

CONTRAST IN FLUID METALLOGENY BETWEEN TIANMASHAN AND DATUANSHAN ORE DEPOSIT, TONGLING, ANHUI*

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The Tianmashan Au-S and the Datuanshan Cu ore deposits of the stratabound skarn type occur in the Tongguanshan and the Shizishan orefields, Tongling, Anhui Province. In order to better understand the metallogenic regularities in Tongling, Anhui Province, a systematic contrast in the metallogenic geological background (table 1) and metallogenic fluid feature (figure 1, tables 2 & 3), especially fluid metallogeny has been performed between the two ore deposits. The major reasons for the formation of the stratabound skarn Au-S ore deposit in Tianmashan and for that of the stratabound skarn Cu ore deposit in Datuanshan are analysed in accordance with this contrast so as to provide some scientific principles for further exploration of the relative ore deposits in the area.

Table 1 Contrast in the metallogenic geological background between the Tianmashan and the Datuanshan ore deposits, Tongling, Anhui Province

	Tianmashan ore deposit	Datuanshan ore deposit
Wall rock	The Lower Huanglong Formation of the Middle Carboniferous System, the major lithologies of which are dolomitite and dolomititic limestone with Au-bearing pyrite layers containing some organic substance	The Lower Xiaoliangting Formation of the Lower Triassic System, the major lithologies of which are marlite, limestone and calcareous shale with no Au-bearing pyrite layers
Host pluton	The Tian'ebaodanshan calc-alkali pluton, which is lower in Cu with an average of 13.29ppm and higher in Au with an average of 3.95ppb and consists of quartz diorite and diorite	The Datuanshan alkalescent to calc-alkali pluton, which is higher in Cu and Au with averages of 153ppm and 3.60ppb respectively and consists of quartz diorite
Metallogenic process	By early generation of Au-bearing pyrite layers with some organic substance followed by late hydrothermal overlapping redevelopment of skarn, oxide, sulfide and carbonate stages, of which the oxide and sulfide stages are the major metallogenic ones	By hydrothermal replacement of skarn and sulfide stages, of which the sulfide stage is the major metallogenic one

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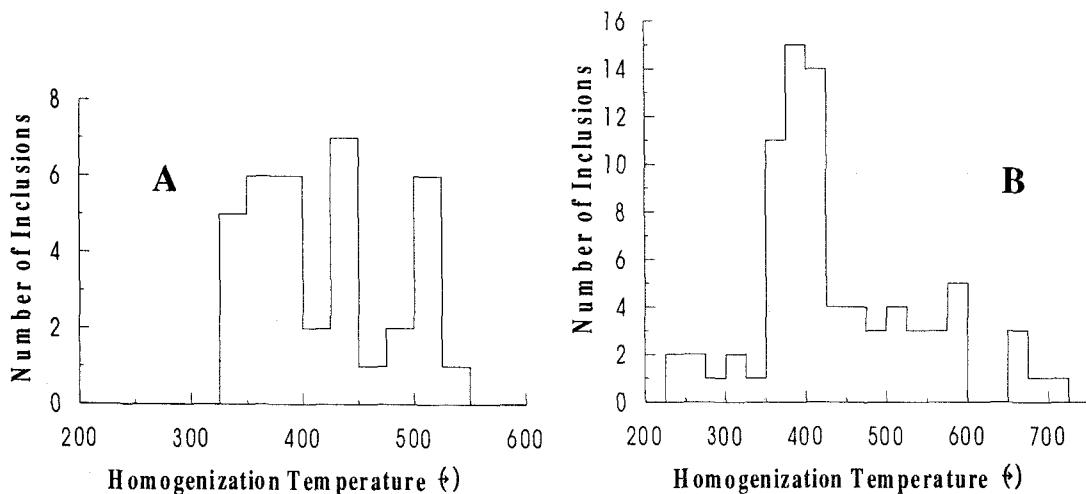


Fig 1 histograms of homogeneous temperatures of fluid inclusions in the Tianmashan (A) and the Datuanshan (B) ore deposits, Tongling, Anhui Province

