

Comparative Analysis of Character of Mineral Deposit between High-grade Scandium and Anatase Ore Deposit in Qinglong Shazi and Laterite Gold Deposit in Western Guizhou, China

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Abstract. With High-grade scandium and anatase ore deposit of Qinglong Shazi and three typical laterite gold deposit of Laowanchang, Baozidong and Shaguochang in western Guizhou as research objects, this paper makes a comparative analysis on character of mineral geology. There are both similarities also differences of the geologic features between anatase and gold deposit with the specific explanations are as follows: 1) Both High-grade scandium and anatase ore deposit and laterite gold deposit are occurred in the laterite of the quaternary slope sand on the plane of unconformity of Permian Maokouan limestone karst; 2) Both High-grade scandium and anatase ore deposit and laterite gold deposit are originated from the relatively broad and gentle anticlinal cores and flanks with the anticlinal core composed of the middle Permian Maokou formation stratum and the flank composed of the stratum of Emeishan basalt and Longtan formation; 3) Both High-grade scandium and anatase ore deposit and laterite gold deposit occurred in the local Karst esker knobs with high altitude and the mini-type depression on the gentle slope; 4) Ore characteristics and mineral composition are mainly the same in the High-grade scandium and anatase ore deposit and laterite gold deposit. The difference lies in no anatase has been found in those three typical kinds of laterite gold deposits and no micro-fine particle of Au has been detected in the High-grade scandium and anatase in Qinglong Shazi ore deposit. Mantle plume active region in Emei is the important concentration zone of super- large and large ore deposit [1-4]. Taking basalt region in the west of Guizhou as an example, mineral products like gold, antimony, copper, arsenic, mercury, thallium, rare earth have produced here [5-7]. In recent years, large-scale High-grade scandium and anatase ore deposit has been founded in the Qinglong Shazi in Guiyang [8]. The genetic type of large-scale High-grade scandium and anatase ore deposit in the Qinglong Shazi belongs to the thermal water deposit- slope deposit related with basalt eruption of Emei. The orebody occurred on the plane of unconformity of Permian Maokouan limestone karst and in red clay of the Karst negative terrain on the bottom of Emeishan basalt, of which the occurrence space is the same with red-clay gold mineral in the west of Guizhou province. However, the High-grade scandium and anatase ore can't be found in red-clay gold deposit and vice versa. Therefore, this paper aims at make a comparative analysis of the High-grade scandium and anatase ore deposit of Qinglong Shazi and three typical laterite gold deposit of Laowanchang, Baozidong and Shaguochang in western Guizhou, so as to discuss the differences the minerogenetic conditions between High-grade scandium and anatase ore deposit of Qinglong Shazi and three typical laterite gold deposit of Laowanchang, Baozidong and Shaguochang in west of Guizhou.

Geological background of High-grade scandium and anatase ore deposit of Qinglong Shazi and laterite gold deposit in western Guizhou

Both High-grade scandium and anatase ore deposit of Qinglong Shazi and laterite gold deposit in west of Guizhou are located in gold-concentrated area in the southwest of Guizhou province which is

in the intersection portion of the southwestern margin of the Yangzi landmass and the west section of the south China fold system from the perspective of geotectonic location. It is the gore which is under the control of regional deep fracture and the main distribution in the region is the Permian Emeishan basalt (Fig. 1).

This area, living through one period of uplift and denudation after reef deposits of flats and limestone in the late middle Permian of Maokou formation, sink into the coastal zone[9]. Due to the volcanic eruption at the end of middle Permian and early of late permian epoch, on the plane of unconformity of Permian Maokouan limestone karst deposited the Emeishan basalt's first section of the clay basaltic volcanic breccia, then pyroclastic rock and tuff, which became the basalts exposed in this area in the southwest of Guizhou Province. It locates in the southeast edge of the basalt distribution range in the west of Guizhou with the thickness more than 200 meters below the earth[10]. and the eruption at the end of middle Permian and early of late permian epoch. Conditions in the early eruption period are the littoral tidal flat [10]. Except for the general properties of the common continental tholeiite, the basalt in the region holds properties like slightly alkaline, high grade ferrotitanium, low-magnesium, SiO₂ saturation, generally containing quartz and few olivines. The degree of alkaline is the highest in the basalt distribution area in the west of Guizhou province and also the volatile component is higher than that of the other regions[11]. The mine-source stratum in initial stage of the lateritic gold deposit also serves as the ore bodies and country rocks of High-grade scandium and anatase ore deposit of Qinglong Shazi.

