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'Geology'

Carleton University
Ottawa, Canada K1S 5B6

March 19, 1984

Dear Mr. Schmidt:

Please find enclosed a geological map including outcrop exposures, as you requested. I have more detailed maps from the Goose Range area in the north, but have excluded them because I think they are outside your area of interest. I also enclose a couple of papers I have written on the area; they contain the basic points of my interpretations.

I think you are mainly concerned with areas north and south of Spanish Lake. The exposure is generally poor. Most of what I have found occurs on logging roads, so you shouldn't have trouble finding these and more. The area has been quite heavily logged so the access is good if you have a good vehicle, and if the old roads are not washed out or too overgrown. The forest service had some air photos done in August 1982, and these are the best 'road maps' you could have, I think. The photos are lines BC 82021 and BC 82026. Check with the air photo office in Victoria for the appropriate numbers (provincial photos, not federal).

If you discover anything of 'academic' interest this summer that you wouldn't mind sharing, such as Antler Formation rocks, or anything that significantly disagrees with my mapping, I'd really appreciate you dropping me a line about it.

Best of luck with your exploration,

Yours sincerely,

Chris Rees

Chris Rees

Department of Geology □ (613) 231-2630

13. A KINEMATIC STUDY OF MYLONITIC ROCKS IN THE OMINECA-INTERMONTANE BELT TECTONIC BOUNDARY IN EAST-CENTRAL BRITISH COLUMBIA

C.J. Rees[1] and Filippo Ferri[2]

Rees, C.J. and Ferri, F., A kinematic study of mylonitic rocks in the Omineca-Intermontane belt tectonic boundary in east-central British Columbia; in Current Research, Part B, Geological Survey of Canada, Paper 83-1B, p. 121-125, 1983.

Abstract

The contact between the Omineca and Intermontane belts in east-central British Columbia is a shear zone marked by mylonitic rocks. The sense of shear is from west to east as determined from rotated feldspar megacrysts and asymmetry of shear band foliation in orthogneiss of the footwall (Omineca Belt).

Overthrust strata of the Intermontane Belt include the Mississippian to Lower Permian Antler Formation and overlying Triassic and Lower Jurassic sedimentary and volcanic rocks. Major displacement occurred in Early to Middle Jurassic time.

Résumé

La surface de contact entre les zones d'Omineca et d'Intermontane dans la partie est-centrale de la Colombie-Britannique est une zone de cisaillement caractérisée par la présence de mylonite. La direction ouest-est du cisaillement est déterminée à partir de macrocristaux tournés de feldspath et de l'asymmétrie de la foliation cisaillée dans l'orthogneiss de la lèvre inférieure (zone d'Omineca).

Les couches charriées de la zone d'Intermontane comprennent la formation d'Antler, du Mississippien au Permien inférieur, recouverte par des roches sédimentaires du Trias et du Jurassique inférieur. Un déplacement important a eu lieu du Jurassique ancien au Jurassique moyen.

Introduction

In the Quesnel Lake area in east-central British Columbia, the boundary between the Omineca Belt and the Intermontane Belt (Fig. 13.1) is marked by mylonitic rocks (Campbell, 1971; Rees, 1981). The Intermontane Belt west of this shear zone comprises Upper Paleozoic ophiolitic rocks (Montgomery, 1978), overlain by Triassic and Lower Jurassic sedimentary and volcanic rocks (Campbell and Campbell, 1970). The Omineca Belt east of the shear zone comprises Upper Proterozoic and Paleozoic clastic metasedimentary rocks and bodies of orthogneiss of uncertain age (Campbell and Campbell, 1970).

The boundary was metamorphosed in the Middle Jurassic; isograds transect it near Crooked Lake to the southeast (Campbell and Campbell, 1970) and within the study area. Tectonic emplacement of the hanging wall (Intermontane Belt) and formation of the mylonites occurred during or after deposition of the youngest, Lower Jurassic

