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Extracting geochronological and baric information from in situ phengite analysis - examples from deeply subjected continental rocks

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Laser ablation split stream multi-collector collision/reaction cell and quadrupole single-collector mass spectrometry has allowed simultaneous age, chemistry, and barometric information to be recovered from phengite-bearing eclogites of the Western Gneiss Region (WGR), Norway. All phengite grains yielded low Rb/Sr ratios with 430–420 Ma isochron ages, consistent with the timing of eclogite-facies metamorphism deduced from garnet ages rather than regional cooling ages returned from Ar-Ar mica analyses. In addition, the simultaneous collection of geochemical information from phengite was used to constrain peak pressures. The results from the barometry yielded pressures of 27–30 kbar in the southern part of the WGC and 36–38 kbar in the northern of the WGR. These results are consistent with previous estimates and the barometric pattern deduced from conventional petrological studies. The preservation of Rb–Sr ages and baric systematics in phengite, at conditions above the notional closure temperature, is interpreted to be due to a lack of pervasive fluid-rock interaction during exhumation and cooling of the WGR whereby phengite in eclogite is isolated from a sink mineral for the radiogenic Rb produced. The ability to simultaneously collect of isotopic and elemental compositions in micas facilitates the rapid characterisation of regional-scale age and baric patterns in high-pressure geological terranes.