

# Southwestern Margin of the Rae Province: A Data Synthesis

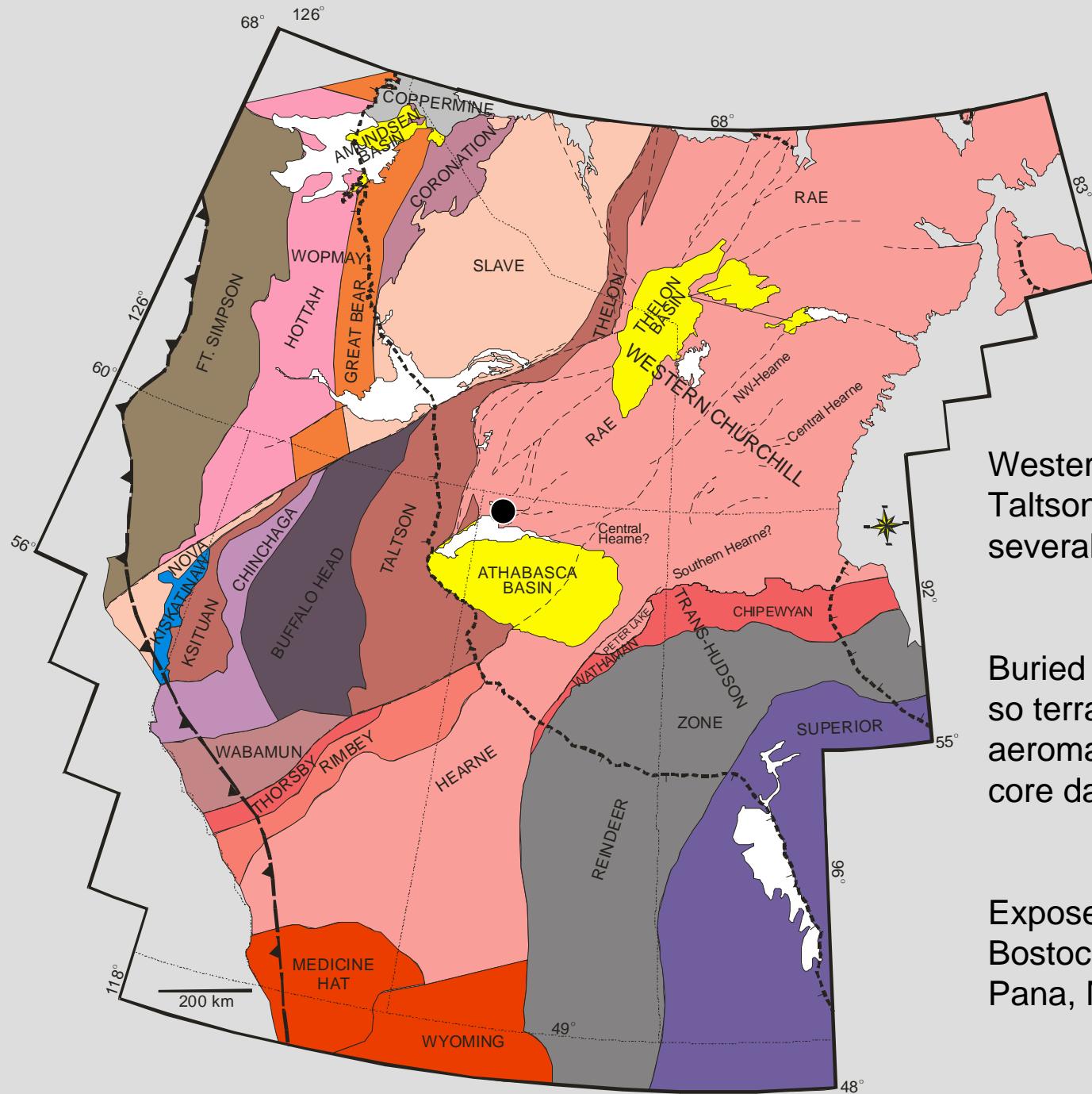
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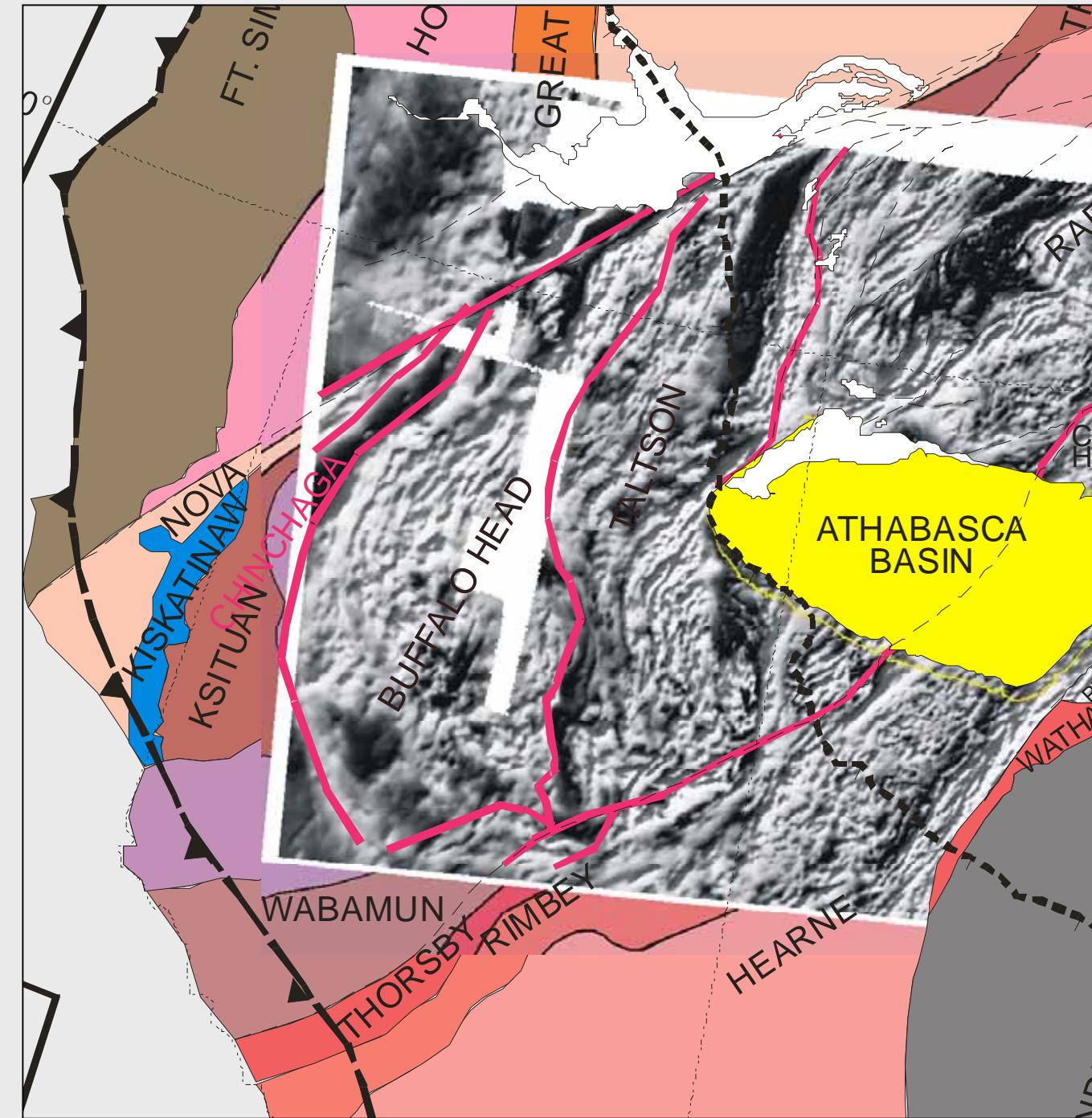
SUCCESS  
THROUGH  
INNOVATION



Western margin flanked by  
Taltson Magmatic Zone and  
several exotic? terranes

Buried under Phanerozoic cover,  
so terranes based on  
aeromagnetic signature and drill  
core data (Ross, Villeneuve)

Exposed margin known from  
Bostock, van Breemen, Berman,  
Pana, McDonough, McNicoll



