GEOLOGICAL FIELDWORK

Investigating a Triassic overlap assemblage in Yukon: On-going field studies and preliminary detrital-zircon age data

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ABSTRACT

New field and detrital-zircon age data from the Selwyn Basin indicate the Yukon-Tanana Terrane (YTT) was a source region for Triassic sediments (Smithian – Norian; conodont ages) that were deposited along the ancestral margin of North America (NAM). Triassic rocks of the NAM contain middle to late Paleozoic detrital-zircon and geochemical signatures which are unique to the YTT and absent from the NAM, demonstrating that the Triassic rocks represent the earliest observed overlap assemblage linking allochthonous terranes to the NAM in the northern Cordillera. New provenance data also defines and characterizes Jurassic assemblages. Terrane accretion in the northern Cordillera was previously thought to have commenced in Early to Middle Jurassic time; however, the presence of a 40-50 m.y. older Triassic overlap assemblage requires that Triassic rocks were deposited in a collision-related foreland basin setting rather than a stable continental terrace and rise.

RÉSUMÉ

De nouvelles données géochimiques et de datation de zircons détritiques recueillies dans le bassin de Selwyn indiquent que le terrane de Yukon-Tanana (TYT) a constitué une région source de sédiments du Trias (conodontes des Smithien – Norien), qui ont été déposés le long de l'ancestrale marge de l'Amérique du Nord (AMA). Les roches du Trias de l'AMA renferment des zircons détritiques datant du Paléozoïque moyen à tardif et présentent des signatures géochimiques uniques au TYT et absentes de l'AMA, ce qui démontre que ces roches représentent l'assemblage chevauchant le plus précoce observé reliant les terranes allochtones à l'AMA dans la Cordillère septentrionale. De nouvelles données sur la provenance permettent en outre de définir et de caractériser les assemblages du Permien et du Jurassique. On pensait antérieurement que l'accrétion des terranes dans le nord de la Cordillère avait commencé au Jurassique précoce à moyen; cependant, la présence d'un assemblage chevauchant du Trias de 40 à 50 Ma plus ancien exige que les roches du Trias aient été déposées dans un cadre de bassin d'avant pays associé à une collision plutôt que dans un cadre de terrasse et de glacis continentaux stables.

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INTRODUCTION

Triassic sedimentary rocks of the Yukon are generally characterized as fine-grained, siliciclastic marine deposits of the Cordilleran miogeocline reflecting passive-margin sedimentation along the western fringe of ancestral North America (Gordey and Anderson, 1993). In eastern and north-central Yukon, Triassic rocks unconformably overlie middle to late Paleozoic sedimentary units of the Selwyn Basin, the distal portion of the passive-margin sequence in the northern Canadian Cordillera. Triassic rocks are also known to be in depositional contact with Paleozoic assemblages of the pericratonic Yukon-Tanana and Slide Mountain terranes, which are located outboard of the Selwyn Basin (Colpron *et al.*, 2006).

Recent geologic investigations demonstrate that the depositional framework of Triassic sedimentary rocks and their relationship with pericratonic terranes in the northern Cordillera is unclear (e.g., Nelson *et al.*, 2006). For example, conspicuous detrital muscovite and local feldspar in Triassic rocks assigned to the Cordilleran passive margin (minerals largely absent in the underlying Paleozoic stratigraphy) may reflect uplift and east-directed sedimentation sourced from terranes to the west (Ross *et al.*, 1997). However, regional studies of the miogeocline in Alberta determined no western or oceanward source has supplied sediment to Triassic marginal basins (Gibson and Barclay, 1989; Davies, 1997).

Lithologically similar packages of Triassic rocks were deposited in the Selwyn Basin and on the Yukon-Tanana and Slide Mountain terranes; hence, these similar successions may record the presence of a sedimentary overlap assemblage defining the first linkage of allochthonous terranes with North America (Murphy *et al.*, 2006). The Yukon-Tanana, with the intervening Slide Mountain, represents the first terrane found west of the North American margin in the northern Cordillera; therefore the style and timing of its accretion is paramount in understanding the fundamentals of Mesozoic Cordilleran tectonics and crustal growth of Laurentia. The implications of a Triassic overlap assemblage extend beyond the Yukon, as similar rocks are found in northern British Columbia and Alaska (Nelson, 1993; Dusel-Bacon and Harris, 2003). Additionally, the interpreted timing of accretion of well known Cordilleran terranes may require revision. For example, the Yukon-Tanana Terrane is interpreted to have late Paleozoic to early Mesozoic links with Quesnellia and Stikinia (Simard *et al.*, 2003; Colpron *et al.*, 2006). Terrane accretion was previously presumed to have commenced in the Early to Middle Jurassic (Gabrielse and Yorath, 1991), therefore the presence of a Triassic overlap assemblage some 40-50 million years earlier requires Triassic rocks to be deposited within a collision-related peripheral foreland basin instead of a stable continental terrace and rise.

