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Abstract: We present evidence for extension of the Central Slave Cover Group into the realm of the northwestern Slave Province, thus uniting all Meso- and Paleoarchean basement of the Slave into a single cratonic nucleus formed by 2.85 Ga. The diagnostic cover sequence overlies ca. 2.9 Ga basement in the Grenville Lake area, and from there can be mapped on both limbs of the Emile River greenstone belt, around the Scotstoun Anticline, and further west into the immediate hanging wall of the Acasta Gneiss Complex. In the Acasta area, and around the Exmouth Anticline, quartzites, banded iron-formation, and overlying mafic volcanic rocks have been previously misidentified as Paleoproterozoic Epworth Group. Detrital-zircon data from two quartzite samples are presented to support our new interpretation that the quartzite and banded iron-formation sequence overlying Acasta basement correlates with the Central Slave Cover Group, and that much of central Wopmay is in fact Archean.

Résumé : On présente des indices favorables au prolongement du Groupe de couverture de la Province des Esclaves central jusque dans le nord-ouest de la Province des Esclaves, ce qui réunirait tout le socle méso- et paléoarchéen de la Province des Esclaves en un noyau cratonique unique dès 2,85 Ga. La séquence de couverture diagnostique recouvre du socle datant d'environ 2,9 Ga dans la région du lac Grenville et, à partir de là, elle peut être cartographiée sur les deux flancs de la ceinture de roches vertes d'Emile River, autour de l'anticlinal de Scotstoun, et plus à l'ouest dans la partie immédiate du toit du Complexe gneissique d'Acasta. Dans la région d'Acasta et autour de l'anticlinal d'Exmouth, des quartzites, des formations de fer rubanées et des roches volcaniques mafiques sus-jacentes ont été précédemment mal identifiés comme faisant partie du Groupe d'Epworth du Paléoprotérozoïque. On présente des données tirées de zircons détritiques provenant de deux échantillons de quartzite à l'appui d'une nouvelle interprétation selon laquelle il existerait une corrélation entre la séquence de quartzite et de formation de fer rubanée qui est sus-jacente au Complexe gneissique d'Acasta, d'une part, et le Groupe de couverture de la Province des Esclaves central, d'autre part, et selon laquelle une grande portion de la partie centrale de l'orogène de Wopmay daterait en fait de l'Archéen.

INTRODUCTION

We report on critical new field evidence and supporting SHRIMP II detrital-zircon data that bear on the tracing of a continuous ca. 2.8 Ga cover sequence throughout much of the central and western parts of the Archean Slave Craton. The cover sequence — the Central Slave Cover Group (Bleeker et al., 1999) — consists of varied siliciclastic and chemical sedimentary rocks and is typically ≤200 m thick. Its most distinctive lithologies are detrital-chromite-bearing, fuchsitic quartzite and a thin banded iron-formation. The Central Slave Cover Group stratigraphically overlies a contiguous basement complex that varies in age from 4.01 Ga to 2.85 Ga (Stern and Bleeker, 1998; Bleeker and Davis, 1999) and forms the core of the Slave Craton. The cover sequence itself is overlain by 2.73–2.63 Ga greenstone belts.

The successful tracing of the cover sequence, from the Yellowknife area in the south to the Sleepy Dragon Complex further east, and from there to the central part of the Slave Province and further northwest to the Point Lake area, and finally into the immediate stratigraphic hanging wall of the Acasta Gneiss Complex, not only has significant implications for many aspects of the geology of the Slave Craton, including the setting of Earth's oldest intact rocks, but also for Archean geology in general. In particular, our findings bear on the architecture and evolution of continental crust older than 2.85 Ga, its break-up and probable dispersal in the late Archean (the onset of plate tectonics?), and the implications this has for global reconstructions of pre-Rodinia supercontinents (e.g. Rogers, 1996). Furthermore, our findings draw attention to an apparent 2.8–3.0 Ga abundance peak of similar fuchsitic quartzites elsewhere in the global Archean record, and they have implications for the tectonic setting of ca. 2.7 Ga greenstone belts.

Following a brief historical overview, we first present the primary field evidence for the discovery and successful correlation of the cover sequence across much of the craton. We then present detrital-zircon data to bolster this correlation — in particular to show that what was earlier mapped as a Paleoproterozoic cover sequence in central Wopmay Orogen (Hoffman et al., 1988; St-Onge et al., 1991) is in fact part of the ca. 2.8 Ga Central Slave Cover Group. We conclude with describing the broad range of implications of our findings, arranged from issues of local significance to those of potential global significance.

SLAVE CRATON AND PREVIOUS INVESTIGATIONS

The Slave Province (Fig. 1) is a relatively small (about 300 000 km^2), but well exposed Archean craton in the northwestern part of the Canadian Shield. Although dominated by ca. 2.73–2.63 Ga greenstone and turbidite sequences, and ca. 2.72–2.58 Ga plutonic rocks, large parts of the craton are underlain by older gneiss and granitoid units. The presence of Mesoarchean rocks, initially predicted on the basis of field relationships (e.g. Baragar, 1966), has been amply confirmed by an ever increasing number of isotopic age dates (e.g. see Bleeker and Davis, 1999 for a review). Nevertheless, the full extent of Meso- and Paleoarchean sialic crust and its relationship to the younger greenstone belts have remained a focus of debate (e.g. Henderson, 1985; Kusky, 1990; Padgham and Fyson, 1992; Bleeker et al., 1999).

