STRUCTURAL EVOLUTION OF THE TALLY HO SHEAR ZONE, SOUTHERN YUKON TERRITORY

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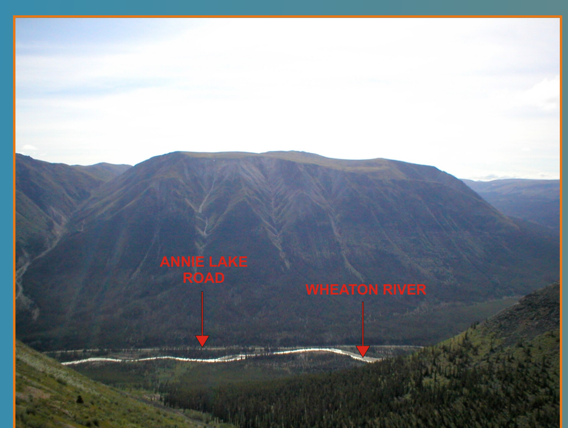
INTRODUCTION

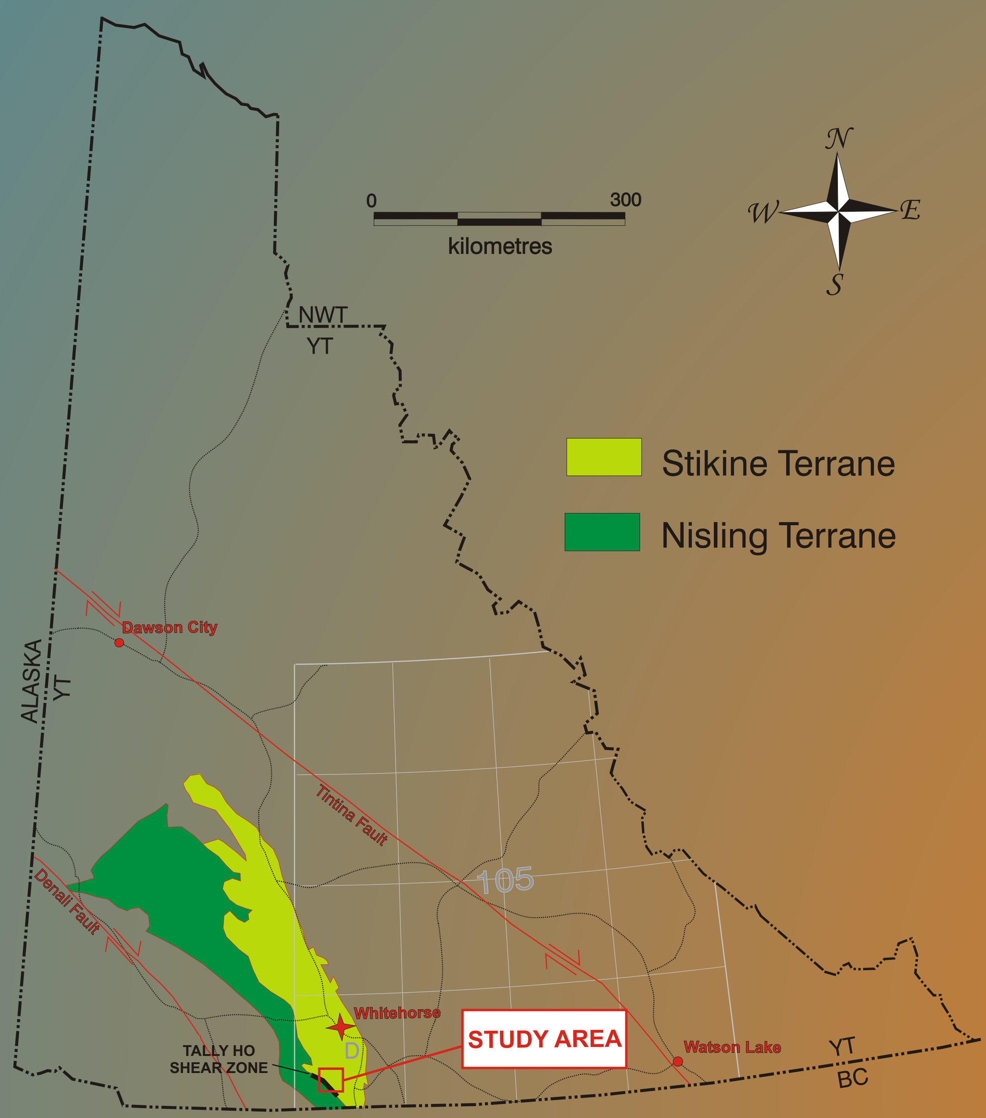
The Tally Ho Shear Zone is located along the western boundary of the Whitehorse Trough in southern Yukon, separating the Stikine Terrane to the east and the Nisling Terrane to the west.