This paper mainly highlights results of new field work and preliminary U-Pb detrital-zircon dating of Triassic sedimentary rocks collected during the summer of 2006. We examine the provenance for passive margin sediments of the Selwyn Basin and parautochthonous Cassiar Terrane, along with Triassic units of the outboard Yukon-Tanana and Slide Mountain terranes. Provenance data from unstudied and newly discovered Jurassic sedimentary assemblages of the Yukon are also included. Preliminary provenance data suggest Triassic sedimentary rocks of the Selwyn Basin contain detritus from Yukon-Tanana and Slide Mountain terranes. From these data, we conclude that the Yukon-Tanana Terrane was linked to North America by the Early Triassic. The direct implication is that Yukon-Tanana Terrane overrode the North American margin by Early Triassic time, creating a peripheral foreland basin on the lower plate. Early to Middle Triassic rocks of the Selwyn Basin represent primary and reworked deposits of this pro-foreland assemblage. The oldest preserved Triassic rocks of Yukon-Tanana and Slide Mountain terranes, recording the earliest presence of the second sedimentary phase, the overlap assemblage, are Middle Triassic in age (Teh clastic unit of Roots *et al.*, 2002; Big Campbell window of Murphy *et al.*, 2006).

PREVIOUS WORK

Field and laboratory studies carried out in 2005 (summarized in Beranek and Mortensen, 2006) included examination of the type section of the Early Triassic Jones Lake Formation in the Little Nahanni map area (NTS 105I/13), which is the only formally described Triassic stratigraphic section in the Selwyn Basin (Gordey and Anderson, 1993). The Jones Lake Formation type section, exposed in the core of the Wilson syncline, comprises >750 m of orange-tan weathering, ripple cross-laminated calcareous siltstone and carbonaceous shale with subordinate limestone. Detrital muscovite is pervasive and locally abundant along shaley bedding planes. Paleocurrent information suggests east to southeasterly flow in a dominantly nearshore environment. New biostratigraphic control based on conodont faunas constrain the entire Jones Lake Formation type section as Early Triassic (Smithian) and the top of underlying Mount Christie Formation as Early Permian (early Artinskian). Whole-rock shale geochemical analyses of the Mount Christie and Jones Lake formations suggest a source that is dominantly granitic and evolved; however, the Jones Lake Formation contains geochemical signatures that suggest partial derivation from a mafic, juvenile source terrain (Beranek and Mortensen, 2006).

Various geologic compilations and bedrock mapping campaigns across the Yukon have constrained the age of Triassic sedimentary rocks and their association with the Cordilleran passive margin (Abbott, 1977; Gordey, 1981; Murphy *et al.*, 2006), Yukon-Tanana Terrane (Roots *et al.*, 2002; Pigage, 2004; Colpron *et al.*, 2005), and Slide Mountain Terrane (Murphy *et al.*, 2006). In two related studies, Colpron *et al.* (2005) reported detrital-zircon age data within a Triassic conglomerate in the Glenlyon map area of central Yukon, and Creaser and Harms (1998) used Nd isotope geochemistry to characterize Triassic sandstones overlying the Klinkit Group near the Yukon-British Columbia border. However, no previous studies have tested possible correlations of Triassic rocks across the Yukon or attempted to determine their provenance in order to evaluate whether the Triassic sequence comprises an overlap assemblage.

FIELD SITES AND PRELIMINARY DETRITAL-ZIRCON DATA

In the following section, we discuss U-Pb detrital-zircon provenance data from seven field sites in Yukon. These data are preliminary in nature and will be used for detailed, site-specific studies in forthcoming publications; U-Pb ages are put into populations according to the time scale of Okulitch (2002). All detrital zircon was analysed by the lead author using laser-ablation ICP-MS methods at the Pacific Centre for Isotopic and Geochemical Research at the University of British Columbia.

SELWYN BASIN

Little Nahanni map area

The type section of the Early Triassic (Smithian) Jones Lake Formation is located in the easternmost Selwyn Basin, south of MacMillian Pass (Location 1 on Fig. 1). It is in disconformable contact with the underlying Late(?) Mississippian-Early Permian Mount Christie Formation, which itself unconformably overlies the Early to mid-Mississippian Tsichu formation. Gordey and Anderson (1993) document a significant sub-Triassic regional unconformity in the Nahanni map area, as the Jones Lake Formation is known to sit on rocks as old as the Devono-Mississippian Earn Group. Notably, Orchard (2006) described Griesbachian and Dienerian (earliest Triassic) reworked conodont faunas in the type section of the Jones Lake Formation and interpreted a regional Smithian depositional event.

In 2005, the type sections of the Mount Christie and Jones Lake formations were measured and sampled to determine their provenance, depositional age and lithofacies associations (Beranek and Mortensen, 2006). The Tsichu formation was also sampled. Measuring and sampling a complete Mississippian to Triassic stratigraphic succession makes it possible to observe any systematic changes in sediment character or provenance through time.

