Metallogenic geodynamic background of Mesozoic gold deposits in granite-greenstone terrains of North China Craton *

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Abstract The spatial distribution map of 65 mid-large gold-deposits hosted in the granite-greenstone terrains of the North China Craton is first drawn. These gold deposits mainly concentrate in the Mesozoic remobilized Yinshan-Yanshan-Liaoning-Jilin intracontinental collisional orogenic belt, the northern Qinling and the Jiaodong Mesozoic collisional orogenic belts, and the Mesozoic intracontinental fault-magmatic belts developed along the Taihangshan and the Tan-Lu faults; their mineralizing time is predominantly Jurassic-Cretaceous, i.e. the Yanshanian. The metallogenic geodynamic background is exactly the compression-to-extension transition regime during continental collision.

Keywords: North China Craton, gold deposit, granite-greenstone terrain, collision orogenesis, Mesozoic.

The North China Craton (NCC), as the core of the North China paleocontinent, is the largest gold-producing area in China and an important auriferous province in the world. Are these gold-centralizing districts granite-greenstone terrains? Can they be attributed to greenstone type? What are the main differences and similarities between greenstone type gold deposits at home and abroad? What are the mineralizing space, time and geodynamic background? All these questions are still in controversy. To improve understanding of the above problems, this paper completely collects the achievements in research into gold deposits of China, and first compiles a spatial distribution map of 65 significant gold deposits (fig. 1, table 1). Accordingly, their mineralizing space, time and geodynamic background are briefly discussed.

1 Gold mineralization types in granite-greenstone terrains of NCC and their significance

1.1 The granite-greenstone terrains in NCC and their gold mineralization

It is not easy to determine if a district is a granite-greenstone terrain because the concept of greenstone belt is understood differently by various geologists. In this paper, the greenstone belt is defined as Archean volcanic-sedimentary association with mafic-ultramafic volcanics taking advantage over associated felsic ones, in the light of the Precambrian geological features of China. The granite-greenstone terrain is composed of the greenstone belt and its genetically related Precambrian granitoids.

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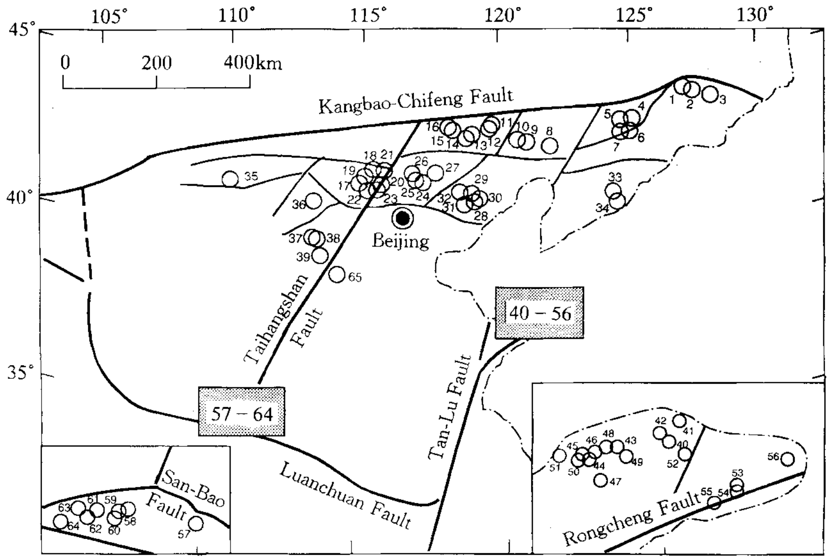

Fig. 1. Spatial distribution of gold deposits in granite-greenstone terrains of NCC. The numbers of the locations are the same as those in table 1.

According to the above understanding, most districts with crystalline basement in NCC belong to granite-greenstone terrains, such as Huaxiong block, Jiaobei terrain, Qingyuan terrain, etc. Gold mineralization strength is very different among these terrains. The O-type granite-greenstone terrains, such as Jiaobei, were strongly gold mineralized, whereas the C-type terrains, such as West Shandong, were slightly mineralized[1,2]. The O-type terrains are often associated with khondalite series, and constitute granite-greenstone-khondalite terrains, e.g. the Huaxiong block and the Jiaobei terrain (table 1), which are usually regarded as high-grade terrains. So far, at least 65 moderate or even larger gold deposits have been found in NCC (figure 1).