Most of this area buried under Phanerozoic cover

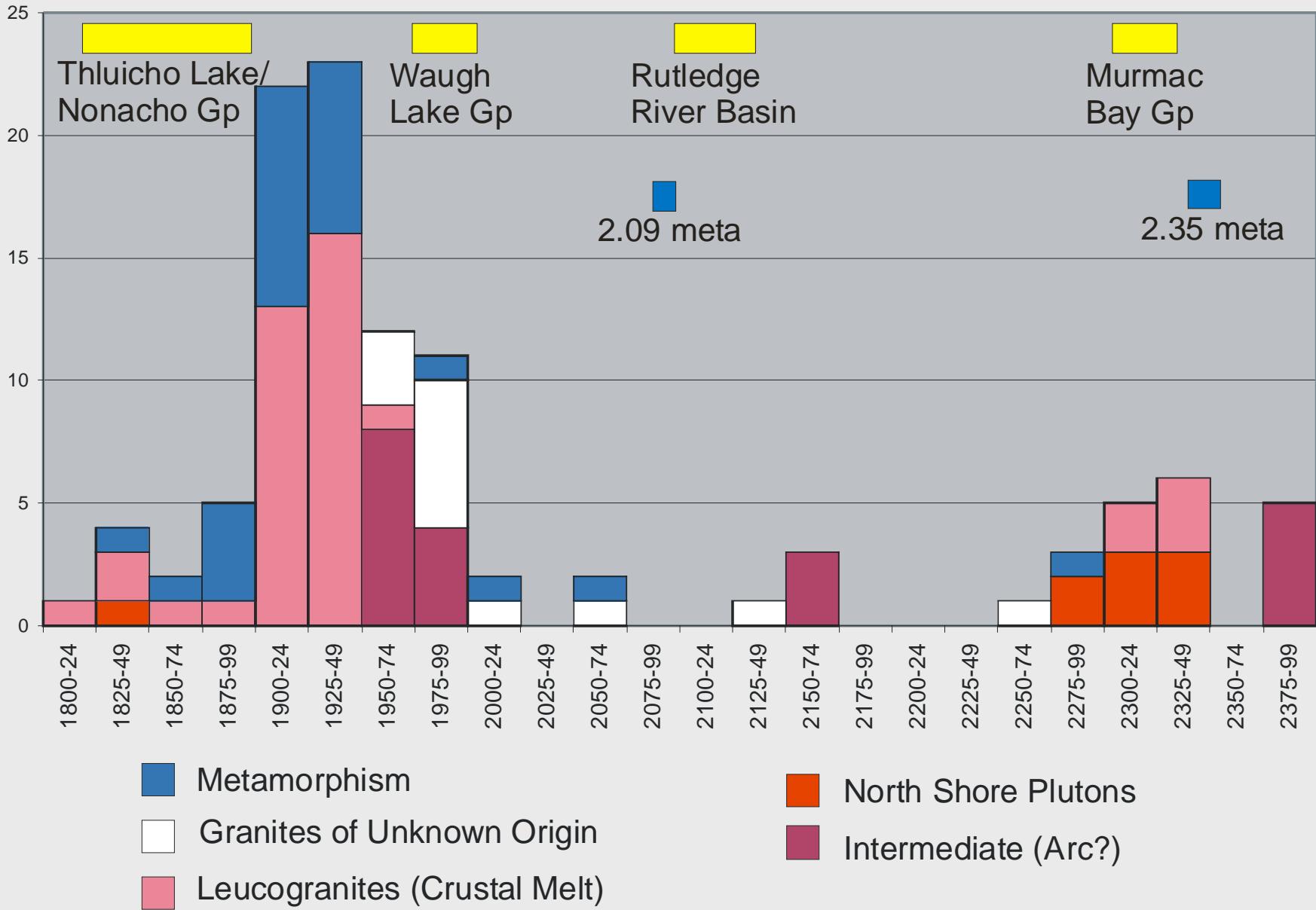
Domains are mainly based on aeromagnetic signatures

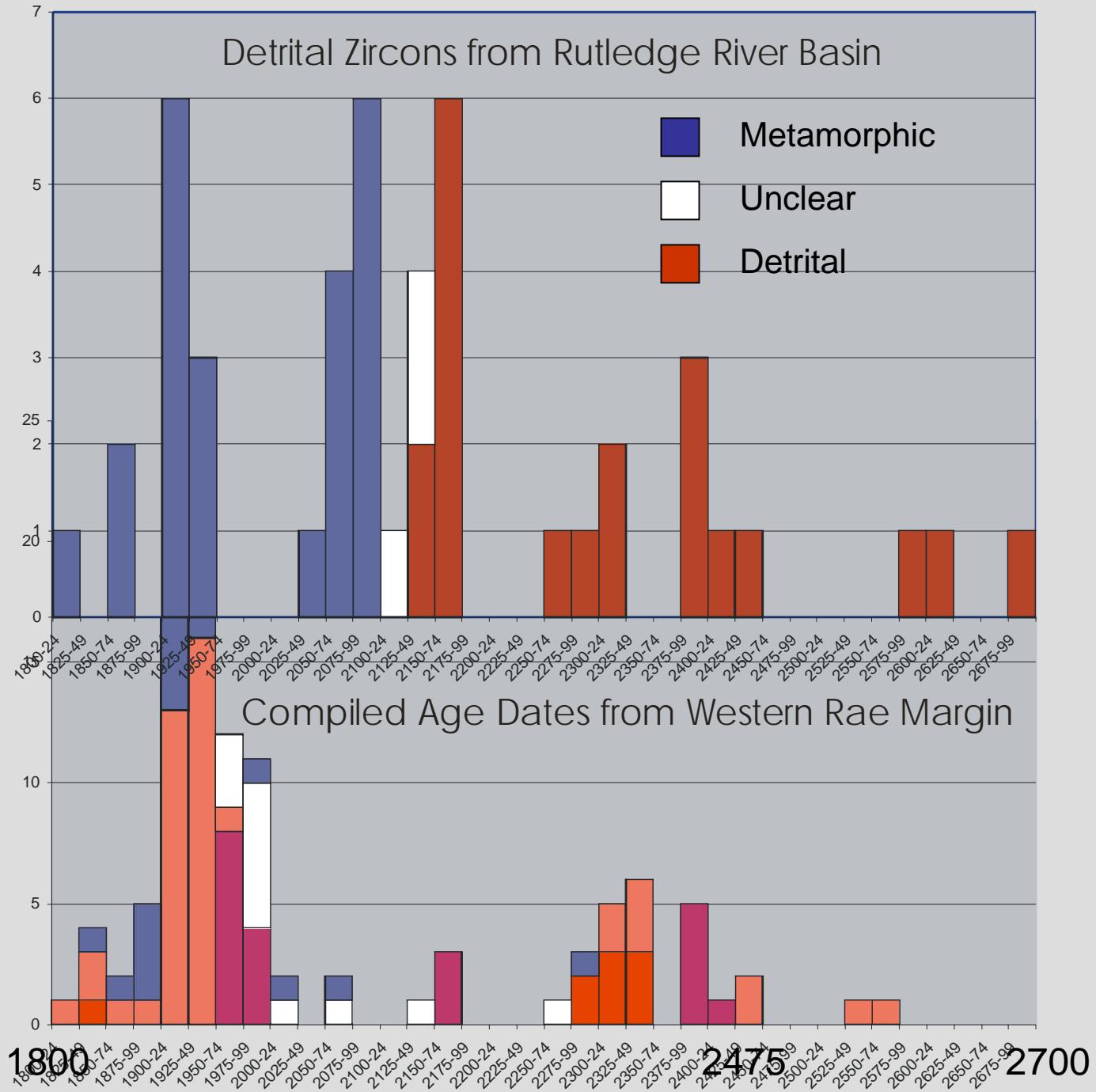
Shouldn't be confused with terranes in the tectonic sense

## Western Rae Margin Database

Rock Type	Arc/Melt	Domain	Age	Error (±	Min	M1	Min (±)	M2	Min (±)	LI	(±)	T <sub>DM</sub>	E <sub>ND</sub>
monzogranite	melt	Rimbey-Hudson	1798	29/28	z					53	22	4.03	-17.9
massive syenogranite	melt	Taltson/Hudson granite?	1813	5	z					?		Bostock et al.	
aplitic granite	melt	Lloyd	1830	25	z							Stern et al.	
syenogranite	melt	Rimbey-Hudson	1831	6	z	1815	m	3		25	18	Villeneuve	
granite	rift?	Clearwater	1843	4	z							Stern et al.	
granodiorite		Fort Simpson	1844	5/4	z							Villeneuve	
granodiorite	arc?	Hottah	1845	61/58	z					63	30/31	Villeneuve	
monzogranite		Fort Simpson	1846	3	z					115	38	Villeneuve	
granite		Nova	1855	6	z							Simandl et al.	
monzogranite	melt	Rimbey-Hudson	1856	3	m					31	100	Villeneuve	
granite		Fort Simpson	1859	10	z							Simandl et al.	
diorite-qtz monz, Compton lac	Great Bear arc?	Athapuscow Aulacogen	1865	15	z							Bowring et al.	
bi tonalite	arc?	Hottah	1870	12/11	z							Villeneuve	
eqigranular granite	melt	Taltson	1882	7/6	z					552	122	van Breemen	
Butte Is Intrusive Suite			1895	8	z							Bowring et al.	
granite	melt	Ksituan	1900	1	z					82	8	Villeneuve	
granite		Kiskatinaw	1903	7	z							Simandl et al.	
quartz monzonite?	melt?	Kiskatinaw	1903	2	z	1900	5	13		32	145/144	Villeneuve	
monzogranite	melt	Taltson	1906	3/1	m							Bostock et al.	
garnet granite?	melt?	Thelon	1909	2.5	z	1908	m	2		755	45	van Breemen	
monzonite	melt?	Lloyd	1911	18	z							Brouard et al.	
U City pink leucogranite	melt	Zemlak	1913	4	z					1005	22	Hartlaub et al.	
granite	melt	Lloyd	1914	20	z							Brouard et al.	
monzonite	melt	Lloyd	1915	17	z							Brouard et al.	
pegmatitic granite	melt	Thorsby	1915	23	z					97	9	Villeneuve	
pegmatite	melt	Lloyd	1917	35	z							Brouard et al.	
monzogranite	melt	Lloyd	1918	9	z							Brouard et al.	
muscovite granite	melt	Taltson	1922		z/m	1913	m					McDonough	
Konth syenogranite (Central)	melt	Taltson	1922	2	z/m							Bostock et al.	
granite	melt?	Hottah	1924	25/24	z					401	153/155	Villeneuve	
granite	melt	Taltson	1925	6/5	z							McDonough	
monzogranite	melt	Taltson	1926	3	z/m							Bostock et al.	
pegmatite	melt	Lloyd	1927	8	z							Brouard et al.	
felsite, Wilson Is Group		Athapuscow Aulacogen	1928	11	z							Bowring et al.	
monzonite	melt	Lloyd	1930	49	z							Brouard et al.	
pegmatite	melt	Lloyd	1932	11	z							Brouard et al.	
granite	melt	Taltson	1933		z/m	1919	m	2				McDonough	
pegmatite	melt	Lloyd	1933	4	z							Brouard et al.	
granite	melt	Taltson	1934	3	z							McDonough	
Konth syenogranite (NW)	melt	Taltson	1935	3/1	m							Bostock et al.	

