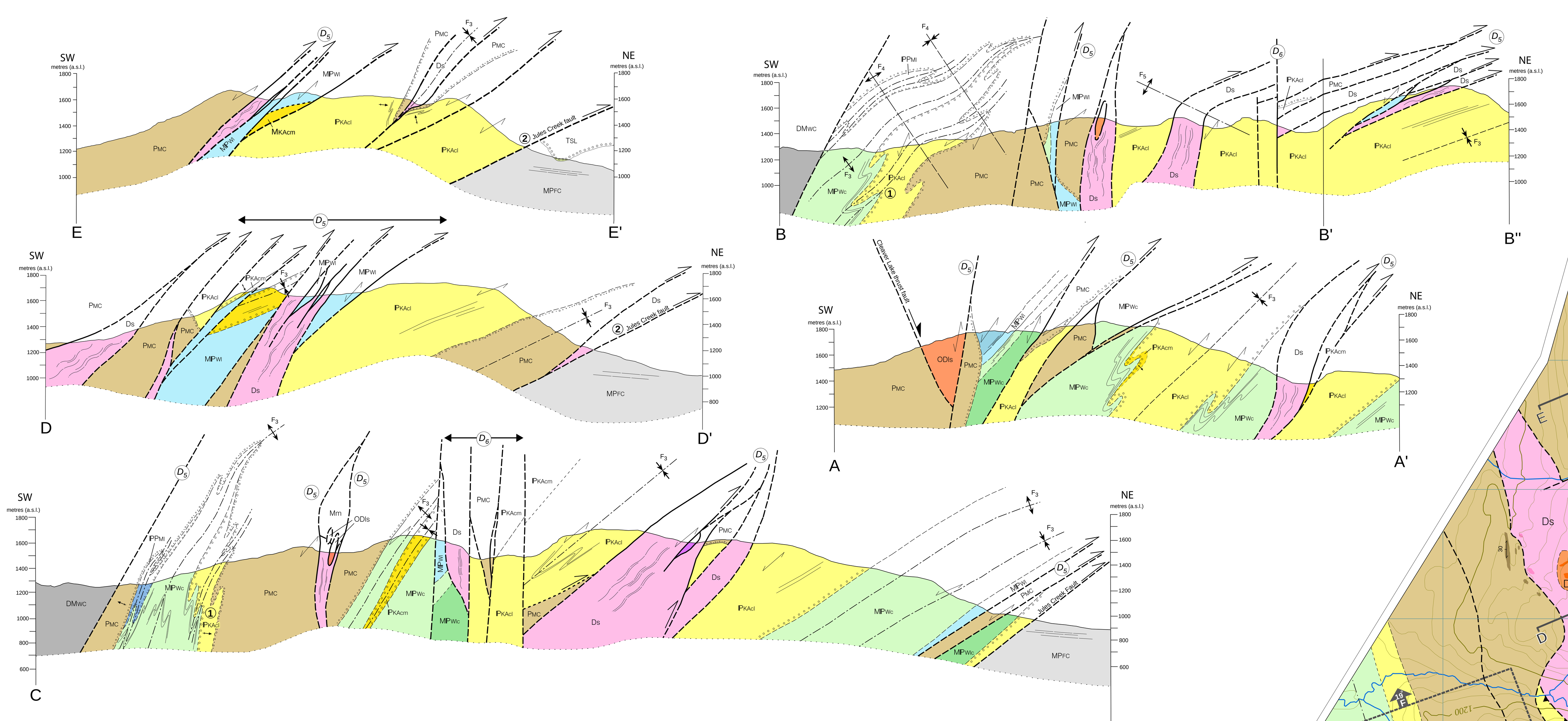
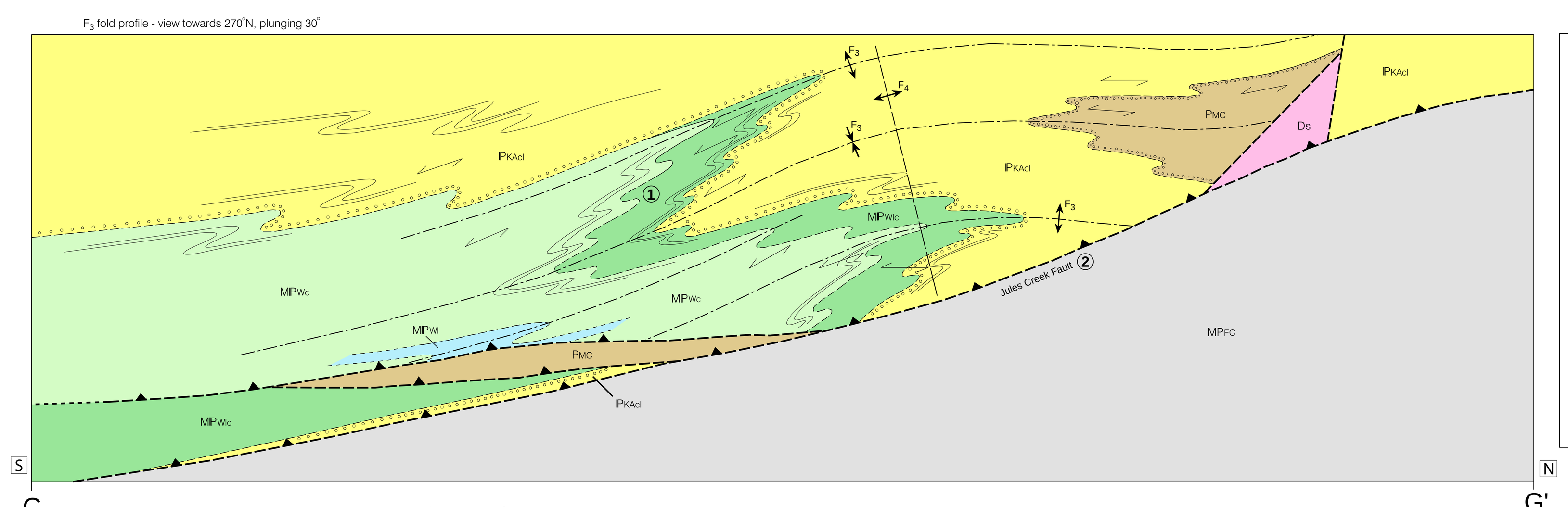
Vertical Cross Sections