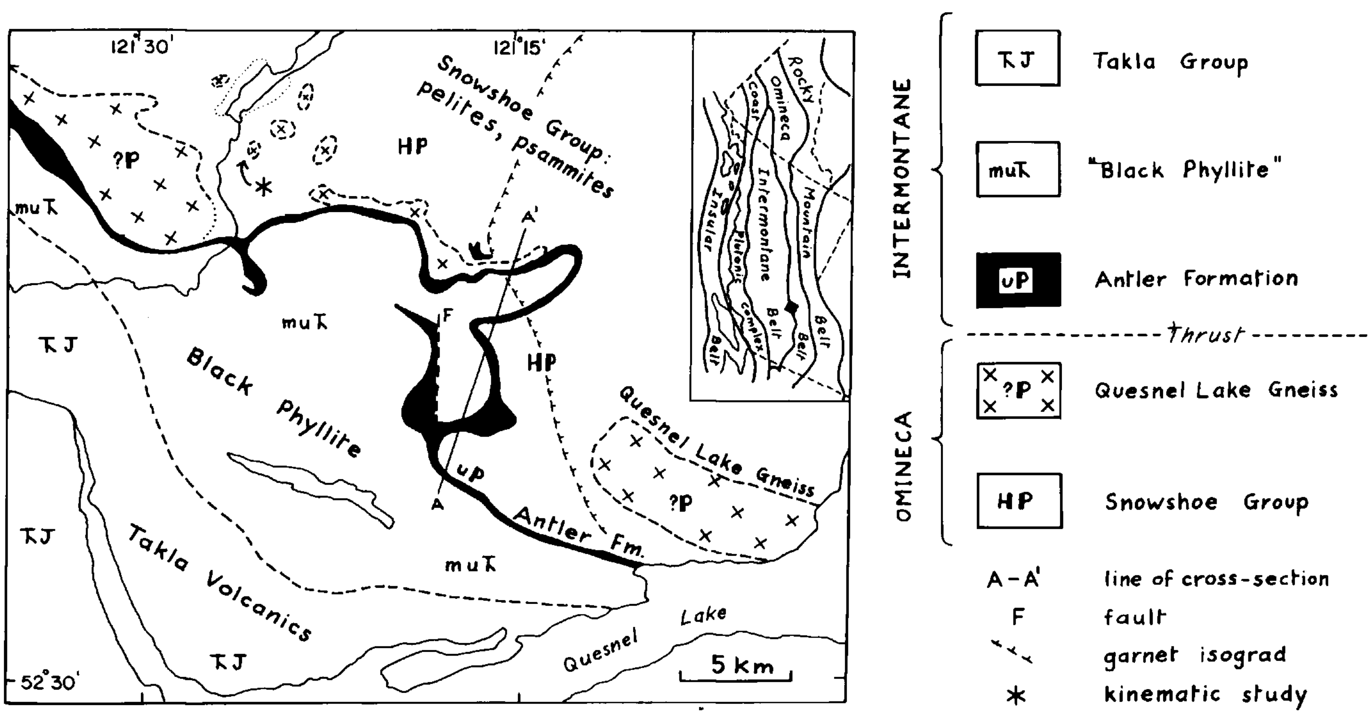


Figure 13.1. *Simplified geological map of the study area, incorporating some information from Campbell (1978) and Struik (1983). Inset shows the location of the area in the Canadian Cordillera.*

[1] Department of Geology, Carleton University, Ottawa, K1S 5B6
[2] Department of Geology and Geophysics, University of Calgary, Calgary, T2N 1N4
Ottawa-Carleton Centre for Geoscience Studies, Publication 20-83

rocks, and prior to Middle Jurassic metamorphism and deformation. The geometry of the shear zone and metamorphism associated with it have been obscured by later deformations and metamorphism, although previous workers have recognized 'early' east-verging isoclinal structures (Montgomery, 1978; J.S. Getsinger, personal communication, 1983) that may be coeval with overthrusting.

This paper presents some kinematic evidence from the footwall (Omineca Belt) orthogneiss indicating that shearing was easterly directed.

General Geology

The Intermontane Belt consists of the Antler Formation and overlying unnamed Triassic and Jurassic sedimentary and volcanic units (Fig. 13.1). The Mississippian to Lower Permian Antler Formation (Campbell, 1978; Struik, 1983) forms the base of the hanging wall, and comprises mainly foliated and banded greenstone, and locally meta-ultramafic schist. The latter contains no relict olivine but dominantly contains either talc or antigorite, with porphyroblasts of magnesite. Trace element geochemistry (also Campbell, 1971; Hall-Beyer, 1976) indicates that the greenstone was derived from ocean-floor tholeiitic basalt. Outside the study area chert beds are interlayered with the greenstone (Struik, 1981), and cumulate structures are preserved in the meta-ultramafite (Montgomery, 1978).

The Antler greenstone is overlain (probably stratigraphically) by an unnamed Triassic unit of grey to black graphitic siltite and phyllite. These rocks are probably contemporaneous with, and laterally transitional to the Upper Triassic to Lower Jurassic Takla Group volcanic and volcaniclastic rocks which crop out in the southwest part of the area. Volcanic rocks are dominated by alkalic augite porphyry basalt (Bailey, 1978; Morton, 1976). Between these and the Triassic black argillite is a zone of volcaniclastic rocks ranging from very coarse debris flows to laminated grey-green lithic sandstones and siltstones.

The Omineca Belt is underlain by the Snowshoe Group (as designated by Struik, 1982, 1983) and the Quesnel Lake Gneiss. The Snowshoe Group is probably time-correlative with Kaza Group, Cariboo Group and Black Stuart Group rocks to the east in the Cariboo Mountains, and if so ranges from Hadrynian to upper Paleozoic, but the lithological successions are not directly comparable, hence the distinction. Most of the Snowshoe rocks are thinly bedded pelitic to psammitic metasediments; some are more massive coarse grained 'gritty' psammite and feldspathic conglomerate. Carbonate rocks are uncommon, and no mafic metavolcanics have been confidently identified.

The Quesnel Lake Gneiss consists of several bodies of granitoid orthogneiss that apparently intrude Snowshoe Group rocks (Struik, personal communication, 1983), although contacts with the metasediments are rarely clear because of strong deformation. The gneiss bodies vary in composition, texture and probably in age; they could be Paleozoic (R.L. Armstrong, personal communication). Northwest of Quesnel Lake, the gneiss is granitic with megacrysts of potassium feldspar; it lies in the footwall adjacent to the shear zone and exhibits mylonitic texture and structures.

Structure and Metamorphism

The formation of the mylonite and related structures are ascribed to phase one (D1), although there may be an earlier pre-Jurassic deformation. Regional folding of the mylonitic foliation (Fig. 13.2) is correlated with second phase southwest-verging folds (here ascribed D2) that dominate the structural culmination of the Cariboo Mountains to the east (Struik, 1981; Murphy and Journeay, 1982; Murphy and Rees, 1983). Open folds and ubiquitous, generally upright crenulation cleavage which trend 130° are ascribed to the third phase of deformation (D3).

Metamorphic grade increases from lower greenschist in the northwest to at least lower amphibolite in the southeast part of the study area. The mylonitic rocks are annealed (also Campbell, 1971) rather than marking localized retrogression; the garnet isograd transects a major second-phase fold closure with Triassic phyllite in the core (Fig. 13.1). This indicates that the peak of metamorphism postdates both the emplacement of the hanging wall, and the D2 folding. Metamorphic conditions during the D1 mylonitization have not yet been ascertained.