# Western Rae Margin: 2400-1800 Ma

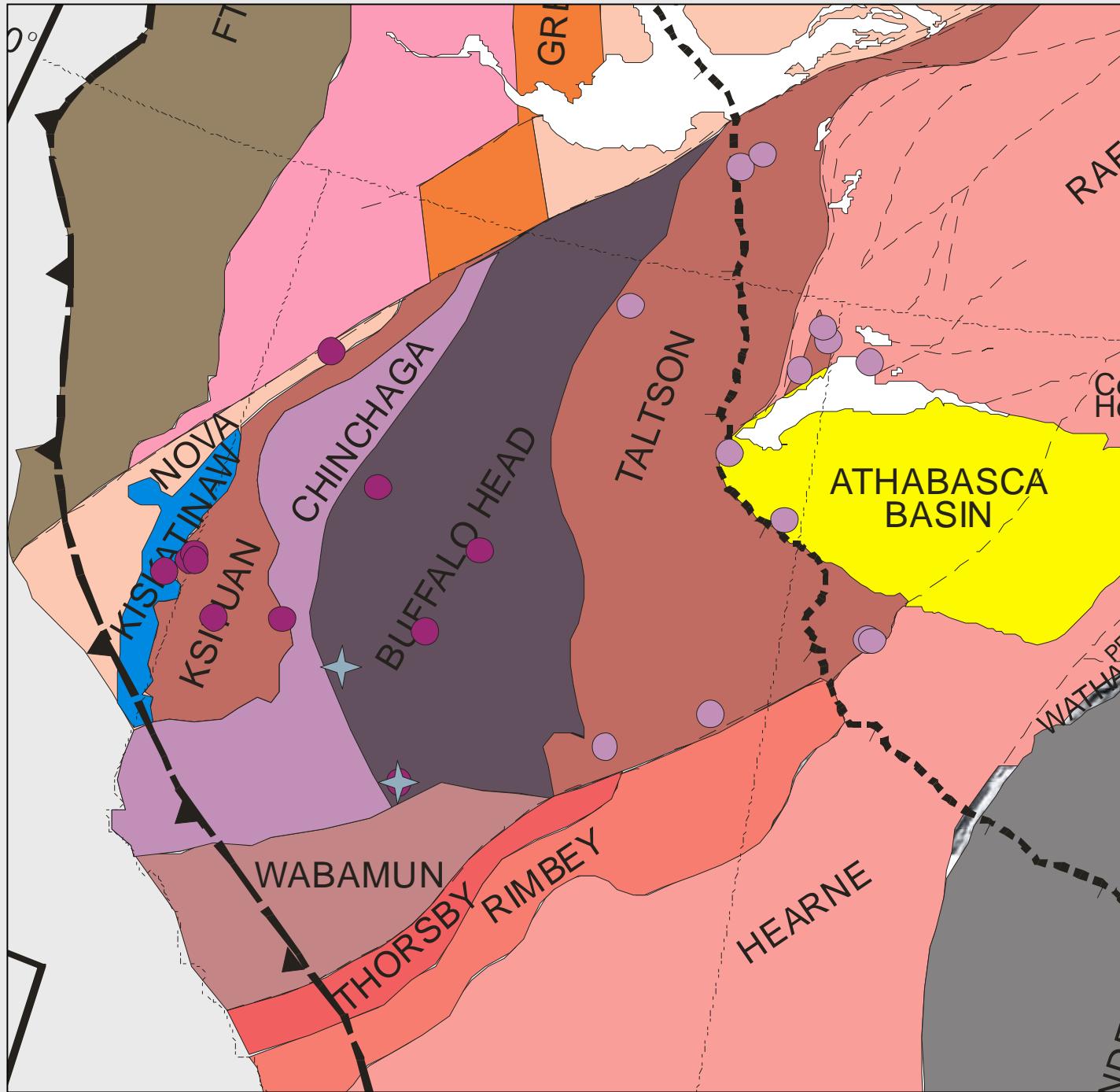


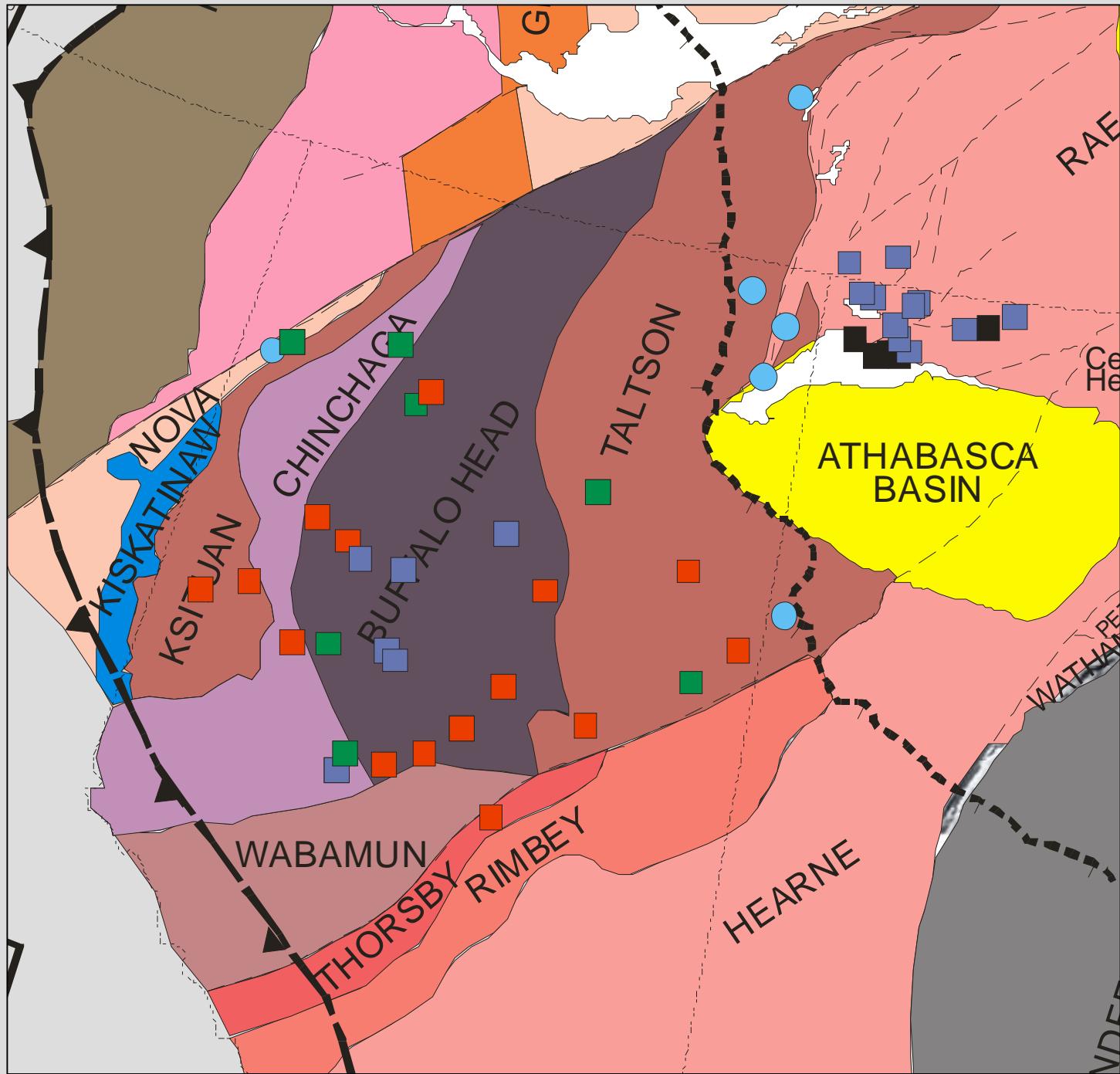


## 2000-1960 Story

- 1985-1960 Ma  
Taltson arc?
- ★ 1980 Ma  
metamorphism
- 2000-1985 Ma:  
Ksituan-Thelon  
arc?

New subduction  
zone sets up  
under Rae as  
Chinchaga-  
Buffalo Head-  
Slave terrane  
approaches?





