Geologic Mapping in the Southern Beaverhead Mountains, Eastern Idaho (West Side): New Structural Interpretations From Field Camp Mapping

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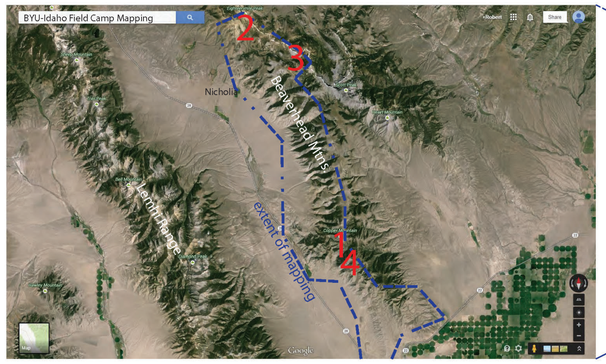
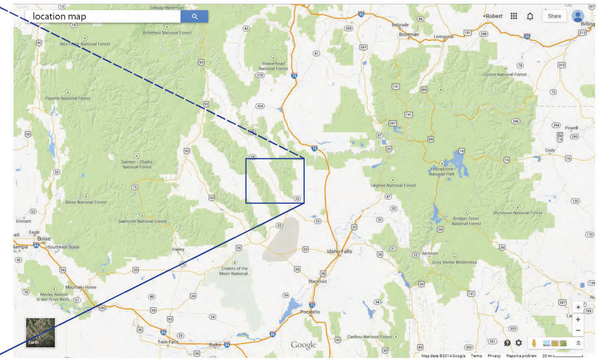
SUMMARY

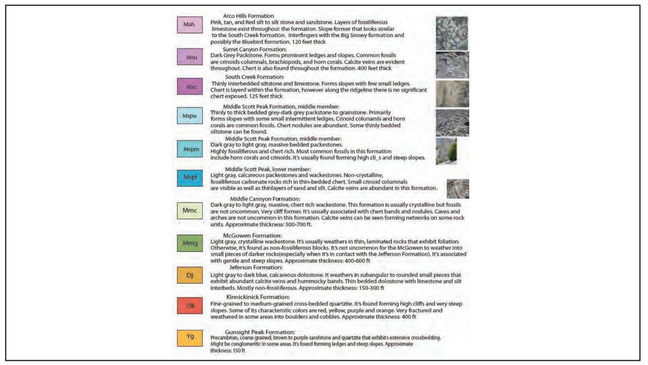
Brigham Young University - Idaho field camp students have mapped the west side of the southern Beaverhead Mountains in 2005 - 2013. The Beaverhead Mountains are a Basin and Range horst parallel to the Lemhi and Lost River horsts in east-central Idaho along the Montana border. This section of the Sevier thrust belt is characterized by a kilometers-thick Mississippian to Permian carbonate section displaced toward the east and northeast in thick thrust sheets. Deformation is characterized by fault-propagation and fault-cored, east- vergent, asymmetric, steep to overturned folds. Nearly all folds are fault-cored or are in the hanging wall of thrust faults. Neogene normal faults in the range trend NNW to W and dissect the folds and thrust sheets in several locations.

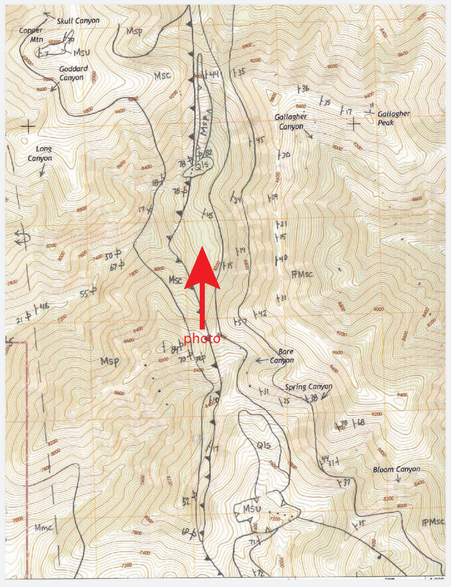
Major Findings

1. We discovered the Copper Mountain thrust, the core of a fault propagation fold with displacement that increases with depth.
2. We discovered stoped blocks of probable Ordovician Kinnikinic formation in the Beaverhead syenitic pluton near Nicholia.
3. We mapped a series of fault-propagation folds and the associated minor thrust faults throughout the range.