Guided by aeromagnetic anomaly maps, magnetite-bearing banded iron-formation and associated orthoquartzite were discovered below the Yellowknife greenstone belt in the late 1970s (e.g. see Helmstaedt and Padgham, 1986). The presence of crossbedded orthoquartzite, together with the discovery of ≥3.0 Ga gneissic xenoliths in a lamprophyric diatreme cutting the Yellowknife greenstone belt (Nikic et al., 1980), led to the prediction that at least some of the granitoid rocks stratigraphically below the greenstone belt represent old basement (e.g. Henderson, 1985). A detailed U-Pb geochronological study of the Yellowknife greenstone belt and adjacent granitoid rocks confirmed this prediction (Isachsen and Bowring, 1997).

Ongoing mapping elsewhere in the province, commonly with a focus on individual greenstone belts and their contacts with adjacent granitoid and (or) gneissic rocks, gradually resulted in an increasing number of quartzite and banded iron-formation occurrences being documented at the base of many of the greenstone belts (e.g. Roscoe et al., 1989; Thompson et al., 1995; Stubley, 1996; Bleeker et al., 1997). As part of an effort to extend and correlate known quartzite and banded iron-formation occurrences laterally, Bleeker and Ketchum (1998) documented a basal quartz pebble conglomerate overlying an aluminosilicate-rich weathering horizon developed in ca. 2.9 Ga foliated tonalites.

With the nature of the basement-cover contact thus resolved unequivocally in favour of a sheared and metamorphosed, yet essentially intact unconformity, it was quickly realized that the overall topology of all greenstone belts in the central and western parts of the Slave Province (i.e. their distribution and facing directions) permits all quartzite and banded iron-formation occurrences to be correlated into a single cover sequence. This lateral correlation is supported by remarkable lithostratigraphic similarities over distances of many hundreds of kilometres (Bleeker et al., 1999; this study). Furthermore, the resulting geometry, although rather complex, is compatible with the known polyphase folding and faulting history of the craton.

Extending systematic investigations of the basement-cover contact further to the north, in part following up on earlier work by Easton et al. (1982), resulted in discovery of the diagnostic quartzite and banded iron-formation sequence below the Point Lake greenstone belt, and below a small outlying greenstone belt to the west of Point Lake (unpub. field data, W. Bleeker, 1998). Based on these observations, as well as on a rapidly expanding database of precise U-Pb ages of basement rocks (e.g. Ketchum and Bleeker, 1999), the concept of a single contiguous basement complex overlain by a diagnostic cover sequence could be extended at least as far north as the Point Lake area (see Bleeker and Davis, 1999).

Attention thus shifted to the next critical question: could the diagnostic cover sequence be extended further to the northwest into the hanging wall of the Acasta Gneiss Complex? If so, all old basement rocks in the Slave would be united into a single cratonic nucleus predating 2.85 Ga. Furthermore, this would place the Acasta gneiss units firmly within this old continental nucleus.

THE CENTRAL SLAVE COVER GROUP

Convincing long-distance lithostratigraphic correlations in multiply deformed Precambrian terrains are generally problematic. This is particularly true for Archean greenstone-belt environments where interfingering of flows from adjacent volcanic edifices and facies changes inherent to volcanic rocks severely limit lateral continuity. High-precision U-Pb

