

# Fluid pressure contrast control the formation of distal vein-type tin deposit, Dachang district, South China

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In a single evolving magmatic-hydrothermal tin metallogenic system, vein-type tin mineralization is traditionally considered as a later distal product compared with proximal skarn, greisen tin mineralizations owing to the strong temperature gradients causing by the causative intrusion. However, growing evidence suggests the ore-forming temperatures of distal vein-type tin mineralization overlap with those of proximal skarn, greisen tin mineralization [1-3]. To address this issue, LA-ICP-MS U-Pb ages of cassiterite, fluid inclusion petrography, microthermometry, and raman spectroscopy analyses were conducted on the Dafulou vein-type Sn-Zn deposit, eastern of the Dachang tin district, South China. LA-ICP-MS U-Pb dating yielded lower intercept values at  $89.4 \pm 4.5$  Ma for Cst I and  $89.6 \pm 3.6$  Ma for Cst II, respectively. These chronological data coupled with the presence of later Cst II-arsenopyrite-quartz vein (stage II) crosscutting Cst I-pyrrhotite-pyrite-arsenopyrite-quartz (stage I), reveal that two-stage tin mineralization events within a short time span occurred. Mineral paragenesis, along with microthermometric and component analyses of fluid inclusions, suggest the ore-forming fluids underwent a gradual drop of temperature, pressure, oxygen fugacity ( $f_{O_2}$ ), and loss of their  $CO_2$ , but fluid salinities remained stable from stage I to stage II (Fig. 1). The temperature decrease from stage I to stage II, coupled with the intergrowth feature of cassiterite (Cst I) and arsenopyrite, demonstrate fluid cooling and the redox buffering between Cst I and arsenopyrite were the primary trigger for Cst I precipitation. Comparatively, the reduction of  $CO_2$  to  $CH_4$ , fluid cooling, and coprecipitation of arsenopyrite and Cst II collectively facilitated the deposition of Cst II. Our new results calculated that fluid pressure contrasts between the interior of intrusion and ore deposition sites of distal vein-type tin deposits are significantly higher than those between the intrusion interior and skarn contact zone (Fig. 2).

References:

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