

Timing and significance of deformation within the Shelving Rock Quadrangle, eastern Adirondack Highlands, southern Grenville Province:

A summary of the results culminating from a summer's worth of field work made possible by the Gloria Radke Memorial Prize awarded to me by the UMass Geosciences Department for summer 2015

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This project is an NSF funded collaboration between the University of Massachusetts, Amherst and Castleton University in Castleton, Vermont.

The Adirondack Highlands preserve a record of the early history of Eastern Laurentia through evidence for multiple stages of continental collision and extension events. These events include: the 1170 Ma Shawinigan orogeny, emplacement of the ca. 1150 Ma AMCG igneous suite, the ca. 1070 Ma Ottawan orogeny, and subsequent 1050-1030 Ma extensional collapse exemplified by the Carthage-Colton mylonite zone and recently described shearing along the eastern edge of the Adirondack Highlands (Eastern Adirondack shear zone). The nature, extent, and tectonic significance of eastern Adirondack extensional shearing are uncertain. It is critical to distinguish late extensional deformation from earlier events using structural and microstructural analysis, forward petrologic modeling, and in-situ geochronology in carefully chosen localities inside and outside of the proposed shear zone.

Field work completed this summer included detailed mapping of key structures and sample collecting in select locations in the 1:24000 Shelving Rock Quadrangle. Two such locations were Shelving Rock Mountain and a well exposed ridge of aluminous, mylonitic paragneiss at Dacy Clearing. Samples collected of compositionally different paragneisses within these two locations will be used to determine the extent, nature and age of shearing resulting from the Eastern Adirondack shear zone through in-situ monazite dating and forward petrologic modeling. At the Dacy Clearing ridge, kinematic indicators within the mylonitic paragneiss revealed a top-to-the-west reverse sense of shear, which will be examined in collected samples using the electron microprobe and Ultrachron facilities at the University of Massachusetts in order to determine the timing and significance of this reverse sense shear.

Farther field work was completed in the role of graduate mentor to undergraduate students from both universities in field areas assigned to each student. These areas were chosen as the locations of previously mapped large scale folds. The actual occurrence, extent, and age of these folds are also a key portion of the history of the eastern Adirondack Highlands, and the study of them forms a number of undergraduate research projects. As the graduate mentor, mapping and sample collecting in each of the undergraduates' areas also falls in the scope of this project.

The results from this summer include structural maps of key locations in the eastern Adirondack Highlands, numerous samples showing the variation in paragneiss and gabbroic units for later in-situ monazite dating and forward petrologic modeling, and plans for further work to be completed.