$T_{DM}$

- 2.48-2.6 Ga
- 2.6-2.8 Ga
- 2.8-3.0 Ga
- 3.0-3.3 Ga

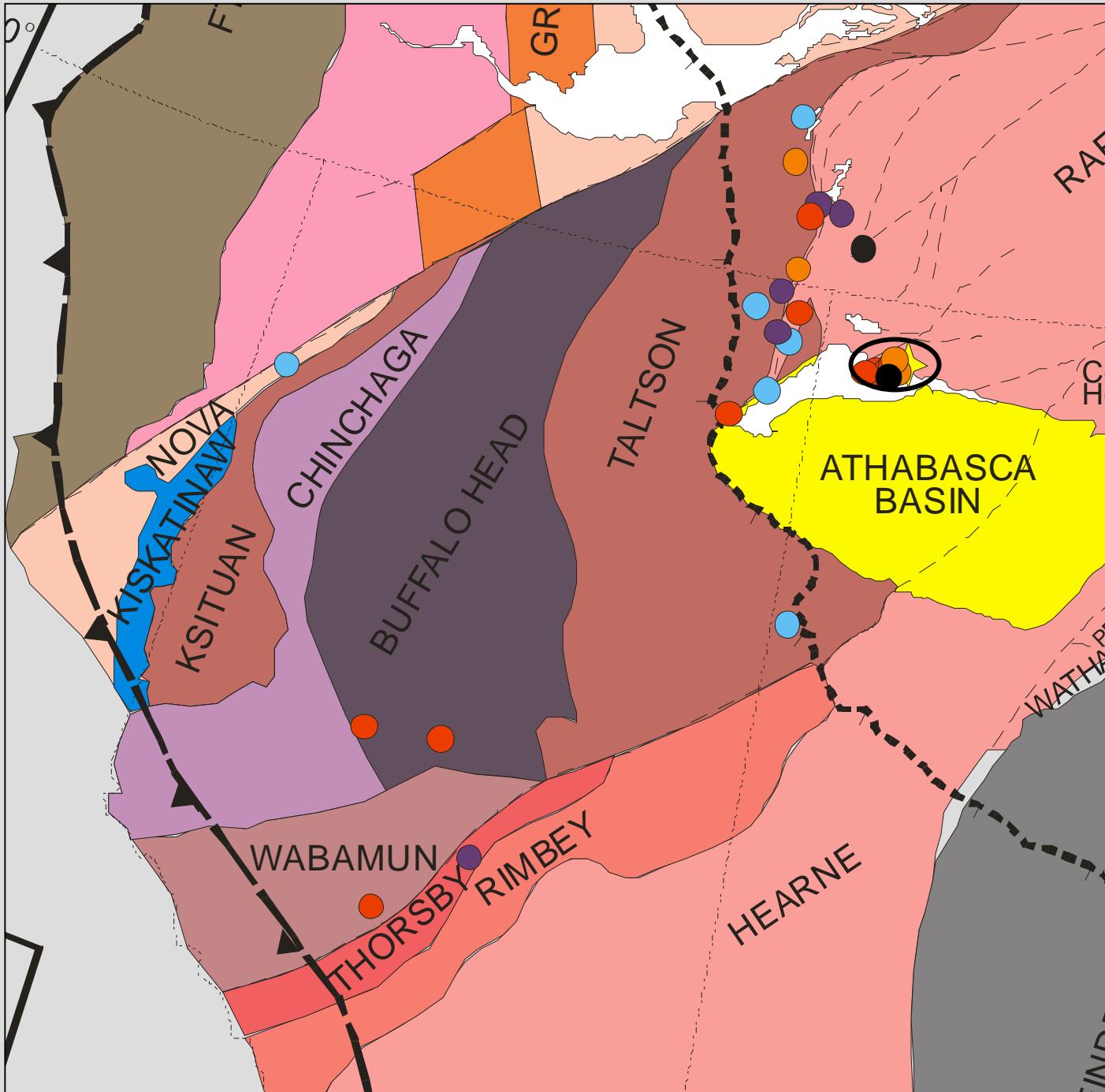
Rock Ages

- Archean

Few Archean rocks dated in western terranes but Nd data infers that most built on Archean material

### 2.4-2.3 Ga Story

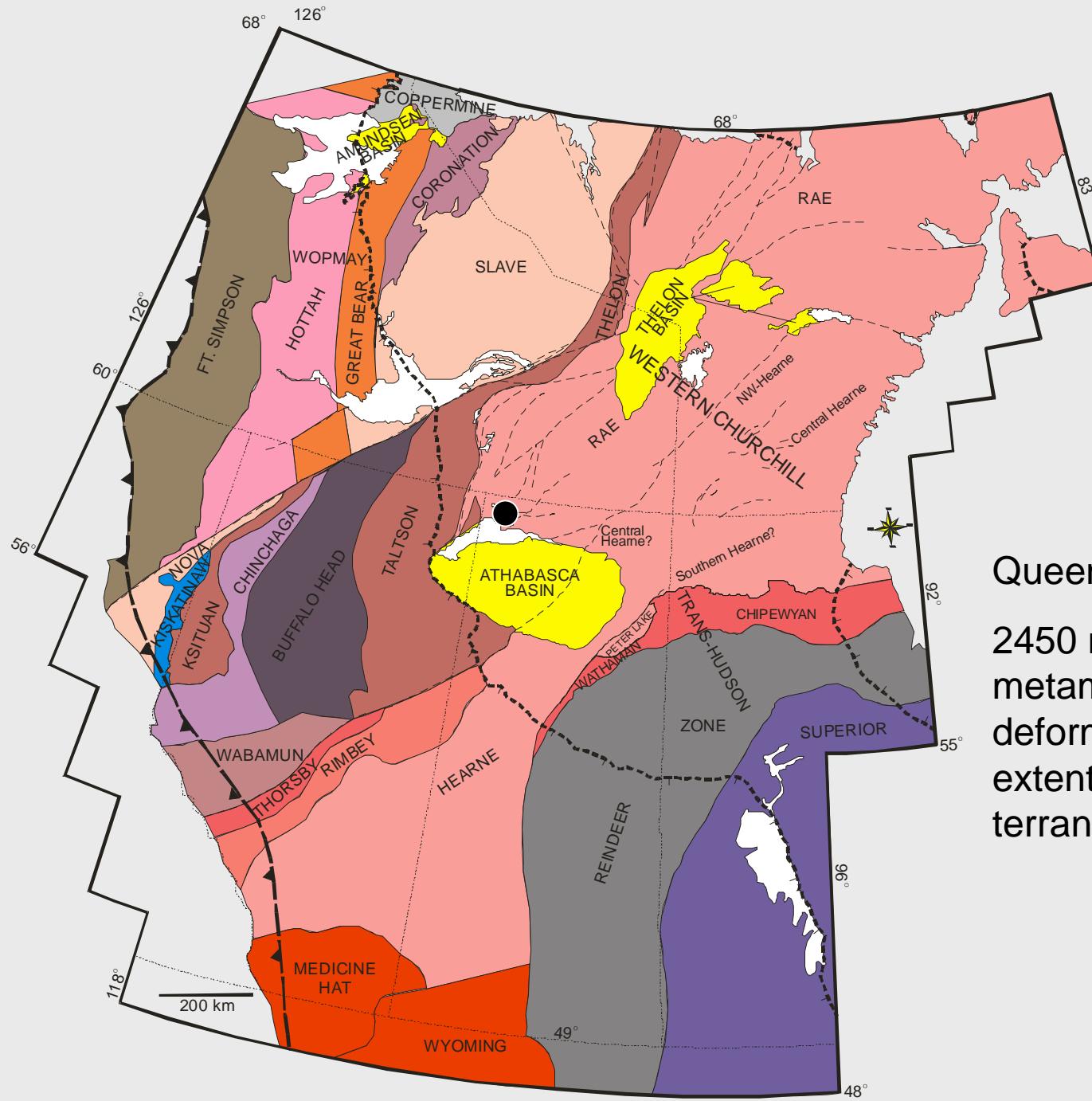
- 2330 Murmac Bay Gp
- 2330-2300 granites
- 2340 gabbro
- ★ Ca. 2350 metamorphism
- 2400-2380 arc?
- Archean



Terrane accretion to western Rae margin?