Preliminary detrital-zircon age data from Tsichu formation quartz sandstone yielded many Paleozoic and Precambrian age populations (n=102 grains): Late to Middle Devonian (*ca.* 360-390 Ma), Early Devonian (*ca.* 400 Ma), Silurian to Cambrian (425-530 Ma), early Neoproterozoic to middle Mesoproterozoic (*ca.* 950-1300 Ma), late to middle Paleoproterozoic (1600-1800 Ma), middle to early Paleoproterozoic (1800-2000 Ma), early Paleoproterozoic (2000-2400 Ma), and Late Archean (2500-2900 Ma). Proterozoic and Archean ages compare favourably with known U-Pb zircon ages of sandy miogeoclinal rocks in the Cordillera and Precambrian basement complexes of Laurentia (Gehrels, 2000; Link *et al.*, 2005). Early to middle Paleozoic ages (Cambrian-Early Devonian) may be sourced from undated volcaniclastic units of the Selwyn Basin (Goodfellow *et al.*, 1995; Gordey and Anderson, 1993) or recycled through early Paleozoic rocks from Arctic Canada (Ross *et al.*, 1997; Miller *et al.*, 2006). Late to Middle Devonian ages correspond to the Ecstall and Finlayson magmatic cycles, generated by the rifting of Yukon-Tanana Terrane from the North American autochthon (Piercey *et al.*, 2006). It is noteworthy that the Early to mid-Mississippian (*ca.* 330 Ma) Tsichu formation contains no detrital zircons younger than *ca.* 360 Ma, suggesting magmatism along the rifted margin ceased by the Late Devonian.

Preliminary detrital-zircon age data from micaceous sandstone of the Jones Lake Formation contain the following age populations (n=98 grains): late Early Mississippian (*ca.* 345 Ma), Late to Middle Devonian (360-380 Ma), Early Devonian to Silurian (400-440 Ma), Ordovician-Cambrian (450-540 Ma), late to middle Neoproterozoic (570-750 Ma), and early Neoproterozoic to Late Archean (*ca.* 1000-3000 Ma). U-Pb ages are similar to the underlying Tsichu formation, however, the type section of the Jones Lake Formation contains late Early Mississippian detrital zircons, whose signature is known to be region- and age-specific to the Yukon-Tanana Terrane to the west (Wolverine Cycle, Piercey *et al.*, 2006) and absent from the ancestral margin of North America. This suggests the Yukon-Tanana Terrane was proximal or linked to the ancient Pacific margin by the Early Triassic.

Frances Lake and Watson Lake map areas

During July, 2005, several Triassic localities were investigated in the Frances Lake and Sa Dena Hes mine road areas of southeastern Yukon (Location 2 on Fig. 1). All sites are interpreted to be in depositional contact with Paleozoic units of the Selwyn Basin (Murphy *et al.*, 2006). Two new conodont collections along the new Sa Dena Hes mine road contained Middle Triassic (late Ladinian) fauna, consistent with previous sampling of the region (Murphy *et al.*, 2006; Orchard, 2006). Light grey weathering, parallel-laminated siltstone and sandstone of this area contain appreciable amounts of muscovite and feldspar. In the Mt. Hundere area, Abbott (1977) located cross-bedding in outcrop and observed current directions suggesting dominantly eastward transport.

Preliminary detrital-zircon age data for Middle Triassic rocks from three localities in southeastern Yukon have main age populations (n=219 grains) that are early Late Triassic (222 Ma), Middle to Early Triassic (233-246 Ma), Early Triassic to mid-Permian (250-269 Ma), mid-Permian to Early Pennsylvanian (269-312 Ma), Late to mid-Mississippian (320-337 Ma), Early Mississippian (350-