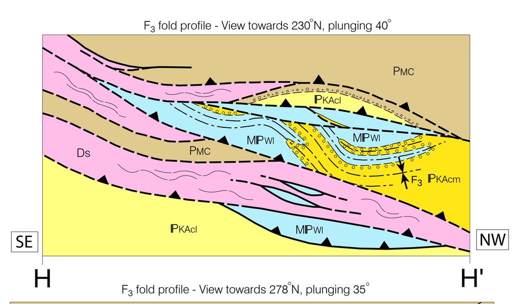


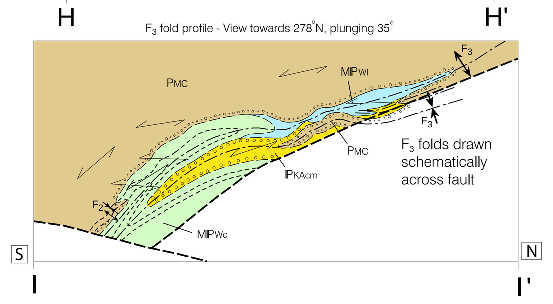
Profile Sections - geology projected to an inclined plane at right angles to F_3 fold axes

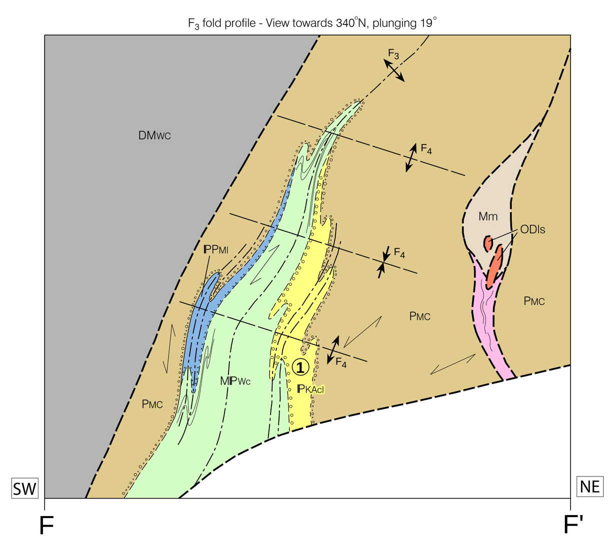


NOTES

1. Schematic fold style, interpreted from fold geometry in outcrop and in thin section, rather than mapped structures.
2. Jules Creek fault - possibly an Early Permian strike-slip fault (Murphy, 2004) reactivated with east-directed thrust motion in the Jurassic (Inconnu-age).
3. King Arctic Upper Quarry. Metasomatic replacement of chert granule to pebble conglomerate by tremolite is visible in outcrop over an interval of 5 metres. The lithologies across the contact from bottom to top are: serpentinite, nephrite, semi-nephrite, partly-replaced conglomerate, and nonmetasomatized metaconglomerate. Nephrite formation resulted from metasomatic replacement of metasedimentary rocks (King Arctic formation green chert pebble conglomerate and lithic arenite and White Lake group Whitefish limestone) and/or serpentinite by serpentinite-derived fluids along D3 thrust faults interpreted to have Early Jurassic motion.







SYMBOL LEGEND