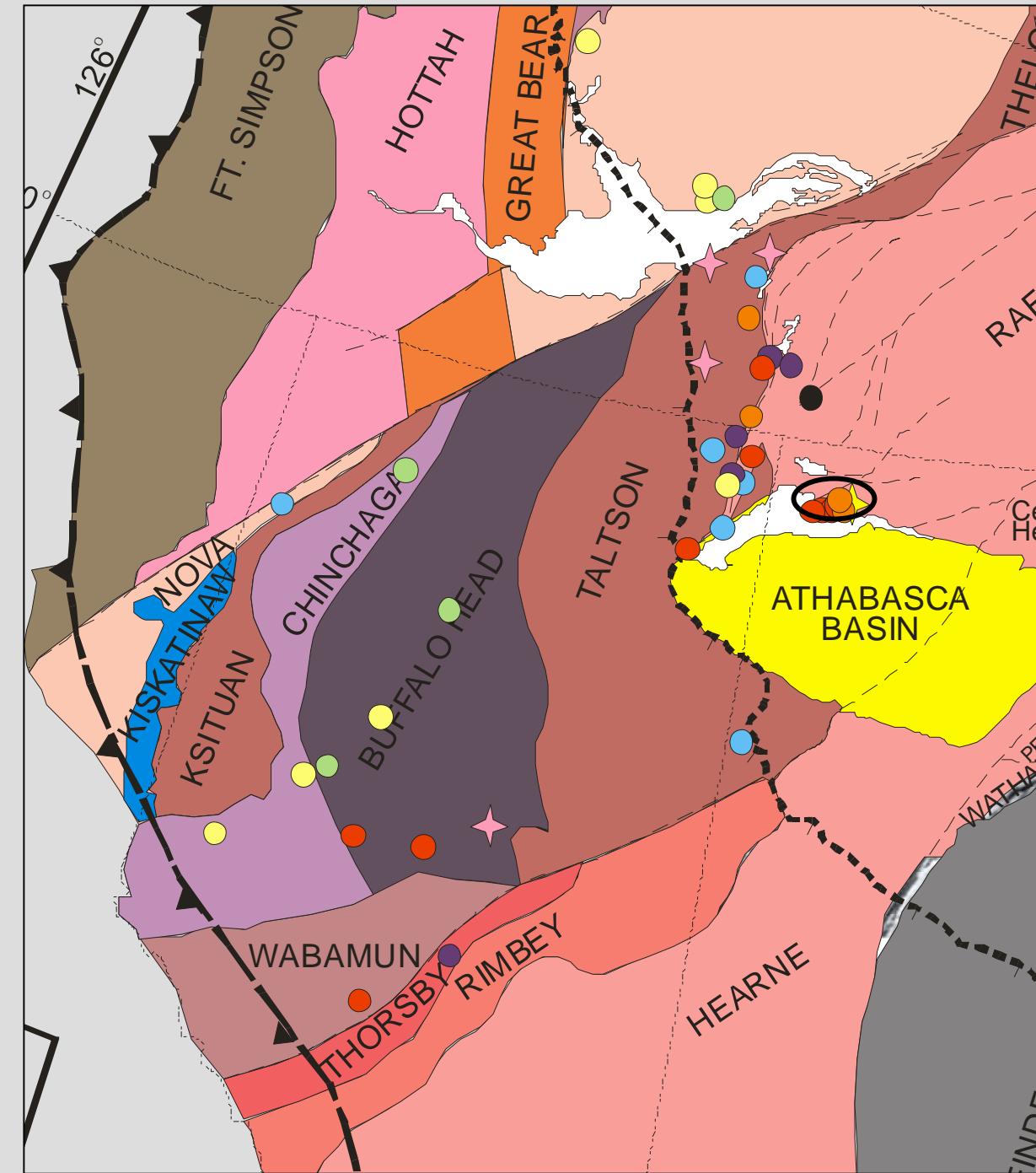
Wabamun-Thorsby extension of Rae margin or separate?

MBG post-collisional extension or separate rifting?



Queen Maud Block:  
2450 magmas and 2350  
metamorphism and  
deformation → northern  
extent of this accreted  
terrane or an earlier one?

## 2.2-2.0 Ga Story

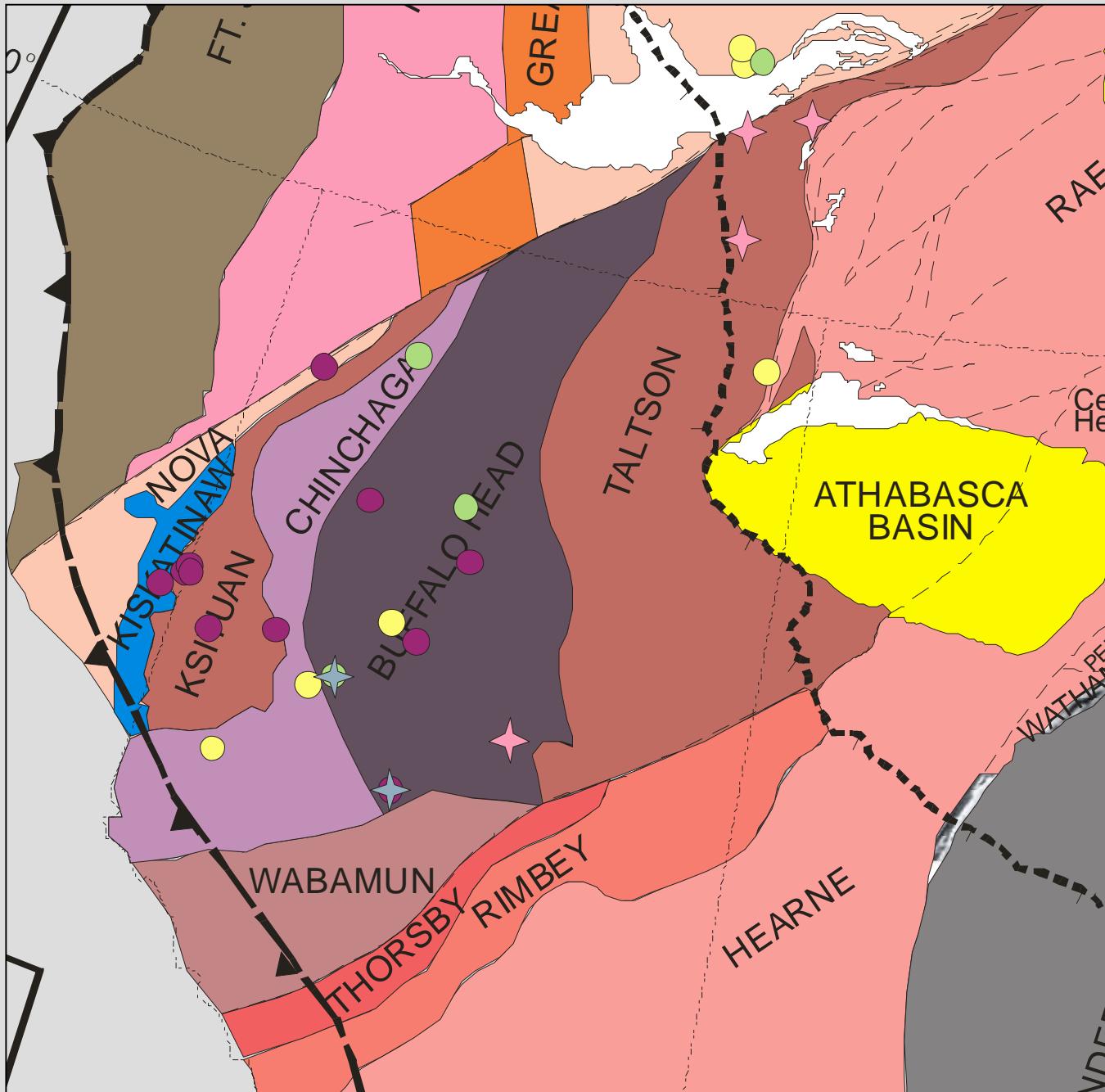


- ★ 2093-2044 meta
- 2094-2014 por gr; an
- 2190-60; 2138; int; an
- 2330 Murmac Bay Gp
- 2330-2300 granites
- 2340 gabbro
- ★ 2350 meta
- 2400-2380 arc?
- Archean

2190-60, 2094-14: periods of rifting and/or subduction?

Did southern Chin-BH rift off Slave?

Rae margin inactive



## 2000-1980 Story

1980 Ma  
metamorphism

2000-1985 Ma:  
Ksituan-Thelon  
arc?