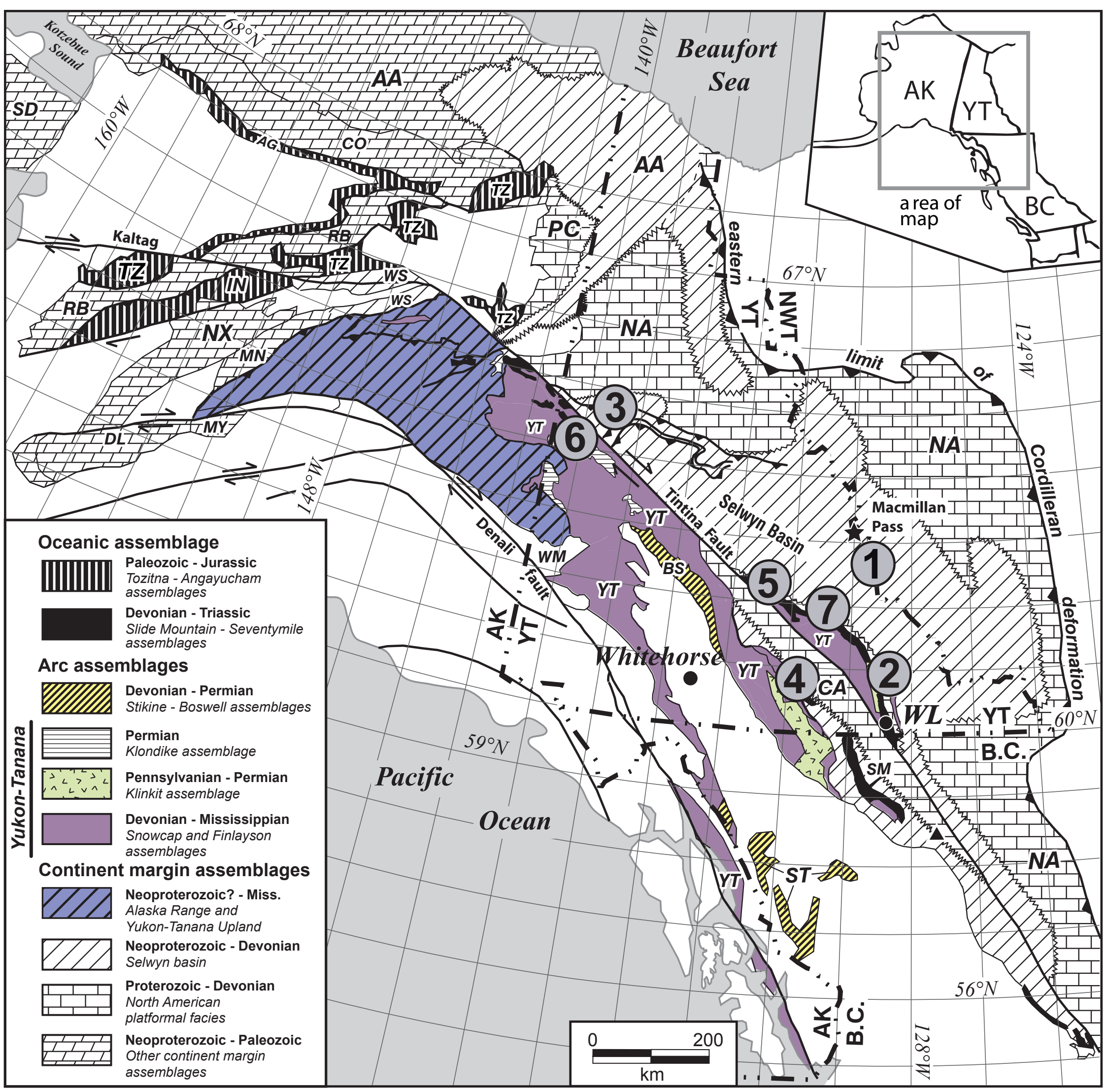

Figure 1. *Tectonic assemblage map of the northern Cordillera. Numbered circles indicate Triassic successions of this study. Modified from Colpron et al. (2006).*

355 Ma), Late to Middle Devonian (358-391 Ma), Early Devonian (400-416 Ma), Silurian-Ordovician (435-476 Ma), Cambrian (490-543 Ma), late Neoproterozoic (543- *ca.* 590 Ma), late to middle Neoproterozoic (600-*ca.* 700 Ma), and early Neoproterozoic to Late Archean (1000-3000 Ma). These populations represent the composite Yukon-Tanana signature, as all middle to late Paleozoic magmatic cycles are represented (*cf.* Piercey *et al.*, 2006). Interestingly, the 300-312 Ma age peak recorded in these sedimentary rocks coincides with a known lull in felsic magmatism in Yukon-Tanana (Colpron *et al.*, 2006); we interpret these zircons to be recycled through the Boswell assemblage (Stikinia/Yukon-Tanana overlap). Pennsylvanian detrital zircons are known to be in Middle(?) Triassic conglomerate of the Glenlyon map area, and Colpron *et al.* (2005) interpreted detrital zircon therein to be recycled through the Boswell assemblage. Early Late Triassic zircon (222 Ma; 3 grains) is present in one sample, a micaceous sandstone from 99 Mile Creek just south of Frances Lake, and suggests some rocks of this region extend beyond the Ladinian. However, Triassic samples from this area contain detrital zircon with concordant analyses of 238 and 240 Ma (Ladinian), suggesting syn-depositional magmatism, previously undocumented. Colpron *et al.* (2005) documented a single 239 Ma detrital-zircon age in Middle(?) Triassic conglomerate of the Glenlyon map area.

Dawson map area

In the upper Klondike River area north of Dawson, calcareous siltstone, feldspathic sandstone, and fossiliferous limestone of unknown Triassic age unconformably overlie Permian siliceous shale and are overlain by Middle Jurassic carbonaceous shale and feldspathic grit (Location 3 on Fig. 1; Fig. 2).