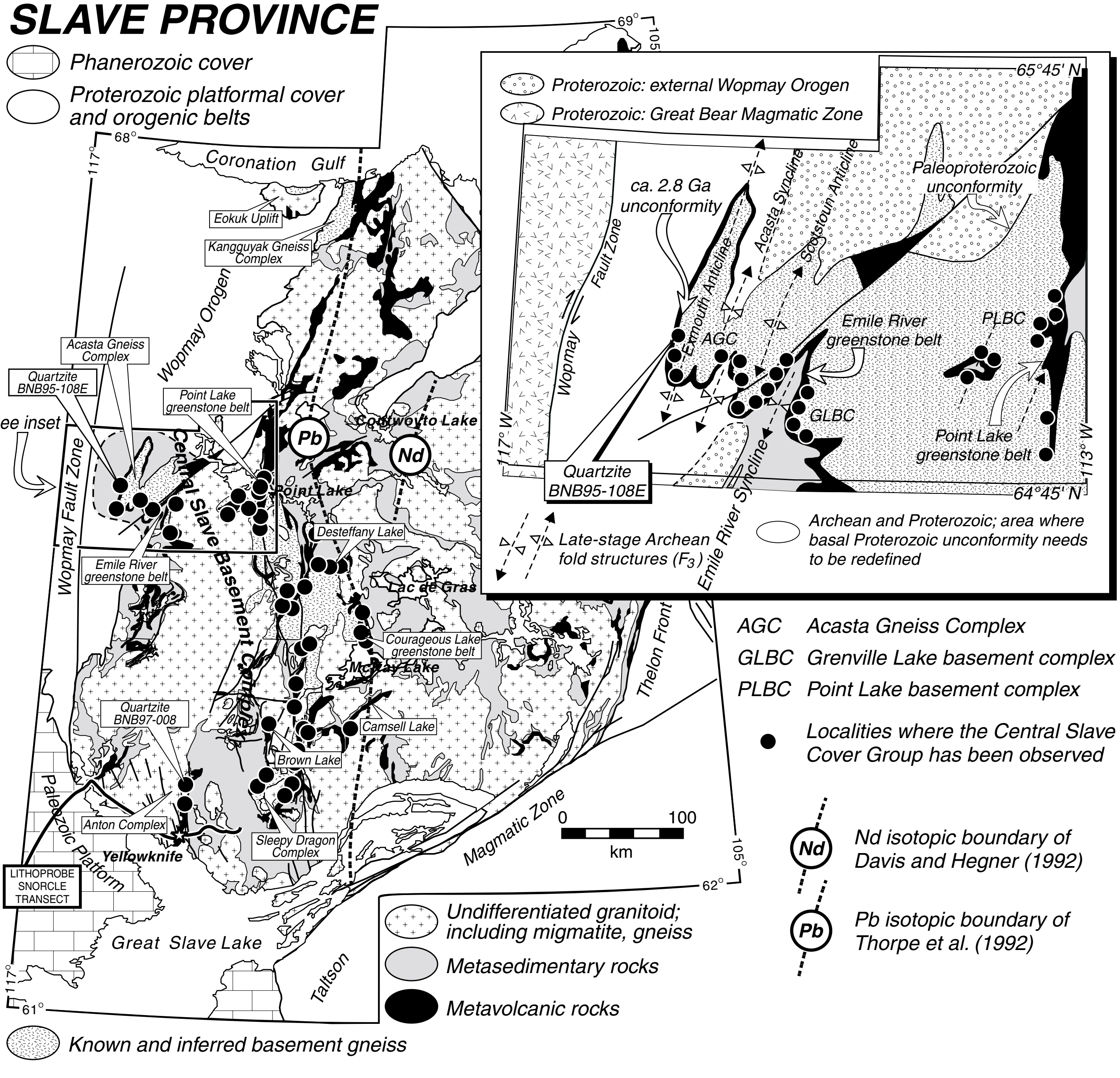

Figure 1. *Geological map of the Slave Province, highlighting all localities where the Central Slave Cover Group has been found to date. Inset shows the Acasta–Emile River area, with newly identified Central Slave Cover Group occurrences stretching from Grenville Lake to the western flank of the Exmouth Anticline. Note location of quartzite sample BNB95-108E.*

zircon ages on selected volcanic units may alleviate this problem, but rarely provide a substitute for a regional 'marker horizon' characterized by a unique set of attributes and sufficient lateral continuity such that it can be 'walked out' along strike. Successful marker horizons typically consist of volcanic-ash layers from large explosive eruptions (waterlain tuffs or tuffites), distinct chemical sediments (e.g. banded iron-formation, carbonate horizons), ejecta layers (e.g. the K-T boundary layer), or basal conglomerate/sandstone sequences overlying a fundamental angular unconformity or nonconformity.

The ca. 2.8 Ga Central Slave Cover Group of the Slave Craton (Bleeker et al., 1999) provides an ideal marker horizon, combining several of the attributes mentioned above (Fig. 2). It overlies a proven unconformity that truncates older granitoid and gneissic rocks formed by earlier tectono-metamorphic cycles. This unconformity surface can thus be expected to have great lateral continuity, unless cut off by fundamental faults. Both the fuchsitic quartzite and the overlying banded iron-formation are highly diagnostic lithologies and commonly of sufficient combined thickness (10–200 m) to be traceable in a terrain of discontinuous bedrock exposure. Above all, the tripartite assemblage of 1) basement rocks, 2) fuchsititic quartzite and banded iron-formation, and 3) a thick package of overlying basaltic pillow lava (Fig. 2), is unmistakable, even where highly sheared (Bleeker et al., 1999). Where possible, we use U-Pb age dating of adjacent basement and volcanic units, or detrital-zircon dating of the quartzite, to test and strengthen the regional correlation.

The lowermost unit of the Central Slave Cover Group typically consists of a well rounded quartz-pebble conglomerate with a somewhat less pure matrix of fuchsitic quartzite. Such supermature conglomerate has now been identified in several localities and, at least at one site, can be seen to overlie an aluminosilicate-rich, metamorphosed, weathering horizon.

Basement below the Central Slave Cover Group may consist of tonalitic-dioritic gneiss, foliated tonalite, or more evolved foliated granodiorite and granite. Older supracrustal sequences have also been identified, but overall form a minor basement component. Basement units are invariably cut by a multitude of deformed and metamorphosed mafic dykes, which tend to increase in abundance towards the contact with supracrustal rocks.