Kinematic Analysis

This study was done on an exposure of Quesnel Lake Gneiss on the upward facing limb of a major southwest-verging D2 fold (indicated by an asterisk in Fig. 13.1). The mylonitic layering in the gneiss is subhorizontal, and two roughly orthogonal vertical joint sets are parallel and perpendicular to the finite extension direction (097°) in this foliation, indicated by strongly aligned potassium feldspar megacrysts and quartz ribbons (Fig. 13.3). Those joint faces parallel to the lineation thus display very closely the XZ plane of the finite strain ellipsoid; the other joint set faces display the YZ plane (Fig. 13.4). Seven XZ surfaces each of about (50 cm)^2 were examined (Fig. 13.5); the length, width, and angle between the long axis and the mylonitic foliation were measured for each megacryst considered to have behaved as a rigid inclusion during shearing. Smaller or

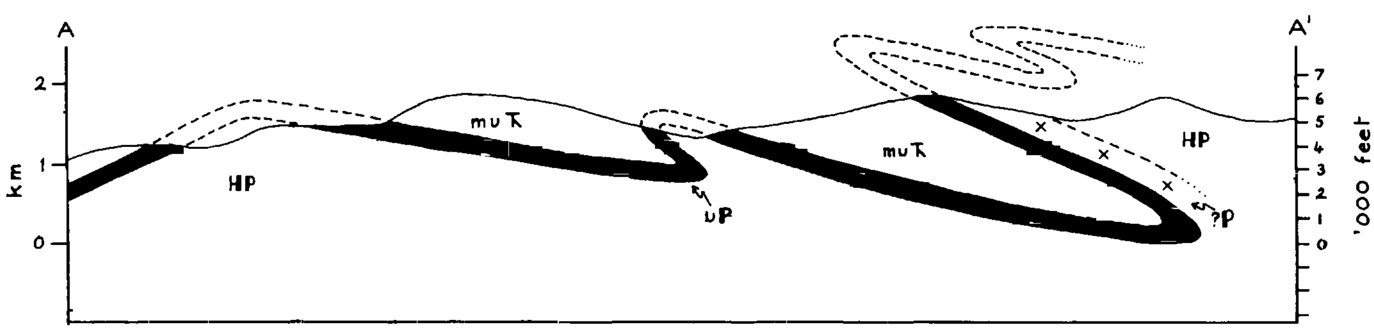


Figure 13.2. *Geological cross-section through the area, showing the predominance of southwesterly-verging, tight overturned D2 folds. The upright open fold in the southwest is D3. The kinematic study was done on an exposure of Quesnel Lake Gneiss downplunge to the northwest of this section, on the upward facing limb of a D2 fold, as indicated by cleavage-bedding relationships in nearby metasediments.*

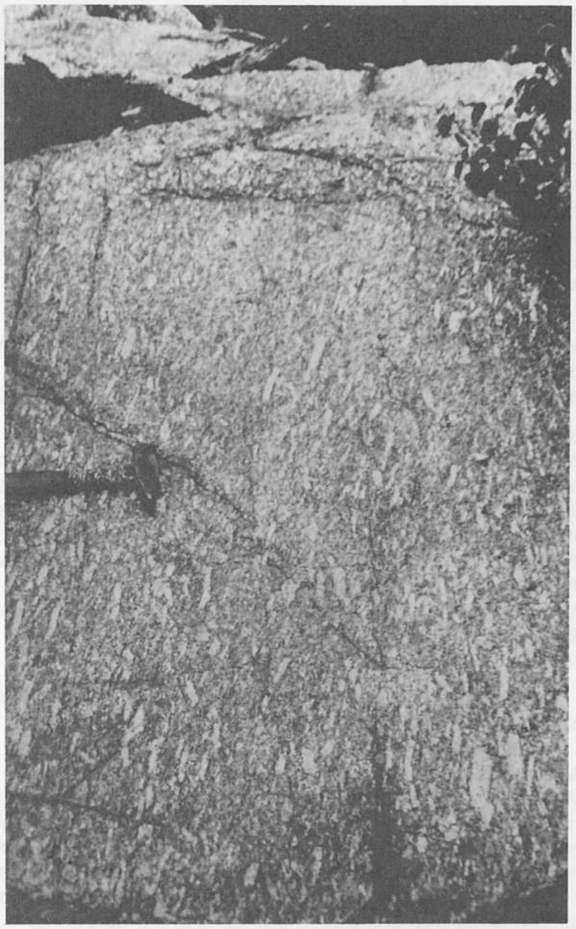


Figure 13.3. Surface of exposure showing finite extension lineation in foliation (XY) plane, marked mainly by potassium feldspar megacrysts.

