Khadka, S., Webb, L.E., Karabinos, P., Long, M.D., and Espinal, K., 2024. Investigating Post-Taconic Deformation in the Pine Hill Thrust, Southern Vermont. In AGU Fall Meeting Abstracts (Vol. 2024, T13A-3341).

T13A-3341 Investigating Post-Taconic Deformation in the Pine Hill Thrust, Southern Vermont

Monday, 9 December 2024
13:40 - 17:30
Hall B-C (Poster Hall) (Convention Center)

Abstract

The Pine Hill thrust, a western frontal thrust of the Green Mountain massif in southern Vermont, is characterized by reverse faults that place Precambrian basement rocks over mid-Ordovician rocks. Based on cross-cutting relationships, it has been considered a late-stage Taconic thrust. However, recent investigations in the western front of the Sutton Mountains, Green Mountain massif, and Berkshire massif of southern Quebec, Vermont, and Massachusetts, respectively, suggest fault displacement at 420 Ma and younger. Therefore, motion on these faults may instead be associated with the late Salinic or early Acadian orogeny.

This study investigates the hypothesis that the Pine Hill thrust records deformational events associated with the late Salinic and/or Acadian orogenies. Preliminary studies from fieldwork and microstructural analysis of slabbed samples from transects across the Pine Hill thrust, where the lower Cambrian Dalton Formation is mapped as thrust over the Upper Ordovician Ira Formation, reveal at least four generations of foliation. The oldest tectonic foliation, S_1, is parallel to primary compositional layering (S_0) and is associated with isoclinal F_1 folds. Moving from the Dalton Formation in the hanging wall towards the fault zone, S_1 becomes progressively transposed into S_2, marked by metamorphic compositional layering. Closer to the fault, S_2 is crenulated, and S_3 emerges as the dominant foliation, becoming the only foliation exhibited by the phyllonites in the fault zone. Finally, the youngest foliation, S_4, is a localized crenulation cleavage developed in more pelitic material.

These preliminary results suggest a complex deformation history, possibly involving multiple phases of post-Taconic motion on the fault during subsequent orogeneses. Further microstructural analysis and geochronology of these deformation fabrics will help establish the timing of deformation and its tectonic significance, helping to correlate surface geology with results from New England Seismic Transect (NEST) imaging of crustal and mantle lithospheric structure in the northern New England Appalachians.