geological contact (defined, approximate, inferred)

fault, displacement unknown (defined, approximate, inferred)

thrust fault (D_5) (defined, approximate, inferred; teeth on hanging wall)

fault - Cleaver Lake fault? or D_5? (approximate, teeth on hanging wall)

axial surface trace (F_2) - antiform and synform

axial surface trace (F_3) - overturned anticline on map and cross sections, overturned syncline on map and cross sections

axial surface trace (F_4) - anticline and syncline

axial surface trace (F_5) - anticline and syncline

bedding, upright

bedding, overturned

foliation (cleavage in sedimentary rocks and serpentinite)

lineation (elongate clasts)

fold hinge

lines of section:
- vertical cross section
- profile section (box encloses the projected outline of the profile plane, dotted line shows the limit of projected data), arrow shows plunge and plunge direction

U-Pb zircon sample location

U-Pb zircon and $^{40}Ar/^{39}Ar$ sample location

fossil

nephrite jade occurrence KING ARCTIC - MINFILE 105H 014

road, minor road or track

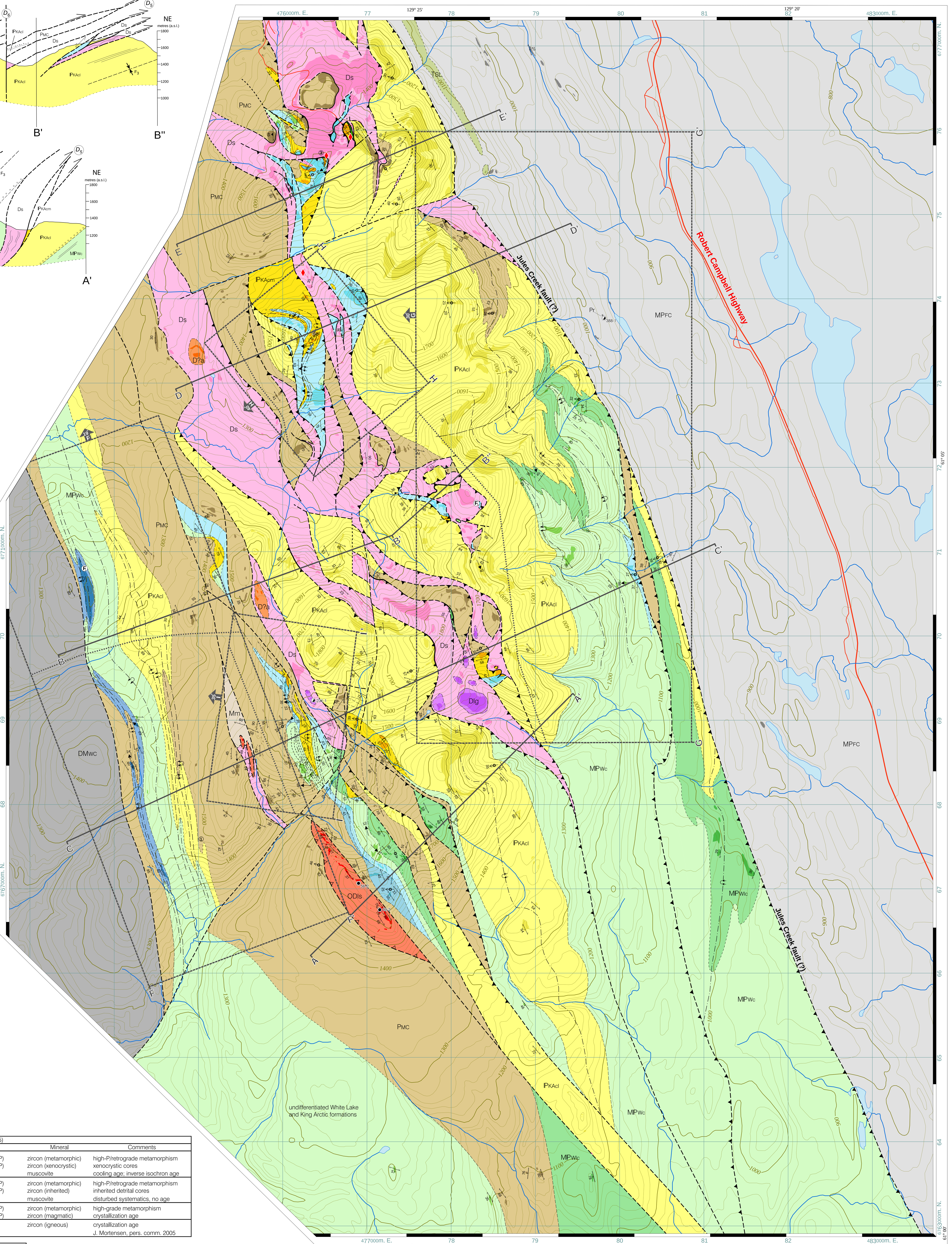
VERTICAL AND PROFILE SECTIONS:
Linework as above, additional symbols below:

unconfomity - base of Money Creek formation
- base of King Arctic formation
- base of "upper" limestone

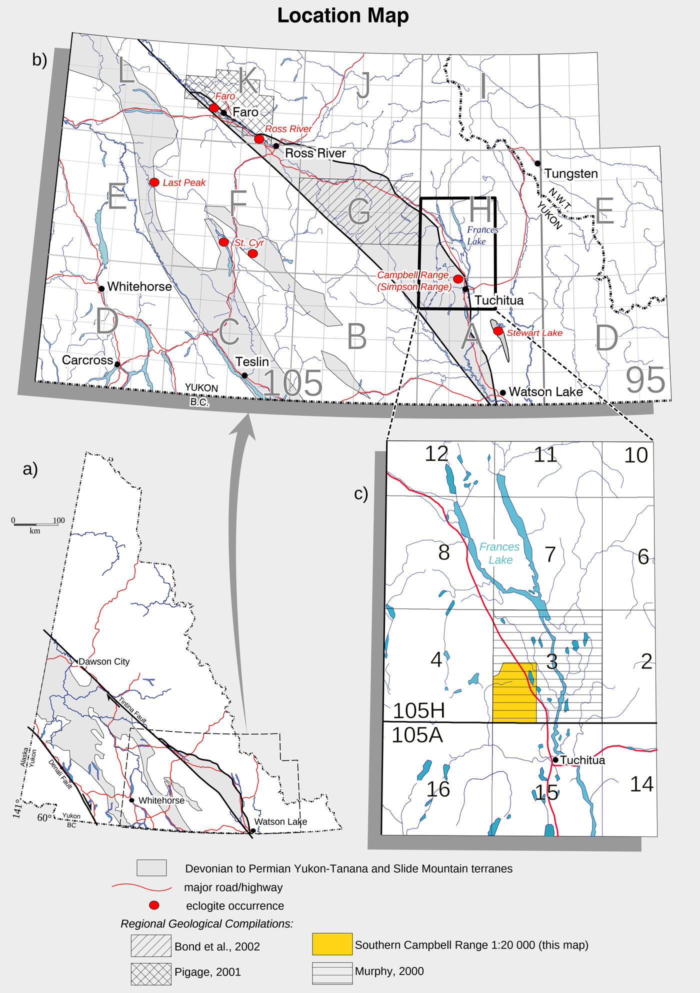
form lines:
- bedding
- foliation (in serpentinite and metasedimentary rocks)
- measured F_3 foliation projected to plane of section

stratigraphic facing direction (fining upwards sequences in lithc arenite)

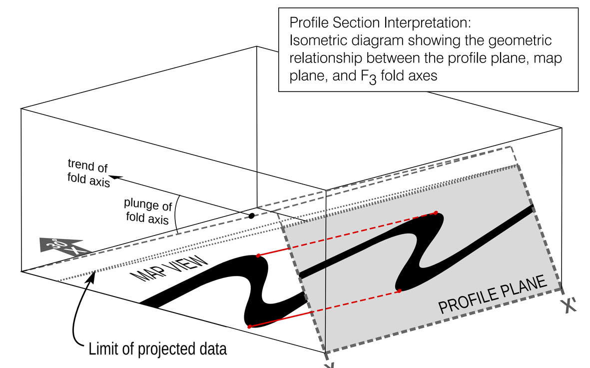
apparent sense of transport on thrust fault