Coarse-grained feldspathic arenite and medium-grained feldspathic wacke from the upper member of the Triassic section (Middle to Late Triassic?) yielded preliminary U-Pb detrital-zircon age distributions that are similar to the previously discussed samples. Major detrital-zircon age populations (n=165) are Early Mississippian (331-334 Ma), Middle Devonian (380-390 Ma), Early Devonian (400-410 Ma), Silurian (420-440 Ma), Early Ordovician (*ca.* 470-490 Ma), Cambrian (506-543 Ma), late to middle Neoproterozoic (550-700 Ma), and early Neoproterozoic to Late Archean (1000-3100 Ma). The presence of late Early Mississippian (*ca.* 330 Ma) detrital zircons suggests that during the Triassic, the North American margin of this region was proximal to the Yukon-Tanana Terrane.

Jurassic carbonaceous shale and feldspathic grit known as the Lower Schist Division sit on top of the Triassic rocks. Contacts with underlying rock units are covered, and conodont age determinations for the Triassic section are still in progess. Poulton and Tempelman-Kluit (1982) assigned an early Late Jurassic (Late Oxfordian) age to the Lower Schist Division succession based on the presence of Buchia and Cardioceras. One detrital-zircon sample,

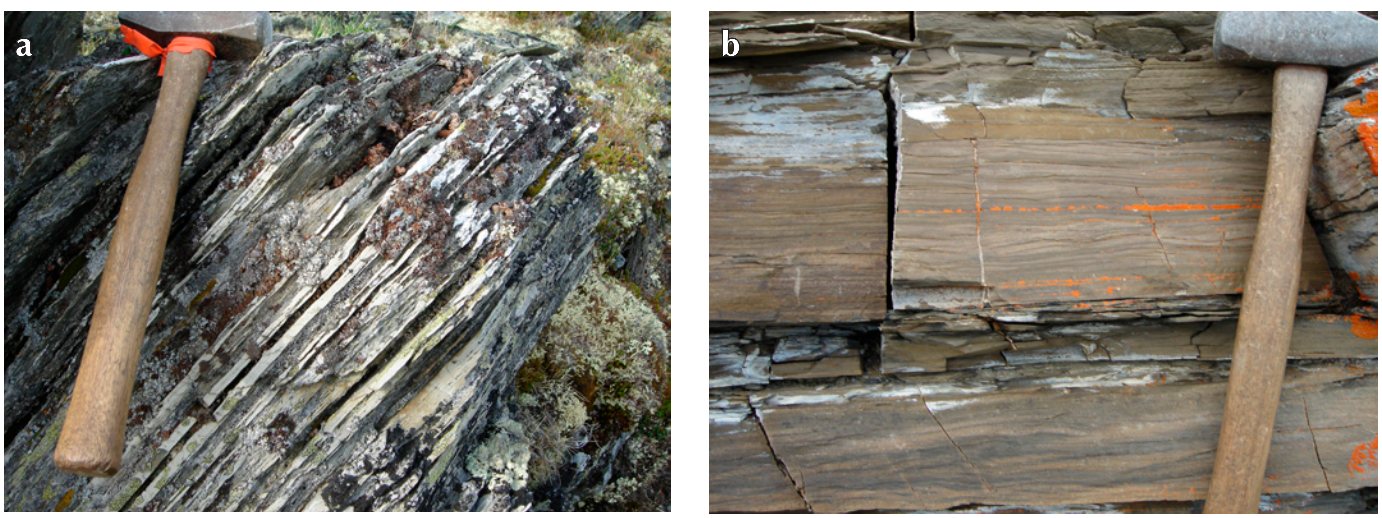

Figure 2. (a) *Typical outcrop view of white-green weathering, grey thinly bedded, siliceous Permian shale that underlies Triassic rocks east of Mt. Robert Service, upper Klondike River area.* ***(b)*** *Wavy-laminated calcareous siltstone and sandstone of the lower Triassic succession east of Mt. Robert Service. Detrital mica is pervasive, especially along shale partings.*

from a 1-m-thick feldspathic grit, yielded the following preliminary age populations (n=73 grains): Middle Jurassic (Bajocian) to Early Jurassic (170-190 Ma), Late Permian (258 Ma), Pennsylvanian to latest Devonian (312-360 Ma), Early Paleozoic to middle Neoproterozoic (420-717 Ma), and early Neoproterozoic to Late Archean (1000-2700 Ma). Jurassic sedimentary rocks of the Selwyn Basin may essentially define a middle Mesozoic overlap assemblage linking an outboard terrane(s) to the composite Yukon-Tanana/North America block. While Early Jurassic plutons are common in Yukon-Tanana, ages younger than *ca.* 180 Ma are scarce; this could reflect sourcing from an outboard terrane, such as Stikinia.