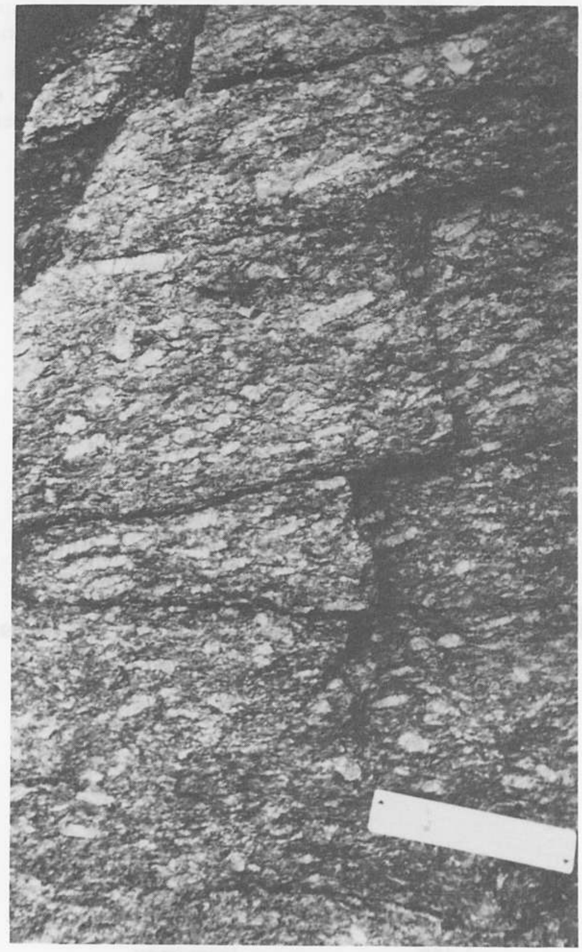


Figure 13.5. Typical XZ surface, looking north. Scale is 15 cm long. Long axes of megacrysts lie approximately in this plane, and most are inclined at a low angle to the mylonitic foliation. Three to four times as many dip west as east.

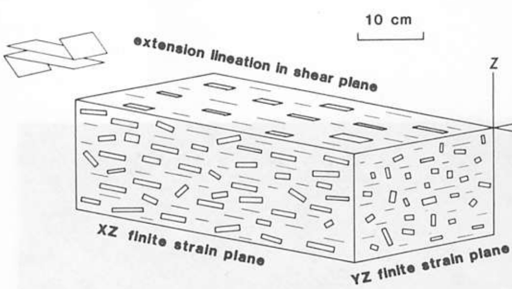


Figure 13.4. Schematic diagram showing arrangement of exposure surface and vertical joint faces with respect to finite strain axes.

strongly comminuted feldspars were ignored as in effect they behaved as part of the 'matrix'. A total of 504 measurements are plotted in Figure 13.6. The finite angle of rotation (ϕ) generally increases as the axial ratio (R) increases. This is generally a reflection of the relative stability of these originally randomly oriented inclusions in simple shear: the more inequant the megacryst, the more likely it is to have rotated close to the flow plane. Even megacrysts with low R tend to lie with their long axis nearly parallel to the mylonitic flow plane. The overall distribution with respect to ϕ is illustrated in the rose diagram in Figure 13.7, which is oriented parallel to the XZ plane, looking north; three to four

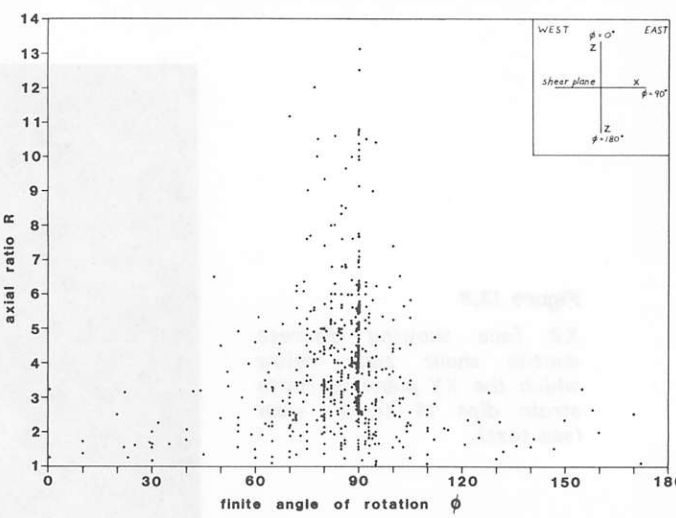


Figure 13.6. Finite angle of rotation (ϕ) of megacrysts in XZ plane in relation to their axial ratio (R). Note that the more equant inclusions (R<3) have little orientation bias; this is compatible with simple shear accompanied by a component of pure shear flattening.

times as many dip west as east. If the orientation bias reflects rotation during progressive simple shear, it implies west over east shearing parallel to the mylonitic flow plane.

The comparatively high number of megacrysts in the range between ∅ = 90° and ∅ = 115° is explicable in terms of a simultaneous component of pure shear flattening parallel to the shear zone (Ghosh and Ramberg, 1976).

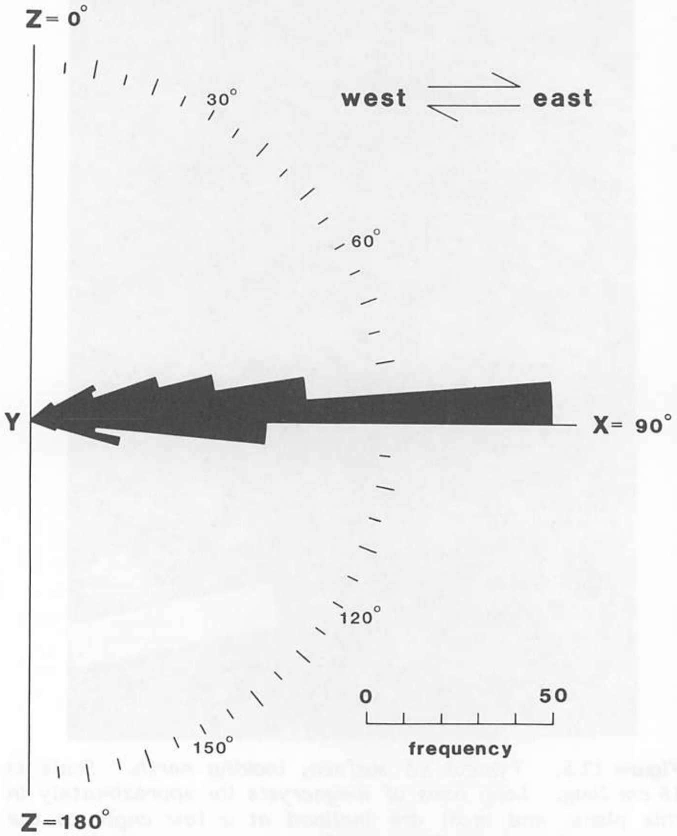


Figure 13.7. *Rose diagram illustrating orientation distribution of megacrysts in XZ, looking north.*

