Origins of Cu-Pb-Zn-bearing and W-bearing granites

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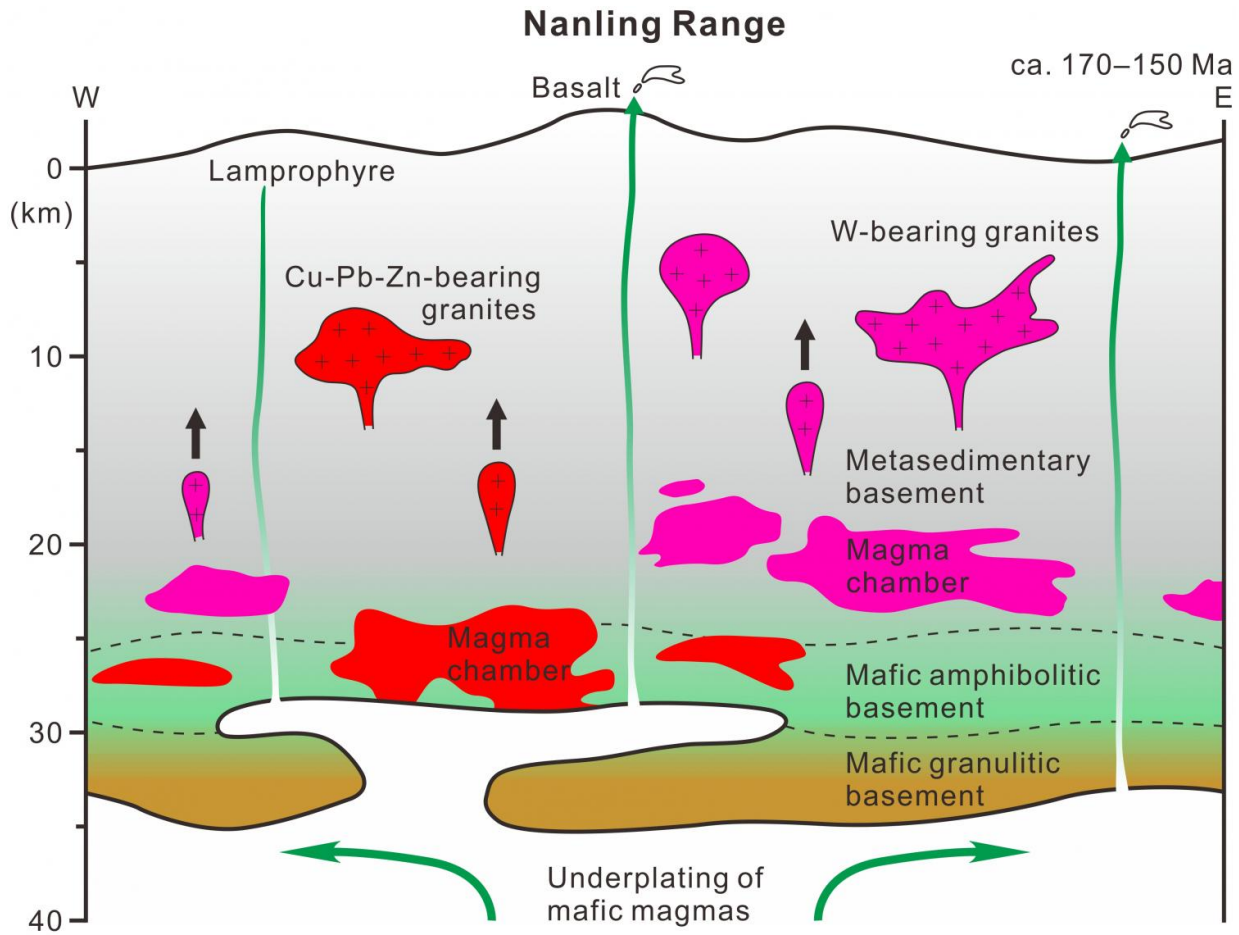

Genetic model of the Middle-Late Jurassic Cu-Pb-Zn-bearing and W-bearing granites in the Nanling Range. Credit: ©Science China Press

The Nanling Range of South China is world famous for its widely developed, multiple-aged granitic magmatism and related polymetallic mineralization. Various kinds of granites have distinct diversities in terms of metallogenic specialization. A recent study revealed the different origins of the Middle-Late Jurassic Cu-Pb-Zn-bearing and W-bearing granites in the Nanling Range.

The study was reported in *Science China Earth Sciences* as the cover paper authored by the research group led by Prof. LU JianJun of Nanjing University.

The Middle-Late Jurassic Cu-Pb-Zn-bearing and W-bearing granites in the Nanling Range are obviously different in terms of their petrography and geochemistry. However, the mechanism that created these differences has not been well understood. In general, the W-bearing granites are considered to be the products of partial melting of an old metasedimentary basement. However, the petrogenesis of the Cu-Pb-Zn-bearing granites is still controversial. There is a time gap of about 5 Ma between the two types of ore-bearing granites, the significance of which still requires further investigation.

Based on detailed geochronological and geochemical studies of both the Tongshanling Cu-Pb-Zn-bearing and Weijia W-bearing granites in southern Hunan Province and combined with the other Middle-Late Jurassic Cu-Pb-Zn-bearing and W-bearing granites in the Nanling Range, a genetic model of the two different types of ore-bearing granites has been proposed (Figure 1). Asthenosphere upwelling and basaltic magma underplating were induced by the subduction of the palaeo-Pacific plate. The underplated basaltic magmas provided heat to cause a partial melting of the mafic amphibolitic basement in the lower crust, resulting in the formation of granodioritic magmas related Cu-Pb-Zn mineralization. As the underplating of basaltic magmas developed, the muscovite-rich metasedimentary basement in the upper-middle crust was

partially melted to generate W-bearing granitic magmas. The compositional difference of granite sources accounted for the metallogenic specialization, and the non-simultaneous partial melting of one source followed by the other brought about a time gap of about 5 Ma between the Cu-Pb-Zn-bearing and W-bearing granites.

This research provides a new viewpoint for understanding the metallogenic specialization of granites. It not only improves the knowledge of the metallogenesis of granites and enlightens prospecting and exploration in the Nanling Range, but also provides valuable reference for the study of granite-related metallogenesis in South China and even in the world.

More information: XuDong Huang et al, Petrogenetic differences between the Middle-Late Jurassic Cu-Pb-Zn-bearing and W-bearing granites in the Nanling Range, South China: A case study of the Tongshanling and Weijia deposits in southern Hunan Province, *Science China Earth Sciences* (2017). DOI: 10.1007/s11430-016-9044-5

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