The dominant lithology of the Central Slave Cover Group is a grey- to greenish-white quartzite, which locally preserves centimetre- to decimetre-scale crossbedding. At each locality, although not necessarily in every bed, disseminated specks of fuchsite can be observed, and where this mineral is abundant, relict, detrital, chromite grains may be preserved within the fuchsite specks. All the fuchsite in the quartzite units is considered to be a product of mica-producing metamorphic reactions during shearing, according to a generalized equation:

detrital feldspar + chromite + fluid → fuchsite + fluid

and considered to reflect initial detrital chromite input. Disseminated fuchsite thus allows correct identification of the quartzites even where shearing and recrystallization have been extreme and primary features have been erased.

In many localities, fuchsitic orthoquartzite units are intercalated with other clastic rocks such as polymict conglomerate, and impure, mica-rich, flaggy quartzite. Pelitic schist, where present, occurs between the quartzitic rocks and the overlying banded iron-formation (Fig. 2), suggesting a

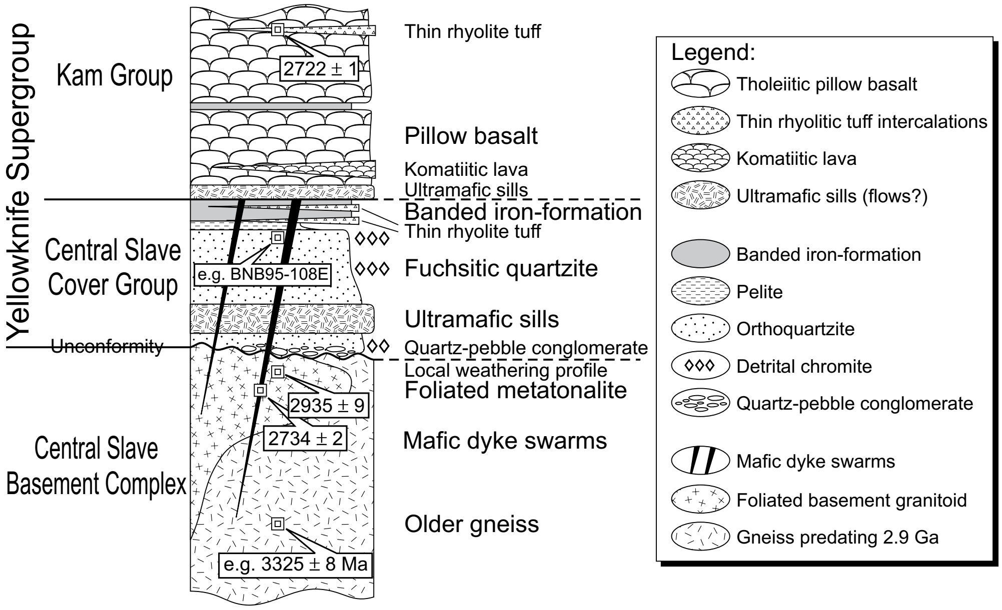

Figure 2. *Stratigraphic column for the Central Slave Cover Group (after Bleeker et al., 1999; age information from Isachsen and Bowring, 1997, Bleeker et al., 1999; and Ketchum and Bleeker, 1999).*

progressive deepening of the depositional environment and transgressive migration of the shoreline, and loci of coarse clastic sediment input, over the basement complex.

The banded iron-formation unit varies in facies from merely a thin sulphidic chert, with or without calc-silicates, to a well developed oxide- or silicate-facies iron-formation. In most places it is capped by a thin, sulphidic chert layer and then abruptly overlain by massive to pillowed basaltic flows, with or without further intercalations of banded iron-formation or sulphidic chert (Fig.2). Sheared ultramafic rocks are commonly associated with the Central Slave Cover Group and mostly represent sills. Highly magnesian mafic/ultramafic lavas have been observed at or near the base of the pillow basalt sequence.

In Figure 1, we show all the localities where the critical stratigraphy (as illustrated in Fig. 2) has been identified. Despite local complexities (e.g. faults, crosscutting plutons, down-cutting younger unconformities; Bleeker et al., 1999), these localities not only define a regional marker horizon, but also a craton-scale form surface (i.e., the basement-cover interface) that outlines a complex, but rational, geometry. The entire area structurally and stratigraphically below this form surface consists of older Meso- to Paleoarchean crystalline basement, variably reworked by younger phases of plutonism.

NEW RESULTS: EXTENSION OF THE CENTRAL SLAVE COVER GROUP INTO THE REALM OF THE NORTHWESTERN SLAVE PROVINCE

Recent work has concentrated on unravelling the connection between the Central Slave Basement Complex with its cover and the old gneiss units in the Acasta area.