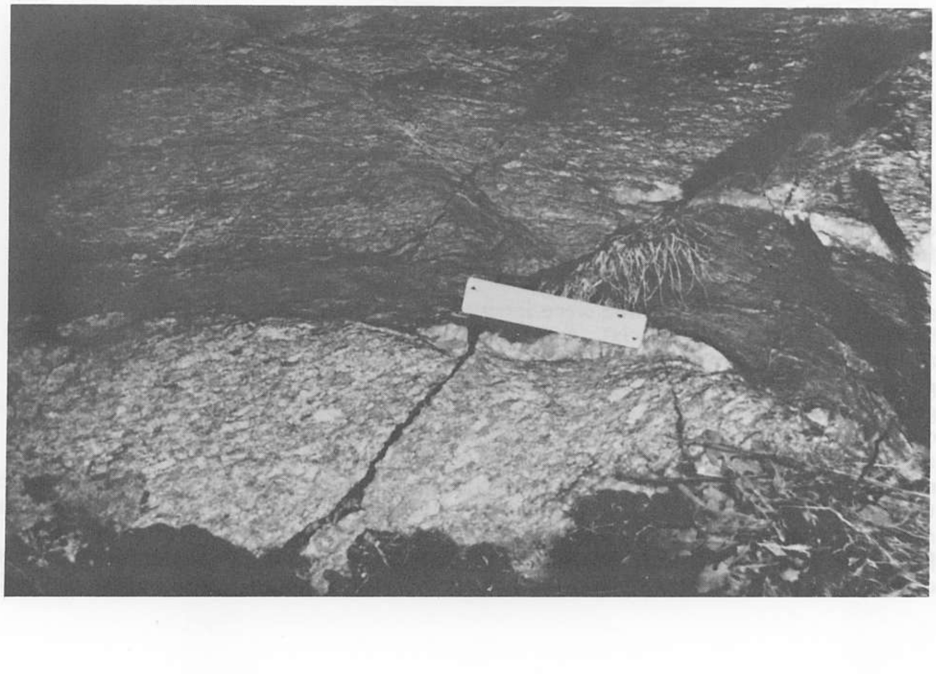
In at least two separate places in the same exposure (XZ planes of the finite strain ellipsoid) a discrete ductile shear zone about 12 cm thick marks a discontinuity in the shear strain (Fig. 13.8). The shear zone consists of many fine, parallel micaceous layers which are the metamorphic derivative of highly strained potassium feldspar, and milky white quartz. For about 50 cm below it, megacrysts, quartz ribbons and micas define a fabric that is not parallel to the shear zone and the general mylonitic foliation elsewhere, but inclined at about 20°, dipping west. This fabric represents the XY plane of finite strain after a relatively small amount of progressive simple shear; that it dips west implies rotation to the east.

Another useful kinematic indicator is shear band foliation, which forms during mylonitization after a strong anisotropy has been produced (White et al., 1980). It is generally inclined at 30 ± 5° to the plane of shear (Fig. 13.9), in a position corresponding to 120° in Figure 13.7. Moderately well developed shear bands have been identified in the Quesnel Lake Gneiss. They indicate a sense of shear consistent with the other observations. The shear bands seem to propagate from the corners of the feldspar porphyroclasts and extend for a few centimetres before attenuating into the shear plane. That they are not pervasive and do not crenulate the mylonitic layering demonstrates that they are synkinematic and not a superimposed cleavage or kink feature.

Attempts to deduce the sense of shear in mylonitic rocks from other parts of the boundary in the study area have been unsatisfactory. To the southeast where the metamorphic grade is higher, feldspars in the Quesnel Lake Gneiss were ductile and there is no systematic orientation distribution; megacrysts have been rounded by dynamic recrystallization and their long axes are parallel to the mylonitic foliation. Several quartz c-axis fabric diagrams have been produced, mainly from quartz-rich mylonitic metasediments, but the fabric patterns are ambiguous.

Figure 13.8

XZ face showing discrete ductile shear zone below which the XY plane of finite strain dips 15 to 20 west (see text).



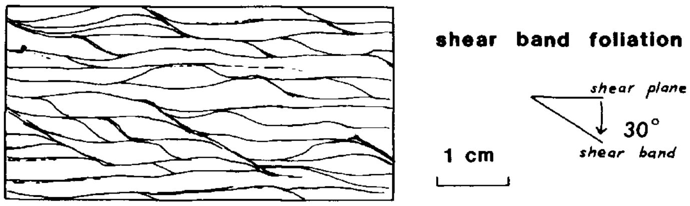


Figure 13.9. Sketch diagram of shear band foliation indicating dextral shear. This sense of asymmetry is seen in the Quesnel Lake Gneiss in the XZ plane of finite strain, looking north.

Concluding Remarks

Several kinematic indicators in a mylonitized orthogneiss from the area of the Omineca-Intermontane tectonic boundary imply a west over east sense of shear. This is consistent with the geological evidence that the Intermontane Belt has been transported eastwards on a flat fault over continental margin sedimentary rocks (cf. Campbell et al., 1973; Montgomery, 1978). The displacement occurred in Early to Middle Jurassic time and predates southwesterly-directed folds (also Struik, 1981) and the Middle Jurassic peak of regional metamorphism.

