Allanite and Apatite Petrochronology from the Western Gneiss Region Ultrahigh Pressure Terrane, Norway

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Laser-ablation split-stream petrochrornology was performed on quartzofeldspathic gneisses for both allanite (18 samples) and apatite (11 samples) from the Western Gneiss Region ultrahigh pressure terrane, western Norway; 5 of the samples were analyzed for both allanite and apatite. In all but 2 cases, allanites yield Precambrian inherited dates with at least some resetting/recrystallization; trace-element analyses that correspond to dates aid to differentiate Pb loss vs. recrystallization. Most samples yielded multi-point Tera-Wasserburg isochrons indicating early, >420 Ma, prograde metamorphism during Caledonian orogenesis, thus providing new time constraints on the early metamorphic petrogenesis of the ubiquitous host gneiss in the WGR. Only one sample contained allanite likely associated with (re)crystallization during retrogression (<400 Ma).

Apatite from all but 1 of the 11 samples yielded solely Caledonian dates, including 5 samples also analzed for allanite, the latter which yielded Precambrian dates. Apatite geochronology for these samples places further constraints on the timing of exhumation of the terrane. Concurrent trace-element analyses can distinguish whether the apatite grew during decompression, or whether preexisting igneous apatite was reset, thereby increasing our understanding of the behavior of apatite during metamorphism. The single apatite with inherited dates was sampled in the foreland where maximum temperatures were likely <650°C.