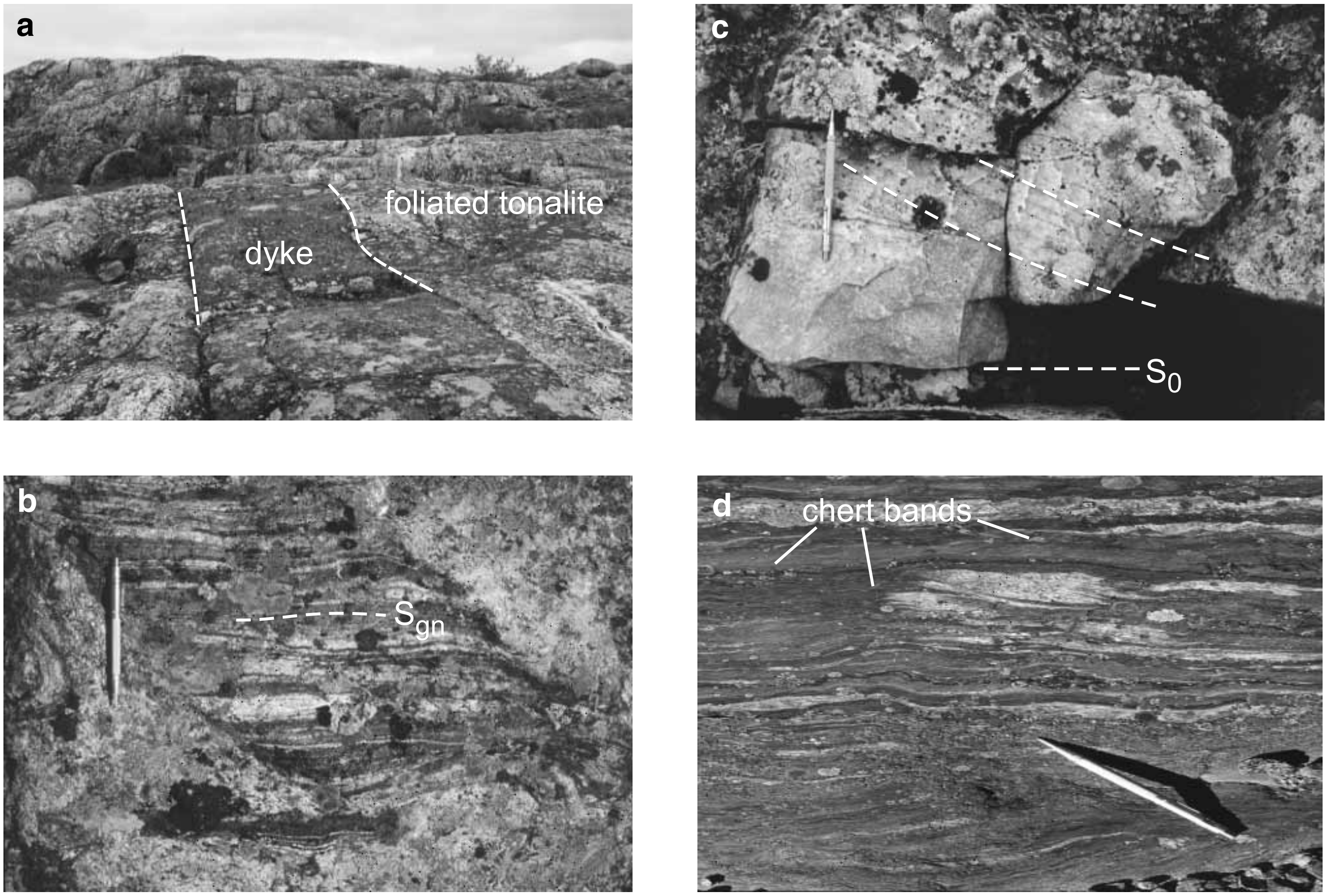

Figure 3. Photographs of critical exposures in the Acasta–Emile River area. ***a****) Amphibolite dyke, about 1.5 m thick, cutting foliated basement tonalite below the western limb of the Emile River greenstone belt.* ***b****) Enclave of Acasta-type layered dioritic gneiss in younger granitoid host below the Emile River greenstone belt, S_{gn} denotes gneissic layering.* ***c****) Crossbedded orthoquartzite of the Central Slave Cover Group, Emile River greenstone belt, S_0 denotes a bedding plane. Younging direction towards greenstones (up in photo; pen is 15 cm long).* ***d****) Silicate/oxide-facies banded iron-formation overlying the quartzite shown in c), top of Central Slave Cover Group, Emile River greenstone belt.*

Gneissic rocks of the Point Lake area are separated from gneisses in the Acasta area principally by the Emile River supracrustal belt (Fig. 1). The Emile River belt comprises two marginal greenstone belts of deformed pillow basalt sequences that converge towards the north and join in a steeply plunging, late-stage fold hinge. The central part of the Emile River belt is occupied by metaturbidite units that overlie pillow basalt units which re-emerge in several complexly shaped domes in the core of the belt. The critical result of this study is that essentially continuous outcrops of fuchsitic quartzite overlain by sulphidic chert or banded iron-formation were found all along the basal contacts of both the eastern and western marginal greenstone belts (Fig. 3). Together with the synformal fold hinge at the northern closure of the Emile River belt, this unequivocally links the Point Lake basement gneiss domain to the Acasta gneiss domain.