CASSIAR TERRANE

Finlayson Lake map area

Triassic rocks in the Pelly Mountains of southeastern Yukon overlie Devonian-Permian(?) black shale and chert of the parautochthonous Cassiar Terrane, a miogeoclinal block displaced along the margin due to dextral translation of the Tintina Fault (Location 4 on Fig. 1). In several localities around southeastern Yukon, rocks of the miogeocline (Triassic and older) are overlain by immature sedimentary rocks, which are structurally overlain by allochthons; these have been regarded by Tempelman-Kluit (1979) as synorogenic clastic and cataclastic rocks, respectively. Gordey (1981) produced a geologic map of the Indigo Lake area in the Pelly Mountains, which outlined the extent and nature of the McNeil Klippe (cataclastic rocks; siliceous mylonite), which in this area overlies a section of Jura-Cretaceous greywacke (synorogenic clastics) and Triassic and Paleozoic miogeoclinal rocks. Field work during 2006 and detrital-zircon dating suggest a reinterpretation for the McNeil Klippe region is necessary. Middle to Late Triassic rocks are overlain by two successions of rocks: a lower one we interpret to comprise Late Permian to Early Triassic sedimentary and volcanic rocks that are tentatively considered to be equivalent to portions of the Simpson Lake group (Permian-Triassic forearc assemblage) in southeastern Yukon; and an upper package which comprises highly deformed chert and calc-silicate rock, which is interpreted to be the Mississippian to Permian(?) Fortin Creek group (Slide Mountain Terrane).

Limited exposure in the Triassic section under the McNeil Klippe did not allow measurement of the succession; however, Gordey (1981) interpreted a thickness of 500 to 750 m. Our new work delimits three separate 30-m sections, each representing the average character for a lower, middle and upper 'member' of the Triassic. The lower member is typified by 2- to 4-cm-thick beds of parallel laminated, brown-weathering, micaceous, silty shale intercalated with 1- to 5-cm-thick, wispy to parallel-laminated, brown-orange-weathering limy siltstone to silty limestone (Fig. 3a). The middle member contains thinly laminated, grey-brown-weathering, carbonaceous shale and parallel-laminated silty shale that grades up-section into silty shale with distinctive lenticular bodies of brown-orange-weathering calcareous material (Fig. 3b). The upper member comprises 1- to 2-cm-thick beds of distinctive wavy laminated, grey siltstone to silty shale with wisps (1-5 mm) of brown-orange-weathering limy silt which thicken up-section into 4-cm couplets with dark grey shale (Fig. 3c). Above the upper member, exposure is limited, but limestone, carbonaceous shale and coarse-grained micaceous sandstone make up the stratigraphy.

Preliminary detrital-zircon data from the Triassic section underlying the McNeil Klippe, and probable allochthon of feldspathic grit, is derived from a composite of coarse-grained, micaceous sandstone and a fine-grained, calcareous siltstone (conodont ages in progress). The major age populations are (n=76 grains) Late to Middle Triassic (212-232 Ma), Early Triassic to Late Permian (248-255 Ma), Late Mississippian (319-322 Ma), Early Mississippian to latest Devonian (354-361), Late to mid-Devonian (375-390 Ma), early Paleozoic (430-512 Ma), late to middle Neoproterozoic (542-762 Ma), and early Neoproterozoic to Lake Archean (1000-2700 Ma).

Preliminary U-Pb detrital-zircon age populations (n=62 grains) from feldspathic grit mapped by Gordey (1981) as synorogenic clastic rocks (our interpreted Simpson Lake group equivalent) overlying North American Triassic rocks are Middle to Early Triassic (237-245 Ma), Early Triassic (246-253 Ma), Late to mid-Permian (254-268 Ma), and Early Permian (280 Ma). These ages contain a high amount of Klondike Cycle-aged zircons (Piercey *et al.*, 2006). As in the case of the Middle Triassic samples from the Finlayson Lake map area, it is unclear where the 237-253 Ma zircons are being derived from, since Early to early Late Triassic magmatism has not been recognized thus far in the Yukon.

YUKON-TANANA TERRANE

Tay River map area

Massive pebble to cobble conglomerate and intercalated sandstone, chert and basalt sit unconformably on rocks of

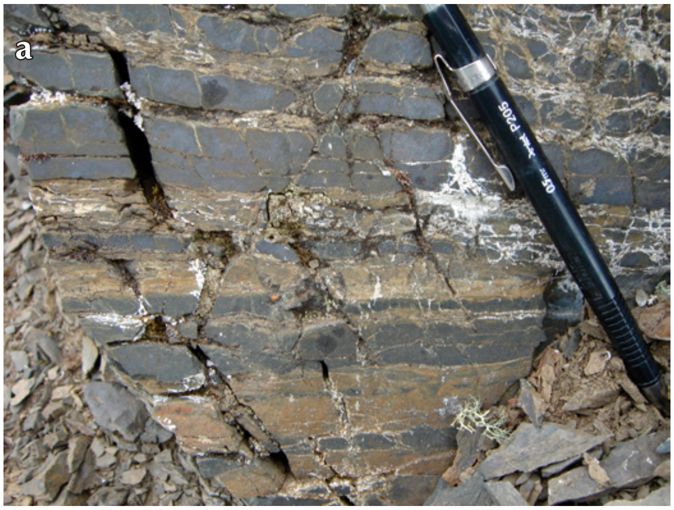

Figure 3. (a) *Triassic silty shale with wispy calcareous material, lower member, McNeil Lake area.* ***(b)*** *Triassic silty shale with lenticular silty limestone bodies, middle member, McNeil Lake area.* ***(c)*** *Triassic couplets of limy siltstone and carbonaceous shale, upper member, McNeil Lake area.*

