

FIELD TRIP: A TRANSECT ACROSS THE ACADIAN AND TACONIC OROGENIC ZONE: BERKSHIRE MASSIF, MA TO THE HUDSON VALLEY, NY *Geosciences 500* *Fall 2013*

PURPOSE

The purpose of this field trip is to complete a transect across the Acadian and Taconic mountain belt from the autochthonous (i.e., in place) mollasse deposits associated with the Devonian Catskill wedge to the allochthonous (i.e., transported) thrust sheets of the Acadian and Taconic foreland to the metamorphosed basement and cover rocks of the hinterland. The trip will consist of two parts:

Day 1

Stop 1- Appalachian trail exposure of the Great Unconformity that separates the Grenville age basement (1.0 Ga) and the staurolite grade Cambrian conglomerates (Dalton Formation) that mark the base of the Paleozoic section. We will have a 20 minute walk where we see exposures of basement rocks with vertical foliation before we come upon the nonconformity.

Stop 2- Deformed schists of the Taconic flysch near the contact with the underlying drift Cambro-Ord. carbonates. This outcrop exposes metamorphosed deepwater clastics that were shed into the foredeep basin in advance of the allochthon before accretion and incorporation into the orogenic belt. We will have a discussion here about the structures observed and where these structures may form in the context of the doubly vergent wedge model for arc-continent collision.

Stop 3- Deformed slates of the Taconic Allochthon at the intersection of Rte 23 and the Taconic Parkway. What is bedding and what is cleavage? What are their orientations? Where are we in our model of the Taconic orogen.

Stop 4- Melange of the Taconic thrust front. How is deformation accomplished? What are the resulting fabrics? How has the style of deformation changed as we progressed from stop 3 to the thrust front?

Stop 5- Bashbish Falls- Phyllites of the Taconic thrust slices. We will return to the escarpment that marks the Western Taconic Mountains along the border between Massachusetts and New

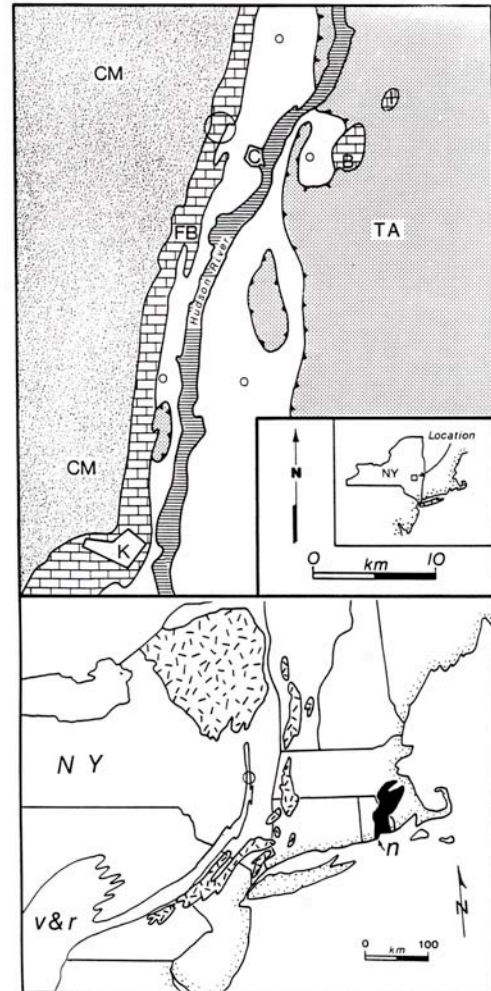


Figure 1. Tectonics of the Hudson Valley (from Marshak, 1983)

York. We will either park in the lower parking lot, in which case we will walk up river and observe a progressive increase in metamorphic grade as we go from slates, to phyllites to schists at the falls. Alternatively we may park in the upper parking lot and descend a path to the Falls. The Falls expose the Everett Formation, with porphyroblasts of garnet and staurolite. The Everett Formation is metamorphosed synorogenic sediments.