1.2 Types of gold mineralizations and greenstone type gold deposits in NCC

The 65 deposits can be divided into the following three styles: (i) as lodes including auriferous quartz-vein and altered crush zone hosted in Precambrian granitoids or greenstone belts, such as Jiapigou, Jinchangyu, Jiaojia, Linglong and Wenyu deposits, with location controlled by fault, belonging to fault-bound deposits[2]; (ii) hosted in the inner or outer contact zones of Yanshanian alkaline intrusions into granite-greenstone terrains, such as Qiyugou deposits, spatially controlled by the Mesozoic plutons, attributed to magmatic-bound deposits[2]; and (iii) as stratiform or stratabound orebodies situated along a special bed such as iron-formation, carboniferous bed or/and massive sulfide bed in the sequence of greenstone belt, regarded as stratiform or stratabound gold deposits[2], for example, the Luanjiagou deposit (not in table 1 for small one) of Shandong Province is hosted in banded iron formation; and gold of Hongtoushan deposit in Liaoning Province is associated with the massive sulfide copper deposit. It is clear that the fault-bound type is most important; the pluton-bound type, the second; the stratiform or stratabound types, less in NCC although they are frequently found abroad, such as the Kolar and the Hemlo deposits.

Table 1 List of gold deposits hosted in granite-greenstone terrains of NCC

No.	Name	Location	Size	Type 1	Type 2	Ore time	Host age	Host rock	Local tectonics
01	Banmiaozi	Huadian	M	Q-vein	GS	J-K	Ar	Jiapigou Gp.	South Jilin GGK terrain
02	Jiapigou	Huadian	L	Q-vein	GS	J-K	Ar	Jiapigou Gp.	South Jilin GGK terrain
03	Haigou	Antu	L	Q-vein	GS	J-K	Ar	Jiapigou Gp.	South Jilin GGK terrain
04	Gounaidianzi	Qingyuan	M	Q-vein	GS	J-K	Ar	Anshan Gp.	Qingyuan GG terrain
05	Hongtoushan	Fushun	M	massive sulfide	GS	Ar	Ar	Anshan Gp.	Qingyuan GG terrain
06	Wangjiadagou	Qingyuan	M	Q-vein	GS	J-K	Ar	Anshan Gp.	Qingyuan GG terrain
07	Xiadabao	Qingyuan	M	porphyry	P	J-K	Ar	Anshan Gp., porphyry	Qingyuan GG terrain
08	Paishanlou	Fuxin	L	Q-vein	GS	J-K	Ar	Jianping Gp.	Chifeng-Jinzhou GGK block
09	Erdaogou	Beipiao	M	porphyry	P	J-K	Ar	Jianping Gp., porphyry	Chifeng-Jinzhou GGK block
10	Jinchanggouliang	Aohanqi	L	altered zone	GS	J-K	Ar	Jianping Gp.	Chifeng-Jinzhou GGK block
11	Zhuanshanzi	aohanqi	M	altered zone	GS	J-K	Ar	Jianping Gp.	Chifeng-Jinzhou GGK block
12	Houdaxian	Jianping	M	Q-vein	GS	J-K	Ar	Jianping Gp.	Chifeng-Jinzhou GGK block
13	Loufengmao	Kalaqinqi	M	Q-vein	GS	J-K	Ar	Jianping Gp.	Chifeng-Jinzhou GGK block
