CROSS-MARGIN SEDIMENT TRANSFER IN A GLACIAL SOURCE-TO-SINK SEDIMENTARY SYSTEM; SOUTHERN ALASKA

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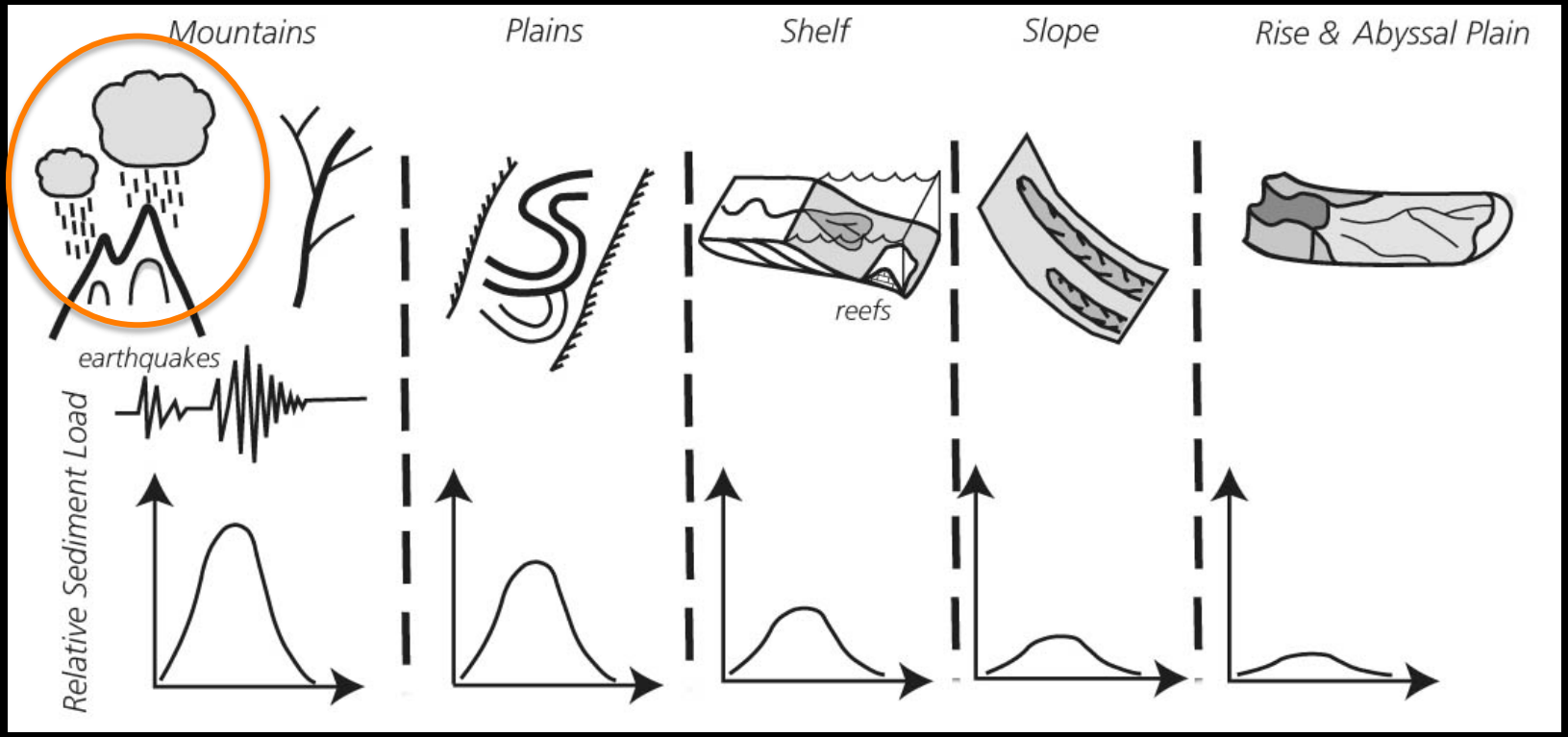
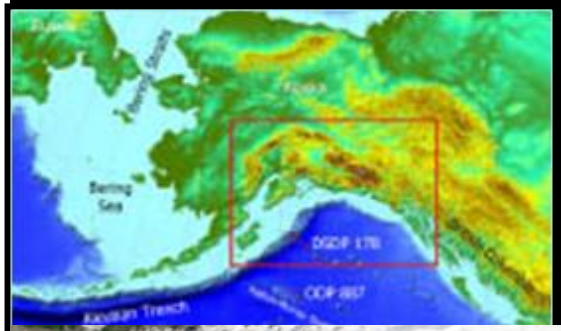
Sediment Transfer in a Glacial S2S system



- *Sediment transfer initiated by changes in precipitation and glacial mass balance*
- *Signal transfer time linked to glacier size and thermal regime (presence of meltwater)*

