Isotopic Constraints on Tungsten-Beryllium Mineralisation at Mahuaping, SW China

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Beryllium deposits in China are largely associated with peraluminous igneous rocks. They can be hosted within pegmatite, granite, quartz vein, skarn, greisen or volcanic rocks [1]. Late Paleogene pegmatite-type beryllium mineralisation commonly occurs in the Tibetan-Sanjiang Tethyan metallogenic belt of western Yunnan Province, SW China [2]. However, intrusive rocks have yet been identified around the large Mahuaping tungsten-beryllium-fluorite deposit in North Lijiang, at the junction of the Yangtze Block, the Changdu-Simao Block, and the Songpan-Ganzi accretionary complex [3]. Contrasting mineralisation is hosted within meta-sedimentary rocks on both sides of the lithological interface: scheelite-beryl-euclase-calcite±galena-muscovite-fluorite veins in Middle and Upper Devonian marble; wolframite-beryl-pyrite±fluorite±cassiterite-muscovite-quartz veins in Lower Devonian slate and phyllite.

Fluid inclusions in vein quartz are either mixed CO_2 – low-salinity aqueous inclusions with total homogenisation (Th) of 270-340°C, or low-salinity aqueous inclusions (ca. 6 NaCl wt.% eq. and Th=180-260°C). Oxygen isotope compositions of quartz ($\delta^{18}O$=11.5–13.8‰, VSMOW), cassiterite (1.7–2.7‰), wolframite (1.0–8.7‰), beryl (10.4–11.7‰), and scheelite (2.7–4.8‰) from several samples analysed by using secondary ion mass spectrometry suggest that mineralising fluids are of multiple origins.

Both muscovite Ar-Ar and wolframite and scheelite U-Pb dating gave a comparable age of 35–30 Ma, indicating that the tungsten-beryllium-fluorite mineralisation formed possibly by unidentified Oligocene magmatism at depth as well as compression, strike-slip and thrust nappe structures of the Yangtse Block in North Lijiang during the Himalayan Orogeny.

Similar tungsten-beryllium mineralisation also occurs in Dabashan of the Qinling orogenic belt, Central China, which is related to emplacement of felsic intrusions in vanadium-rich meta-sedimentary rocks including carbonaceous slate, phlogopite schist and marble [4].

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