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Canada

GEOLOGY OF THE TESLIN SUTURE ZONE IN PARTS OF LABERGE (105 E/1), QUIET LAKE (105 F/4) AND TESLIN (105 C/11, 13, 14) MAP AREAS, YUKON TERRITORY

INTRODUCTION

This open file presents the geology (1:50 000 scale) of the Teslin suture zone and related rocks in parts of Teslin (105 C/11, 13, 14), Quiet Lake (105 F/4) and Laberge (105 E/1) map areas. Previous maps of the area (1:250 000 scale) are presented by Lees (1936), Mulligan (1963) and Tempelman-Kluit (1977, 1984). The Teslin map area is being remapped at 1:50 000 and 1:250 000 scales by the Geological Survey of Canada (Gordey, 1991, 1992).

The Teslin suture zone is a part of the Yukon-Tanana composite terrane (YTT)(Kootenay terrane of Wheeler et al., 1991) of southern Yukon and east-central Alaska. In southern Yukon, it marks the fundamental boundary between deformed autochthonous North American rocks of the Omineca Belt to the east and accreted terranes of the Intermontane Belt to the west. It includes of a variety of S-, L-S, and L-tectonites derived from sedimentary, volcanic and plutonic rocks metamorphosed under greenschist to amphibolite facies conditions (Stevens, 1991, 1992; Stevens and Erdmer, 1993). The Teslin suture zone was named by Tempelman-Kluit (1979) and extends from the southern part of the Glenlyon map area (105L) down through the Laberge map area (105E) and into the Teslin map area (105C) at least as far south as the Canol Road. In the Laberge map area the Teslin suture zone has been studied by Erdmer (1985) and by Hansen (1992 and references therein).

The complete legend for the open file is presented on this sheet. Teslin Suture Zone Units are part of the YTT and consist of rocks that show the development of penetrative ductile deformation fabrics. North American units are interpreted to be a metamorphosed and ductilely deformed part of the pre-Mesozoic North American margin. Other units cross-cut several terranes, lack a foliation and intrude Teslin Suture Zone units.

STRUCTURAL CHARACTERISTICS

Two deformation phases are recorded in the Teslin suture zone. The first was a penetrative ductile deformation event that produced S-, L-S, and L-tectonites under greenschist to lower amphibolite facies metamorphic conditions. The second was a folding event, under similar metamorphic conditions that produced widespread crenulation of earlier fabrics, hand-specimen scale folds and local cleavage development (Stevens and Erdmer, 1993).

Within the map area presented in this open file three detailed structural transects have been completed. Mapping along the transects revealed that the suture zone includes many domains of contrasting structural style with different foliation and lineation fabric orientations. On this sheet (right-hand side) strip maps of the transects with accompanying stereographic projections plots of lineations and poles to foliations for each structural domain are presented. In addition, the orientation of fold axes from second deformation phase folds are presented in a separate stereographic projection plot.

AGE CONSTRAINTS

U-Pb dating on rocks of unit DMt, give early Mississippian crystallization ages (Stevens, unpublished data, 1993). In the YTT rocks similar to this unit give crystallization ages that range from Late Devonian-early Mississippian, thus a Devono-Mississippian age is assigned to this unit. An early Mississippian body of unit DMt is interpreted to intrude unit PMgp giving a minimum age for this unit (Steven 1991; unpublished data, 1993). Numerous bodies of unit DMt intrude unit PDsq suggesting a Late Devonian minimum age for this unit. Maximum ages for units PMgp and PDsq are not constrained but are interpreted to be in the Proterozoic. The ages of units PMgr, PMga, PMh, and PMsn are not constrained, however similar rocks types in the YTT are thought to be Paleozoic and/or Mesozoic. Rocks of the North American unit are assigned a Proterozoic and/or Paleozoic age, based on the interpretation that they are part of the pre-Mesozoic North American margin. The ages assigned to rocks of the Other units are based on regional correlations.

ACKNOWLEDGMENTS

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LEGEND

TESLIN SUTURE ZONE UNITS

PALEOZOIC AND/OR MESOZOIC

PMgr — Resistant, medium to dark green foliated actinolite-chlorite-epidote quartzofeldspathic schist and greenstone (±sphene±carbonate±biotite±hornblende); includes light to dark green compositionally banded schist: PMgr1 resistant, generally massive, hornblende megacrystic greenstone; minor foliated schist and greenstone: PMgrc, marble. This unit is interpreted to be equivalent to the Anvil Allochthonous Assemblage (Tempelman-Kluit, 1984)

PMga — Resistant, white and green, massive to weakly foliated, coarse grained metagabbro; locally mylonitic; includes dykes and pods of mafic schist and greenstone equivalent to PMgr. This unit is interpreted to be equivalent to the Anvil Allochthonous Assemblage (Tempelman-Kluit, 1984).