Bagley Icefield, Bering and Malaspina Glaciers



IL

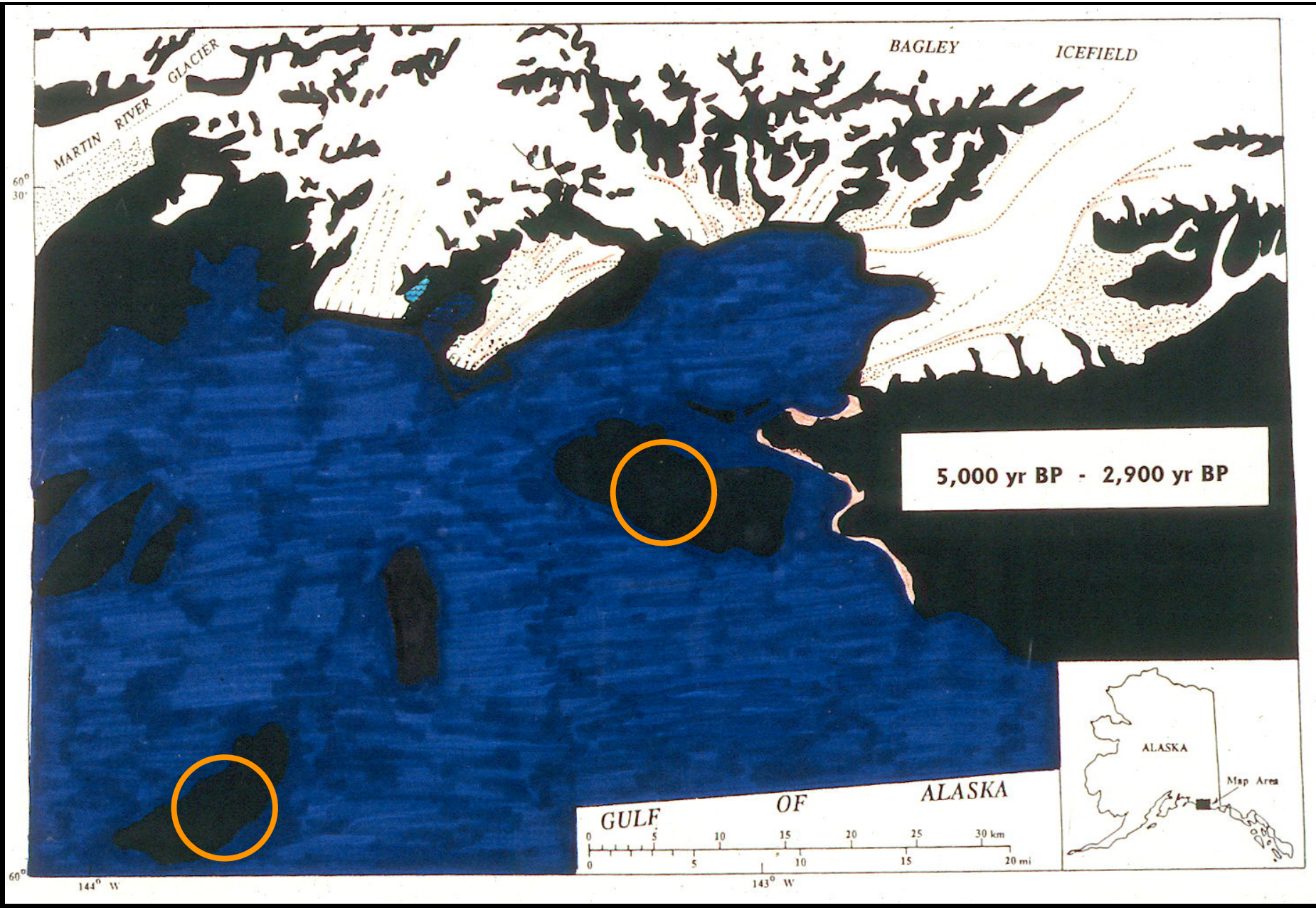
BI

BG

MG

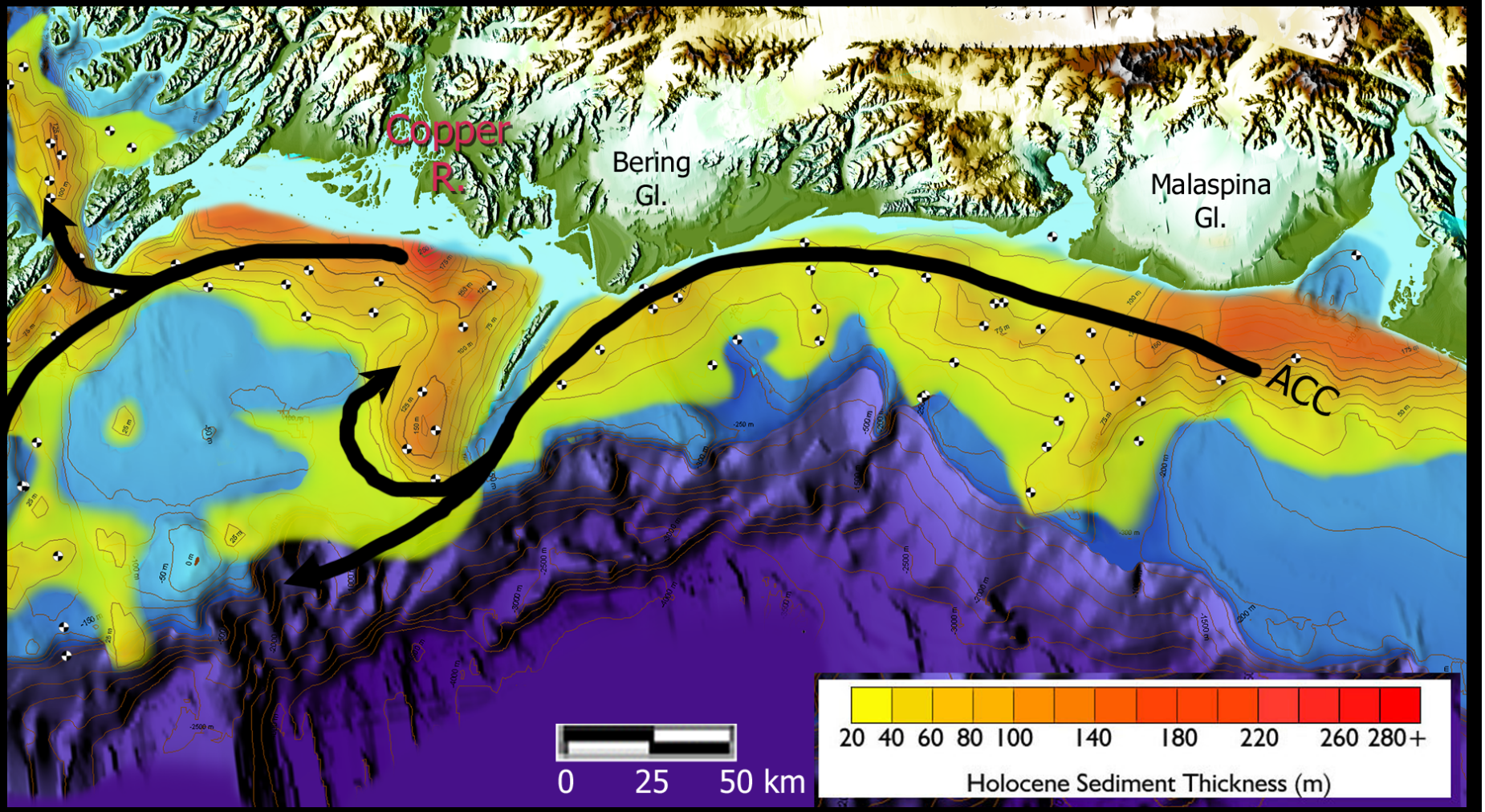
25 km

Image courtesy of NASA's Earth Observatory



