

DECIPHERING THE TEMPORAL RELATIONSHIP BETWEEN CRUSTAL LOADING AND GARNET GROWTH: NORTH AMERICAN CORDILLERA

1TINKHAM, D.K. and 1STOWELL, H.H. 1University of Alabama, Department of Geological Sciences, Tuscaloosa, USA.

Phase diagrams constructed for individual bulk-rock compositions (pseudosections) have been suggested as a viable method for determining pressure-temperature conditions of garnet core growth. The relationships between crustal loading and garnet growth in the Mount Stuart Batholith region, Washington, and Coast Plutonic Complex, Alaska, were evaluated using the pseudosection approach in combination with garnet rim thermobarometry. Results of garnet-rim thermobarometry and pseudosections contoured with garnet core compositions for three rocks from the Mount Stuart Batholith region indicate that rocks adjacent to the Batholith experienced pressure increases of 2-3 kilobars, while rocks northeast of the Batholith experienced no discernable pressure increase during garnet growth. Therefore, the temporal relationship between heating (leading to garnet growth) and crustal loading varied across the region. Core pressure-temperatures predicted by pseudosection and inclusion suite thermobarometry are in close agreement for the only sample with appropriate inclusions. Results obtained from a polymetamorphic pluton pendant in southeast Alaska indicates no or small pressure increase during garnet growth, and are compatible with garnet growth during contact metamorphism. In both localities, the predicted garnet-core growth temperatures exceed the pseudosection garnet-in temperature by 25° to 125°C. This may result from garnet nucleation well above garnet-in reactions (plausible for rapid heating rates), or may indicate that these pseudosections are overestimating core temperature growth. The combination of these results with garnet Sm-Nd geochronology would allow direct constraints to be placed on the temporal variation of loading and heating across metamorphic terranes, and hence has direct implications on tectonic interpretations.