

*THE EVOLUTION OF TUNGSTEN SOURCES IN CRUSTAL MINERALIZATION
FROM ARCHEAN TO TERTIARY INFERRED FROM LEAD ISOTOPES*

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Abstract

Lead isotope compositions of 31 tungsten-bearing mineral occurrences worldwide, with ages ranging between Archean and Tertiary, have been determined to assess the evolution of tungsten sources in crustal mineralization through time. The data indicate that tungsten of crustal mineralization was mainly supplied by the mantle between 3.0 and 2.4 Ga. The possibility of increasing contributions from the newly formed crust to tungsten mineralization throughout the Archean is suggested by the available data, although this suggestion needs to be tested by additional measurements. The tungsten occurrences of Proterozoic age contain “mature” crustal lead, reflecting their association with crustal reworking through metamorphism and magmatism in the Proterozoic mobile belts. From 0.5 Ga onward, tungsten mineralization displays a renewed mantle-lead contribution owing to the direct or indirect association of post-0.5-Ga tungsten occurrences with subduction-related magmatic rocks of the Phanerozoic orogenic cycles. The data presented also suggest that several tungsten mineralization pulses may have recycled tungsten from older reservoirs.

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