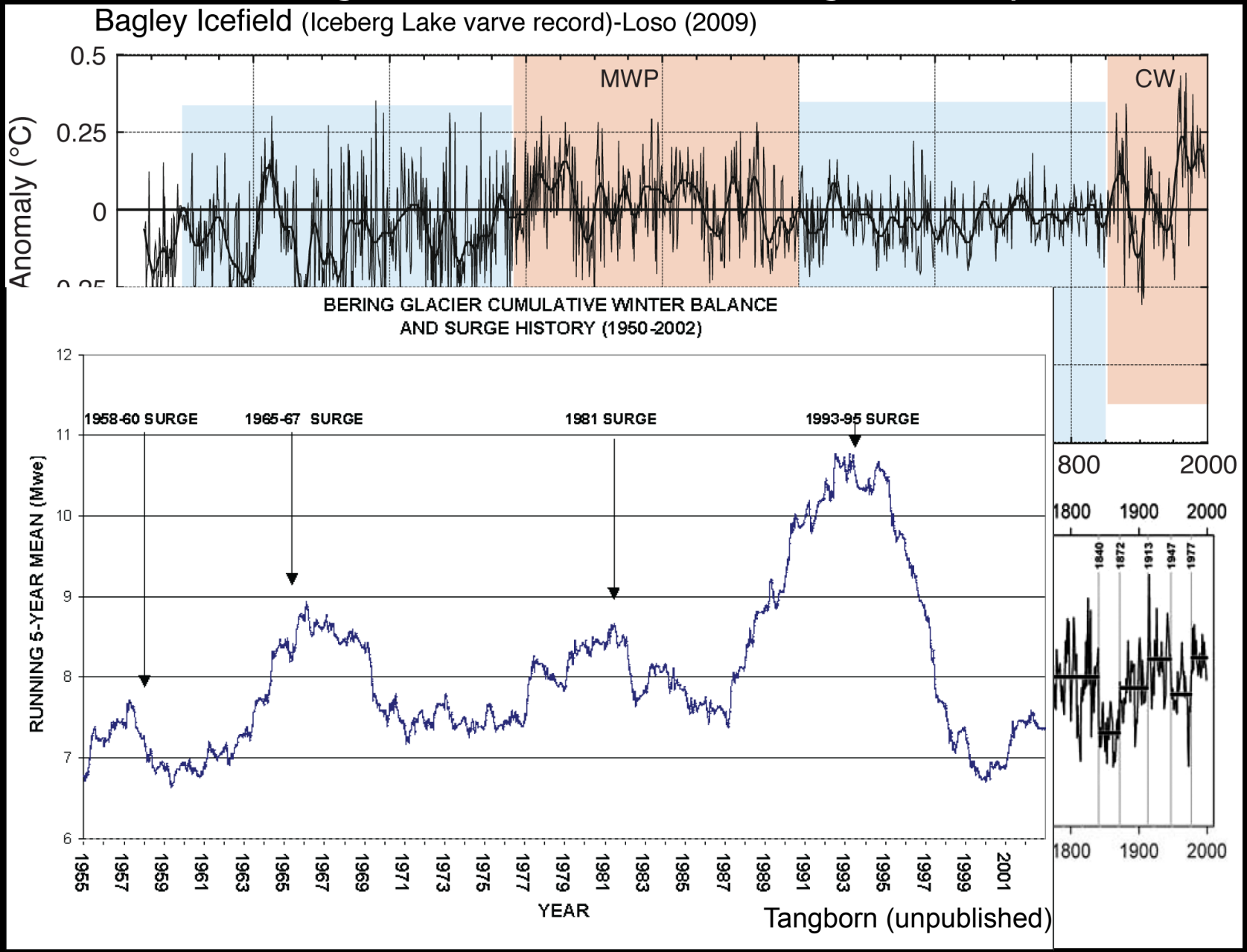
Slide courtesy of Bruce Molnia (USGS)

Post-LGM Sediment Thickness

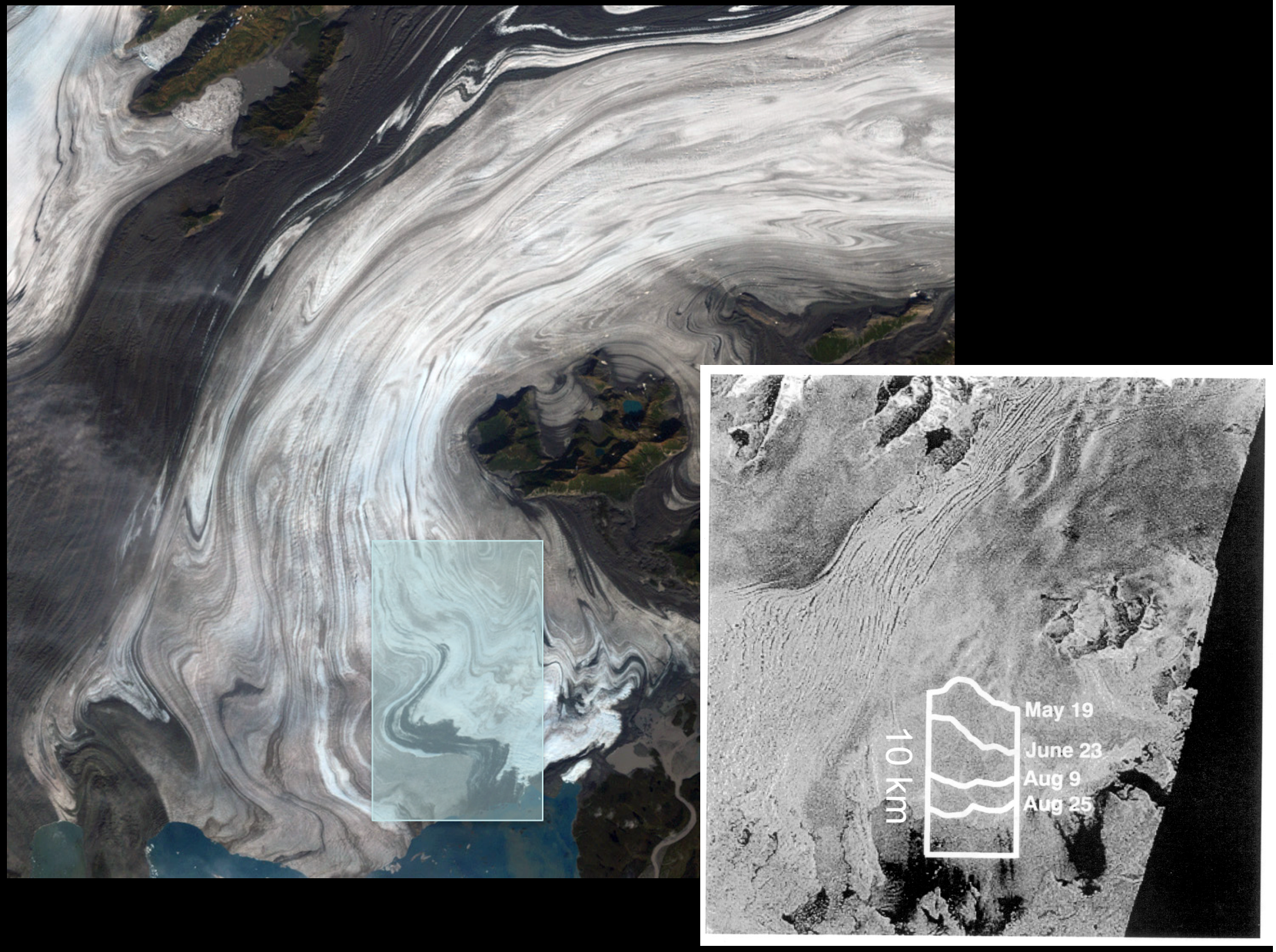


Jaeger et al. (1998)