14	Anjiayingzi	Kalaqinqi	M	Q-vein	GS	J-K	Ar	granitoid into Jianping Gp.	Chifeng-Jinzhou GGK block
15	Honghuagou	Chifeng	L	porphyry	P	J-K	Ar	Jianping Gp., porphyry	Chifeng-Jinzhou GGK block
16	Lianhuashan	Chifeng	M	Q-vein	GS	J-K	Ar	Jianping Gp.	Chifeng-Jinzhou GGK block
17	Shuijingtun	Chongli	M	Q-vein	GS	J-K	Ar	Sanggan Gp.	Zhangjiakou terrain
18	Dongping	Chongli	L	porphyry	P	J-K	Mz	Sanggan Gp., porphyry	Zhangjiakou terrain
19	Guzuizi	Chongli	M	Q-vein	GS	J-K	Ar	Sanggan Gp.	Zhangjiakou terrain
20	Hougou	Chicheng	M	porphyry	P	J-K	Mz	Sanggan Gp., porphyry	Zhangjiakou terrain
21	Huangtuliang	Chicheng	M	Q-vein	GS	J-K	Ar	Sanggan Gp.	Zhangjiakou terrain
22	Xiaoyingpan	Xuanhua	L	Q-vein	GS	J-K	Ar	Sanggan Gp.	Zhangjiakou terrain
23	Zhangquanzhuang	Xuanhua	M	Q-vein	GS	J-K	Ar	Sanggan Gp.	Zhangjiakou terrain
24	Xituogu	Miyun	M	Q-vein	GS	J-K	Ar	Sanggan Gp.	North Hebei block
25	Beigangou	Huairou	M	Q-vein	GS	J-K	Ar	Sanggan Gp.	North Hebei block
26	Dayingzi	Fengning	M	Q-vein	GS	J-K	Ar	Sanggan Gp.	North Hebei block
27	Shiziling	Chengde	M	altered zone	GS	J-K	Ar	Sanggan Gp.	East Hebei block
28	Huajian	Kuancheng	M	Q-vein	GS	J-K	Ar	Badaohe Gp.	East Hebei block
29	Niuxinshan	Kuancheng	L	Q-vein	GS	J-K	Ar	Badaohe Gp.	East Hebei block
30	Dachagou	Qinglong	M	Q-vein	GS	J-K	Ar	Badaohe Gp.	East Hebei block
31	Jinchangyu	Qianxi	L	Q-vein	GS	J-K	Ar	Badaohe Gp.	East Hebei block
32	Chagou	Qianxi	M	Q-vein	GS	J-K	Ar	Badaohe Gp.	East Hebei block
33	Wulong	Dandong	L	Q-vein	GS	J-K	Ar-Pt1	Kuandian Gp.	East Liaoning block
34	Sidaogou	Dandong	M	altered zone	GS	J-K	Ar-Pt1	Kuandian Gp.	East Liaoning block
35	Hadamengou	Baotou	L	Q-vein	GS	J-K	Ar-Pt1	Wulashan Gp.	Yinshan GGK block
36	Baoziwan	Yanggao	M	breccia pipe	P	J-K	Mz	Wutai Gp., porphyry	Jining GGK terrain
37	Yixingzhai	Fansi	M	Q-vein	GS	J-K	Ar	Wutai Gp.	Wutaishan GG terrain
38	Xinzhuang	Fansi	M	Q-vein	GS	J-K	Ar	Wutai Gp.	Wutaishan GG terrain
39	Gengzhuang	Fansi	M	breccia pipe	P	J-K	Mz	Wutai Gp., porphyry	Wutaishan GG terrain
40	Heilangou-Qijiagou	Penglai	M	Q-vein	GS	K	Ar	Jiaodong Gp.	Jiaobei GGK terrain
41	Daliuhang	Penglai	M	Q-vein	GS	K	Ar	granitoid into Jiaodong Gp.	Jiaobei GGK terrain
42	Daduogou	Penglai	M	Q-vein	GS	K	Ar	granitoid into Jiaodong Gp.	Jiaobei GGK terrain
43	Linglong-Taishang	Zhaoyuan	SL	Q-vein	GS	K	Ar	granitoid into Jiaodong Gp.	Jiaobei GGK terrain
44	Lingshangou	Zhaoyuan	M	Q-vein	GS	K	Ar	granitoid into Jiaodong Gp.	Jiaobei GGK terrain
45	Beijie	Zhaoyuan	L	altered zone	GS	K	Ar	granitoid into Jiaodong Gp.	Jiaobei GGK terrain

(*To be continued on the next page*)

(*Continued*)