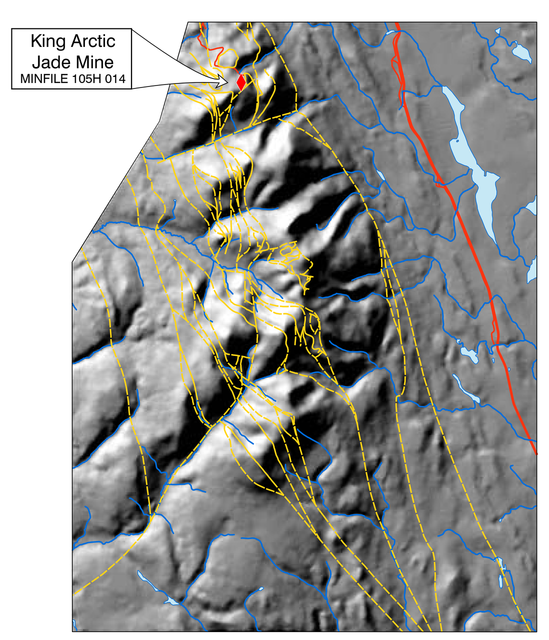
Location Map



a) Map of Yukon showing major faults and the distribution of pre-Late Devonian to Permian Yukon-Tanana and Slide Mountain terranes. The dashed outline shows the location of inset map (b). b) Location map of Yukon-Tanana and Slide Mountain terranes in east-central Yukon showing eclogite localities and the locations of relevant regional geological complilations. The dark outline shows the location of the Frances Lake area shown in inset map (c). c) Location map of the Frances Lake area showing the southern Campbell Range field area (this map) in the shaded region.



Profile Section Interpretation: Isometric diagram showing the geometric relationship between the profile plane, map plane, and F_3 fold axes



King Arctic Jade Mine MINFILE 105H 014

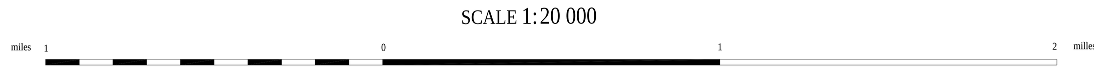
Shaded digital elevation model of the Southern Campbell Range region; red lines show roads and tracks; yellow lines are fault traces (see adjacent map).

ISOTOPIC AGE DATES (Devine, 2005)						
Symbol	Sample	Unit	Date	System	Mineral	Comments
39-2	03FD039-2	ODls (metabasite)	353.1 ± 2.4 Ma 2.4 Ga & 1.2 Ga 353.4 ± 0.79 Ma	U-Pb (SHRIMP) U-Pb (SHRIMP) ^{40}Ar-^{39}Ar	zircon (metamorphic) zircon (xenocrystic) muscovite	high-P/retrograde metamorphism xenocrystic cores cooling age; inverse isochron age
56-2	03FD056-2	ODls (schist)	353.0 ± 3.7 Ma 2.8 Ga to 0.47 Ga no age	U-Pb (SHRIMP) U-Pb (SHRIMP) ^{40}Ar-^{39}Ar	zircon (metamorphic) zircon (inherited) muscovite	high-P/retrograde metamorphism inherited detrital cores disturbed systematics, no age
231-1	03FD231-1	Dlg (leucogabbro)	351 ± 12 Ma 368 ± 10 Ma	U-Pb (SHRIMP) U-Pb (SHRIMP)	zircon (metamorphic) zircon (magmatic)	high-grade metamorphism crystallization age
388-1	03FD388-1	Pr	259.6 ± 1.2 Ma	U-Pb (TIMS)	zircon (igneous)	crystallization age J. Mortensen, pers. comm. 2005

FOSSIL AGES				
Symbol	Sample	Material	Age range	Reference
F1	03FD292-1	Conodont	Pennsylvanian	Orchard, 2005
F2	00DM324/C203149	Conodont	Carboniferous, Serpukhovian	Orchard, 2005

MINERAL OCCURRENCES Yukon MINFILE (Deklerk and Traynor, 2004)		
105H 014	♦	KING ARCTIC/LIND open pit producer (inactive)