Climate Signal Generation in the Bering Glacier System



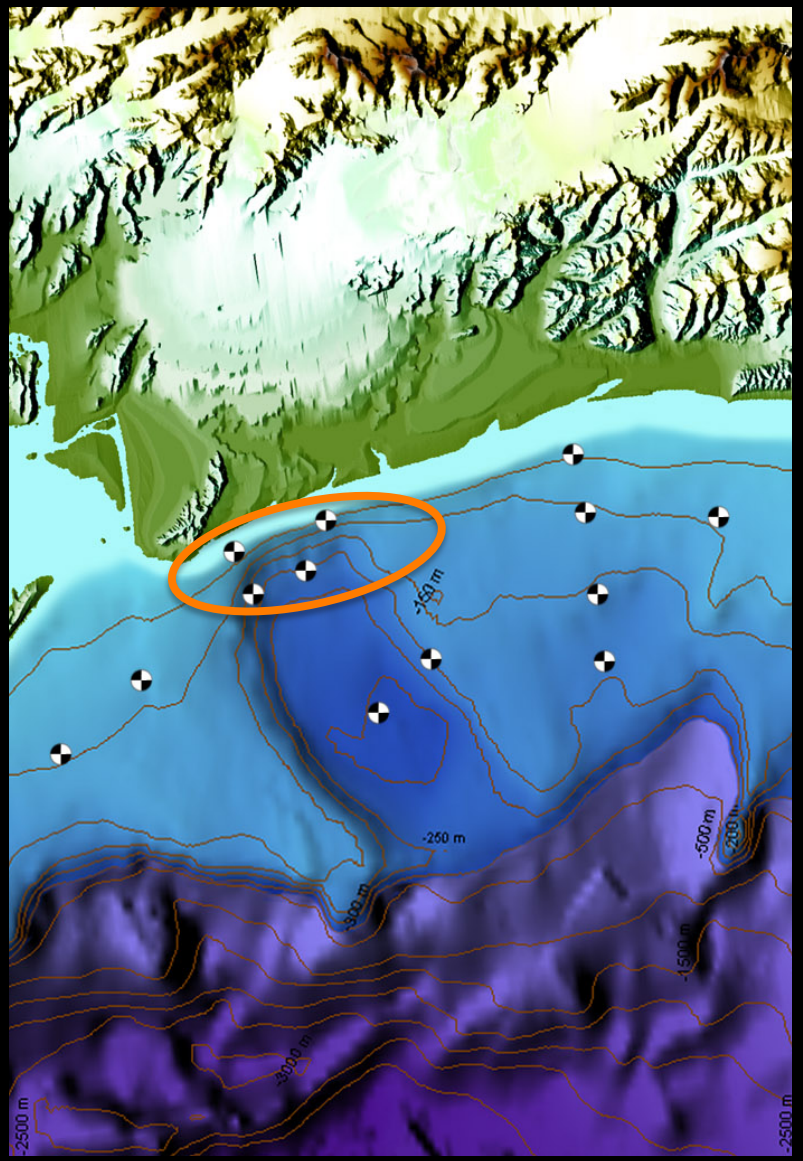
Bering Glacier Surges



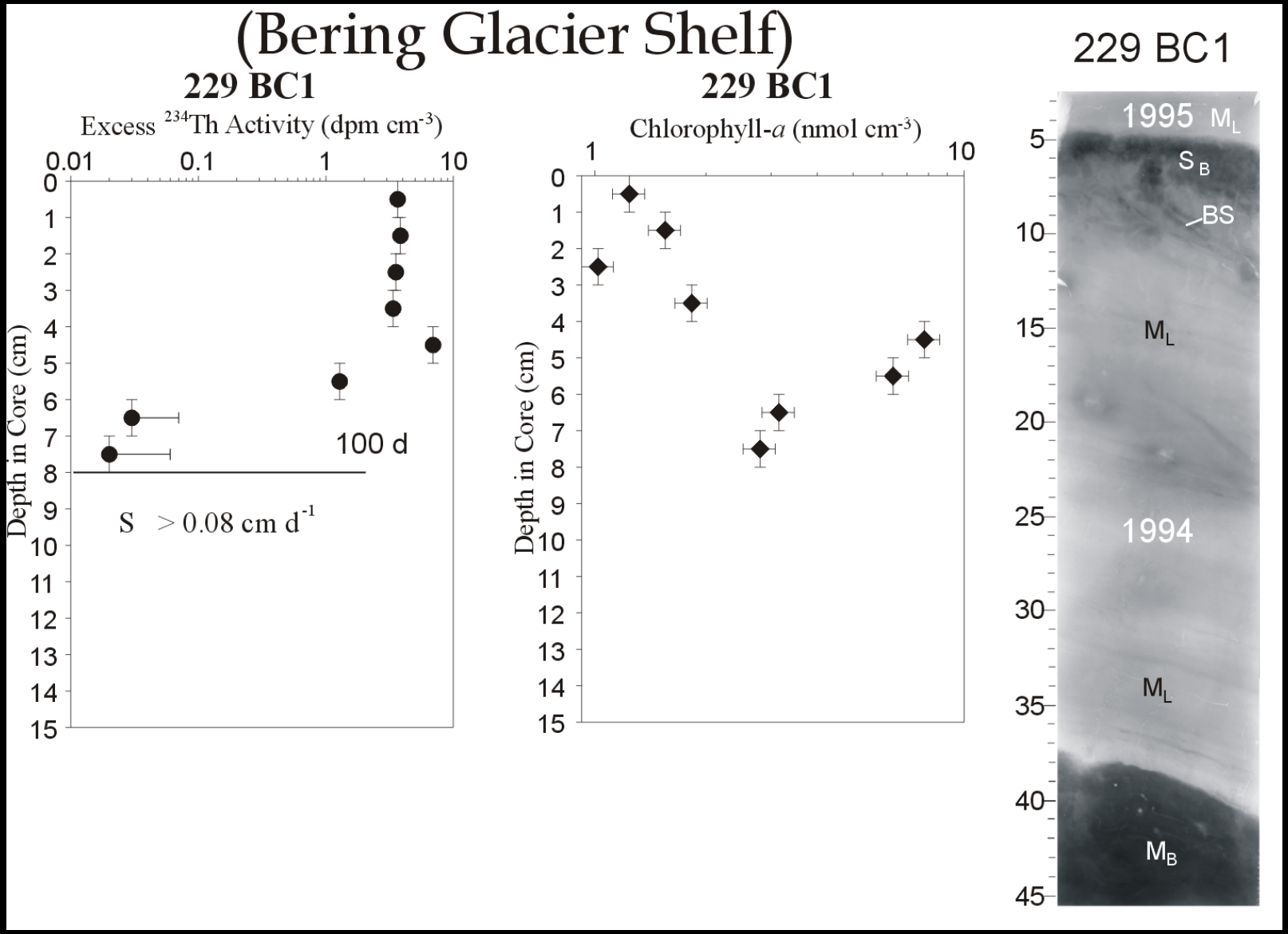
Images courtesy of NASA's Earth Observatory; Inset from Roush (1996)