PMh — Resistant, dark green and white, sheared hornblende metadiorite and metagabbro and sheared dark green amphibolite and hornblendite; cut by massive leucocratic quartzofeldspathic dykes and massive mafic dykes including hornblendite and hornblende diorite; mafic dykes may be equivalent to Mt.

PMsn — Variable unit consisting of sheared quartzite, quartz-muscovite schist, biotite-muscovite-quartz-amphibole±chlorite±epidote±garnet schist and gneiss and amphibolite; massive to sheared, hornblende-bearing metatonalite, metaquartz-diorite and metadiorite, and massive felsic pegmatite. Rocks of this unit may be equivalent, in part, to units PDsq and DMt.

DEVONO-MISSISSIPPIAN

DMt — Resistant, grey-green, massive to mylonitic medium grained metamorphosed tonalite to quartz-diorite; mafic minerals constitute 10-50% and are dominantly hornblende, chlorite and biotite. DMt1, includes abundant interbands of PDsq.

PROTEROZOIC TO MISSISSIPPIAN

PMgp — Recessive, fissile, rusty red to black, fine grained graphite-muscovite phyllite; locally the phyllite is pyritic or calcareous; minor quartz-muscovite-chlorite schist, quartzite and interlayered marble. PMgpc buff to grey recrystallized marble

PROTEROZOIC TO DEVONIAN

PDsq — Red-brown, grey-brown to silvery white to green weathering, protomylonitic to mylonitic quartz-muscovite±chlorite±epidote±feldspar±biotite±garnet±amphibole schist and muscovite-chlorite quartzite; schist locally includes carbonate minerals, pyrite, ilmenite, sphene and graphite; minor chlorite schist, chlorite-actinolite schist and marble: PDsq1, includes abundant interbands of DMt: PDsqm, relatively mafic schist containing more chlorite+biotite+actinolite than muscovite: PDsqc, buff to grey sucrosic-textured marble and calcareous schist; marble often contains quartz, tremolite, muscovite, chlorite, and rarely epidote and garnet; marble occurs as large relatively pure exposures and as interbands with schist and quartzite: PDsqp, graphitic-muscovite phyllite and schist and quartzite containing abundant interbands of graphitic phyllite. Rocks of this unit are interpreted to be part of the Nisutlin Allochthonous Assemblage (Tempelman-Kluit, 1984).

NORTH AMERICAN UNITS

PROTEROZOIC? AND/OR PALEOZOIC

PPn — Brownish grey to red, recrystallized biotite±muscovite±sillimanite quartzofeldspathic schist to gneiss and red-weathering to strongly gossaned biotite-pyrite quartzite to quartz-schist; these are cut by and include massive sills and dykes of biotite quartz-monzonite and felsic pegmatite: PPn1, brown to grey weathering recrystallized biotite±hornblende±muscovite quartzofeldspathic schist and gneiss (±sphene±sillimanite); cut by garnet-bearing leucocratic dykes. This unit may be correlative with unit Pn+ in the Quiet Lake map area (Tempelman-Kluit, 1977).

OTHER UNITS

CRETACEOUS

uK_O — Jointed, grey to greenish weathering, black basalt; buff to reddish dacite. Equivalent to uK_O of Tempelman-Kluit (1984).

uK_{RM} — Altered, reddish-yellow to buff and brown quartz-monzonite porphyry(?), dacite(?) and rhyolite porphyry(?). The main body of this unit is referred to as the Red Mountain Porphyry Molybdenum Deposit by Brown and Kahlert (1986). This unit is likely equivalent to uK_O.

Kqm — Resistant, blocky, light grey weathering, medium equant grained to rarely porphyritic biotite quartz-monzonite. Equivalent to Kqm of Tempelman-Kluit (1984).

JURASSIC

Jt — Resistant, fresh, grey to green and white medium grained hornblende bearing tonalite, granodiorite and quartz-diorite: Jt1, coarse grained hornblendite and lesser pyroxene hornblendite, both include veins of epidote and are cut by granodiorite to quartz-diorite of the main body: Jt2, grey-green hornblende diorite to gabbro, commonly porphyritic with phenocrysts of hornblende and augite.