Using aeromagnetic anomalies as a guide, the fuchsitic quartzite and banded iron-formation on the west side of the Emile River belt could be mapped all around the southern closure of a large basement-cored anticline, the Scotstoun Anticline, into the Acasta Syncline, and from there further west around another basement-cored domal structure, the Exmouth Anticline (Fig. 1). Previous workers (e.g. St-Onge et al., 1991) had identified several of the quartzite occurrences around the Exmouth Anticline and correlated these quartzite bodies and overlying volcanic rocks with the Paleoproterozoic Epworth Group. In our view, this correlation is incorrect. Instead, lithological correlation with the ca. 2.8 Ga Central Slave Cover Group is so strong, with many of the characteristic and rather unique features of the Central Slave Cover Group being present at each locality from Emile River to Acasta (basal quartz pebble conglomerate, fuchsitic quartzite, banded iron-formation, ultramafic rocks, see Fig. 2), that we conclude that quartzite and banded iron-formation overlying the Acasta Gneiss Complex are Archean in age and part of the Central Slave Cover Group. In contrast, true Epworth Group strata of the foreland of Wopmay Orogen further to the northeast consist of glauconitic quartz arenite units interlayered with green and red siltstones and yellow stromatolitic dolomites. This much younger and thicker siliciclastic shelf sequence lacks the typical Archean association with banded iron-formation and overlying pillow basalt flows.

We support our new correlation with detrital-zircon data from a quartzite sample overlying Acasta basement on the western flank of Exmouth Anticline (Fig. 4a). Using the SHRIMP II facility at the Geological Survey of Canada, Ottawa, analysis of 49 grains revealed a variety of detrital ages, but none younger than ca. 2820 Ma (Table 1). These data are consistent with the quartzite being part of the ca. 2.8 Ga Central Slave Cover Group. A Paleoproterozoic quartzite would almost certainly have sampled detritus from ca. 2.6 Ga granite units that are ubiquitous throughout the Slave Province. To further strengthen our correlation, we also show detrital zircon data from a second fuchsitic quartzite of the Central Slave Cover Group sampled along the basement-cover contact north of Yellowknife (Fig. 4b). Although there are subtle differences in the detrital zircon populations of the two samples, probably reflecting local source variations, more important are the similarities, namely the presence of a variety of very ancient grains and a complete lack of grains younger than 2.8 Ga. The youngest concordant grains have ages of ca. 2820–2850 Ma (Exmouth Anticline, sample BNB95-108E) and ca. 2880–2950 Ma (Yellowknife, sample BNB97-008), respectively. The age of quartzite deposition is thus constrained to be younger than ca. 2820 Ma, but older than 2734 Ma, the age of the oldest crosscutting mafic dykes determined elsewhere (Bleeker et al., 1999).

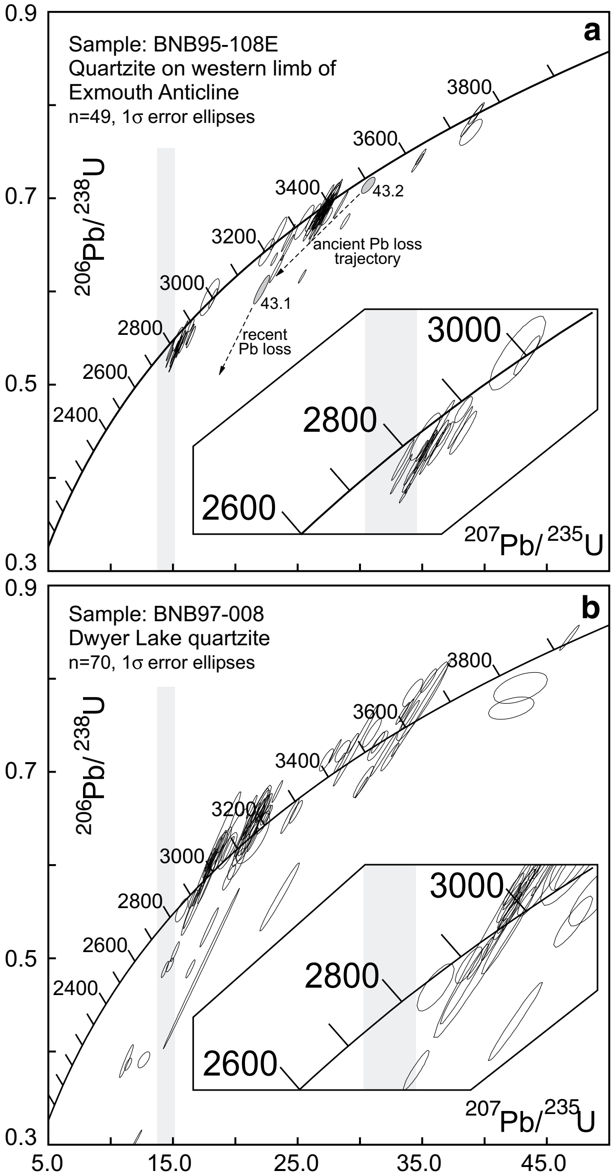

Figure 4. *Concordia diagrams of SHRIMP detrital zircon analyses of two quartzite units from the Central Slave Cover Group.* ***a****) Sample BNB95-108E, basal quartzite overlying Acasta gneiss on the western limb of the Exmouth Anticline.* ***b****) Sample BNB97-008, basal quartzite from below the Yellowknife greenstone belt, Dwyer Lake. Shaded bands highlight the permissible depositional age range of the Central Slave Cover Group.*

Table 1. $^{207}Pb/^{206}Pb$ ages of youngest concordant and near concordant detrital-zircon grains in two quartzites of the Central Slave Cover Group.