Outburst Floods

1993-1995 Bering Glacier Surge

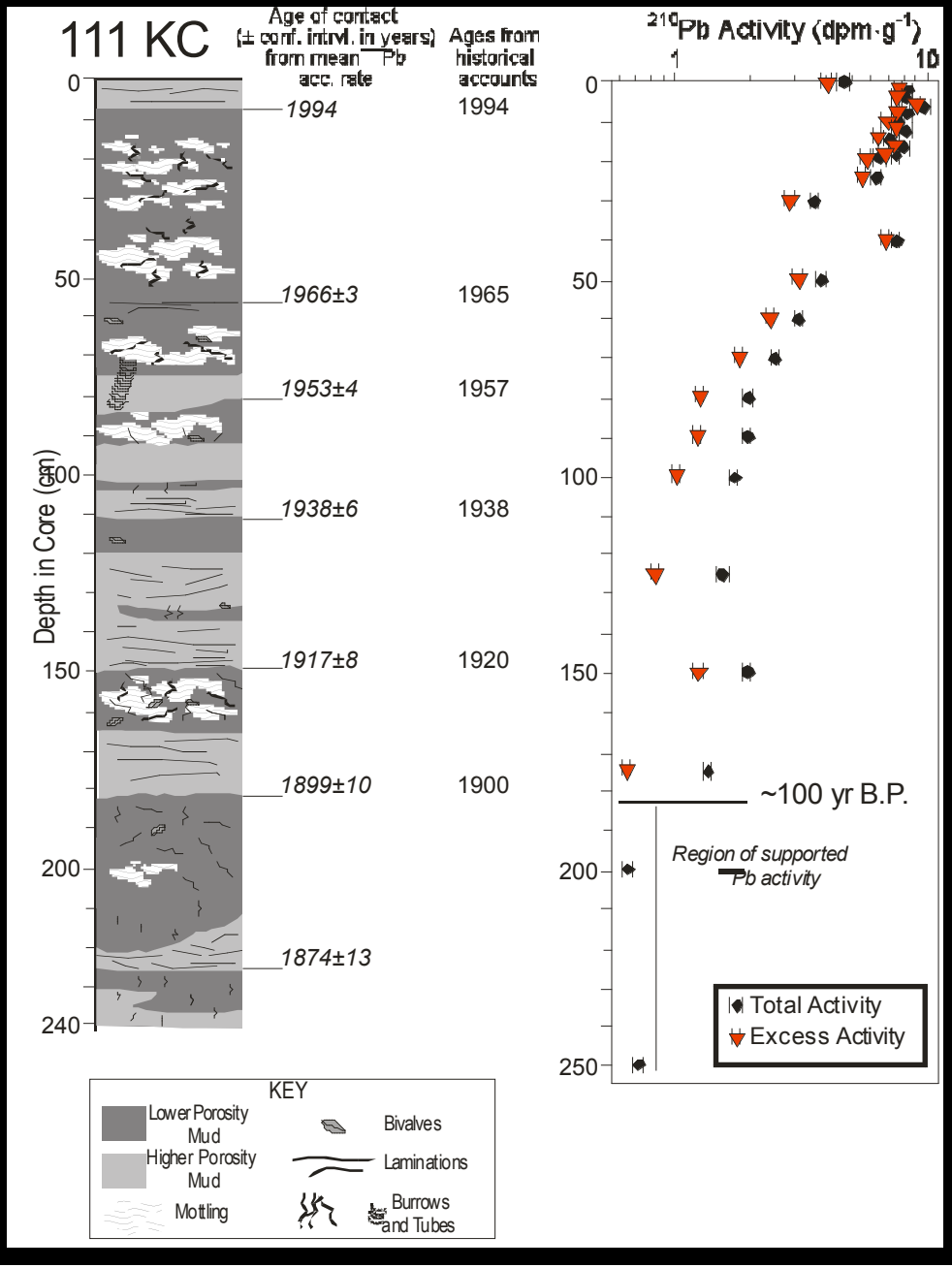


Outburst Flood Deposition
1993-1995 Bering Glacier Surge



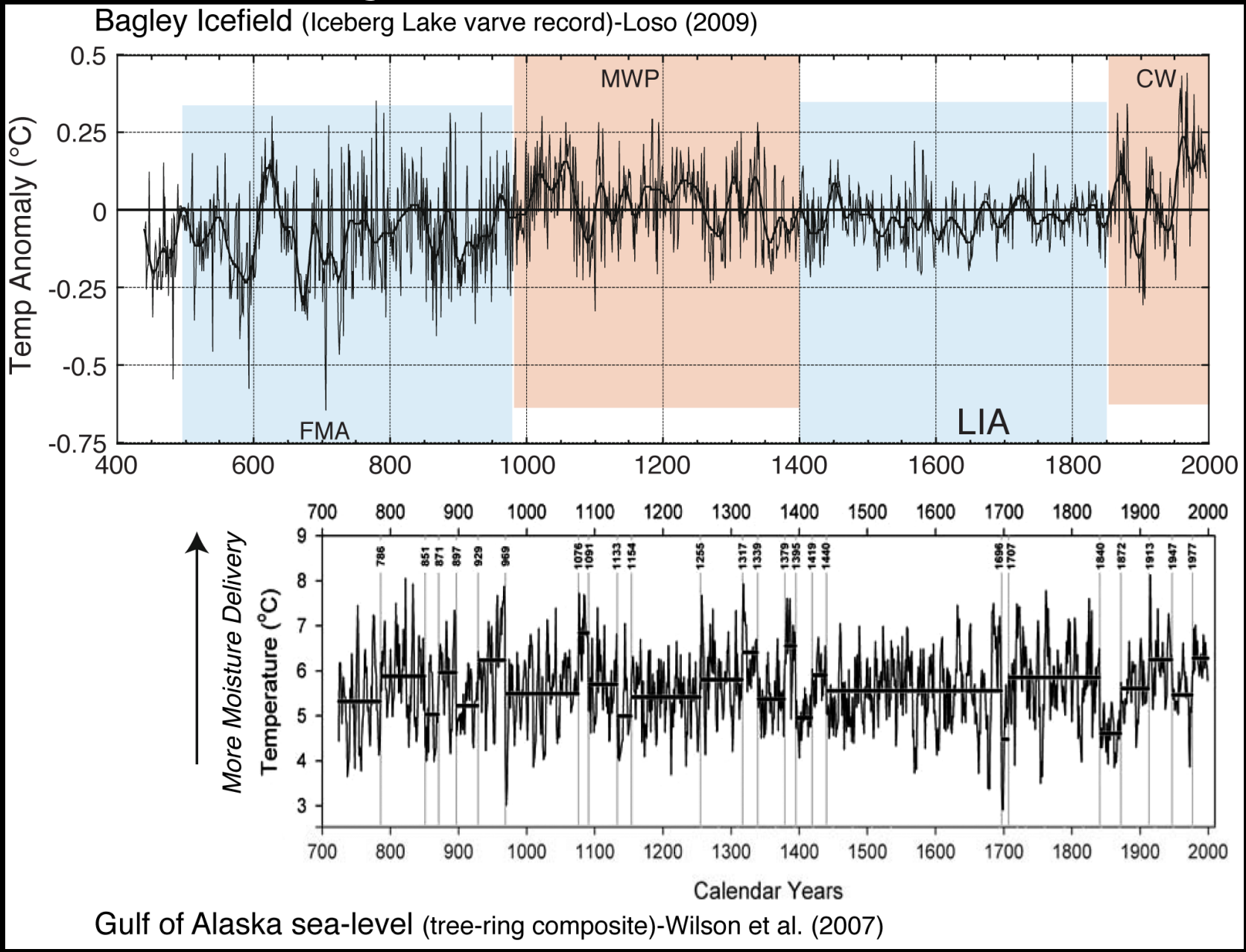
Jaeger and Nittrouer (1999)