Day 2

Stop 1-- Taconic unconformity, Acadian foreland fold and thrust belt, and stratigraphy of the Helderberg Group. We will characterize the stratigraphy and use it to evaluate structure (positions of faults and folds) in this foreland fold and thrust belt. What is the age of the deformation? What is the evidence?

Stop 2-- an exposure of the Esopus shale, an intensely deformed unit that acted as an upper detachment to the structures at stop 1.

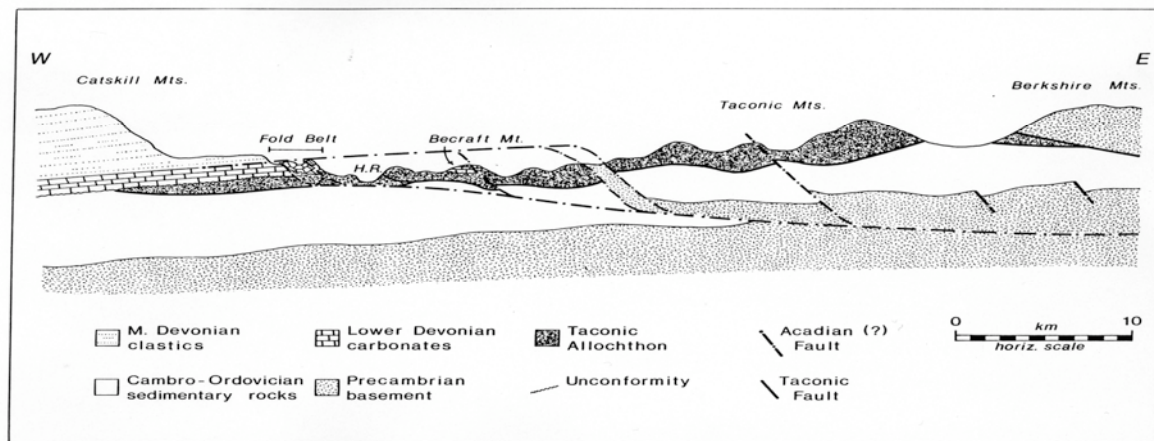
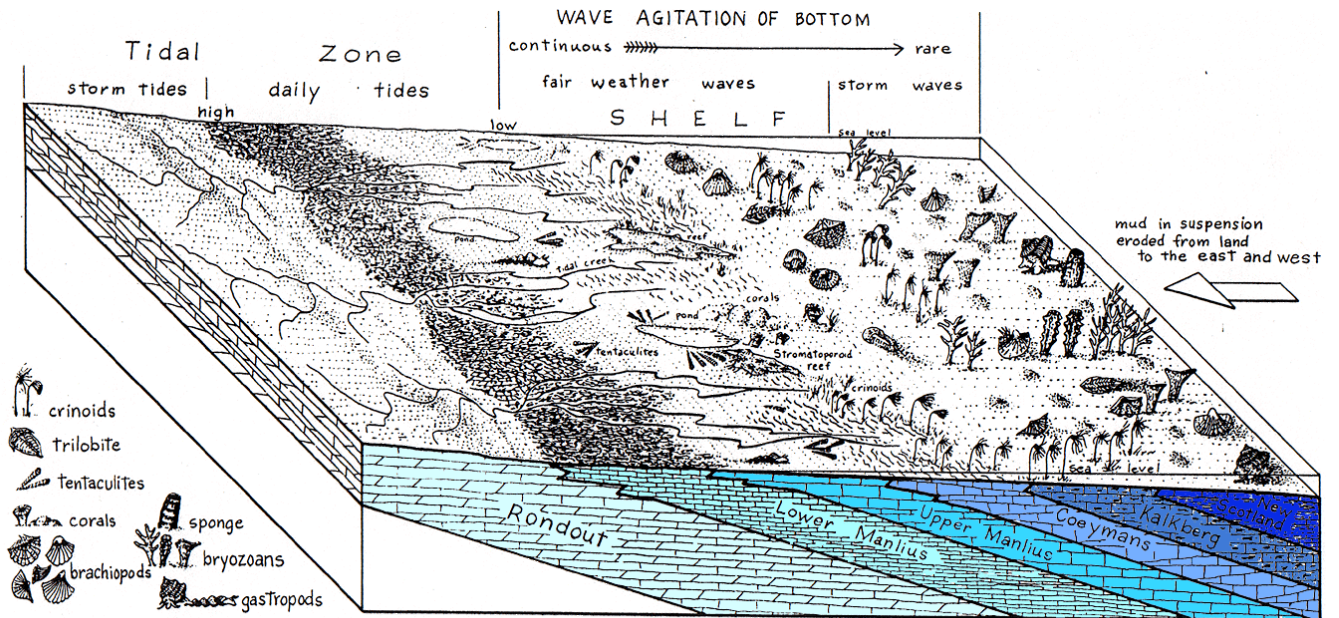


