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Re-Os AND $^{40}Ar/^{39}Ar$ AGES OF PORPHYRY MOLYBDENUM DEPOSITS IN THE EAST GREENLAND VOLCANIC-RIFTED MARGIN

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Abstract

Precise Re-Os dating of molybdenite from the Malmbjerg and Flammefjeld rift-related porphyry molybdenum deposits indicates that they are among the youngest magmatic events (25.8 ± 0.1 and 39.6 ± 0.1 Ma) in their respective areas of the East Greenland rifted continental margin. An $^{40}Ar/^{39}Ar$ age for biotite from the Malmbjerg granite stock (25.7 ± 0.3 Ma) demonstrates that molybdenite mineralization is essentially concurrent with granite emplacement. Further, the identical ages obtained by argon and Re-Os geochronology suggest that for the youngest events in a region, Re-Os and argon-based methods produce similar age results, whereas this is generally not the case for older ore-forming events that have been thermally overprinted. In the latter case, disturbance of argon systematics produces ages younger than those determined by Re-Os.

Both deposits postdate continental breakup and the associated flood volcanism episode at 56 to 54 Ma. We suggest that the Malmbjerg and Flammefjeld molybdenum deposits formed during later periods of lithospheric uplift, which, at least in the case of Malmbjerg, may have been related to plate tectonic reorganization of the Northeast Atlantic Ocean basin. This uplift may have caused decompression mantle melting and renewed generation of mafic magma that led to crustal anatexis and the establishment of major hydrothermal systems. The suggestion that molybdenum mineralization occurred at times of late uplift of a volcanic rifted margin may be useful in prospecting.

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