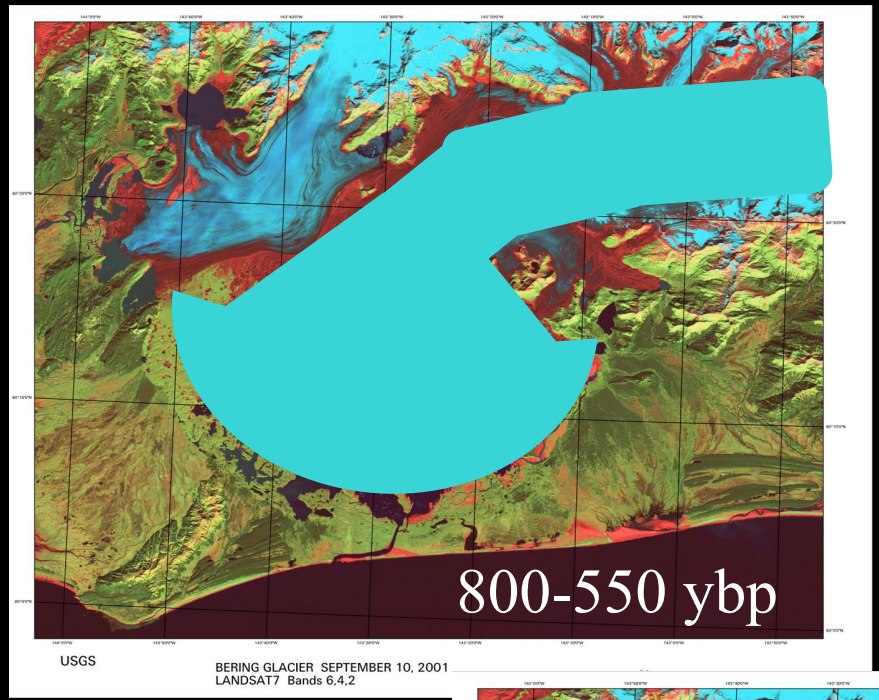
Sedimentary Record of Surge Events

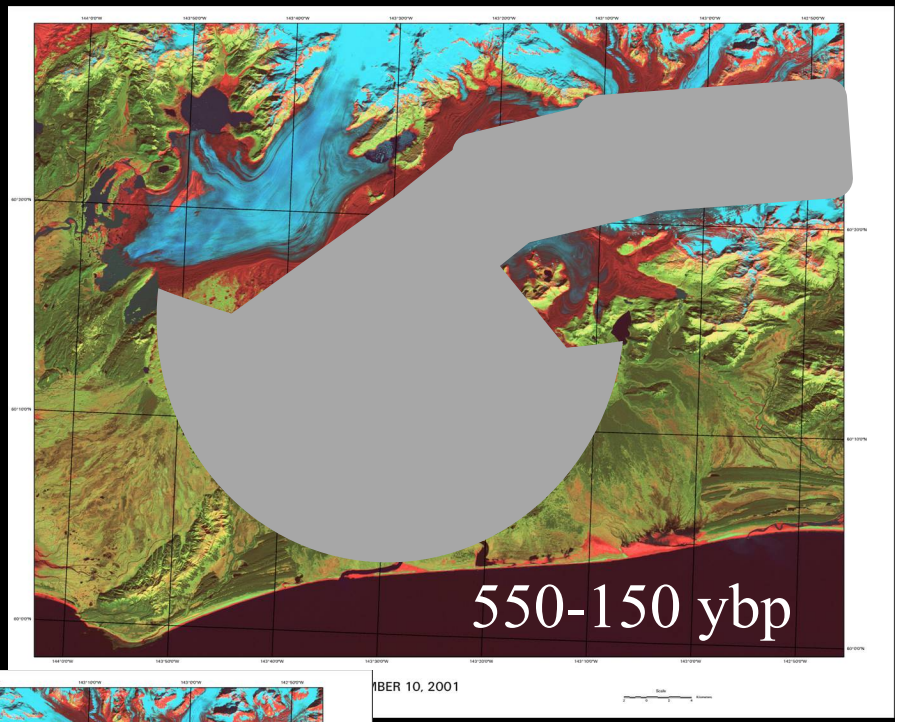


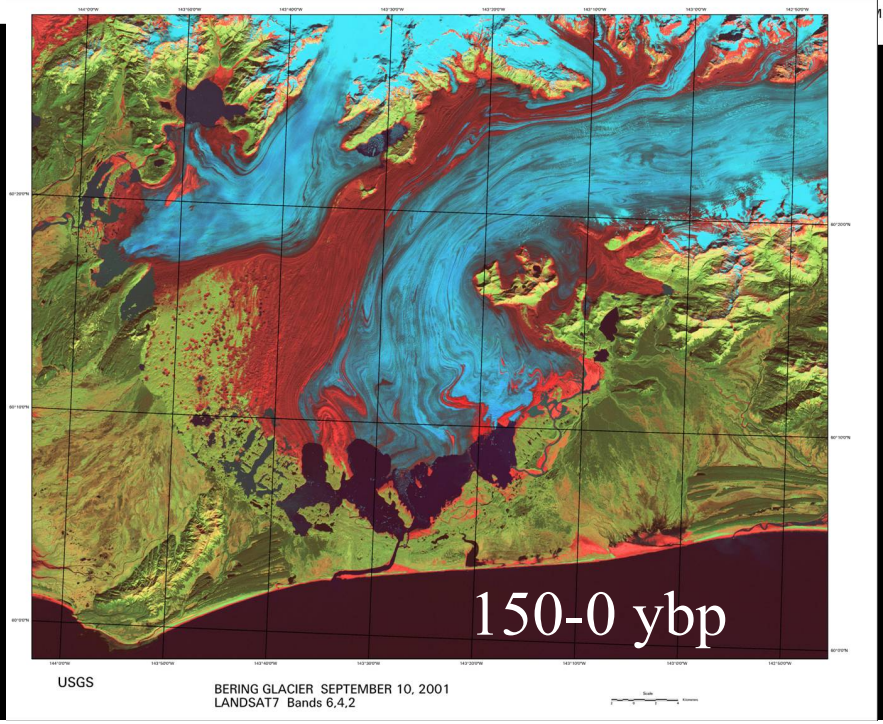
Jaeger and Nittrouer (1999)