Figure 2. Schematic cross section between the Berkshire and Catskill Mountains (from Marshak, 1983)

The block diagram below gives an interpretation of the depositional environments of the Helderberg.



Helderberg Facies (from U. of Rochester website)

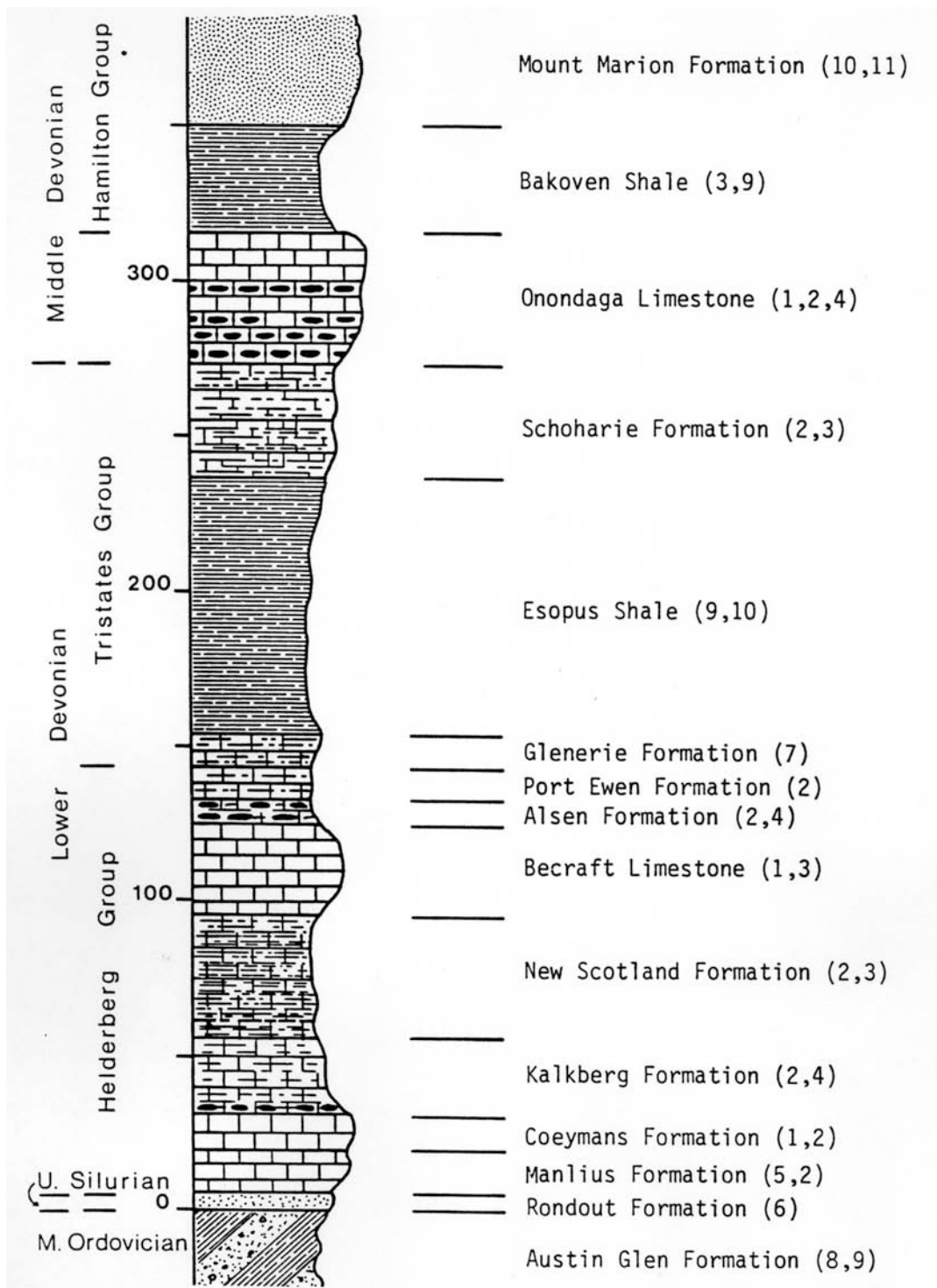


Figure 3. Stratigraphic column of the Hudson Valley Fold and Thrust Belt (from Marshak, 1983)