The determined displacement vector has only limited regional application because the mylonitic contact rocks have been folded non-coaxially at least twice and so have sustained some rotation. Elsewhere, mylonitic stretching directions are northeast or southeast. More observations are needed to establish the regional sense of shear.

Acknowledgments

The authors gratefully acknowledge funding from the Natural Sciences and Engineering Research Council of Canada through operating grant A2693 to R.L. Brown. Part of the study is the subject of a B.Sc. Thesis (Carleton University, 1982) by F. Ferri and continuing research on this problem is part of a doctoral thesis by C. Rees of Carleton University.

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1981

30. **WESTERN MARGIN OF THE OMINECA BELT AT QUESNEL LAKE, BRITISH COLUMBIA**

EMR Research Agreement 84-4-80

C.J. Rees[1]
Cordilleran Geology Division, Vancouver

Rees, C.J., Western margin of the Omineca Belt at Quesnel Lake, British Columbia; in Current Research, Part A, Geological Survey of Canada, Paper 81-1A, p. 223-226, 1981.

Abstract

Field mapping of the boundary between the Omineca Belt and the Intermontane Belt has revealed evidence of a major shear zone, marked by mylonized sedimentary and plutonic rocks immediately east of the boundary, and larger-scale tectonic imbrication on both sides. Immediately overlying the shear zone to its west are mafic and ultramafic rocks and argillites of the Intermontane Belt which are interpreted as representing oceanic terrane. The inferred major thrusting of the Intermontane Belt rocks eastwards over the older Omineca terrane is compatible with recent interpretations of the same boundary in Yukon.

Introduction

The area straddles the boundary between the Omineca Belt and the Intermontane Belt to its west, and is included in the reconnaissance map of Campbell (1978).

The boundary is usually drawn on tectonic maps as a major fault, although on less direct evidence in the southern Canadian Cordillera than to the north. The western boundary of the Omineca Belt in Yukon was recently described by Tempelman-Kluit (1979); he found impressive evidence for major telescoping at the boundary and concluded that Intermontane terrane has been obducted onto Omineca terrane.

The boundary in question is comparatively well-defined and exposed in the Quesnel Lake area, and the writer spent the 1980 field season studying contact relations and evidence for major shearing and a possible suture.

This work forms the basis of a Ph.D. program begun this year at Carleton University. The writer is grateful to Dr. R.L. Brown and Dr. J.M. Moore of Carleton University for their support, supervision and advice during field visits. Thanks are also expressed to Jim Connelly for cheerful and competent assistance in the field. The project and the area of study were suggested by Dr. R.B. Campbell of the Geological Survey of Canada.

Figure 30.1, which summarizes the geology of the area, is based on Campbell (1978) and Tipper et al. (1979), with minor modifications as a result of the summer's mapping. ~~All the geological contacts in the simplified cross-section are regarded as tectonic; no evidence for stratigraphic continuity between any of the major units has been found in either the Omineca Belt or the Intermontane Belt.~~ The section is described from west to east.

Tectonic between Antler and Kaza, but other contacts are depositional or intrusive.

Takla Group

The westernmost rocks in the section are designated Upper Triassic to Lower Jurassic Takla Group, following Tipper et al. (1979). These comprise mainly volcaniclastic and volcanic rocks of basaltic to andesitic composition (Campbell, 1971; Bailey, 1976; Morton, 1976), with subordinate conglomerate, sandstone, shale and limestone. Plant remains found in shale may permit more precise dating of the sediments. No mature continentally derived clastic lithologies were found, and the overall assemblage is compatible with formation in an island-arc environment (see Wheeler and Gabrielse, 1972) or possibly an intraplate rift setting (Morton, 1976).

The rocks are fractured on all scales, mainly along discrete shear zones and faults, where there has been low grade alteration. Some are steeply dipping, but the rocks lack penetrative fabric. The metamorphic grade is very low (zeolite facies: Morton, 1976), but increases to NE.

Black Phyllite

The informal name describes the dominant lithology of this comparatively uniform unit; minor rock types include siltstone, volcaniclastics, carbonate and impure chert. The age of these rocks is unknown, but is thought to be Upper Triassic on the basis of meagre fossils in presumably equivalent rocks outside this area (Campbell, 1971; Campbell and Tipper, 1971).

how understood.

Because of the fine grain size, low metamorphic grade and virtual absence of stratigraphic markers, the internal structure of the Black Phyllite is obscure. Locally, three cleavages are visible; usually two are present. Bedding is indicated by very fine discontinuous compositional laminations and locally by beds of carbonate or siltstone, but both indicators are probably transposed within the dominant cleavage. The trends of the two main cleavages are similar, being about 130°; the earlier cleavage commonly dips ~~southwest.~~ northeast in general.