SOUTHERN CAMPBELL RANGE
105H/3 SW
YUKON
SCALE 1:20 000



Topographic base produced by SURVEYS AND MAPPING BRANCH DEPARTMENT OF ENERGY, MINES AND RESOURCES

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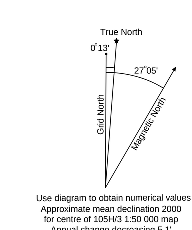
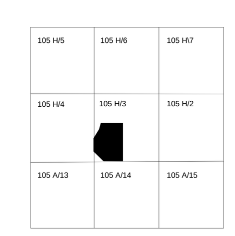
ONE THOUSAND METRE Universal Transverse Mercator Grid ZONE 9

Contour interval 20 metres
Elevations in feet above Mean Sea Level
North American Datum 1983
Transverse Mercator Projection





LEGEND

***Dark shades of unit colours indicate regions of outcrop*

Yukon-Tanana Terrane

CLEAVER LAKE THRUST SHEET

LATE DEVONIAN TO EARLY MISSISSIPPIAN

Klatsa metamorphic complex

Ds — **serpentinite:** bright green weathering on vegetation-free slopes, dark green and smooth on fresh surfaces; < 5 % relict pyroxene phenocrysts up to 0.5 cm diameter are found locally, where massive cumulate texture is preserved. Green colour represents regions of metasomatic replacement of serpentinite to nephrite jade.

Dlg — **leucogabbro:** grey, moderately foliated, medium- to locally coarse-grained; dark amphibole and white saussuritized plagioclase; blocks up to 300 m in diameter occur within serpentinite bodies

D?a — **amphibolite:** fine- to medium-grained, moderately to well foliated amphibolite, garnet amphibolite, and plagioclase amphibole schist are found as blocks within serpentinite variably retrogressed to greenschist facies.

ODls — **layered schist:** coarse-grained heterogenous **quartz-muscovite schist** with local carbonate and lenses of medium-grained chlorite-epidote-amphibole-garnet **metabasite** up to 5 m thick. The metabasite contains chloritized garnet porphyroblasts up to 1.5 cm in diameter within an amphibole-epidote-clinozoisite matrix with accessory titanite-rimmed rutile. Amphibolite and eclogite facies peak metamorphic mineral assemblages are retrogressed to amphibolite and greenschist facies.

Mm — **phyllite-matrix mélange:** dark grey to black carbonaceous phyllite hosts blocks of orthoquartzite, grey ribbon chert and ODls unit up to 30 m diameter

CLEAVER LAKE THRUST

Yukon-Tanana Terrane

MONEY CREEK THRUST SHEET

LOWER PERMIAN

Money Creek formation

PMC — **carbonaceous phyllite, lithic metawacke, and chert-pebble metaconglomerate:** no consistent internal stratigraphy. Well foliated dark grey phyllite (L-, L-S-, and S-tectonite fabrics) is interlayered with variable amounts of fine sand to granule-sized wacke that contains chert, quartz, and lithic fragments; most distinctive are smoky-blue, glassy quartz granules. Grey to black chert-pebble metaconglomerate with angular to well-rounded, white, dark grey and black chert clasts occur locally. Blocks of grey crinoidal limestone and grey ribbon chert up to 50 m long are locally found within a mixed, mélange-style matrix of wacke and phyllite.

UNCONFORMITY

PENNSYLVANIAN TO LOWER PERMIAN

"upper" limestone

PPMl — **limestone:** pale grey weathering, grey on fresh surfaces; dominantly massive with patches of recrystallization and minor crinoid accumulations; locally sandy with rust staining and millimetre-scale interbeds of pale green phyllite.

UNCONFORMITY

PENNSYLVANIAN

King Arctic formation

PKAcl — **lithic-arenite and quartz-wacke:** green to pale grey, fine- to medium-grained, lithic arenite dominated by green chert clasts grades upwards into dark grey fine-grained quartz wacke. Arenite passes transitionally upward into fine-grained quartz wacke with metre-scale interbedding of arenite and wacke over 10's of metres. Dark grey argillite and chloritic phyllite overlie the wacke and includes metre-scale and millimetre-scale interbeds of argillaceous chert and fine-grained lithic arenite, respectively.