No.	Name	Location	Size	Type 1	Type 2	Ore time	Host age	Host rock	Local tectonics
46	Jinchiling	Zhaoyuan	M	Q-vein	GS	K	Ar	granitoid into Jiaodong Gp.	Jiaobei GGK terrain
47	Dayigezhuang	Zhaoyuan	L	altered zone	GS	K	Ar-Pt1	Jiaodong Gp. and granitoid	Jiaobei GGK terrain
48	Jishan	Zhaoyuan	M	Q-vein	GS	K	Ar-Pt1	granitoid into Jiaodong Gp.	Jiaobei GGK terrain
49	Panjia	Zhaoyuan	M	altered zone	GS	K	Ar	Jiaodong Gp.	Jiaobei GGK terrain
50	Jiaojia-Xincheng	Zhaoyuan	SL	altered zone	GS	K	Ar	granitoid into Jiaodong Gp.	Jiaobei GGK terrain
51	Sanshandao	Laizhou	SL	Q-vein	GS	K	Ar	Jiaodong Gp.	Jiaobei GGK terrain
52	Dujiayazi	Yantai	M	altered zone	GS	K	Ar	Jiaodong Gp.	Jiaobei GGK terrain
53	Denggezhuang	Muping	L	altered zone	GS	K	Ar	Jiaodong Gp. and granitoid	Muping-Rushan terrain
54	Jinqingding	Rushan	L	Q-vein	GS	K	Ar	granitoid into Jiaodong Gp.	Muping-Rushan terrain
55	Baishi	Rushan	M	Q-vein	GS	K	Ar	Jiaodong Gp.	Muping-Rushan terrain
56	Fanjiafu	Weihai	M	Q-vein	GS	K	Ar	Jiaodong Gp.	Muping-Rushan terrain
57	Qiyugou	Songxian	L	breccia pipe	P	K	Ar, Mz	Taihua Supergroup	Xiongershan GGK terrain
58	Dahu-Linghu	Lingbao	L	Q-vein	GS	K	Ar	Taihua Supergroup	Xiaoqinling GGK terrain
59	Chuchaluanshi	Lingbao	M	Q-vein	GS	K	Ar	Taihua Supergroup	Xiaoqinling GGK terrain
60	Qinling	Lingbao	SL	Q-vein	GS	K	Ar	Taihua supergroup	Xiaoqinling GGK terrain
61	Wenyu-Dongchuang	Lingbao	SL	Q-vein	GS	K	Ar	Taihua Supergroup	Xiaoqinling GGK terrain
62	Yanzhihe	Luonan	M	Q-vein	GS	K	Ar	Taihua Supergroup	Xiaoqinling GGK terrain
63	Tongguan-Tongyu	Tongguan	L	Q-vein	GS	K	Ar	Taihua Supergroup	Xiaoqinling GGK terrain
64	Hulugou	Luonan	M	altered zone	GS	K	Ar	Taihua Supergroup	Xiaoqinling GGK terrain
65	Shihu	Lingshou	L	Q-vein	GS	K	Ar	Fuping Gp.	Taihangshan GGK terrain

Type 1 is determined according to ore[2], Type 2 according to nature of host-rock[3]. Nos. 1—35 distributed in north margin of NCC, Nos. 36—39 and 65 in Taihang fault-magmatite belt, Nos. 40—56 in east margin of NCC, Nos. 57—64 in south margin of NCC. GS, Greenstone; P, porphyry; M, medium; L, large; SL, super-large; GG, granite-greenstone; GGK, granite-greenstone-khondalite.

For the importance of the gold deposits in granite-greenstone terrains, the concept of greenstone type gold deposit is widely used by Chinese geologists. According to the definition by Tu Guangzhi[3], the concept of greenstone type gold deposit should only include the fault-bound deposits and the stratiform or stratabound deposits hosted in granite-greenstone terrains. Meanwhile, the pluton-bound (or porphyry-bound) gold deposits hosted in granite-greenstone terrains are classified into "alkaline intrusive contact zone type"[3], rather than greenstone type gold deposits.

Although there are obvious differences in geological and geochemical characteristics between the greenstone type and the alkaline intrusive contact zone type gold deposits, these two gold deposits are hosted in granite-greenstone terrains and have similar country rock, mineralizing time, space and geodynamic background. Therefore, they are regarded as "the gold deposits in granite-greenstone terrain" in this paper, and discussed as a whole.