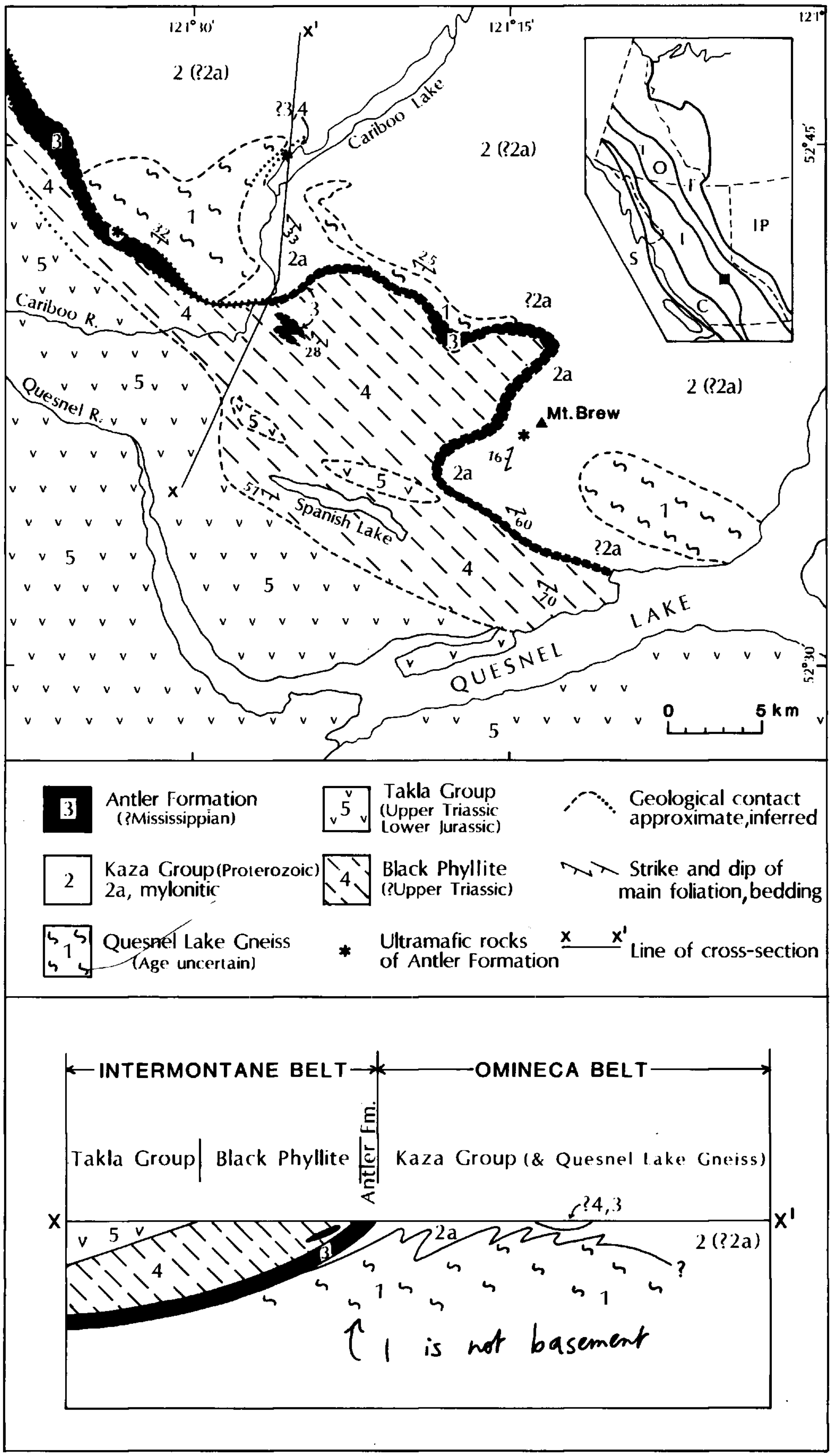
Antler Formation

Previous workers correlated this unit with mafic rocks in the Mississippian Slide Mountain Group of the McBride and Bonaparte River areas, on the basis of lithological and chemical similarities (Campbell, 1971; Campbell and Tipper, 1971; Campbell et al., 1973). In the Quesnel Lake area the unit mainly comprises green to green-grey, fine- to medium-grained 'greenstono'. Subtle compositional banding over a few centimetres is typical, parallel to the dominant cleavage. Concordant quartz-carbonate-epidote-magnetite veins and lenses are present locally. Important but uncommon varieties of this unit include coarse grained metagabbro-like lithologies: variably altered ultramafic rocks, now chlorite-talc-serpentine-carbonate and actinolite-tremolite 'schists', and serpentinite breccia. The unit is usually strongly folded and foliated, especially near its margins; structures have a similar style and trend to those in the Black Phyllite.

→ could be flattened pillows.

→ Trace elements indicate ocean floor tholeiitic basalt.

[1]Department of Geology, Carleton University, Ottawa, Ontario, K1S 5B6



See later paper for better cross-section

Figure 30.1. *Simplified geological map of the study area and schematic cross-section. Inset shows location of area (black square) in terms of structural provinces of Canadian Cordillera: IP, Interior Platform; F, Foreland Thrust and Fold Belt; O, Omineca Belt; I, Intermontane Belt; C, Coast Plutonic Complex; S, St. Elias and Insular Belt; T, Teslin Suture Zone, where defined by Tempelman-Kluit (1979).*

Higher metamorphic grade equivalents of the Antler Formation are present southeast of Quesnel Lake in the Crooked Lake area (Campbell, 1971) and the Lake Dunford area (Montgomery, 1978). In the latter it forms a klippen within the Omineca terrane and comprises a basically intact section of variably altered dunite, peridotite with cumulate layering, metagabbro and amphibole schist.

Kaza Group

The age of these rocks is speculative, there being no apparent stratigraphic continuity with Proterozoic or Paleozoic strata as defined to the northeast; they are, however, designated Kaza Group following Tipper et al. (1979) (see also Campbell and Campbell, 1970; Campbell and Tipper, 1971; Campbell et al., 1973). In the map area the rocks comprise blue quartz feldspathic grits, psammites, phyllites and semipelitic to pelitic metasediments. Generally, greenschist grade is inferred from hand specimen examination, although localized retrograde alteration of garnet suggests that peak metamorphic grade was higher in the east of the area. Two distinct 'bodies' of felsic orthogneiss occur within the Kaza outcrop, termed the Quesnel Lake Gneiss by Campbell and Campbell (1970); their age is under investigation by Dr. R.L. Armstrong of the University of British Columbia.