MESOZOIC

Mv — Grey-green basalt(?), locally porphyritic and locally sub-volcanic. Possible equivalent to the Lewes River or Hutshi groups in the Whitehorse map area (Wheeler, 1961).

TRIASSIC TO JURASSIC

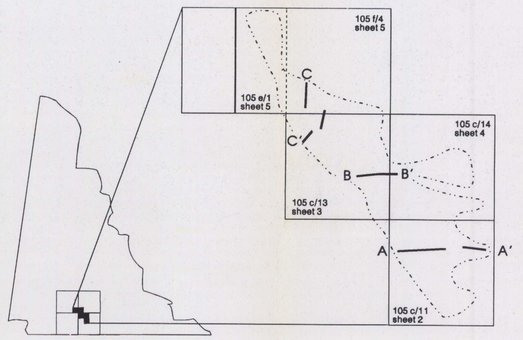
TJa — Thinly laminated, green to black to brown fine grained siliceous sandstone and siltstone, possibly tuffaceous in part.

PENNSYLVANIAN

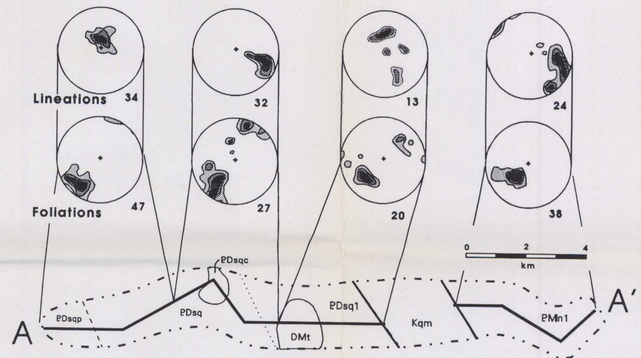
P_{BS} — Black weathering fine to medium-grained conglomeratic grit. Equivalent to P_{BS} of Tempelman-Kluit (1984).

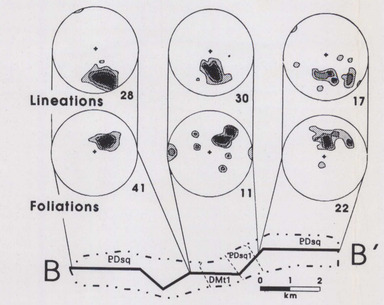
Geology by R.A. Stevens 1990, 1991, 1992

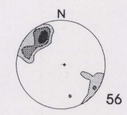
SHEET 1 OF 5



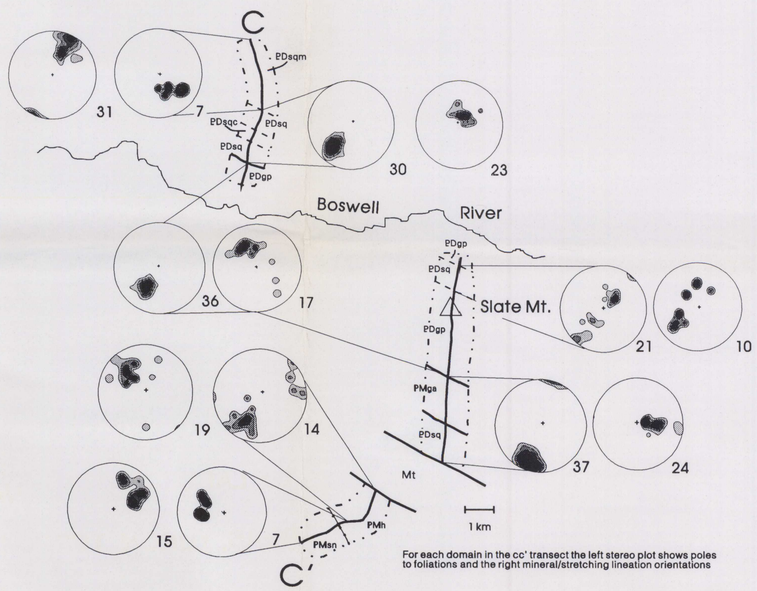
Location Map







Representative fold axis orientations from folds formed during the "folding" deformation phase



For each domain in the cc' transect the left stereo plot shows poles to foliations and the right mineral/stretching lineation orientations

The above are strip maps of transects AA', BB' and CC' showing the geology along the transect line. Stereographic projection plots are of lineations and poles to foliations formed during the ductile deformation phase. Contours are densities expressed as multiples of a uniform density. Contours are at densities of 3, 6, 9 and 12.