Statement of Research Philosophy
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Detailed metamorphic pressure-temperature-time (P-T-t) paths have the potential to constrain tectonic models of mountain building and exhumation events much more precisely then present methods allow. More complicated P-T paths require tectonic systems that include methods for multiple pulses of heat, explanations for hiatuses between metamorphic stages, and a method to increase and/or decrease the pressure in stages. Consequently, P-T-t paths that are constrained by more than one or two points afford an opportunity to gain considerable insight into the large scale processes that are responsible for orogenic and exhumation events.

My own research uses bulk composition specific phase diagrams, crystal size distribution studies based on computerized X-ray tomography data, and quantitative textural modeling of nucleation, growth and dissolution of metamorphic phases. Field work provides samples, which we then try to reproduce *via* the textural modeling to provide a valuable tool to derive a P-T estimate not just for one point of the rock's history, but for the entire P-T-t path. Traditionally, simple clockwise or counter-clockwise P-T paths have been constructed based on a few P-T points to describe the orogenic evolution of a sequence of samples. In reality, orogenic events probably consist of multiple pulses of metamorphism and deformation that often overprint the previous stage. Different bulk compositions will record varying portions of the orogenic P-T path due to variances in the phase relationships, which in turn provide the means to derive a more realistic P-T-t path.

In addition to providing more detailed P-T-t paths, a greater understanding of the parameters that control crystal nucleation, growth and dissolution will increase our knowledge of reaction mechanisms and the kinetics that govern texture development. By refining quantitative models to match more closely with natural samples, we gain important insights into metamorphic processes.