2093-2044 meta

2094-2014 por gr; an

2190-60; 2138; int; an

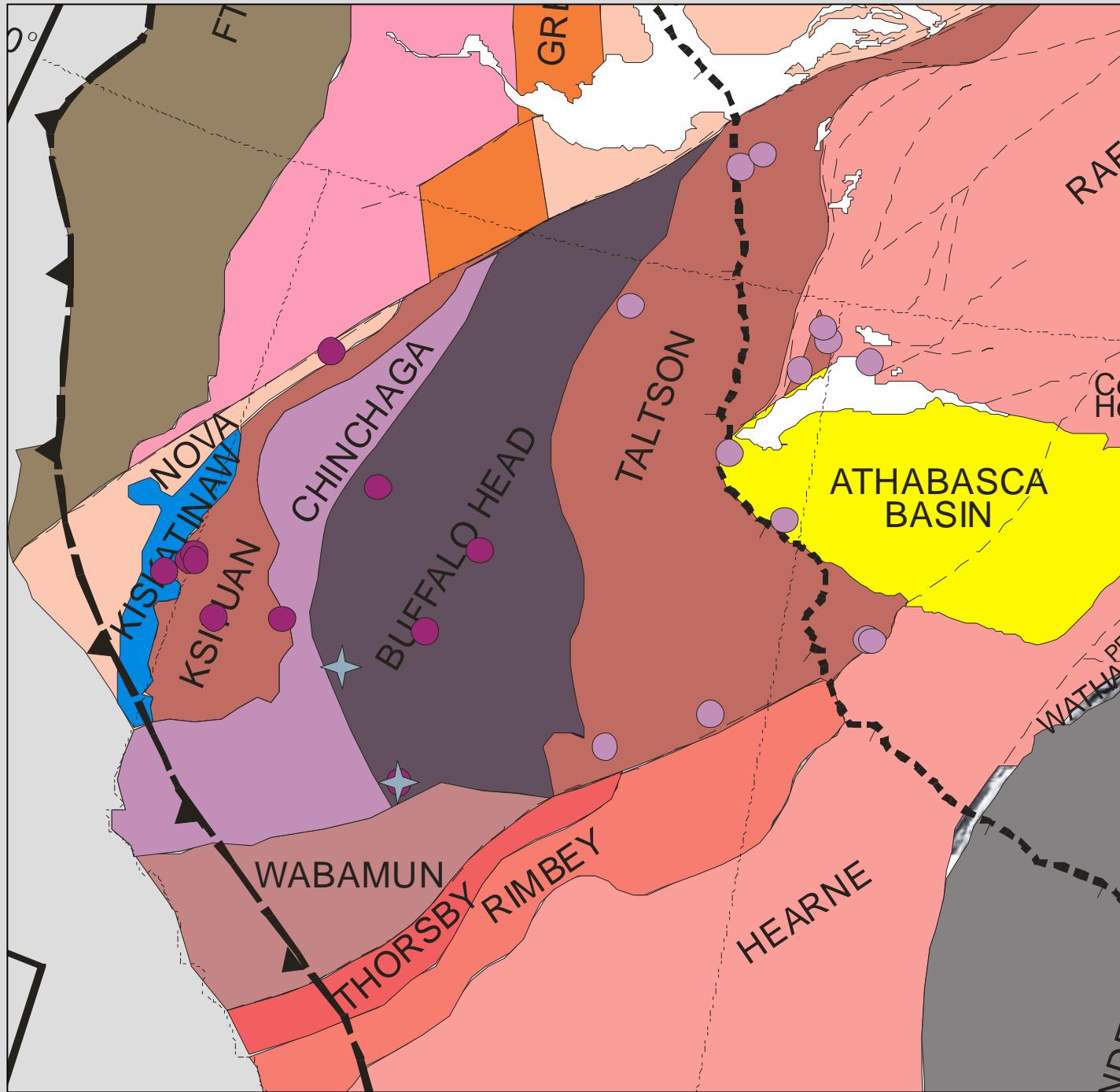
Subduction under  
Chinchaga-  
Buffalo Head  
Terrane followed  
by collision of  
Slave Craton?

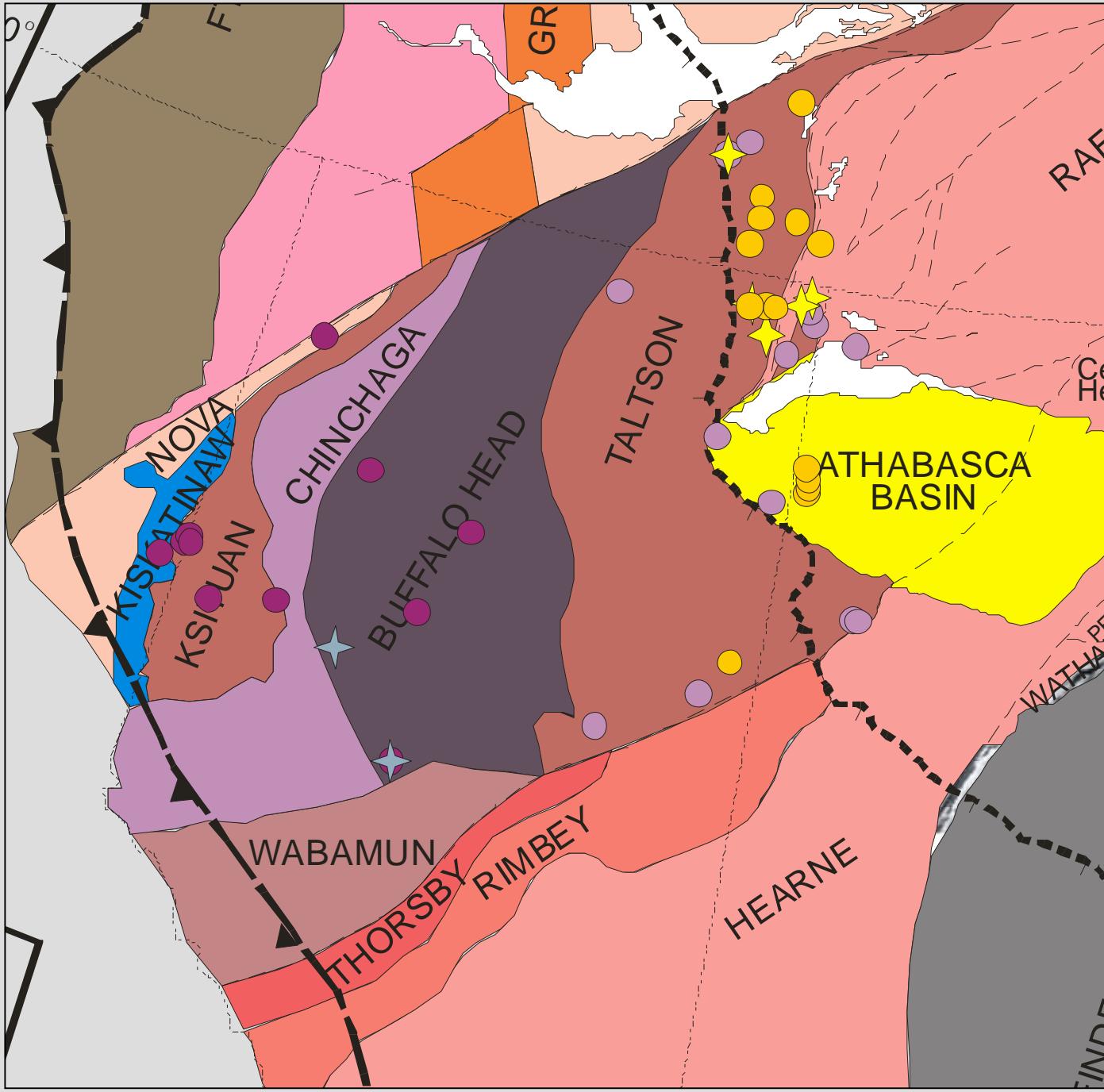
Rae margin  
inactive

## 1985-1960 Story

- 1985-1960 Ma  
Taltson arc?
- ★ 1980 Ma  
metamorphism
- 2000-1985 Ma:  
Ksituan-Thelon  
arc?

New subduction  
zone sets up  
under Rae as  
Chinchaga-  
Buffalo Head-  
Slave terrane  
approaches?





## 1960-1930 Story

- Yellow star: 1960-1930 Ma metamorphism
- Yellow circle: 1960-1930 Ma syn-collisional
- Purple circle: 1985-1960 Ma Taltson arc?
- Blue star: 1980 Ma metamorphism
- Purple circle: 2000-1980 Ma: Ksistuan-Thelon arc?

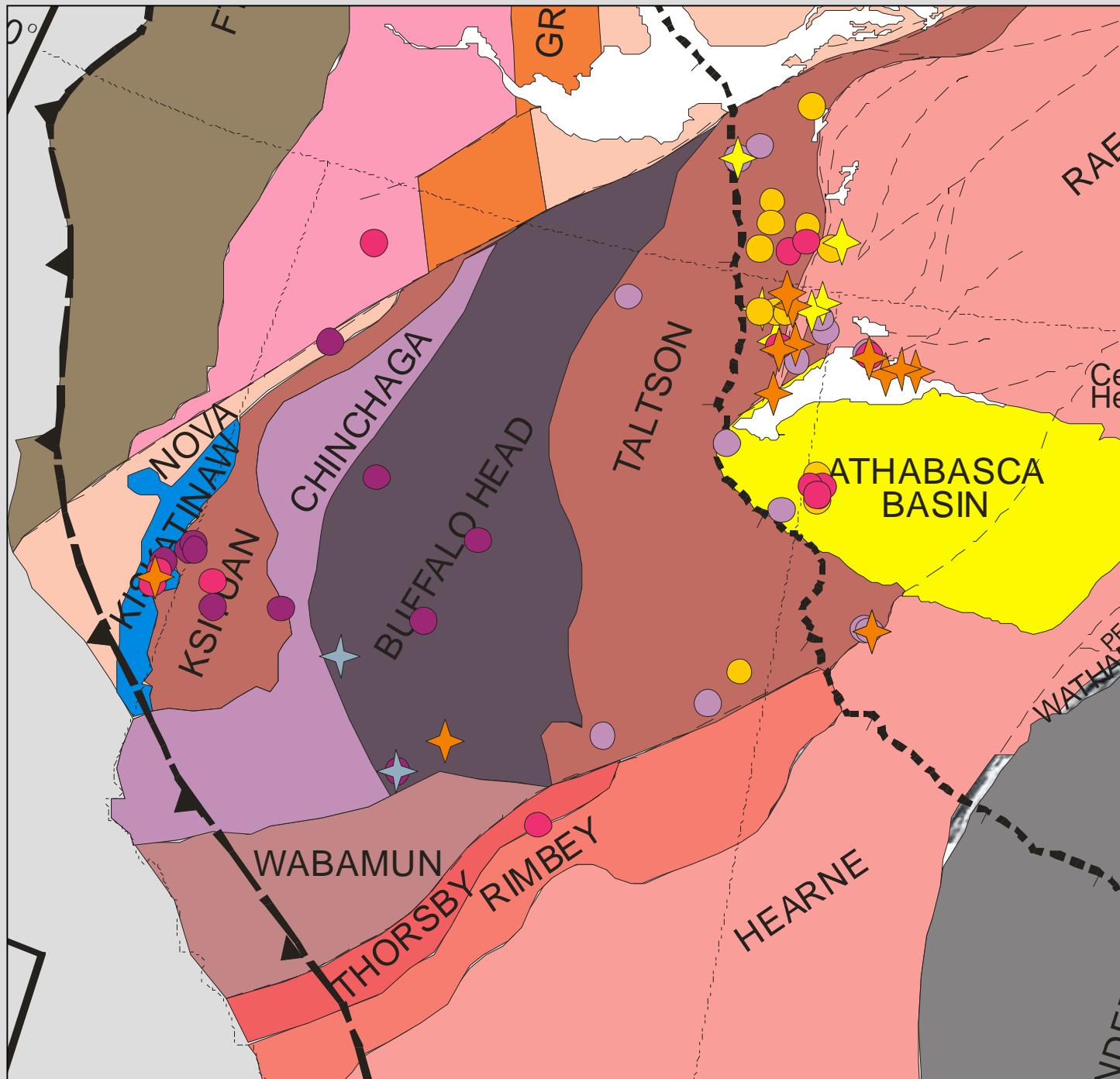
Chinchaga-Buffalo Head-Slave Terrane or exotic precursors begin to collide with Rae