2 Spatial distribution of gold deposits in granite-greenstone terrains, NCC

As shown in fig. 1, the gold deposits are mainly distributed as WE bands at the margins of NCC, i.e. the Huaxiong block at the southern margin, Jiaodong block at the eastern margin, and the Yinshan-Yanshan-Liaoning-Jilin gold belt at the northern margin. These gold belts could also be divided into some districts, such as the Jiaodong block into Jiaobei and Mu-Ru terrains; and the north margin into Wulashan, Jining, Zhangjiakou, Chifeng-Jinzhou, North Hebei, East Hebei, East Liaoning, Qingyuan, and South Jilin districts (fig. 2), thus clearly showing that the gold deposits are distributed as WE belts, consisting of several ore-fields, at the margins of NCC.

In the interior of NCC, a few gold deposits are distributed along the Taihangshan and Tan-Lu faults, showing two NS strings of gold deposits. The tectonics of the gold-producing districts can be classified into three different types.

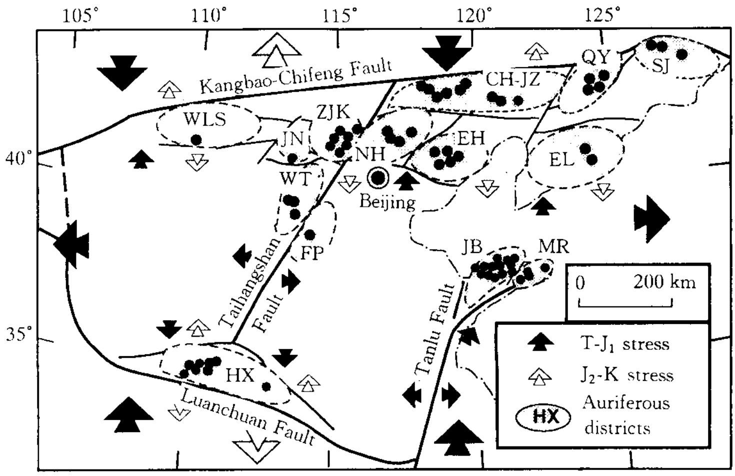

Fig. 2. Mesozoic geodynamic background of the gold-producing districts in NCC and their adjacent area, showing early south-to-north compression during Triassic to early Jurassic, and late north-to-south extension during late Jurassic to Cretaceous. Gold-producing districts: WLS, Wulashan terrain; JN, Jining terrain; ZJK, Zhangjiakou terrain; CH-JZ, Chifeng-Jinzhou block; NH, North Hebei block; EH, East Hebei block; EL, East Liaoning terrain; QY, Qingyuan terrain; SJ, South Jilin terrain; FP, Fuping terrain; JB, Jiaobei terrain; MR, Mu-Ru terrain; HX, Huaxiong block; WT, Wutaishan terrain.

2.1 Collisional orogens

Jiaodong is the most important gold-producing district in China, and has been regarded as a shield area for a long time. Now it has been verified to be the eastern counterpart of the Qinling-Dabie collisional orogens. The Sm-Nd isochron dating for Su-Lu eclogites got the ages of (221 ± 6) Ma, (211 ± 83) Ma and (208 ± 33) Ma[4], showing that the beginning of intercontinental collision between the South and the North China ancient continents should have occurred in the period of 250—200 Ma, i. e. in Triassic. The development of a great deal of Cretaceous alkaline granitoids in Jiaodong block indicates that intense collisional orogenesis should have finished at the end of Cretaceous. Therefore, the Jiaodong block is actually a Mesozoic collisional orogenic belt.

The Huaxiong block is the second important gold-producing district in China. It has also been regarded as a part of the stable crystalline basement of the North China platform. The recognition and detailed study of the San-Bao (Sanmenxia-Baofeng) fault[2,5] made it clear that the San-Bao fault acted as reverse boundary thrust (RBT) at the northern boundary of the Qinling collisional orogens, which is extremely the same as the RBT described by Sengor[6] for typical collisional orogens. Consequently, the Huaxiong block can be more logically taken as a part of the Qinling collisional orogens.

