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Metallogenic model of the Uranium deposits in Guyuan area, China

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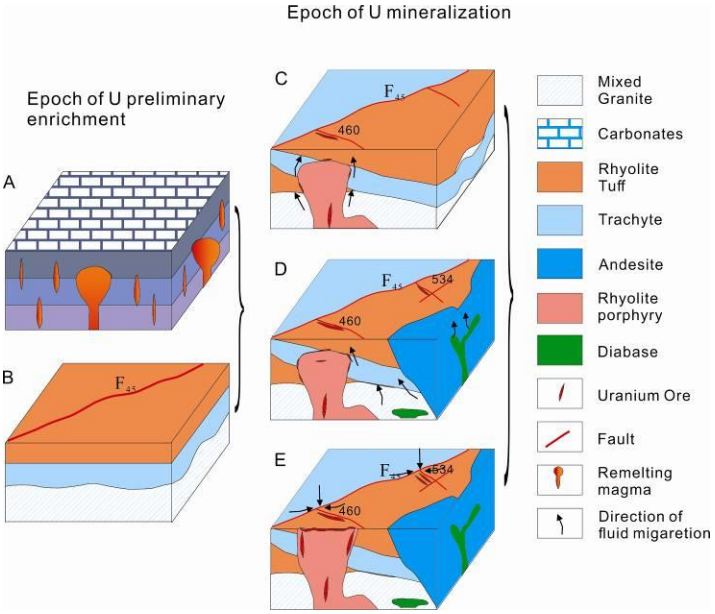
Guyuan area, one of the most important uranium-mining and production regions in the Guyuan-Hongshan uranium metallogenic belt, is located on the middle of the northern margin of the North China Craton(NCC), namely Guyuan Mesozoic volcanic basin. More than 20 uranium deposits and occurrences have been delineated[1]. Of these, 460 and 534 deposits are the largest. Based on the systematic study of the geology, tectonics and geochemistry, "Two epochs and Five stages model" of uranium mineralization in Guyuan volcanic basin can be concluded as follows:

I. Epoch of uranium preliminary enrichment (2 stages): The uranium preliminary enrichment in research area has experienced two peak periods, Paleoproterozoic and Mesozoic Jurassic, respectively. During the Paleoproterozoic, strong potassic migmatization occurred to Hongqiyingzi subgroups of Archean, which is also the first pre-enrichment of uranium for the area. The abundance of uranium enriched from (1.1-2.7) $\times 10^{-6}$ to (4-5) $\times 10^{-6}$ in the mixed granite. Since the Mesozoic, the strong subduction of the Izanagi palate to the Eurasian continental plate, the research area into the period of Yanshannian polycyclic movement, led to the anatexis of potassic mixed rock in the basement. In this process, a giant thick crust remelting type acidic volcanic rock was yielded in the late Jurassic period; the uranium content was further enriched, up to (10-15) $\times 10^{-6}$. As a result, a direct source layer of the uranium mineralization was formed in the area.

II. Epoch of uranium mineralization (3 stages): In the late Yanshannian movement, along with the ongoing of crustal remelting, and the enrichment of uranium increasingly, and a series of rhyolite porphyry magma with high uranium content have been developed. The magma went up along the regional basement fault or volcanic channel, during the process of cooling, the high uranium content fluid was differentiated from the magma, at the same time, extracted the preliminary enrichment uranium from the rock strata. Subsequently, the mineralization was formed in the right structural space. The 460 deposit, whose age is around 122.2Ma, were formed in this stage. To the early Himalayan movement, the crustal evolution from an extruded into a tensional environment resulted in a large amount of deep source basaltic magma. The uranium-rich fluids had the mantle source characteristics produced by means of the magmatic differentiation, further extracted U from wall-rocks and formed ore body. The 534 deposit are formed in this stage, and enlarged the scale of 460 deposit as



well, the mineralization age is 89-67.7Ma approximately. To Paleogene, with the uplift of the crust, the erosion of the ore body, epigenetic oxidation and eluviation enhancement, the native ore body was further enriched (31.76-23Ma), and the present deposit patterns was formed finally.

Figure 1: "Two epochs and Five stages model" of Uranium Mineralization in Guyuan area, China

References:

[1] HUANG Zhixin, et al. (2014) Acta Geologica Sinica (English Edition) 88(sup.2):1360-1361