## 1930-1900 Story

- 1930-1900 meta
- 1930-1900 Ma syn-meta gran
- 1960-1930 Ma metamorphism
- 1960-1930 Ma syn-collisional
- 1980-1960 Ma Taltson arc?
- 1980 Ma metamorphism
- 2000-1980 Ma: Ksituan-Thelon arc?

Terminal collision,  
re-activation?

Nova = Hottah?

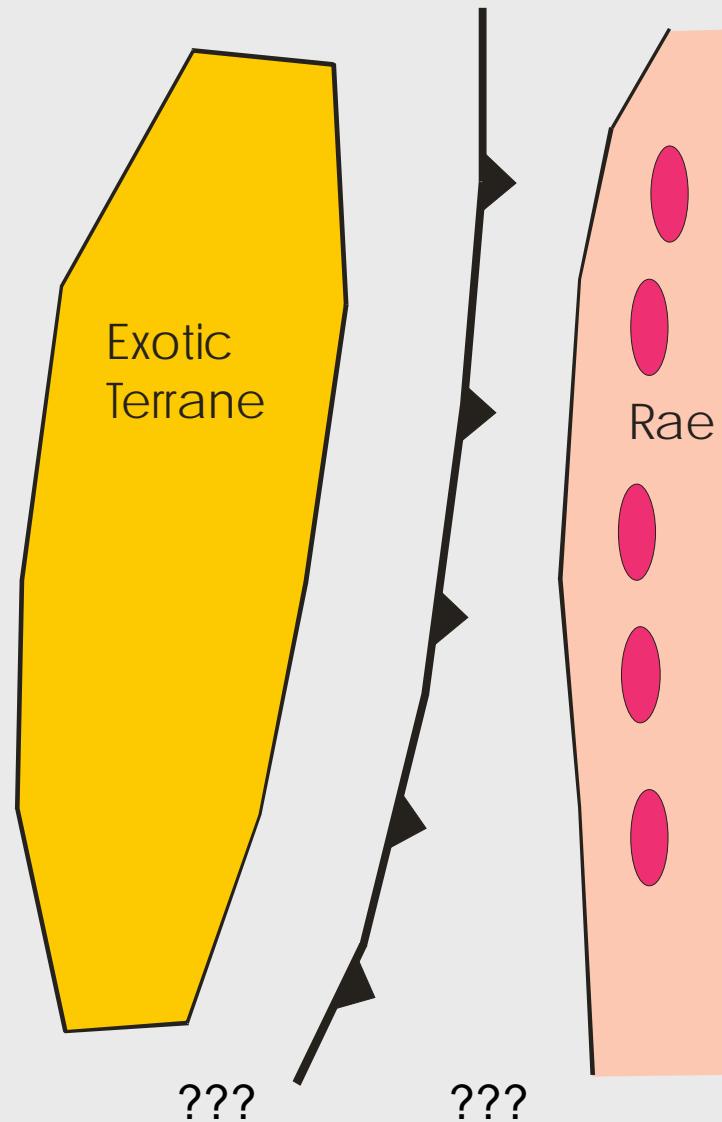


# Evolution of Southwestern Rae Margin 1

2400: Subduction under Rae and approach of exotic Archean terrane that may extend northward to include Queen Maud Block

2350: Collision and metamorphism

2330-2300: Post-collisional plutons and Murmac Bay Group

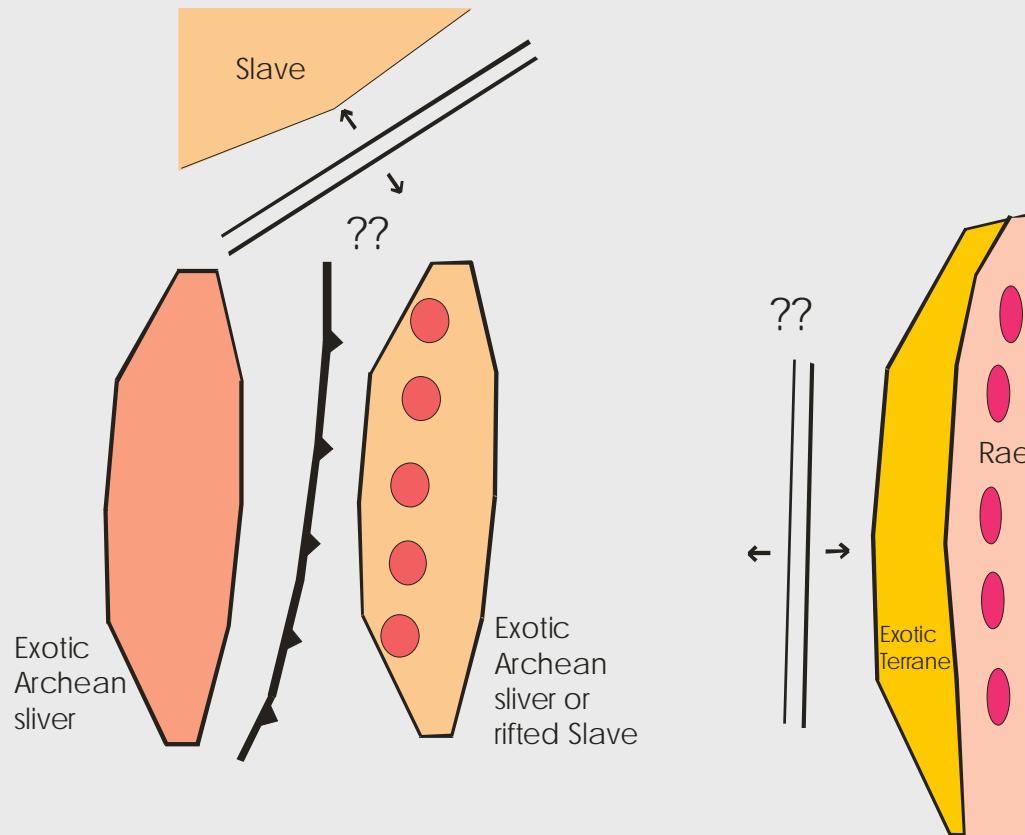


# Evolution of Southwestern Rae Margin 2

2190-2160: A) Rifting of Slave, B) accreted terrane or C) subduction beneath outboard terrane

2094-2014: Syn- to post-collisional granites?