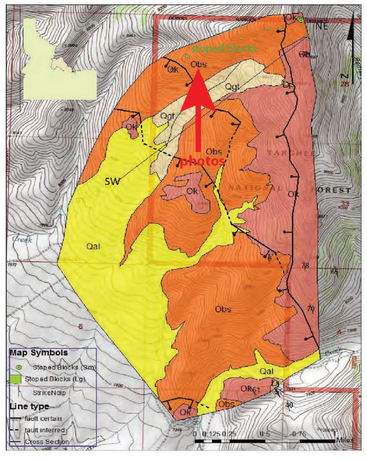




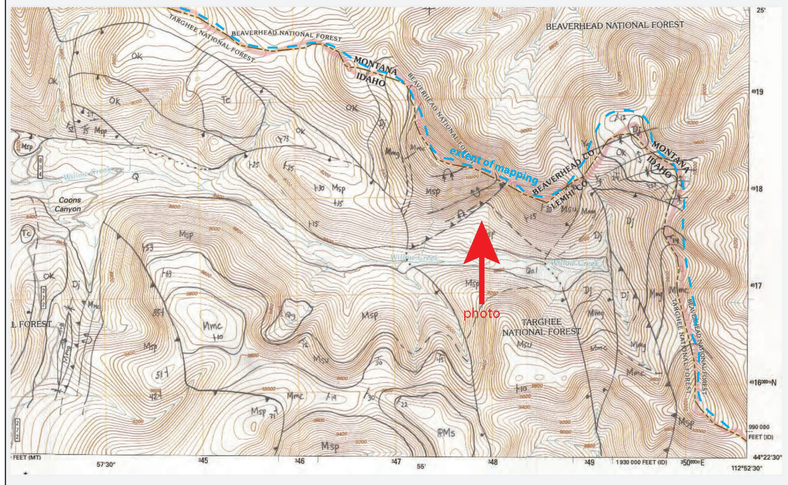


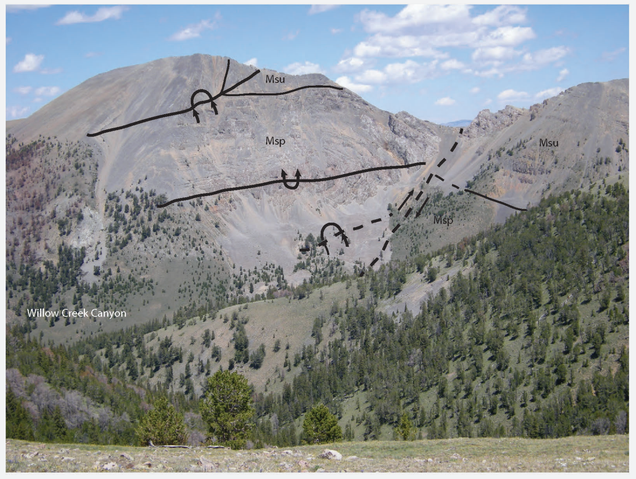
1 The Copper Mountain thrust extends from the southern end of the range northward at least as far as Copper Mountain. Further detailed mapping will be needed on the east side of the range to determine its northern terminus. The fault is part of a fault-propagation fold with very little displacement at Copper Mountain, but displacement increased with structural depth toward the south.

Evidence that the fault is a thrust include 1) it is strata-bound; 2) it dips to the west, placing older units over younger; and 3) it is intimately associated with folds in the hanging wall and little to no folding in the footwall along its entire length.



2 Our field camp students discovered stoped blocks of a quartzite inside the Beaverhead pluton (Obs) in the area of Eighteenmile Peak north of Nicholia. The stoped blocks are presumed to be the Ordovician Kinnikinic Quartzite (Ok) based on proximity (see map), but further analysis will be needed. The blocks could also be the Precambrian Gunsight formation that is intruded by the pluton. The blocks range in size from a few meters to a few tens of meters, and have preserved depositional layering in many places. Contacts with the pluton are sharp (see photos). The blocks have various orientations. Further study of the blocks and pluton may narrow the uncertainty of the pluton's age.





3 We have mapped fault-propagation folds and related thrusts throughout the range. The largest of these folds is in the east end of Willow Creek, east of Nicholia. The fold involves the Scott Peak and Surrett Canyon formations, which are difficult to distinguish at a distance. The thrust has just enough displacement to place the upper Scott Peak formation against the overlying Surrett Canyon formation. The thrust is displaced in Willow Creek canyon by a northwest-trending normal fault, and its southern extent is unknown. About half of the fault-propagation folds we have mapped, like this one, can only be followed along strike for less than 2 miles.

4 Folding in the southern Beaverhead Mountains is characteristically east- vergent, asymmetric, steep to overturned, kinked in thin-bedded units to similar or concentric in thick-bedded units. Folds have amplitudes and wavelengths of from a few meters to a kilometer. Most folds are demonstrably associated thrust faults.

Remaining Issues include 1) northward continuation of the Copper Mountain thrust; 2) northward continuation of the Snaky Canyon thrust; 3) resolution of complex faulting at the Viola Mine; 4) age of the Beaverhead pluton and positive identity of the stoped blocks; 5) resolution of complex faulting in Skull Canyon.