the Yukon-Tanana Terrane north of the Tintina Fault, near Faro (Location 5 on Fig. 1; Fig. 4). Pigage (2004) informally named this succession the Faro Peak formation. Carnian and Norian conodont faunas were collected from limestone clasts within Faro Peak formation conglomerate and Pigage (2004) assigned this unit a Late Triassic age. The Faro Peak formation conglomerates also contain clasts of metaclastic rocks, chert, and mafic to intermediate volcanic rocks.

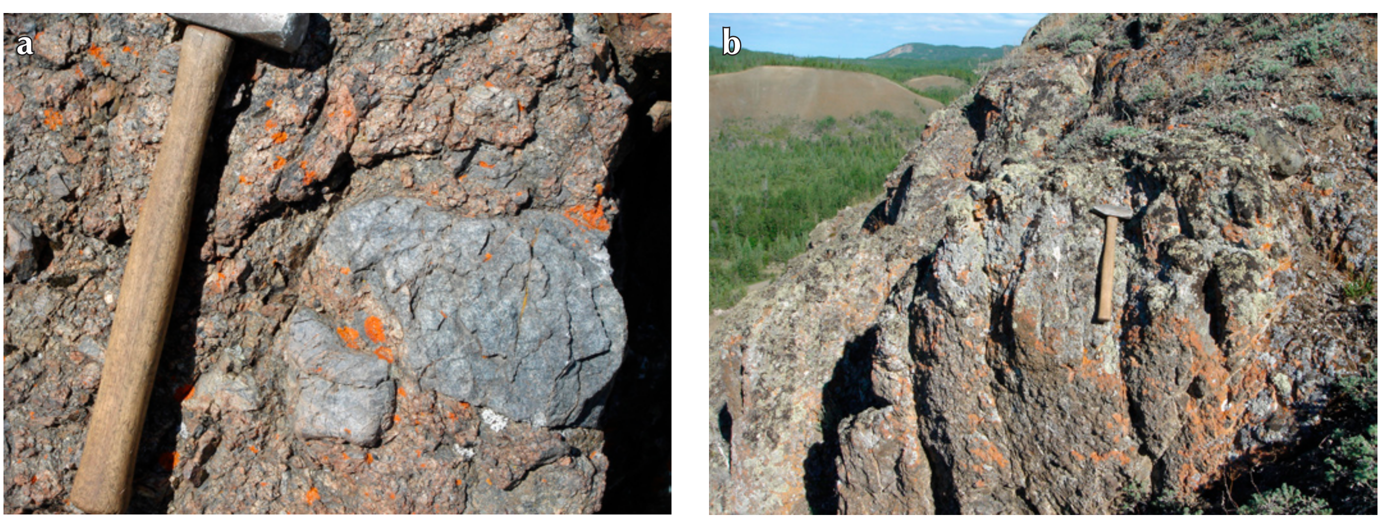

Figure 4. (a) *View of pebble to cobble conglomerate of the Faro Peak formation, north of Faro townsite. Cobble to right of hammer is a micaceous metaclastic rock.* ***(b)*** *Typical view of massive, granule to pebble conglomerate of the Faro Peak formation, east of Faro townsite.*

Results of detrital-zircon dating of Faro Peak samples collected during 2006 indicate that the depositional age of this unit is not Late Triassic as previously believed. Preliminary detrital-zircon age dating shows major age populations (n=89 grains) from two Faro Peak conglomerate samples are Middle Jurassic (167-176 Ma), Early Jurassic (178-200 Ma), Late Triassic (202-235 Ma), Permian (250-278 Ma), Pennsylvanian to Late Mississippian (306-319 Ma), and Proterozoic (1000-1900 Ma). These data require that the depositional age of the Faro Peak formation can be no older than Middle Jurassic. This is, in general terms, age-correlative with rocks of the Lower Schist Division in the upper Klondike River area, north of Dawson. More importantly, the Jurassic detrital zircons of the Faro Peak formation may separate it from the synorogenic clastic rocks of Tempelman-Kluit (1979), which we interpret to be mainly Permian to Early Triassic in age.

SLIDE MOUNTAIN TERRANE

Dawson map area

Triassic rocks exposed in the vicinity of the Clinton Creek mine, northwest of Dawson, are spatially associated with greenstone and ultramafic units of the Slide Mountain Terrane (Location 6 on Fig. 1). Contact relationships are faulted, and it is unclear if Triassic sedimentary packages of the region were originally deposited on Slide Mountain Terrane or Yukon-Tanana Terrane. Four new conodont collections confirm these rocks are Late Triassic (early Norian) in age.