Sample: BNB95-108E
Rock type: basal pebbly quartzite overlying Acasta gneiss
Location: western limb of Exmouth Anticline
Total grains analyzed: 49

Grain/probe spot	$^{207}Pb/^{206}Pb$ age (Ma)	2σ error (Ma)	Concordance (%)
1.1	2823	11	98.1
47.1	2841	8	96.3
59.1	2852	42	98.9

Sample: BNB97-008
Rock type: basal fuchsitic quartzite overlying Anton Complex foliated granodiorite
Location: Dwyer Lake, below Yellowknife greenstone belt
Total grains analyzed: 70

Grain/probe spot	$^{207}Pb/^{206}Pb$ age (Ma)	2σ error (Ma)	Concordance (%)
32.1	2879	69	98.4
4.1	2935	40	98.2
23.1	2939	18	103.7
50.1	2944	13	103.7
8.1	2947	20	102.4

Both quartzite samples show important detrital modes at ages of known plutonic activity in the underlying basement (e.g. ca. 2950 Ma in the Yellowknife area, and ca. 3400 Ma in the Acasta area).

IMPLICATIONS AND CONCLUSIONS

Wopmay Orogen

Quartzite and banded iron-formation overlying the Acasta Gneiss Complex are identified as part of the ca. 2.8 Ga Central Slave Cover Group based on 1) lateral continuity from Emile River to Acasta, 2) robust lithological correlations, and 3) a complete absence of detrital zircons with ages younger than ca. 2.8 Ga. This cover sequence is conformably overlain by pillow basalt flows, and in turn by metaturbidite units. These conformably overlying strata are therefore also of Archean age and part of the Yellowknife Supergroup rather than the Paleoproterozoic Epworth Group. Consequently, considerable parts of the central Wopmay Orogen are part of the Slave Craton proper, possibly as far west as the Wopmay Fault Zone, with only small outliers of Paleoproterozoic Epworth Group overlying the craton (e.g. granite-cobble conglomerate and dolomite in the Acasta area). Many of the ramifications for the geology of the central Wopmay Orogen need further analysis, but the thrust defined by King (1986) and St-Onge et al. (1991), wrapping the Exmouth Anticline and Acasta Syncline, cannot be the basal décollement of the Wopmay Orogen as it follows stratigraphy and structure that are now recognized as being largely Archean in age. The detailed map trace of the Paleoproterozoic basal unconformity needs to be redefined first before the Paleoroterozoic structural evolution can be assessed.

Acasta

Mapping of the Central Slave Cover Group into the Acasta River area, with the fuchsitic quartzite unconformably overlying the Acasta gneisses, firmly places Earth's oldest rocks within the old cratonic nucleus of the Slave Province prior to deposition of the ca. 2.8 Ga quartzite units. The ca. 4.0 Ga rocks of the Acasta River area form an unusually large, and on average better preserved, ancient enclave in a polycyclic, heterogeneous gneiss terrain that trends from Exmouth Anticline in the west, to around the Emile River Syncline (e.g. Fig. 3b), and further eastward to the Point Lake gneiss domain. Hence, considerable potential exists for a much larger preserved extent of 4.0 Ga crust, a prediction further underscored by the occurrence of >3.9 Ga detrital zircons in the quartzite north of Yellowknife (Fig. 4b).

Central Slave Basement Complex and the Central Slave Cover Group

Successful tracing of the Central Slave Cover Group into the northwestern part of the Slave Province unites all known rocks of the craton older than 2.85 Ga into a single contiguous basement complex prior to deposition of the fuchsitic quartzite units. A previous analysis of quartzite occurrences (Bleeker et al., 1999) and U-Pb basement ages (Bleeker and Davis, 1999) already had linked all basement rocks into two basement domains, one in the south-central Slave and one in the northwest. We have now bridged the gap between these two domains and shown that they formed a single block by at least 2.85 Ga. Consequently, we propose to redefine the Central Slave Basement Complex to include this entire cratonic nucleus. The Central Slave Cover Group forms the hallmark of this old cratonic nucleus. Bleeker et al. (1999) interpreted the Central Slave Cover Group and overlying basalt sequence in terms of plume-assisted rifting of the older continental nucleus.

The areal extent of the Central Slave Basement Complex is ≥100 000 km^2 in size — a fragment of preserved Meso- and Paleoarchean crust that is larger than, for instance, the exposed parts of the Pilbara Craton. For descriptive purposes, and given the overall size and shape of the Central Slave Basement Complex, it is probably useful to retain a subdivision of the basement into two domains: 1) a south-central domain, comprising the Anton, Sleepy Dragon, and other basement complexes as far north as Point Lake; and 2) a northwestern domain, comprising the area stretching from Acasta to the Coronation Gulf, including the Kanguyyak Gneiss Complex and the Eokuk Uplift (e.g. see Bleeker and Davis, 1999, and references therein, for U-Pb age domains).