Complex geologic structures, plutonism and abundant Tertiary volcanism obscure the nature of this boundary and its relation to adjacent terranes.

Detailed geological mapping, with associated geochronology and geochemistry sampling was undertaken to better understand the Tally Ho Shear Zone and thus the relationship between Stikinia and the Nisling Assemblage.



Tally Ho Mountain in relation to the Annie Lake Road and Wheaton River. Photo faces southwest.



Location of study area and simplified tectonic boundaries of Stikinia and the Nisling Assemblage. Tectonic boundaries are modified after Wheeler and McFeely (1991).

MAJOR LITHOLOGIES

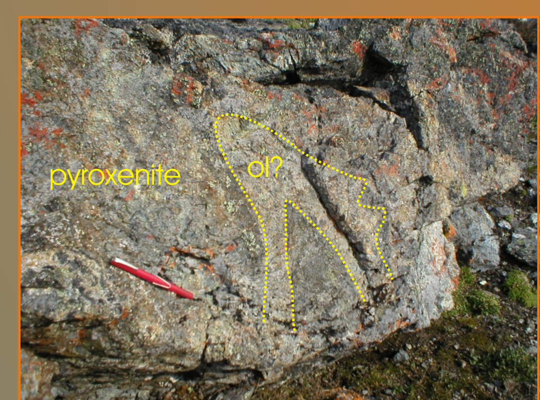
The majority of rocks in the study area belong to the Triassic Lewes River Arc (Hart and Radloff 1990). Major lithogies include leucogabbro, pyroxenite, mylonite, greenschist, augite basalt, marble and volcaniclastic rocks.

Plutonic rocks of the region are part of the Whitehorse Plutonic Suite, and include the Bennett Granite and Wheaton Valley Granodiorite.

Cretaceous and Eocene volcanism cross-cut structures throughout the study area.

Augite porphyroclast on Dickson Hill showing sinistral sigma-type augen.