Table 2 Contrast in gas compositions of metallogenic fluids Between the Tianmashan and the Datuanshan ore deposits, Tongling, Anhui Province

	Stage	Mineral	N ₂	CH ₄	CO ₂	H ₂ O
			ppm	ppm	ppm	ppm
Tian Ma Shan	Skarn	Pl	4.12	5.59	11.2	512.94
		Sep	2.87	3.15	5.8	819.64
		Cc	3.93	5.74	62.77	1212.9
		Cc	4.84	8.29	76.54	1402.8
	Oxide	Cc	5.27	13.4	171.96	730.59
	Sulfide	Cc	7.66	10.4	235.95	731.59
		Cc	2.93	5.56	158.15	658.6
Carbonate	Cc	2.26	3.99	13.84	668.39	
Da Tuan Shan	Skarn	Cc	23.8	1.6	17.69	1218.6
		Di	17.8	1.8	12.39	909.48
	Sulfide	Q	11.5	1.5	13.3	769.5
		Q	17.5	3.26	48.9	718.23
		Q	27.6	2.44	25.9	823.1
		Q	26.4	2.79	16.62	705.05
		Q	23.5	1.55	25.31	716.13

Analyses at the Inclusion Laboratory in China University of Geosciences, Beijing

Table 3 Contrast in aqueous compositions of metallogenic fluids between the Tianmashan and the Datuanshan ore deposits, Tongling, Anhui Province

	Stage	Mineral	Na ⁺	K ⁺	Mg ²⁺	Ca ²⁺	F	Cl ⁻	SO ₄ ²⁻	Na ⁺ /K
			ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Tian Ma Sha n	Skarn	Cc	1.47	3.07	116	59.6	3.21	28.1	33.6	0.81
		Cc	6.1	6.59	94	47.9	1.95	23.7	29.6	1.57
	Oxide	Cc	14	21.8	160	87.8	5.97	34.8	8.43	1.09
	Sulfide	Cc	11.4	14.7	170	93.4	11.3	67.6	30.7	1.31
	Carbonate	Cc	5.6	6.14	20.3	203	5.6	10.4	97.1	1.55
Da Tua n Sha n	Skarn	Gn	7.87	6.43	2.48	18.4	25.5	8.49	4.92	2.08
		Di	2.3	3.78	1.8	13.8	11.1	7.73	5.26	1.03
	Sulfide	Q	15.5	11.9	0	13.9	1.03	29.9	8.25	2.21
		Q	15.7	9.16	0	7.39	1.18	39	4.73	2.9
		Q	8.61	6.39	0	7.5	1.67	23.1	6.66	2.28
		Q	10.8	8.58	0	6.71	1.87	28.7	5.97	2.14
		Q	11.7	7.46	0	3.89	2.92	39.6	7.79	2.65

Analyses at the Inclusion Laboratory in China University of Geosciences, Beijing.

The magmatic pluton closely associated with the ore deposit in Tianmashan is rich in Au and poor in Cu, but that in Datuanshan is rich in Cu and Au. The wallrock strata in Tianmashan contain Au-bearing pyrite layers with some organic substance but those in Datuanshan contain no such layers. Moreover, the metallogenic fluid in Tianmashan is dominated by magmatic hydrothermal fluid characterized by enrichment of Na⁺, K⁺, Mg²⁺, Ca²⁺, F and Cl⁻ with ratio of Na⁺/K⁺ approximate to 1 in the major metallogenic stage, but that with high content of Cu in Datuanshan by groundwater fluid rich in Na⁺, K⁺, Ca²⁺ and Cl⁻ with ratio of Na⁺/K⁺ approximate to 2. These three contrasts account for the formation of the stratabound skarn Au-S ore deposit in Tianmashan and that of the stratabound skarn Cu ore deposit in Datuanshan. In addition, the differences in compositional evolution and physic-chemical condition variation of the metallogenic fluid result in gradual dispersing of Cu or Au in the late stage of the fluid metallogeny. This is also an important cause for the generation of the stratabound skarn Au-S ore deposit in Tianmashan and that of the stratabound skarn Cu ore deposit in Datuanshan.