Break-up of the old cratonic nucleus: the 2.8–2.6 Ga orogenic cycle

Sometime after 2.85 Ga, the nucleus of Meso- and Paleoarchean sialic crust experienced regional uplift followed by gradual subsidence giving rise, first, to the craton-scale unconformity and, then, to the thin transgressive veneer of crossbedded, highly mature, quartzitic sediments. We attribute this uplift-subsidence cycle to arrival of a mantle plume which gave rise to subaerial komatiite flows, the vestiges of which are now preserved as the detrital chromite grains in the quartzite units of the Central Slave Cover Group. Following this initial uplift-subsidence cycle, rifting of the thermally weakened crust resulted in voluminous outpouring of pillow basalt flows and intrusion of associated dyke swarms. Much of the craton was submerged at this time, so that there is little or no sedimentary record of this rifting phase. Banded iron-formation deposition marks both the waning of terrigenous sediment input and the onset of widespread submarine volcanism. Fissure-fed basalt flows poured out over variably thinned continental crust, and are now preserved as the basal greenstones of the west-central Slave Province.

Rift to drift and old supercontinents

Along its eastern margin, old crust of the Central Slave Basement Complex is juxtaposed against younger than 2.8 Ga crust (Davis and Hegner, 1992). Evidently, a complementary part of the Central Slave Basement Complex had drifted away and was replaced by a younger, largely juvenile, and possibly exotic fragment of Archean crust. The dispersed complementary part or parts, if preserved, are now likely incorporated in some of the twenty-odd Archean cratons scattered around the globe. The diagnostic sequence of the Central Slave Cover Group, and its associated template of precise U-Pb ages, will provide the critical correlation tool for testing possible matches. This will be important not only for reconstructing a ca. 2.5 Ga supercontinent, which likely existed prior to 2.4–2.0 Ga break-up and dispersal of Archean cratons, but also for the more daunting task of reconstructing a potential supercontinent predating 2.8 Ga.

A 3.0–2.8 Ga global 'quartzite peak'

A preliminary survey of the Archean rock record with the ultimate aim of identifying complementary parts of the Central Slave Basement Complex and its diagnostic cover reveals that similar (fuchsitic) quartzite units are quite common. Some examples include quartzite overlying gneiss of the Winnipeg River Subprovince, western Superior Craton (e.g. Sanborn-Barrie and Skulski, 1999); the Manjeri Formation of the Belingwe greenstone belt, Zimbabwe Craton (e.g. Hunter et al., 1998); quartzite of the Southern Cross Province, Yilgarn Craton (Griffin, 1990); and fuchsitic quartzite of the Beartooth Mountains, Wyoming Craton (e.g. Mueller et al., 1992).

Quartzite of this type, characterized by conspicuous detrital chromite and its metamorphic derivative fuchsite, occurring in general association with older sialic basement and overlying banded iron-formation, komatiite, and mafic volcanic rocks, show ages that span the entire Archean rock record, although most of them appear to be younger than 3.0 Ga. A large number of prominent quartzite occurrences, including representatives from virtually every craton, were deposited between 2950 Ma and 2750 Ma. Other, apparently older quartzite occurrences are not very well dated, their ages mainly constrained by the youngest detrital zircons analyzed to date. Some of these apparently older quartzite units may therefore be younger than assumed and may also belong to this 2950–2750 Ma age group (e.g. Malene supracrustal rocks of western Greenland, see Schiøtte et al., 1988). Yet other quartzite sequences such as the Sargur Group (an older sequence of the Dharwar Craton; e.g. Viswanatha and Ramakrishnan, 1975), the Beit Bridge sequence (Limpopo Belt; e.g. Eriksson and Donaldson, 1986), and fuchsitic quartzite at Isua (ca. 3.8 Ga, Nain Craton; Nutman et al., 1997) are clearly older and a testament to similar tectonic and depositional processes all through the Archean. In contrast to these Archean quartzite units, detrital chromite does not appear to be particularly abundant in Paleoproterozoic and younger cover sequences, clearly pointing at the greatly reduced role of komatiitic magmatism in the cooler post-Archean Earth.

Despite variable age uncertainties for many of the Archean quartzite sequences, and a bias introduced by preservation being a function of age, the overall distribution appears strongly skewed towards a global 3.0–2.8 Ga 'quartzite peak'. This peak likely reflects progressive growth and stabilization of continental crust towards the close of the Archean. The quartzite peak at ca. 2.9–2.8 Ga suggests that many protocratonic fragments, including the Central Slave Basement Complex, had attained stability by this time. However, for most cratons, except for large segments of the Pilbara and Kaapvaal, this stability was transient and temporarily lost during collisions towards the end of the ca. 2.7 Ga supercontinent break-up and subsequent reaggregation.

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