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Discussion on Structural Ore-controlling Patterns of Gan-Hang Uranium Metallogenic Belt

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1 Introduction

Polygenetic compound deposit can reflect the four-dimensional thinking emphasized in Historical dynamic comprehensive geotectonics, namely the thinking method combined time with three-dimensional space (Chen, 1982; 2000), so for this kind of deposits, the phase of geotectonic evolution is important. Gan-Hang volcanic uranium metallogenic belt is one of the important metallogenic belts in China. Some important ore-controlling structures produced in regional geotectonic evolution are studied, in order to preferably describe the space-time relationship among a series of geological events occurring before and after uranium mineralization, and establish structural ore-controlling patterns to predict perspective areas and put forward further exploration direction.

2 Geotectonic Setting of Gan-Hang Volcanic Uranium Metallogenic Belt

South China Block were formed in late proterozoic by Yangtze(in west part) and Huaxia(in east part) blocks in Mesoproterozoic, or formed by southeast fold orogenic belt in early paleozoic era, then uniform landmass were united (Chen, 2001). The late Triassic epoch was the beginning epoch for the activation of South China Block. Gan-Hang volcanic uranium metallogenic belt is located in the connection belt between Yangtze block and South China block. In Mesozoic era, frequent magmatic activities, especially strong continental-facies volcanic activities occur, and an important volcanic belt was formed. The west section of the volcanic belt was controlled by Fuzhou-Suichuan fault and Hukou-Xingan fault, and the east section of the volcanic was controlled by Tonglu-Jinshan fault and Qingjiang-Shaoxing fault, distributing as a

reverse S-type arc.

3 Structural Ore-controlling Rules of Gan-Hang Volcanic Uranium Metallogenic Belt

Three uranium ore fields(Xiangshan, Shengyuan and Dazhou) and fifty-six uranium deposits were discovered and proved along Gan-Hang metallogenic belt, including fifty-two volcanic uranium deposits, mostly were distributed in the south section of Gan-Hang fault.

The ore-controlling structures of Gan-Hang metallogenic belt presented dendritic characteristics in section. The ore-controlling structures are directly or indirectly connected with super-deep fault, presenting multilevel phacoidal network on plane, so uranium mineralization were closely related with the magmatism in deep structure. Some structures developed in Gan-Hang uranium metallogenic belt, with various types and long-period activities, different scale structures and one same structure in different evolution phases were different to uranium mineralization, some structures had the characteristics of rock-controlling, basin-controlling and ore-controlling (Lin, et al., 2006).

The volcanic uranium deposits in Gan-Hang mineralization belt were mainly controlled by tectonic magmatic belt. The center of volcanic activity between two tectonic magmatic belts often was the favorable location for mineralization of volcanic uranium deposits. Some deposits often were jointly controlled by regional structures and volcanic structures, and the ore bodies often occur near the tensional interface, with interface ore-controlling rules in general. In addition, the small-scale magmatic intrusion activity and paleo-infiltration in post-volcanic period can also obviously control the transformation of volcanic uranium deposits.

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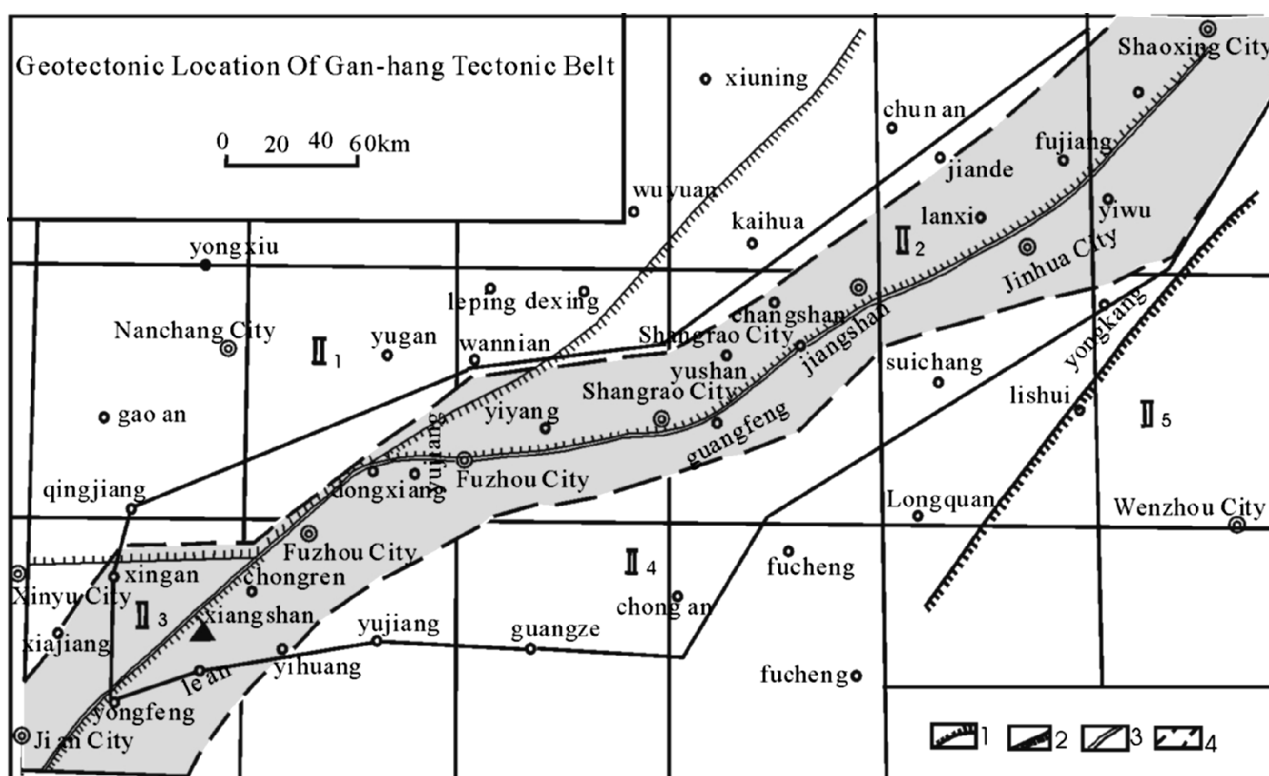