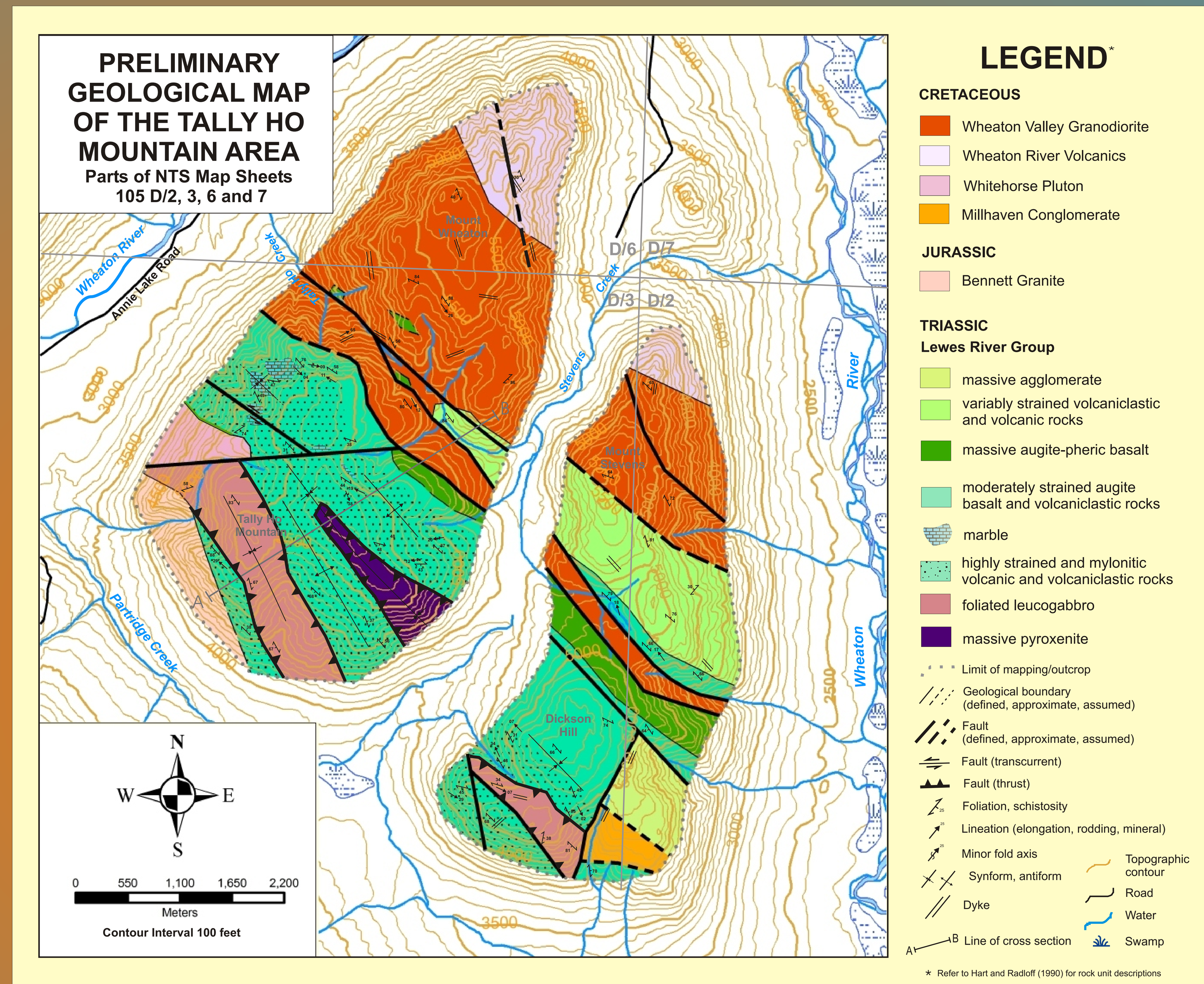
Characteristic coarse-grained texture of the foliated leucocratic gabbro on Tally Ho Mountain and Dickson Hill.



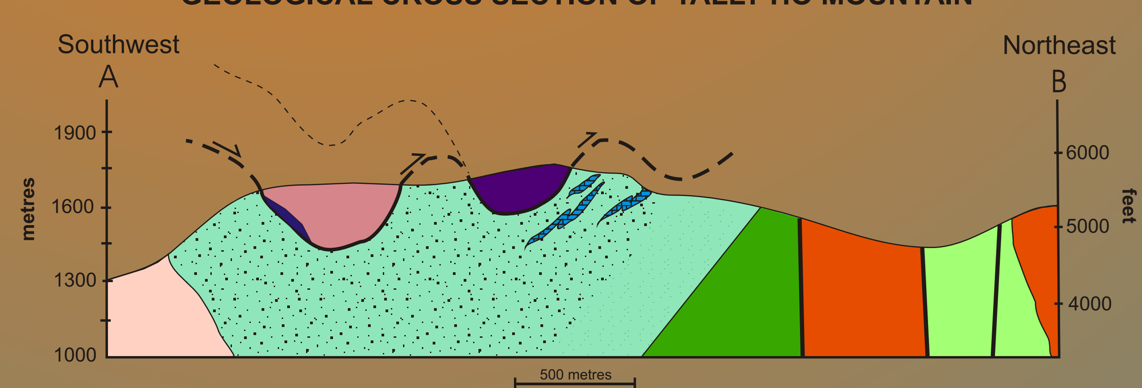
Dark grey, coarse-grained pyroxenite on Tally Ho Mountain. Serpentinization is pervasive and cumulate textures with relict olivine (ol) may be present.