2.2 Mesozoic intracontinental orogenic belt

During the Mesozoic collisional orogenesis between the South and the North China continents, the northern margin of NCC mobilized again and formed orogens, associated with intense magmatism and mineralization, which resulted in the formation of the Yinshan-Yanshan-Liaoning-Jilin metallogenic belt represented by the well-known Yanshan Mountains. This kind orogenesis (Yanshan movement), which took place nearby an ancient collisional orogen (Mongolia-Xing'anling), resulted from and was identical to marginal intercontinental collision, should be intracontinental collisional orogenesis. Then, the Yinshan-Yanshan mountains can be regarded as typical intracontinental orogens.

2.3 Intracontinental fault-magmatic belts

Taihangshan and Tan-Lu are two ancient great fractures in inner NCC, trending NNE-NS. Along these two translithospheric faults developed kimberlites, basalts and a great deal of Mesozoic moderate-felsic alkaline magmatites, constituting fault-magmatic belts. There are several gold deposits situated along the Taihangshan fault, such as Shihu deposit (Fuping terrain) and Gengzhuang and Yixingzhai (Wutaishan terrain) deposits(fig. 1). Along the Tan-Lu fault-magmatic belt, the Guilaizhuang and Zhifang gold deposits were found (too small to be shown in fig. 1 and table 1). They are genetically related to the Yanshanian moderate-acidic magmatism. In summary, Mesozoic intracontinental fault-magmatic belts are also significant gold-producing districts.

It should be pointed out that a special district may belong to different tectonic settings in different periods, where is usually favorable for gold mineralization. For instance, the Dongping gold deposit is situated at the conjoint place of Yanshan intracontinental orogens and Taihangshan fault-magmatic belt.

3 Ore-forming time of gold deposits in granite-greenstone terrains of NCC

Although NCC has experienced many episodes of tectonic events, gold mineralization mainly occurred in Jurassic-Cretaceous, associated with Yanshan movement, corresponding to 200—65 Ma (table 2). Gold mineralization in Jiaodong block and the Huaxiong block mainly took place in Cretaceous, while that in Yinshan-Yanshan-Liaoning-Jilin auriferous belt occurred in Jurassic and Cretaceous (table 2), showing that their mineralization time became slightly younger from north to south.

Table 2 Results of isotopic dating for gold mineralization of every gold provinces, NCC

Gold province	Typical deposit	Age range and most probable age/Ma	Data source
Xiaoqinling	Qinling, Wenyu	148—67.7, 91.6±2.7—76	this paper
Jiaobei terrane	Jiaojia, Linglong, Sanshandao	132.3 ± 3.9—104.97, 110 ± 10, 110.27, 100.74 ±3.58, 111.38±2.81	[7, 8]
Mu-Ru terrane	Jinqingding, Denggezhuang, Rushan	101.78±3.4, 121.3±0.587, 113.31±4.43, 106.14 ±4.92	[8]
South Jilin terrane	Jiapigou, Haigou	161, 150, 143.3	[7]
Qingyuan terrane	Xiadabao	154—80.3, 132—108	[9]
East Liaoning terrane	Wulong, Sidaogou	115.32, 106.32, 111	[10]
Chifeng-Jinzhou terrane	Paishanlou, Anjiayingzi	116.6—130.7, 120	[11]
East Hebei block	Jinchangyu, Niuxinshan	183—95, 169.8—95	[12]
Zhangjiakou terrane	Dongping, Xiaoyingpan	177.4±5—127.48, 156.7—141.02	[13]
Yinshan block	Hadamengou	139.08±3.31	[14]
Jining block	Baoziwan	186.9—97, 140—102	*
Wutaishan terrane	Yixingzhai, Gengzhuang	186.9—97, 140—102	*
Fuping terrane	Shihu	132±6, 121.08±2.88, 119.93±2.81	[15]

* Chang Zhaoshan, Late magmatic and postmagmatic phenomena of intrusive rocks in the Taihang Mountains, Ph.D. dissertation, Peking University, 1997.

