Using Photogrammetry to Analyze Structures in a Tectonic Sliver in the Foot Wall of the Champlain Thrust, Shelburne, Vermont II Chirigos, Michael¹; Kim, Jonathan²; Klepeis, Keith¹, and Van Hoesen, John³

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Abstract

In the Champlain Valley Belt of west-central Vermont, the Champlain hrust juxtaposed ferruginous quartzites and dolostones of the Lower Cambrian Monkton Fm (hanging wall) with calcareous shales of the Late Ordovician Stony oint Fm (foot wall = Parautochthon), during the Ordovician Taconian Orogeny. nternal to the Parautochthon in this area, a tectonic sliver of dark gray limestone i found that likely correlates with the Cumberland Head Fm.

Structural analysis of a ~100 m long outcrop was accomplished through a combination of photogrammetric techniques and field measurements. We used photogrammetry software to construct photo mosaics of 1) the entire outcrop, 2 ach structural package, and 3) across the tectonic boundaries between structur backages. A preliminary structural synthesis is described below. It is important to point out that structures with the same relative age, determined using cross cutting elationships, may have developed diachronously across the outcrop.

The "sliver" of Cumberland Head Fm consists of 5 structural packages that re bounded by 4 faults. The oldest planar structure in each package is bedding S_0), which appears as a millimeter-scale, dark and light, compositional banding perposed on S_0 at high angles, is a penetrative spaced pressure-solution cleava S_1 that, where associated folds are absent, is thrust-related. Southeast-trending ickensides formed on fault-parallel zones of calcite veins in each of the 4 faults

In packages 1-3 (numbered from west to east), S_1 is truncated by, and/or rotated into parallelism with, the overriding east-dipping thrust faults. These faults (A+B) are deformed by open folds (F_2) with a local axial planar spaced cleavage S_2). The fault C boundary between packages 3 and 4 truncates S_2 . Although the S_1 cleavage is openly folded (F_3) and fans on the west side of package 4, it shears out on the east side to form a ~vertical fault contact with package 5. Within package 3 S_1 is deformed by tight reclined F_3 folds, with gently south-plunging axes.

This poster shows photo mosaics of different scales that are integrated with field data to document the structural history of the Shelburne outcrop. Our approach illustrates the utility of using photogrammetric techniques in the structural analysis of complexly deformed outcrops.

















Figure 4A- Annotated photo mosaic of the Fault A boundary between SP1 and SP2.



Figure 5A- Stereonet of Package 1 Structural data.



Figure 5B- Stereonets for Package 2 Structural data.

Figure 4B-Annotated photo mosaic of the Fault B boundary between SP2 and SP3.

Figure 4C- Annotated photo mosaic of SP3 before truncation by Fault C



Figure 5C- Stereonets for Package 3 structural data.









Figure 4E- Annotated photo mosaic of the western half of SP5.

igure 4H-Slickensides.



Figure 4F- Annotated photo mosaic of the eastern half of SP5.



Figure 5E- Stereonets for Package 4 structural data.





EAST

Figure 5F- Stereonets for Package 5 structural data.

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