

Revision of the Stratigraphy of the Proterozoic Hornby Bay Group, Nunavut

Paul Ramaekers
832 Parkwood Dr., S.E., Calgary, AB, T2J 3W7
mfres@telus.net

Octavian Catuneanu
University of Alberta, Edmonton, AB

Summary

Geochronological work and exploration drill and mapping programs in the eastern half of the Hornby Bay Basin area over the last 8 years permits a re-evaluation of the stratigraphy, depositional environments, and development history of the Hornby Bay and Dismal Lake groups in their outcrop area. The data indicates the need for a stratigraphic revision of the Hornby Bay Group. A suggested revision is provided in the correlations chart.

Main Points and Conclusions

The Hornby Bay area sediments between the slightly metamorphosed sediments, volcanics, and intrusives of the Great Bear Magmatic Zone (GBMZ) and the Dismal Lakes Group, i.e. the Hornby Bay Group of Ross and Kerans (1989) should be subdivided into a lower Bigbear Group for the sediments of the Bigbear Formation, and an overlying Mountain Lake Group to contain the present Lady Nye, East River, and Kaertok formations. This is indicated by the presence of a major unconformity between the proposed groups.

The Bigbear Group may be subdivided into a basal Rocky Defile Formation and an upper Weather Lake Formation. On present maps some of the conglomerates of the GBMZ are mapped as basal Bigbear Formation. The Rocky Defile Formation consists of four fining-up cycles of coarse conglomerates, pebbly sandstones, sandstones, and in places appreciable thicknesses of interbedded mudstones, siltstones and fine sandstones. These were deposited in alluvial fan, fluvial and possibly lacustrine depositional environments shedding on both sides of the GBMZ uplands. The overlying Weather Lake Formation consists largely of eolian sandstones with interbedded relatively thin fluvial and lacustrine deposits. The presence of great thicknesses (>700m) of Weather Lake sediments in narrow (<3 wide) basins indicates a change of tectonic regime during deposition of the Bigbear Group.

The recent work shows that a similar sequence of facies onlaps both sides of the GBMZ and is probably continuous across this upland in places. The sequence west of the GBMZ (Fault River Fm) was previously thought to be younger than the Bigbear Fm, but the two formations are likely coeval and synonymous, rather than Fault River sediments overlying reworked Bigbear clastics.

A substantial hiatus separates the Bigbear and Mountain Lake groups. This is indicated by a dramatic shift in paleocurrent patterns and a change in the depositional maturity of the

sediments. It indicates a change in the tectonic framework: producing relatively local basins adjacent to uplifts during Bigbear time and a major coastal plain along an epicontinental sea during Mountain Lake time.

The basal fluvial, eolian to shallow marine Lady Nye Formation of the Mountain Lake Group extends much further east than previously thought, right to the eastern limit of the Bigbear-Mountain Lake outcrop belt. The overlying paralic clastics and shallow marine carbonates of the East River Formation and the paralic clastics of the upper Kaertok Formation are at present restricted to areas west of the main NS outcrop belt of the GBMZ.

Acknowledgements

Results from over 80 drill holes, a number of them 700-1000 m long, and a 5 year helicopter supported mapping program, geochemical and geophysical data were graciously made available by Unor Inc. Doug Cruickshank did much of the core logging. Discussion with other Unor staff especially Dave Bent, Vadim Galkin, Bogdan Nitescu and Doug Cruickshank was of great assistance in understanding the area.

References

Ross, G.M, Kerans, C., 1989, Geology, Hornby Bay and Dismal Lakes Groups, Coppermine Homocline, District of Mackenzie, Northwest Territories. Geological Survey of Canada, Map 1663A, scale 1:250,000.

Ross and Kerans 1989			Proposed revision								
Group	Formation	Member	members shown to be synonyms and reassignments	Group	Formation	Member	Main generalized lithofacies				
Conformable contact with overlying Coppermine River Group basalts											
Dismal Lakes Group	Greenhorn Lakes	Dg		Dismal Lakes Group	Greenhorn Lakes	Dg	Laminated carbonates, minor stromatolite bioherms, mudstone				
	Sulky	Ds			Sulky	Ds	Stromatolitic carbonates, reefal in some areas				
	Kendall River	Dk			Kendall River	Dk	Interbedded oolitic and stromatolitic carbonate, mudstone, and fine sandstone				
	Dease Lake	Dd			Dease Lake	Dd	Fine sandstones and mudstones, evaporitic, with salt and gypsum casts				
	Fort Confidence	Df				Fort Confidence	Df	Thinly bedded black mudstone, interbedded fine sandstone			
									Dl		
Leroux			Leroux			Marine qtz-rich sandstone, minor basal pebbly sandstone, lags, mudstone					
Major unconformity											
Hornby Bay Group	Kaertok	Hk		Mountain Lake Group	Kaertok	Mk	Feldspathic qtz arenites, mudstones, trace carbonates				
		He3				Me3	Interbedded carbonate and sandstone				
		East River	He2				Me2	Carbonates			
	He1				Me1	Interbedded carbonate and sandstone					
	Lady Nye	HI4				Lady Nye	MI4	Quartz arenite, minor black mudstone and evaporites			
							MI3b	Fluvial sandstone, pebbly sandstone, mudstone			
							MI3a	Cgl largely of reworked Bw, Br cobbles, sandstones			
							MI2b	Pebbly qtz-rich fluvial sandstone, eolian fine sandstone			
							MI2a	Quartz-rich cgl, pebbly sandstone, sandstone			
	Bigbear	HI1 part, HI2				Bigbear	MI1, fine clastics	Sandstone, pebbly sandstone, mudstone			
							MI1 part				
	Major unconformity, change of paleoslope										
Bigbear Group	Fault River	Hf3	= MI2a, b	Bigbear Group	Weather	Bw2	Eolian sandstones, minor fluvial sandstones and mudstones				
		Hf2	= MI1, MI2b in part			Bw1, Br4b	Eolian sandstone, base pebbly where it overlies basement				
	Hf1	= Br1, Br2a,b,c, Br3	Br4a		Polymict pebbly sandstone, sandstone						
	Hb7	= MI1, MI2a, MI2b	Br3b		Polymict cgl, minor pebbly sandstone						
	Hb6	= MI1, MI2a, MI2b	Br3a		Polymict pebbly sandstone, sandstone						
	Hb5	= Bw1, Bw2	Rocky Defile		Br2c	Mudstone, siltstone, fine sandstone					
	Hb4	= Bw1			Br2b	Polymict pebbly sandstone, sandstone					
	Bigbear	Hb3	= Br2, Br3, Br4			Bigbear	Br2a	Br2a	Polymict cgl, minor pebbly sandstone		
										Hb2	= Br2, Br3, Br4
										Hb1 part	= Br1
Bigbear	Hb1 part			Bigbear		Br1a,b,c	Monomict cgl of local derivation, pebbly sandstones and mudstones				
								Hb1 part	= McTavish group and Br1		
Major unconformity											