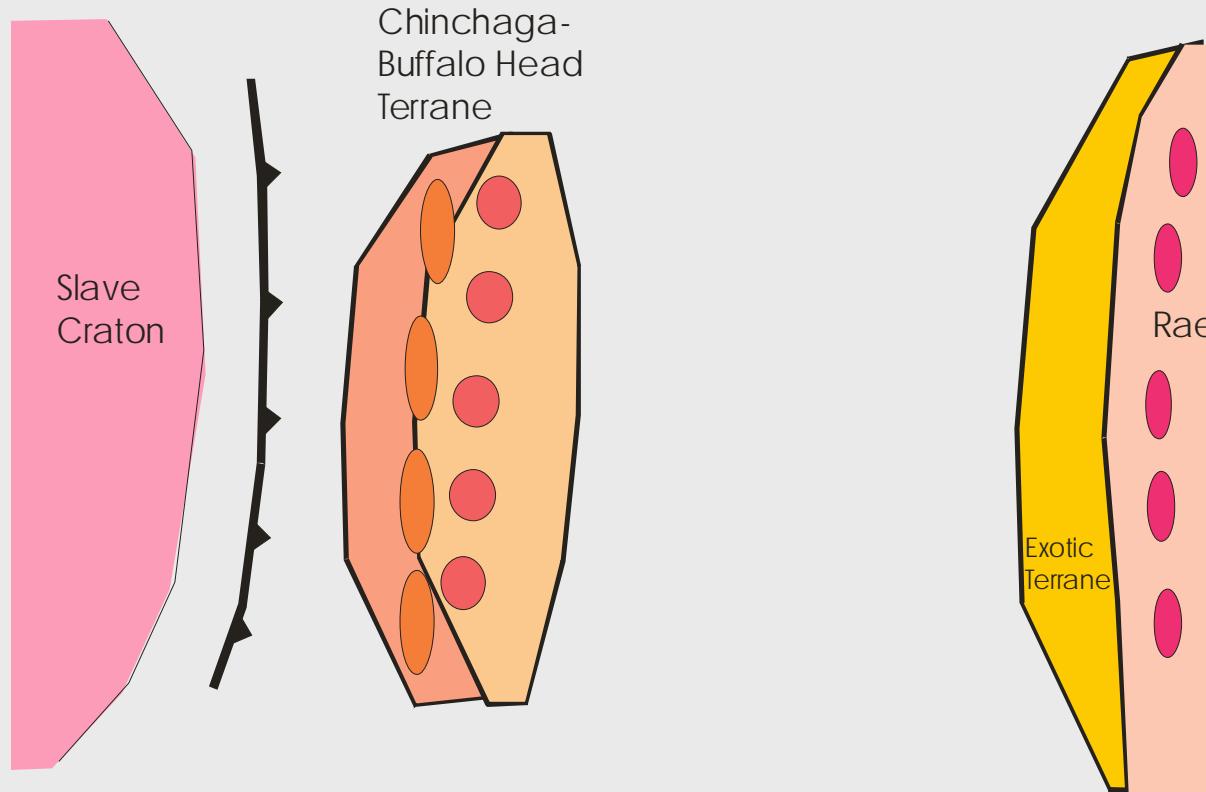
2093-2044: Collision and metamorphism not recorded in Rae



# Evolution of Southwestern Rae Margin 3

2000-1985: East-dipping subduction under Chinchaga-Buffalo Head terrane

~1980: Slave collides with C-BH Terrane; east-dipping subduction begins under Rae

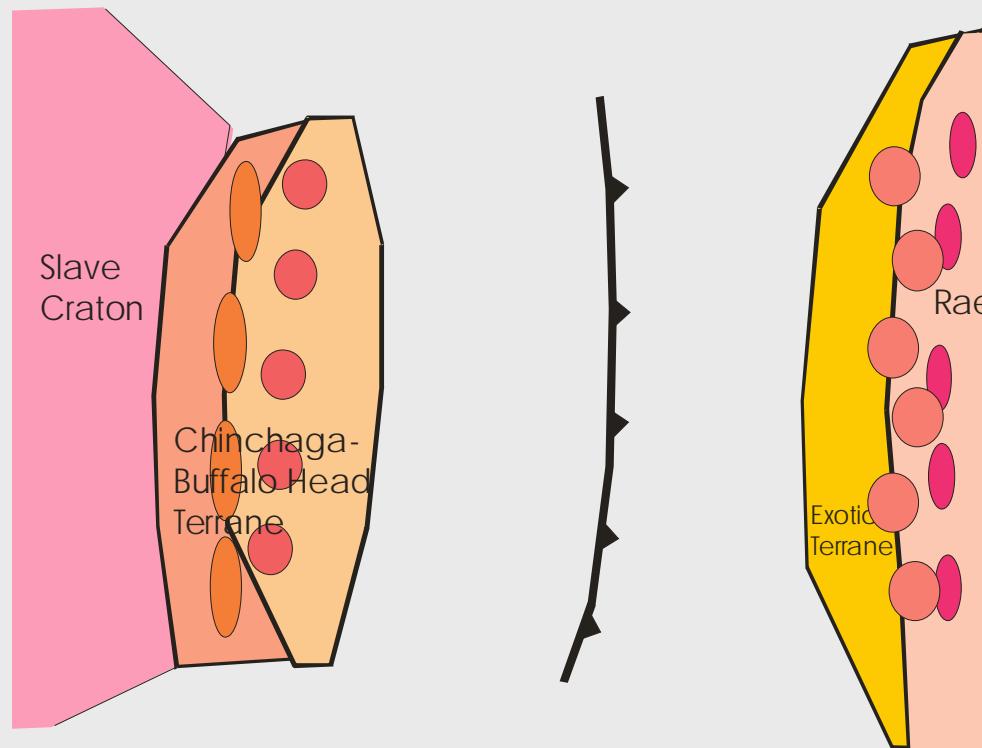


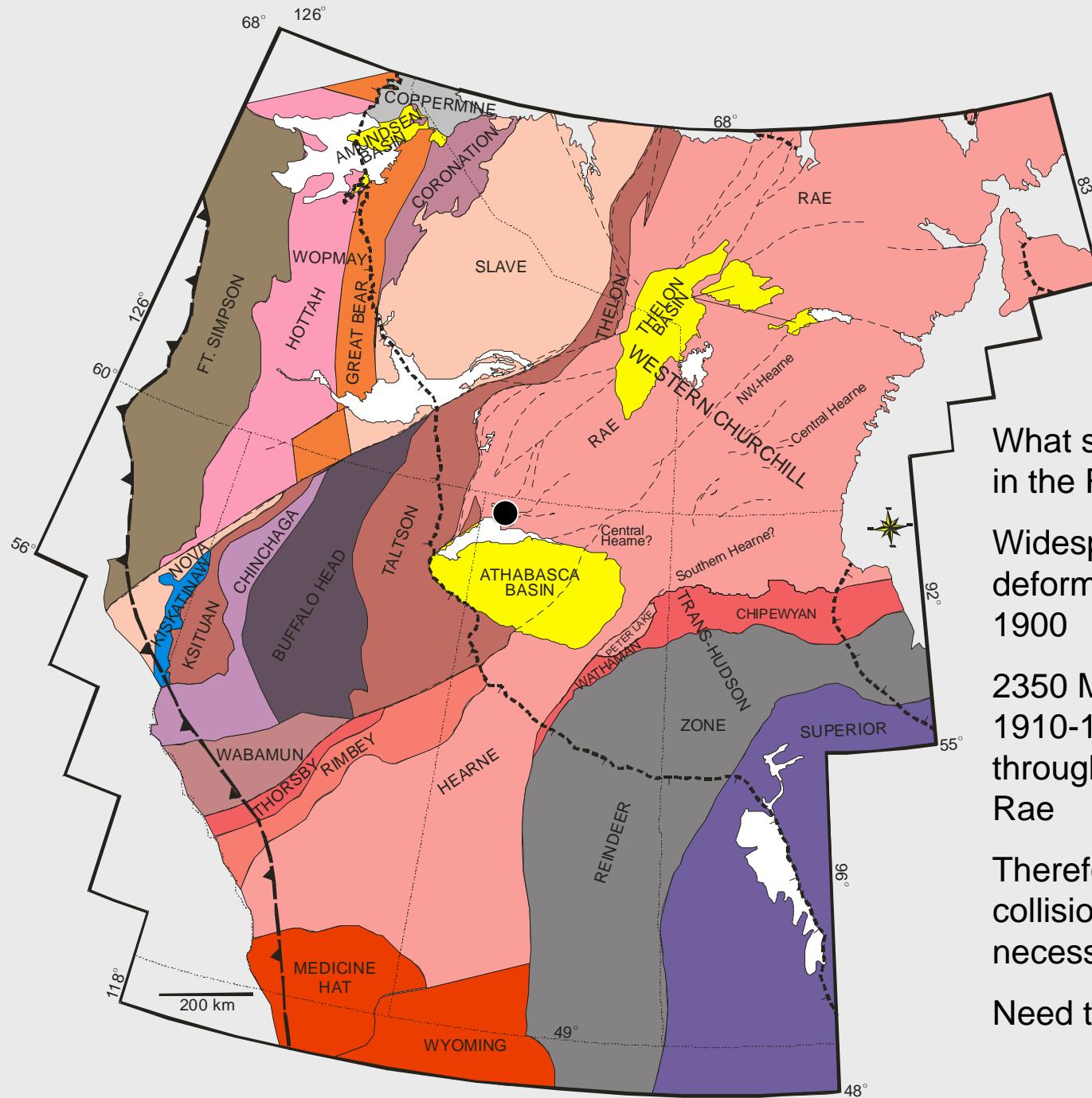
# Evolution of Southwestern Rae Margin 4

1985-1960: Slave-C-BH micro-continent approached & collides with Rae

1960-1930: Syn-collisional plutons emplaced in Rae margin

1930-1900: Metamorphism and syn-metamorphic granitoids in Rae margin





What should be the ramifications in the Rae Province?

Widespread metamorphism & deformation at 2350 and 1930-1900

2350 Ma event now showing up;  
1910-1900 Ma event recorded throughout full extent of southern Rae

Therefore, a Rae-Hearne collision possible but not necessary

Need to check detrital story!

# Conclusions & Speculations

- Accretion at western Rae margin at ~2.35 and ~1.96 → metamorphism & deformation throughout Rae
- Wabamun, Thorsby & southern Buffalo Head may represent reworked Rae margin rather than separate terranes?
- Queen Maud Block appears to be northern extent of a terrane accreted to Rae at 2.35?
- Chinchaga-Buffalo Head Terrane may be a slice off Slave?
- Slave? collides with Chinchaga-Buffalo Head Terrane (~1980); before it collides with Rae (~1960)
- Thelon-Talton Orogen is very complex!!!