 1 = grainstone, 2 = wackestone, 3 = calcareous shale, 4 = black nodular chert, 5 = laminated micrite, 6 = sandy limestone, 7 = cherty limestone, 8 = graywacke, 9 = siliceous shale, 10 = quartz sandstone, 11 = quartz sandstone.

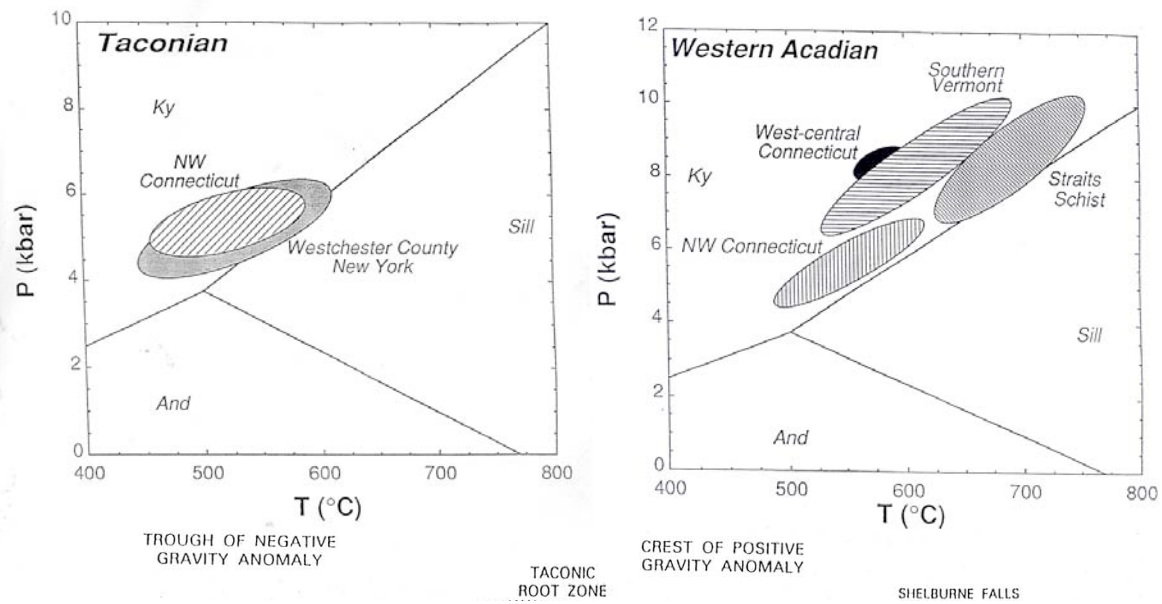


Figure 7. P-T diagrams showing ranges of documented pressures and temperatures of the Taconian and western Acadian belts.

