

Two types of Cenozoic potassic volcanic rocks and carbonatite and their geodynamic implications in western Qinling, NW China

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The volcanic kamafugites, shoshonites and carbonatites outcropped geographically in the area ranging 104°20'—105°30'E longitude and 33°30'—35°10' N latitude, Western Qinling, Gansu Province, NW China. It neighbours on three terrans, i.e., the Alashan- Ordos to the north, the Qaidam to the southwest and the Yangtze to the east, respectively, bounded by a series of left-lateral strike-slip faults, especially Kunlun fault to the southwest and West Qinling fault to the north. Therefore, this area became a large pull-apart area in western Qinling and provided potentially a channel for a possible asthenospheric motion from the Tibetan Plateau.

The extrusive kamafugites, shoshonites and carbonatites formed several strato-volcanoes, with the occurrence of the tephra cones, rings, or diatremes. The K/Ar isotopic dating of 13 whole-rock samples for kamafugites gave ages in the range of 7.1Ma-18.9Ma, The Ar⁴⁰/Ar³⁹ isotopic dating for 6 samples of phlogopite separates from kamafugites determined an age of 23Ma. Moreover, the Ar⁴⁰/Ar³⁹ isotopic dating for two whole-rock samples of shoshonite gave an age of 9Ma. All of the isotopic dating show that the potassic and carbonatitic volcanism took place in the Miocene (23.03Ma-7.25Ma).

Both kamafugite and shoshonite are characterized by strong enrichment in incompatible trace elements and LREE. A variable but coherent values of initial ⁸⁷Sr/⁸⁶Sr (ranging in 0.70403—0.70749 for kamafugite and 0.70412—0.70522 for shoshonite), ¹⁴³Nd/¹⁴⁴Nd (0.51274—0.51294 for kamafugite and 0.51265—0.51276 for shoshonite), ϵ_{Nd} (1.12—5.95 for kamafugite and 0.3—2.3 for shoshonite), and Pb isotopic ratios (18.3746—18.9986 for ²⁰⁶Pb/²⁰⁴Pb, 15.529—15.6693 for ²⁰⁷Pb/²⁰⁴Pb, 38.4971—39.4144 for ²⁰⁸Pb/²⁰⁴Pb for both kamafugite and shoshonite) have been determined. All these data were plotted respectively on the diagrams of ¹⁴³Nd/¹⁴⁴Nd vs ⁸⁷Sr/⁸⁶Sr, ²⁰⁷Pb/²⁰⁴Pb vs ²⁰⁶Pb/²⁰⁴Pb, ²⁰⁸Pb/²⁰⁴Pb vs ²⁰⁶Pb/²⁰⁴Pb, ¹⁴³Nd/¹⁴⁴Nd vs ²⁰⁶Pb/²⁰⁴Pb, ⁸⁷Sr/⁸⁶Sr vs ²⁰⁶Pb/²⁰⁴Pb, Ba/Nb vs La/Nb and Th/Nb vs (Ce/Yb)_n and fell in the compositional area near the EM1-OIB or EM11-OIB and Ontong-Java, which indicating the geochemical characteristics of plume-like asthenospheric mantle. It also implies that there at least three endmembers in the mantle source region of magmas of the Cenozoic potassic rocks in western Qinling. Combining with the available geological and geophysical information of western Qinling, and the temporal and spatial distribution pattern of the Cenozoic potassic rocks in the Tibetan plateau and adjacent area, it is suggested that the Cenozoic potassic rocks and carbonatites in western Qinling may be related to the eastward motion along the 400-km depth interface of the extrusional asthenosphere lateral flow induced by the India-Asia collision.

Metallogenic anomaly identification with multifractal-Krige method: A case study of Cu element in Tongling Area, China

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Treating Results

Multifractal-Krige interpolation method has tremendous advantages compared with Krige interpolation method [1, 2]. We have taken Cu element of Tongling ore concentration area, China as an example, based on deep soil data, carried out the research on metallogenic anomaly identification with Multifractal-Krige interpolation method.

We used the calculation method of elements content-cumulative frequency of the number of deposits, and the anomaly area obtained by this method can well identify most of known deposits. Meanwhile some blank anomaly area has also been identified. The results are shown in the figure below.

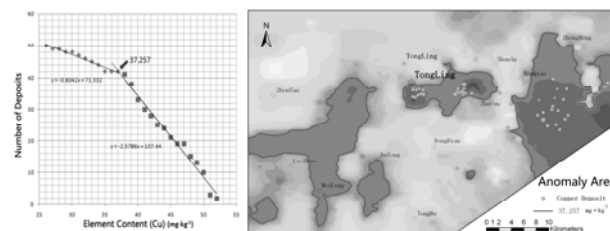


Figure 1: Anomaly area obtained by the method of elements content-cumulative frequency of the number of deposits

Discussions

As to this kind of old ore concentration area, the Multifractal-Krige method which is based on deep soil data can identify anomalies efficiently and provide special services for deep and peripheral concealed ore prospecting in Old Ore cluster area. The anomaly threshold which obtained by above method is based on the known ore information, so it is very suitable for the ore-hunting prognosis on the peripheral area in old deposit.

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[1] Li (2005) *Advances in Earth Science* **20**, 248-256.

[2] Cheng (1999) *Proceedings of the Fifth Annual Conference of the International Association for Mathematical Geology*, 245-250.