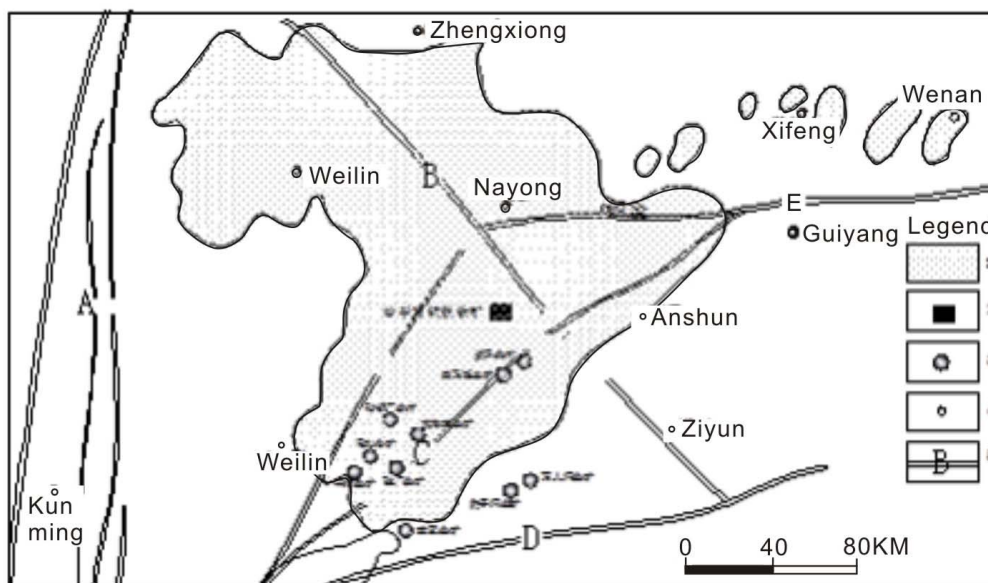


Fig.1 Geology map of the study area (based on, [1-2],[5-6],[10] revision); 1 Large distribution of Emeishan basalt in Guizhou province; 2 High-grade scandium and anatase ore; 3 laterite gold deposit (point); 4 Geographical names of the cities and counties; 5. Deep fracture zone and fracture zone A Xiaojiang fault B Shuicheng-Ziyun fault C Mile-Shizong fault D Nanpan River fault E Nayong-Anshun fault.

Ore-hosting strata

Exposure strata of both High-grade scandium and anatase ore deposit of Qinglong Shazi and three typical laterite gold deposit of Laowanchang, Baozidong and Shaguochang in west of Guizhou is featured by the Permian middle maokou formation, upper Permian series Emeishan basalt group, Longtan formation and the quaternary system. Besides, both High-grade scandium and anatase ore deposit and laterite gold deposit are occurred in the laterite of the quaternary slope sand on the plane of unconformity of Permian Maokouan limestone karst.

Structure

High-grade scandium and anatase ore deposit of Qinglong Shazi is located at the northwestern flank of the anticlines and domes of Bihenyng. The Laowanchang lateritic gold mine is situated near to the core of the domes and anticlines of Bihenyng, with the anticlinal core composed of the middle Permian Maokou formation stratum and the flank composed of the stratum of Emeishan basalt and Longtan formation. Baozidong lateritic gold mine is situated near to the core of the domes and anticlines of Getang which consists of middle Permian maokou formation stratum and the flank is the stratum of Emeishan basalt and Longtan formation. Shaguochang lateritic gold mine is located at the middle and northwest section of Lianhuashan anticlines with the anticlinal core composed of middle Permian Maokou formation stratum and the flank composed of the stratum of Emeishan basalt and Longtan formation.

Landform

The industrial ore bodies of High-grade scandium and anatase ore deposit of Qinglong Shazi originated from Karst esker knobs with the height of 1338.90-1498.45m and the mini-type depression on the gentle slope. The Laowanchang lateritic gold mine is situated at the Karst esker knobs with the height of 1300-1650m and the mini-type depression on the gentle slope. Baozidong lateritic gold mine is situated at the micro depression in the Qiufengshan in Hunyuan of the Karst mountain ridge with the height of 1600-1650m. Shaguochang lateritic gold mine is located at the mini-type peak-forest-depression of Karst with the height of 1750-1900m.

Characteristics of ore

The High-grade scandium and anatase ore deposits of Qinglong Shazi are mainly red and yellow clay and loam, with clay always consists of rubbles as basalt, siliceous limestone, siliceous rocks, iron manganese clay rock and tuff rock etc. The metallic mineral in the ore mainly covered anatase and limonite and the gangue mineral mainly covered kaolinite, with quartz, silk (white) mica, chlorite, plagioclase and zircon in the second place. There are 12 kinds of minerals existed in the ore which includes three classes of oxide, silicate, and sulfide; among which the oxide accounts for about 46.2%, silicate accounts for about 53% and sulfide is rather rare and the anatase occupies of 3%. The anatase exists in silicate and quartz mainly through micro-fine particle inclosure and some of them exist in the limonite through isomorphism with little of them exists with the form of independent anatase mineral and the single particle size smaller than 10 μ m. There are no independent minerals of scandium in the ore and the scandium mainly exists in the clay mineral like kaolinite and sericite which accounts for 46.07%, and then in limonite for 33.25% and 13.64% in anatase. The major of them is ion adsorption type with some of them is isomorphism scandium.

Three typical laterite gold ores mainly are red and yellow clay and loam, with clay always consists of rubbles. The metallic mineral in the ore mainly covered limonite and few anatase and pyrite. The gangue mineral chiefly are quartz, and then kaolinite, water, mica, sericite, illite, rutile and zircon etc. After research through observation under light thin lens, x-ray diffraction analysis, proton, ion and electron probe analysis, it is found that the micro-fine particles of Au less than 1 are adsorbed or packaged in the limonite, kaolinite, water, mica, sericite, illite and rutile etc.

Summary

There are both similarities also differences of the geologic features between anatase and gold deposit with the specific explanations are as follows: (1) Both High-grade scandium and anatase ore deposit and laterite gold deposit are occurred in the laterite of the quaternary slope sand on the plane of unconformity of Permian Maokouan limestone karst; (2) Both High-grade scandium and anatase ore deposit and laterite gold deposit are originated from the relatively broad and gentle anticlinal cores and flanks with the anticlinal core composed of the middle Permian Maokou formation stratum

and the flank composed of the stratum of Emeishan basalt and Longtan formation; (3) Both High-grade scandium and anatase ore deposit and laterite gold deposit occurred in the local Karst esker knobs with high altitude and the mini-type depression on the gentle slope; (4) Ore characteristics and mineral composition are mainly the same in the High-grade scandium and anatase ore deposit and laterite gold deposit. The difference lies in no anatase has been found in those three typical kinds of laterite gold deposits and no micro-fine particle of Au has been detected in the High-grade scandium and anatase in Qinglong Shazi ore deposit.

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