Climate Signal Generation in the St. Elias Mountains



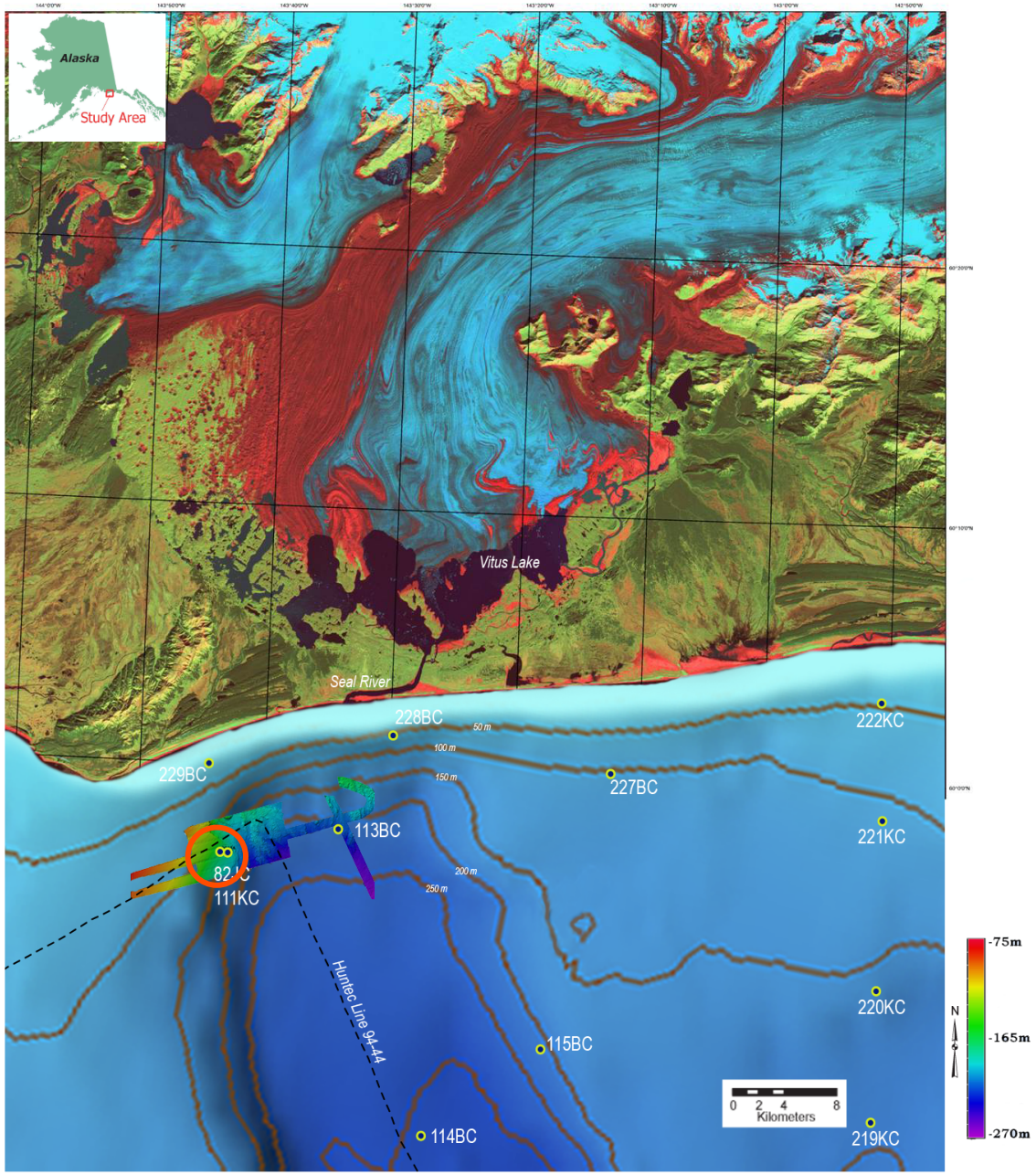






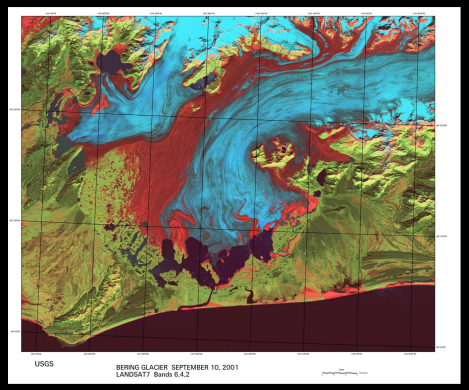
After Wiles et al. (1999)