Each mineralizing time for different auriferous districts listed in table 2 is constrained by carefully comprehensive study based on a large amount of geological and geochemical data. For example, the emplacing time of the orebodies in the Xiaoqinling district is argued in the period of 148—67.7 Ma, i.e. Cretaceous, according to the following facts: (i) In Xiaoqinling and its adjacent area, placer gold mineralization only happened in Cenozoic sediments, while all the pre-Cenozoic strata, including Cretaceous sediments, show no positive gold anomaly, with their gold abundance ranging $0.4—2.6\times10^{-9}$. (ii) Gold orebodies are hosted in Yanshanian fractures. (iii) The Wenyu granite mass which is responsible for the gold mineralization in Xiaoqinling district yields K-Ar ages in the range of 130—90 Ma and Rb-Sr isochron age of 105 Ma. It should have intruded in Cretaceous. (iv) K-Ar dating for ores from the Wenyu gold deposit gave an age of 76 Ma. Through laser microprobe Ar-Ar dating for K-feldspar in metasomatites from the Yangzhaiyu gold deposit, the authors recently got another age of 91.6 Ma. (v) The gold-bearing quartz-veins intersect the basaltic swarms which yield K-Ar ages of 182—148 Ma for whole rocks and minerals, and are cut by lamprophyres dated at 67.7 Ma by K-Ar whole-rock method, indicating that the emplacement of orebodies should be in the period of 148—67.7 Ma. (vi) Cretaceous was exactly the time when granitic magmatism and fluidization reached their tops, and was also the metallogenic time of hydrothermal mineralization of Mo, W, Au, Pb, Zn, Hg, Sb, Ag, etc.

4 Metallogenic geodynamic background of gold deposits in granite-greenstone terrains of NCC

The gold deposits in granite-greenstone terrains of NCC were emplaced in Yanshanian, which shows that the metallogenic geodynamic background is the Yanshan geodynamic evolution of NCC. Among three different tectonic settings of gold-producing districts in NCC, the Mesozoic collisional orogens and the Mesozoic intracontinental orogenic belts clearly result from the Mesozoic intercontinental collision. The Taihangshan and the Tan-Lu fault-magmatic belts, perpendicular to the Qinling-Dabie collisional orogens, developed contemporaneously with the latter, indicating that they were also genetically related to the Mesozoic collision. Hence we can conclude that the gold deposits of various tectonic units in NCC were formed in a uniform geodynamic background; that is, the Mesozoic continental collisional regime. So it is necessary to discuss the detail of the Mesozoic geodynamic framework and its evolution.

As stated above, the intercontinental collision between the South and the North China continents began in Triassic. In Triassic and Jurassic (fig.2), the Qinling-Dabie-Su-Lu orogens and their northern neighboring area, NCC were under a strong south-to-north compressing environment, which made the northern margin of NCC and its northern adjacent Xing'anling orogens be also under the south-to-north compressing environment. Simultaneously, the inner NCC extended eastward, which consequently led the Tan-Lu and Taihangshan faults to behave as rifts; and then the fault-magmatic belts, perpendicular to the Qinling-Dabie-Su-Lu orogens, along these two great faults could be expected to develop.

During the late Jurassic and the Cretaceous (fig.2), the collisional compression in the Qinling-Dabie-Su-Lu orogen turned into NS extension; the closed compressing ductile fractures turned into open extending fragile ones; a lot of red fault-basins came into being; alkaline magmas and fluids were formed by depressurized partial melting; the EW trending mountains were separated by the NE- or NNE-trending faults into several segments; for instance, the Huaxiong block was separated into Xiaoqinling, Xiaoshan, Xiong'ershan and some other terrains. Accordingly, it was summarized as "block-faulted orogenesis", namely Yanshan movement. Without doubt, this kind of tectonic movement can also be found extensive in the northern margin of NCC because the Yanshan movement was called after Yanshan Mountain. As for the fault-magmatic belts within NCC (Taihangshan and Tan-Lu), at the same time, the NS-trending extension would have been added to the eastward extension of the Triassic and early Jurassic, so the magmatism would remain intense.

In a word, the metallogenic geodynamic background for the gold deposits in granite-greenstone terrains of NCC was Mesozoic collisional compression-to-extension transition stage.

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