

Re-Os Sulfide Geochronology of the Red Dog Sediment-Hosted Zn-Pb-Ag Deposit, Brooks Range, Alaska

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Abstract

The Red Dog sediment-hosted deposit in the De Long Mountains of northern Alaska is the largest Zn producer in the world. Main stage mineralization is characterized by massive sulfide ore and crosscutting subvertical veins. Although the vein mineralization is clearly younger than the massive ore, the exact temporal relationship between the two is unclear. Re-Os geochronology of pyrite is used to determine the absolute age of main stage ore at Red Dog. A 10-point isochron on both massive and vein pyrite yields an age of 338.3 ± 5.8 Ma and is interpreted to represent the age of main stage ore. The Re-Os data indicate that both massive and vein ore types are coeval within the resolution of the technique. Formation of the Red Dog deposit was associated with extension along a passive continental margin, and therefore the Re-Os age of main stage ore constrains the timing of rifting as well as the age of the host sedimentary rocks. Sphalerite from both massive and vein ore yields imprecise ages and shows a high degree of scatter compared to pyrite. We suggest that the Re-Os systematics of sphalerite can be disturbed and that this mineral is not reliable for Re-Os geochronology.

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