PKAcm — **chert-pebble conglomerate:** green, sub-angular to well rounded, granule to pebble-sized green chert with subordinate white limestone and argillite clasts. Conglomerate clast size and unit thickness varies along the basal unconformity; normally graded beds of green siltstone to angular granule conglomerate 1 to 3 cm thick as well as fine-grained lithic arenite to siltstone with pale to dark green millimetre- to centimetre-scale banding are interlayered with conglomerate lenses down to 5 cm thick. Where overlying limestone, limestone clasts are dominant and the matrix is calcareous. Clasts are flattened to 20% of original thickness where the rocks are highly deformed.

UNCONFORMITY

UPPER MISSISSIPPIAN TO PENNSYLVANIAN

White Lake formation

MPWlc — **laminated chert, fine-grained lithic wacke, and siltstone:** Black, bright green, and white layers of translucent to opaque chert are interlayered on a millimetre- to sub-millimetre scale; fine-grained green quartz-silt layers are locally present as thin laminations; <5% magnetite porphyroblasts up to 0.5 mm diameter

MPWc — **green-pink chert and interbedded limestone:** green ribbon chert with pale-green to silver micaceous partings, locally contains plagioclase granules and pyrite boxwork; sections of bright rose to pink ribbon chert <20 metres thick is locally present. The unit locally contains green and pink chert layers mingled at handsample scale, concentrations of magnetite porphyroblasts up to 1 mm diameter; and interbeds of fine- to medium-grained quartz wacke. Interbedded limestone lenses <10 cm thick are included within this unit, but broken out as unit PPWLI when > 10 m thick.

MPWl — **limestone:** white to grey, locally sandy and crinoidal, interlayered with chert. Layers range from 5 centimetre-thick lenses to 30 m thick massive limestone. Where interlayered with chert on the metre-scale, limestone contacts with silvery-green phyllite are gradational over 0.5 cm intervals. Local patchy rusty discolouration creates a striking colour juxtaposition of bright orange limestone with green phyllite. Where strongly deformed the limestone may be mylonitic and striped black-white with boudinaged silicified layers.

MPWl — **limestone (sandy):** brown-weathering, carbonate-matrix quartz arenite with <50% sand-sized quartz grains. Centimetre-scale beds are enhanced on weathered surfaces by variable sand content.

UNCONFORMITY

LATE DEVONIAN TO EARLY MISSISSIPPIAN

undifferentiated Waters Creek group and Simpson Range Plutonic Suite

DMWC — **muscovite amphibole granodiorite and chlorite muscovite schist:** fine- to medium-grained, quartz-phyric, epidote- and chlorite-altered granodiorite; moderately foliated, quartz-phyric muscovite schist

JULES CREEK FAULT (?)

TRIASSIC

Simpson Lake group

TSL — **heterolithic conglomerate:** clast or matrix supported, poorly sorted with sub-rounded granule- to pebble-sized clasts of chert, green quartz-arenite and serpentinite, reflecting local sources.

UNCONFORMITY

PERMIAN

Pr — **rhyolite:** quartz-phyric rhyolite with <5 mm clear quartz phenocrysts; local mm-scale flow banding. Rhyolite was not broken out from the Fortin Creek group.

UNCONFORMITY

Slide Mountain Terrane

LOWER MISSISSIPPIAN TO LOWER PERMIAN

Fortin Creek group

MPFC — **chert-pebble conglomerate, quartz wacke and rhyolite:** dark grey to black chert-pebble conglomerate; rusty weathering, medium-grained quartz wacke. Units are spatially related but have poorly exposed contacts. Metasedimentary rocks are locally silicified and display open quartz-lined vugs up to 2 cm diameter.

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RECOMMENDED CITATION

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Digital cartography and drafting by F. Devine.

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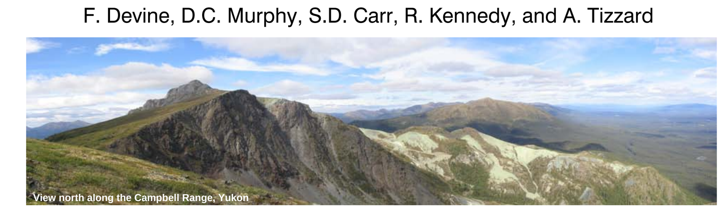
Keep this map in a dark area to keep colours from fading.

Yukon Geological Survey
Energy, Mines and Resources
Yukon Government

Geoscience Map 2005-1

Geological map of the southern Campbell Range (NTS 105H/3 SW), southeastern Yukon (1:20 000 scale)

by

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