Preferential alignment of clasts in a strained volcaniclastic rock on Mt. Stevens.

East facing photo of a scarp on the north face of Tally Ho Mountain. Intercalated marble and mylonite are in the foreground with Wheaton Valley Granodiorite in the background.



GEOLOGICAL CROSS SECTION OF TALLY HO MOUNTAIN



En-echelon tension gashes indicating sinistral semi-brittle shear in granodiorite on Mt. Wheaton.

East-vergent crenulation in mylonite on Tally Ho Mountain.

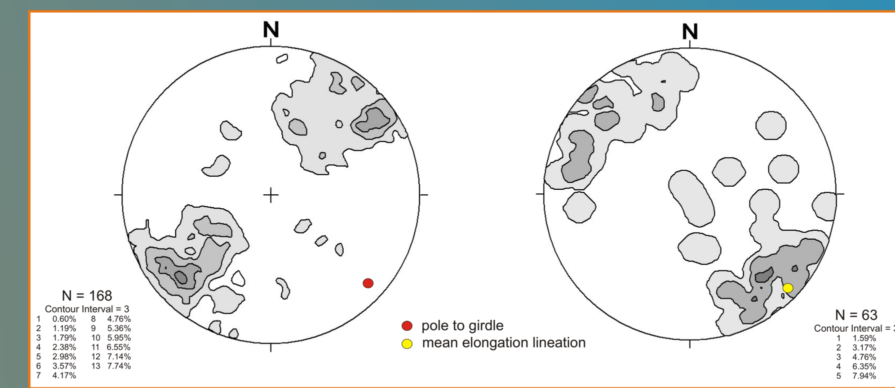
Crenulation lineations in augite mylonite on Dickson Hill.

South-vergent duplex structures on the north face of Tally Ho Mountain. Photo faces east.

STRUCTURES

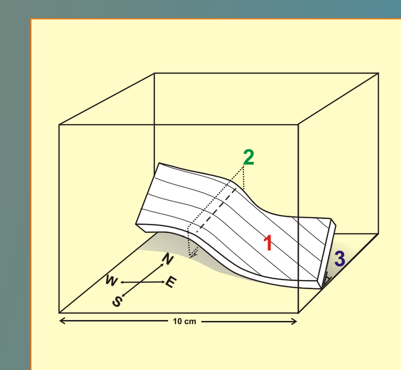
At least 3 episodes of deformation are recorded in the rocks of the Tally Ho Mountain area.

Episode	Style of Deformation	Field Evidence
D1	ductile shear	Mylonitization, schistosity and elongation lineations developed in Triassic volcanic, plutonic and volcaniclastic rocks.
D2	compression	Thrusting of pyroxenite and gabbro onto mylonitinized sediments (see cross-section).
D3	compression	Elongation lineations are folded into east-vergent crenulations and kink bands found in mylonitic rocks.
D4	brittle to brittle-ductile shear	Discrete shears and brittle faulting in mid-Cretaceous and younger rocks.



Contoured stereoplot of poles to foliation planes in the Tally Ho Mountain area. A weak girdle is definable by the methods of Woodcock and Naylor (1983).

Contoured stereoplot of elongation lineations in the Tally Ho Mountain area. A weak cluster is definable by the methods of Woodcock and Naylor (1983).



Schematic representation of deformed rocks on Tally Ho Mountain. Mylonitized rocks typically have:

1) southeast trending and shallowly plunging elongation lineations

2) south plunging and east vergent crenulations

3) moderate to steeply dipping foliation

SUMMARY

Rocks in the study area have experienced at least 3 phases of deformation since the late Triassic.

Stereoplot analyses suggest that sub-horizontal upright folding may be present in the sheared rocks with movement to the southeast.

Crenulations may reflect folding of a thrust fault which juxtaposes ultramafic rocks against mylonite.

Future work will examine these and other field relations to help further the understanding of the tectonic evolution of the northern Canadian Cordillera.

REFERENCES

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