Preliminary detrital-zircon age populations (n=173 grains) from three grouped samples are Late Triassic (*ca.* 221 Ma), mid- to Early Permian (260-300 Ma), Late Mississippian (321-343 Ma), Early Mississippian (346-357 Ma), Late to mid-Devonian (363-394 Ma), early Paleozoic (400-*ca.* 540 Ma), late to middle Neoproterozoic (555-772 Ma), and early Neoproterozoic to early Paleoproterozoic (1000-1900 Ma). Regardless of whether these Triassic rocks were originally part of the Slide Mountain Terrane or the Yukon-Tanana Terrane, they definitely received sedimentary input from the Yukon-Tanana Terrane, as shown by the composite Permian-Early Mississippian age groupings present (Klondike-Wolverine cycles; Piercey *et al.*, 2006).

Finlayson Lake map area

Triassic rocks in the northern Finlayson Lake District (Location 7 on Fig. 1) comprise sandy bioclastic limestone and shale that lie in angular unconformity with the underlying Fortin Creek group (Slide Mountain Terrane). These rocks are all in the hanging wall of the Inconnu thrust, a regional thrust fault placing outboard rocks in contact with the North American margin (Murphy *et al.*, 2006). Overlying the Late Triassic package is an allochthon containing tan-grey chert-pebble conglomerate, lithic sandstone, and grey limestone which we interpret to be equivalent to the Permo-Triassic Simpson Lake group. The sandy bioclastic limestone unit has been assigned an early Norian age, and conodont fauna therein are unknown in rocks of the Western Canada Sedimentary Basin (Orchard, 2006). However, these fauna are present in early Norian Eurasian (Tethyan) successions observed further outboard (i.e., Cache Creek Terrane, Wrangellia).

Preliminary detrital-zircon age populations from the Late Triassic sandy bioclastic limestone (n=78 grains) are Pennsylvanian to Late Mississippian (312-330 Ma), Late to Middle Devonian (357-386 Ma), Early Devonian to Cambrian (399-539 Ma), late Neoproterozoic (575-657 Ma), and early Neoproterozoic to Late Archean (1000-2800 Ma). The presence of specific Proterozoic and middle to late Paleozoic age populations suggest this package was formed in proximity to the Laurentian margin, as those ages are observed in other studied Devonian to Triassic samples of the Selwyn Basin. The presence of Eurasian conodont faunas may simply call for Late Triassic rocks of Slide Mountain Terrane to have formed in a lower paleolatitude, rather than in outboard Tethyan realms.

Chert-pebble conglomerate and lithic sandstone in the allochthon structurally overlying the composite Late Triassic section contains the following preliminary detrital-zircon age populations (n=157 grains): Middle Triassic (235-244 Ma), Early Triassic (245-253 Ma), Permian (254-*ca.* 300 Ma), and Precambrian (1452-2470 Ma). The abundance of Triassic and mid- to Late Permian detrital zircons correlates well with the feldspathic grit (Simpson Lake group?) overlying Triassic rocks in the McNeil Klippe area.

SUMMARY

Preliminary provenance data indicate Triassic rocks of the Cordilleran margin contain abundant Paleozoic and early Mesozoic detrital zircons. The presence of early Paleozoic detrital zircons can be explained by an influx of sediment from the Arctic. The presence of Mississippian to Triassic detrital zircon, however, requires that the Yukon-Tanana

Terrane was proximal to the North American margin by at least Early Triassic time.

Although still a work in progress, the simplest tectonic model to explain these signatures is that Triassic rocks of the Yukon form a two-part sedimentary succession: (1) an early phase (Permo-Triassic to Middle? Triassic) peripheral foreland basin assemblage superimposed on the Selwyn Basin (North America); and (2) a post-orogenic, or molasse, phase producing a sedimentary overlap assemblage overlying all tectonic elements of the northern Cordillera. Whether the accretion of Yukon-Tanana Terrane was a 'passive' docking, or a dramatic collisional event, the collider would have created an uplifted hinterland, shedding sediment downslope, in this case to the east, onto the overridden Selywn Basin. Geodynamically, the Triassic basin would be designated as a peripheral foreland basin, a depocentre controlled by the tectonic loading of the collider. Similar in nature to the retro-arc foreland basin of fold and thrust belts, a peripheral foreland basin is genetically different, as basin formation is primarily within the lower, overridden plate (North America). This model is simplistic, as convergence of Yukon-Tanana Terrane with North America was assuredly oblique; strike-slip motion may have produced additional accommodation space within the flexed Selwyn Basin.

New U-Pb detrital-zircon geochronology has also expanded our knowledge base of Jurassic sedimentary assemblages in Yukon, and further constrained the sources for immature clastic rocks associated with allochthons of Slide Mountain Terrane in the Finalyson Lake map area.

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