Re-Os dating of the two major Cu-Ni deposits in Northern Xinjiang, China

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In Northern Xinjiang, there developed several mafic-ultramafic intrusions, of which some are closely related to copper-nickel sulfide deposits. Among them the Karatungk and Huangshan-Jing'erquan are the largest-scale and most representative rock mafic-ultramafic belts.

Two most representative Cu-Ni deposits, Karatungk and Huangshandong deposits were selected for Re-Os chronological study in order to discuss the formation environment of copper-nickel sulfide deposits in northern Xinjiang. Re-Os dating of copper-nickel sulfide ores in the Nos.1 and 2 intrusions of the Karatungk ore district and Huangshandong deposit gave isochron ages of 282.5 ± 4.8 Ma, 290.2 ± 6.9 Ma and 284 ± 14 Ma, respectively, with relevant initial $^{187}Os/^{188}Os$ ratios of 0.2563 ± 0.0073, 0.2721 ± 0.0053 and 0.241 ± 0.092. The γ_{Os} values of the Nos.1 and 2 intrusions in the Karatungk and Huangshandong deposits mainly vary from 100.6 to 119.9, 114.9 to 124.2 and 25.6 to 235.9, respectively. Highly precise rock- and ore-forming ages suggest that mineralization associated with the major mafic-ultramafic intrusions in northern Xinjiang took place from the end of the Carboniferous to the beginning of the Permian, and certain amount of crustal substances mixed into the Cu-Ni sulfide ore system during their forming process.

Combining other data [1, 2], it could be concluded that the formation environment would be a post-collisional extensional environment rather than island-arc one. The rock- and ore-forming ages are close to the ages of shear zone type gold deposits in the region, and all of them formed in an extensional environment. In such an environment, there occurred not only mantle-derived alkali-rich granitic magma emplacement but also mafic-ultramafic magma ascent and emplacement. Magma differentiation and evolution were accompanied by concentration and mineralization of Cu, Ni and other elements.

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