Possibly an earlier met. NO

Of importance is that nearly all rocks so far mapped in this unit display evidence of mylonization, such as local fine ~~to cryptocrystalline~~ mylonitic fabrics in siliceous and quartzofeldspathic rocks. The mylonization is generally more ~~widespread and more~~ intense towards the unit's southwestern margin with the Antler Formation, which also shows signs of mylonization. ~~The mylonitic fabric forms the dominant structure in the rocks and in most places dips southwest; it is commonly~~ deformed by at least ~~one~~ 2 major phases of later folds. The writer's preliminary impression is that the trend and style of the shear fabric and later minor folds correlate with structures in the Antler Formation and Black Phyllite to the west.

The mylonized Kaza is well exposed around Mount Brew where it extends eastwards from the Antler Formation (for at least 3 km); its true thickness may be indeterminate because of later folding or imbrication. Several discontinuous and variously sized lenses of greenstone and meta-ultramafic schists occur within the mylonitic rocks; both are identical to those described within the Antler Formation.

Discussion

The thickness and intensity of the mylonite zone in the westernmost part of the Omineca Belt in the study area seems to indicate a major shear zone adjacent to the lowest unit of the Intermontane Belt, the Antler Formation. Its existence has not previously been emphasized, probably because farther southeast recrystallization has disguised mylonitic textures; Campbell (1971) mentioned cataclastic rocks but inferred localized thrusting of an originally stratigraphic contact.

If the Antler Formation has the composition of primitive tholeiitic basalt (Campbell, 1971), this and the evidence of (metamorphosed) ultramafic and mafic cumulate rocks suggest that the Antler is part of a layer of oceanic crust, and has been thrust eastwards over the western margin of the Omineca Belt. ~~The serpentinite breccia may be some kind of trench mélange, and will be examined for fragments of blueschists.~~ Montgomery (1978) called this association in the Lake Dunford area an obducted ophiolite; there too it overlies a "well defined, west-dipping thrust of unknown displacement" (Montgomery, 1978). If this interpretation is correct, and assuming that the Antler Formation in this area is correlative with the type-Antler Formation in the Black Stuart Synclinorium (in the McBride area to the north; Campbell et al., 1973), it follows that the Slide Mountain Group there is also allochthonous, at least in part.

At its contact with the Black Phyllite in the Cariboo River the Antler greenstone is strongly altered and streaked with orange-brown ankeritic veinlets concordant with the main cleavage, which is subparallel to that in the Black Phyllite. The Black Phyllite may represent hemipelagic carbonaceous mud deposited on oceanic crust; the original contact features are now masked or obliterated by shearing and hydrothermal alteration resulting from the same thrusting and deformation that affected the Antler and the underlying Kaza Group rocks. Carbonate and siltstone within the Black Phyllite may represent distal derivatives of shelf-slope deposits in the Takla volcanic complex to the west, or conceivably from the Omineca ~~shelf-slope~~ to the east. The Takla Group rocks themselves must be in fault contact with the Black Phyllite in the study area, possibly another easterly directed thrust, or a strike-slip fault. (Only this can account for the contrast in strain between the two units, which can be observed over a few metres in the field.) - not generally true.

but probably depositional slope-rise

Northeast of the mylonite zone the Kaza rocks may be tectonically imbricated, which might explain why previous attempts to define their stratigraphy have been inconclusive. In this connection, the transition between this Kaza terrane and the Windermere-Paleozoic succession north of Cariboo Lake (the southwest limb of the Black Stuart Synclinorium) has important implications, depending on whether it is stratigraphic or whether it is another tectonic contact, perhaps directly related to the 'Antler allochthon'. That this allochthon does extend northeast of its main contact with the Kaza is suggested by an outcrop exposed on Cariboo Lake (Fig. 30.1) which closely resembles Black Phyllite and which includes strongly deformed and altered ultramafic schists and possibly mylonized greenstone. This might be a klippen of Intermontane Belt rocks, although it was originally mapped by Campbell (1978) as Lower Cambrian Midas Formation.

Preliminary impressions are that the dominant fabric is subparallel in all the rocks in the area (except the Takla Group), and is genetically related to horizontal translation and eastward thrusting (obduction) of the Intermontane Belt relative to the Omineca terrane. A process of progressive deformation is envisaged in which primary structures and early formed fold elements are partly reoriented and transposed within the contemporaneous cleavage. Tectonic imbrication probably accounts for complex structural repetitions, especially within the main shear zone, but may also be applicable to the Kaza terrane on a larger scale.

The mylonitic and related cleavages are refolded about shallower and commonly steep axial surfaces. This is thought to reflect compression of the shear fabric after mylonization ceased; it may or may not be related to the large regional Z-fold visible Yes. in Figure 30.1. Hand specimen examination indicates that garnet crystals are incorporated within the mylonitic fabric and appear to be moderately to severely altered; mica growth is synchronous with the later folds. This implies that mylonization outlasted the peak of metamorphism, which probably correlates with the regional Middle Jurassic event. The significance of the younger, lower grade recrystallization has yet to be determined. Still to be resolved

In conclusion, Tempelman-Kluit's (1979) suggestion that the Teslin Suture Zone may be extrapolated southeast to the western margin of the Shuswap terrane is compatible with the writer's observations in the Quesnel Lake area. The horizontal movements involved in the evolution of this boundary zone may be directly related to major décollement structures in the core zone of the Omineca Belt to the east (R.L. Brown, personal communication).

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