Fig.1 Geotectonic location of Ganhang tectonic belt (after Zhou, 2008)

II₁ South platform uprise; II₂ Qian tang platform subside; II₃ Geosyncline of Jiangxi west; II₄ Wuyishan-Simingshan upwarping; II₅ Mesozoic fault-depression zone in Zhejiang and Fujian 1—boundary between the largest geotectonic unit; 2—boundary between the secondary geotectonic unit; 3—Gan-Hang fault belt; 4—the range of Ganhang tectonic belt (after Zhou, 2008)

4 Genesis of Mineral Deposits

The study on structural system of uranium mineralization should focus on dynamic background. Tension and compression are two kinds of basic unit to describe the stress state of tectonic activity. The endogenous uranium mineralization often occurs in the period from compress orogenesis to carat tension.

The Gan-Hang fault is important to mineralization, including three evolution periods: 1) It was favorable for basement preparation of uranium mineralization—Yangtze continental block and South China continental block were collaged in Caledonian period, and a set of gathering compressive structural system trending in near WE direction were formed. 2) It was favorable for the development of volcanic activity of uranium mineralization—In early Yanshanian period, the lithosphere was activated due to the thermal disturbance of asthenosphere and the uplifting or diapir of thermal boundary layer, and a set of shearing and strike-slip structural system was formed in Gan-Hang belt near one side of South China continental block. 3) It was favorable for locating the position of deposits and ore bodies—due to the deep thermal dynamic extended toward to east in activation violent period, and restrained by non-restrictive dynamic boundary in east part, the structure-dynamic

system in active region began to transformed to lithosphere tension reduction. To the residual mobility period, South China active region began to adjusted to thermal equilibrium in Neogene period, and obvious thermal precipitation occur. A series of rift and fault basins and tensional spaces were formed in Gan-Hang belt located in tensional structural system.

The uranium deposits and ore occurrences located in three uranium ore field (Xiangshan, Shengyua and Dazhou ore field) in Gan-Hang belt were distributed in three volcanic basins or near of them. The uranium mineralization were not directly related with basin types, such as Xiangshan ore field occurred in volcanic collapse basin, Shengyuan ore field occurred in volcanic subsidence basin, and Dazhou ore field occurred in volcanic fault basin, but the mineralization were related with the geological setting of volcanic basin evolution. The sedimentation age of red basin was consistent with that of uranium mineralization, it indicated that the location of uranium deposits was related with rift or tension regional background.

The stress releasing region was the main location for fluid gathering and hydrothermal alteration and mineralization. Different stress can produce corresponding types of stress releasing and determine the space scale and

distribution characteristics of uranium mineralization (Zhou, et al., 2008) .

5 Conclusions

This paper introduces the evolution patterns of uranium mineralization in Gan-Hang belt. The Gan-Hang uranium mineralization belt were related with three large tectonic movements: 1) Yangtze continental block and South China continental block were collaged in Caledonian period, and a set of gathering compressive structural system trending in near WE direction were formed. 2) In early Yanshanian period, the lithosphere was activated due to the thermal disturbance of asthenosphere and the uplifting or diapir of thermal boundary layer, and a set of shearing and strike-slip structural system was formed in Gan-Hang belt near one side of South China continental block. 3) South China active region began to adjusted to thermal equilibrium in Neogene period, and obvious thermal precipitation occur.

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