

The sample was granite in Dunde iron deposit. It was collected from the light-red moyite body in the western field, which was shaped as northwest-southeast longitudinal zonality. The body contacted by a intrusive with the volcanic formation in the middle of the field, where canbonatation, chloritization and sericitation were main rock alterations. Fluorite, chalcopyrite and pyrite had been found as some lumps and some veins in this body. It was post iron metallogenetic rock ones. Its isotopic age was 300.7±2.0 Ma.

2 Study on the Metallogenetic Epoch

Sun JM et al.(2012) had ever studied on the epochs of barren dacite and granite, which were located in the tunnel outside in Beizhan iron field. The isotopic ages of them were 329.1±1.0 and 307.0±1.2 Ma.Han Q et al.(2013) had also reported that the isotopic ages of granite was 301.4±0.4 Ma. The age of dacite was obviouslu older than this research. It was possible that the dacites were from the different volcanic cycles. The ones of granite was as old as this research, and the rocks might be from same rock body. So, the metallogenetic age was 99~308Ma in Beizhan iron deposit. The ore bodies formed in late carbonifereous.

Hong wei et al.(2012) and Jiang ZS et al.(2012) had ever

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Table 1 the isotopic ages of rocks in main magnetite deposits in Awulale iron belt, Western Tianshan mountains

Iron Deposit	Rock	Method	Age/Ma	Sample station
Beizhan	Granite	Zircon LA-ICP-MS U-Pb	299.0±2.5	ZK009 hole
	Dacite	Zircon SHRIMP U-Pb	300.4±2.2	L3 ore body
	Albitite	Zircon SHRIMP U-Pb	308.7±2.1	L3 ore body
	Tuff	Zircon SHRIMP U-Pb	303.0±2.1	L3 ore body
Chagangnuoer	Tuff	Zircon SHRIMP U-Pb	329.9±3.7	No.2 ore belt in 3100 drift
	Granite	Zircon LA-ICP-MS U-Pb	325.9±2.7	The edge of No.2 ore belt
Songhu	Tuff	Zircon SHRIMP U-Pb	323.9±1.9	The edge of L1 ore body
Zhibo	Andesite	Zircon SHRIMP U-Pb	310.0±3.0	Middle ore nugget
	Dacite	Zircon SHRIMP U-Pb	307.0±3.0	Middle ore nugget
	Tuff	Zircon SHRIMP U-Pb	336.0±4.0	Middle ore nugget
Dunde	Granite	Zircon LA-ICP-MS U-Pb	300.7±2.0	southwestern filed

tested the skarnoid, rhyoliter, dacite and diorite in the Chagangnuoer iron field and reported the isotopic ages of 316.8±6.7,301.8±0.9, 300.3±1.1 and 303.8~305.0Ma. The ones of volcanic rock and the irruptive rock were obviously younger than this research. The volcanic rock had cycles at least. Two periods of mineralization happened in this field. The isotopic age of the first mineralization was 326~330Ma, and the ones of the second was 300-316Ma. They both happened in late carbonifereous.

The ages of andesite, dacite and tuff were respectively 316.8±6.7,301.8±0.9,300.3±1.1 and 303.8~305.0Ma in Zhibo iron field. The volcanic rock had two cycles at least. Xi Zhang et al.(2012) reported the isotopic ages of 320.3±2.5Ma and 294.5±1.0 Ma for the granite transecting the iron ore body, and the ones of granite were 318.9±1.5Ma and 304.1±1.8 Ma that had transected the mineral-bearing formation. It showed the multiple phases of granite in Zhibo field. So, two periods of mineralization happened in this field. The isotopic age of the first mineralization was 320~336Ma, and the ones of the second was 295-307Ma.

The ages of tuff was 323.9±1.9Ma in Songhu iron field, and the ones of iron ore bodies should be later than this result.

The isotopic ages of granite were 300.7±2.0Ma and 295.8±0.7Ma(Duan et al.,2013), and the ones of dacite was 316.0±1.7Ma(Duan et al.,2013) in Dunde iron deposit. The ore bodies were formed between 296Ma and 316Ma.

3 Cconclusion

The main magnetite deposits were formed between 296Ma and 336Ma. Multiple metallogenetic phases happened in some iron deposits. The epoch of the first mineralization was early carbonifereou s (320~336Ma), and the ones of the second was late carbonifereou s (300~316Ma).

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