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Crystallization of metamorphic garnet in the Sikkim Himalaya: insights into element equilibration, rock-wide deformation and rates of Barrovian heating

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N/A

Rates and mechanisms of metamorphic garnet crystallization in the Sikkim Himalaya, NE India

Crystallization of metamorphic garnet in the Sikkim Himalaya: insights into element equilibration, rock-wide deformation and rates of Barrovian heating.

Metamorphic petrology has evolved significantly over the last few decades, and our ability to unravel the processes by which metamorphic minerals crystallise is ever-improving. These steps forward are in part a consequence of analytical advances that have made characterizing chemical and microstructural variation in metamorphic rocks easier, and are also partly due to our increased ability to constrain the departure from equilibrium required for mineral nucleation and growth in natural samples. This talk will present results from a garnet population of a garnet-grade pelitic schist from the Lesser Himalayan Sequence in the Sikkim Himalaya, India. X-ray micro-computed tomography, major element mapping and laser ablation–inductively coupled plasma–mass spectrometry raster mapping of trace elements in garnet yield insight into nuanced aspects of the Barrovian crystallization history, including rates of metamorphism, the extent of major and trace element equilibration, and pervasive rock-wide deformation. Coupled phase equilibria modeling enables assessment of the magnitude of departure from equilibrium required for garnet nucleation. Combined, these data highlight the breadth of information that can be coerced from a single rock, and thus serve to emphasize the value of detailed sample characterization in metamorphic and geochemical studies.