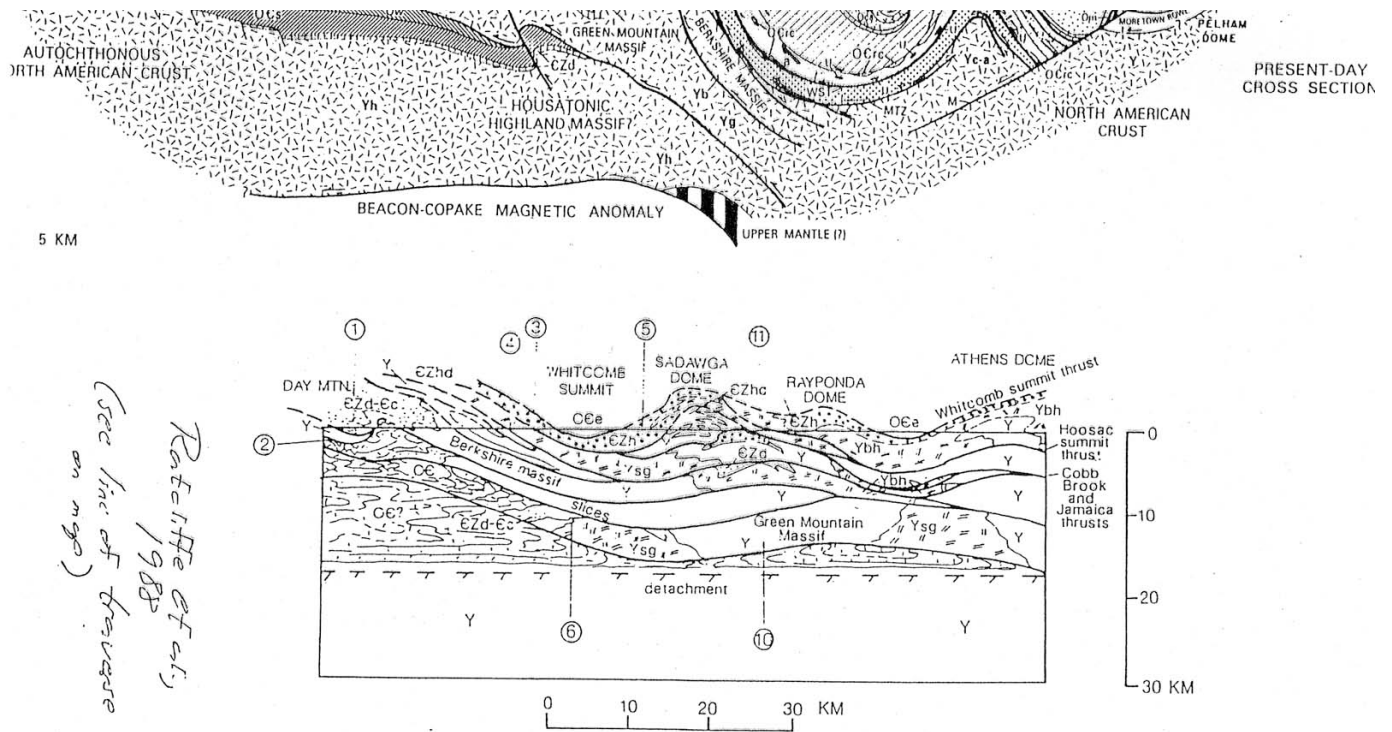


Figure 8. Generalized cross section from Day Mountain northeastward to the Athens dome.