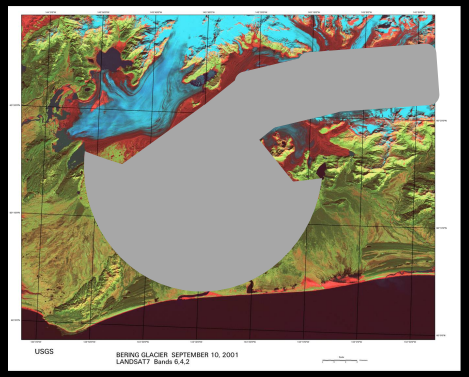
EW0408 82JC Core Location

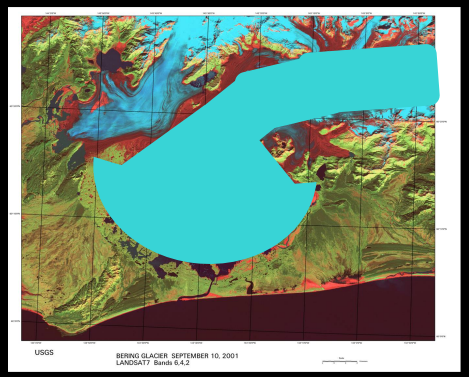


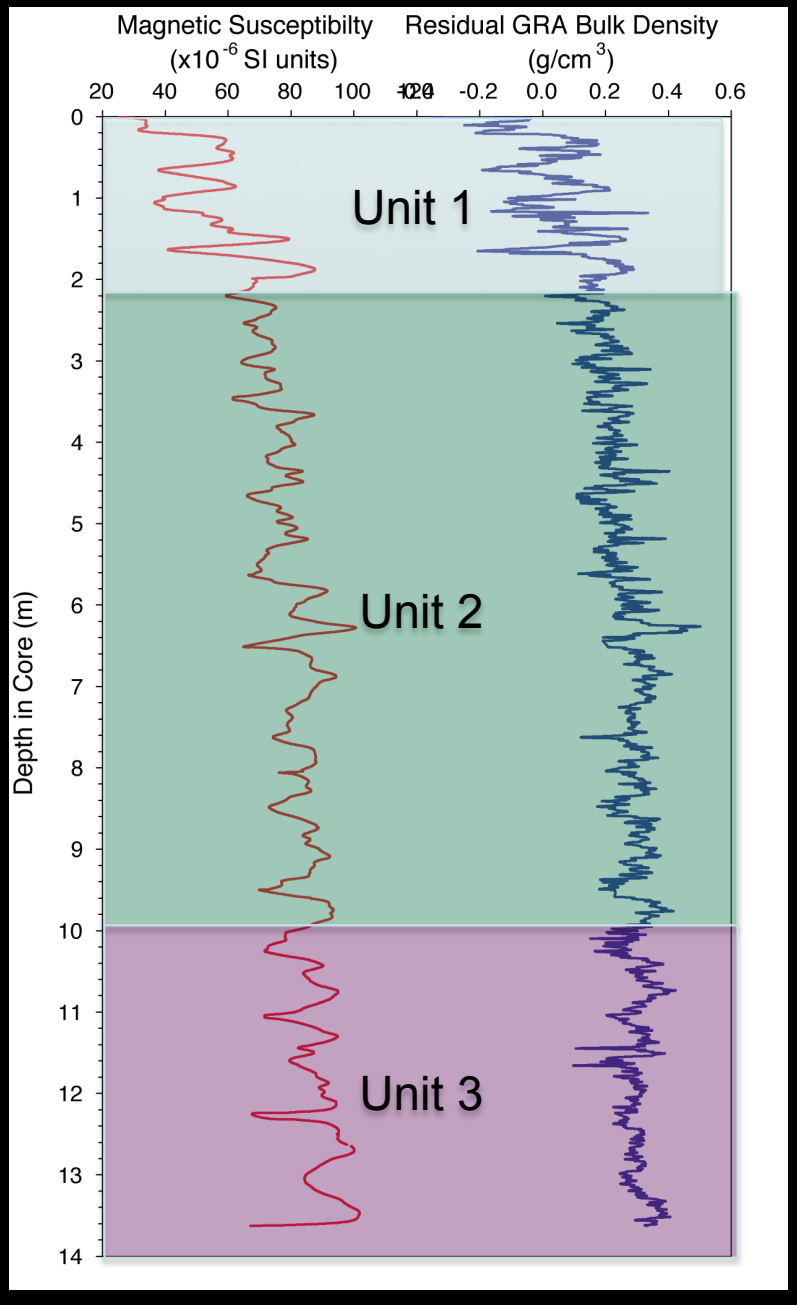
Swath Imagery Courtesy of Larry Mayer and Jim Gardener/UNH

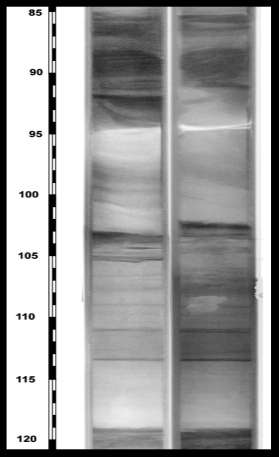
Bering Glacier Shelf Deposition



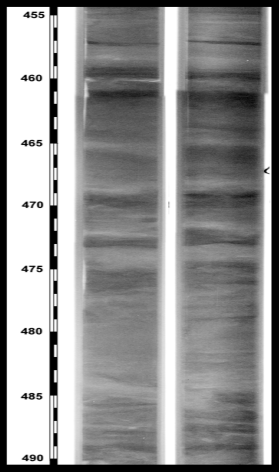




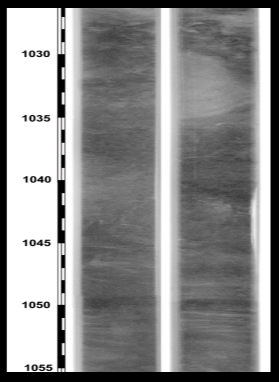




Unit 1 (0-2 m)

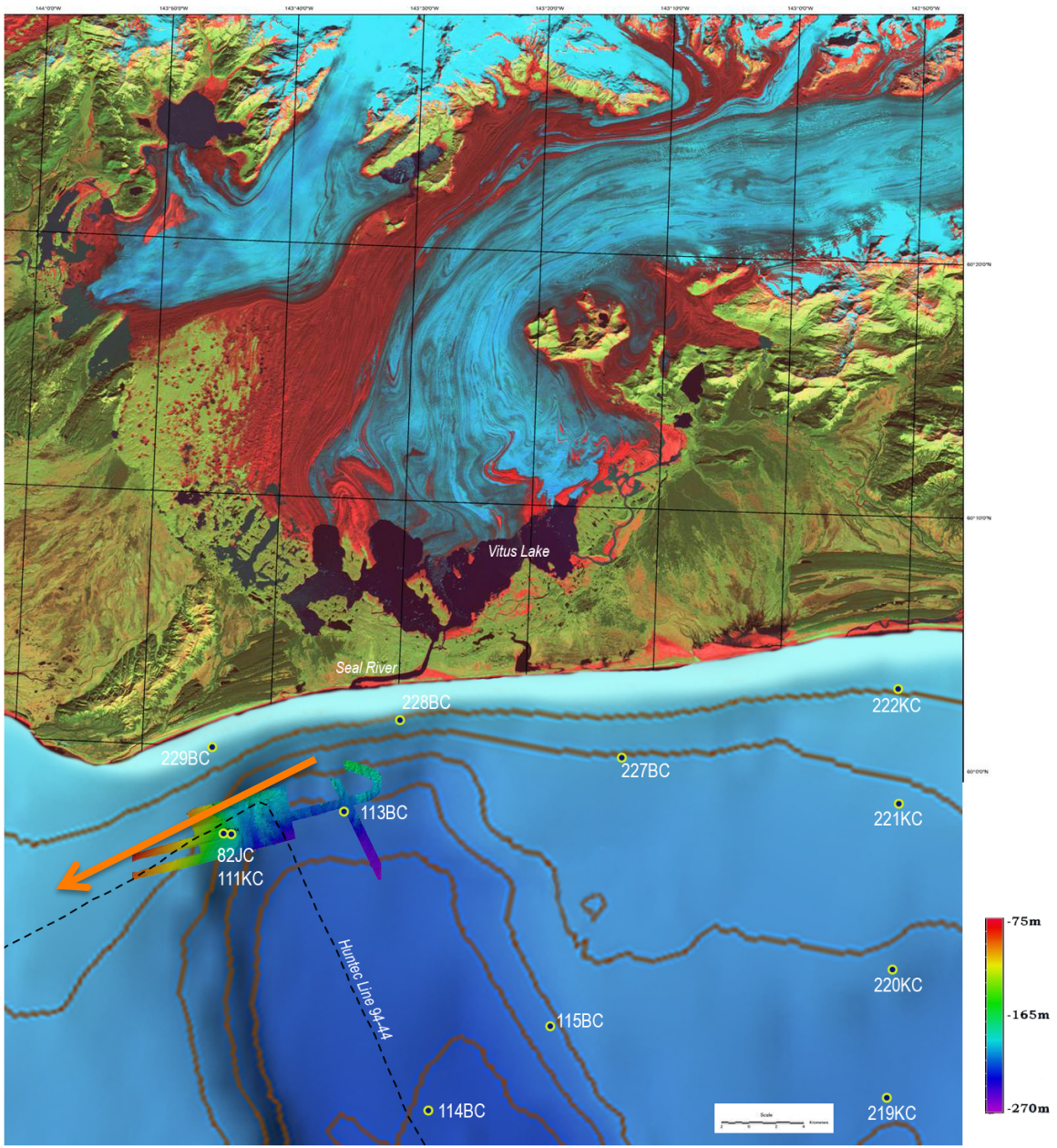


Unit 2 (2-10 m)

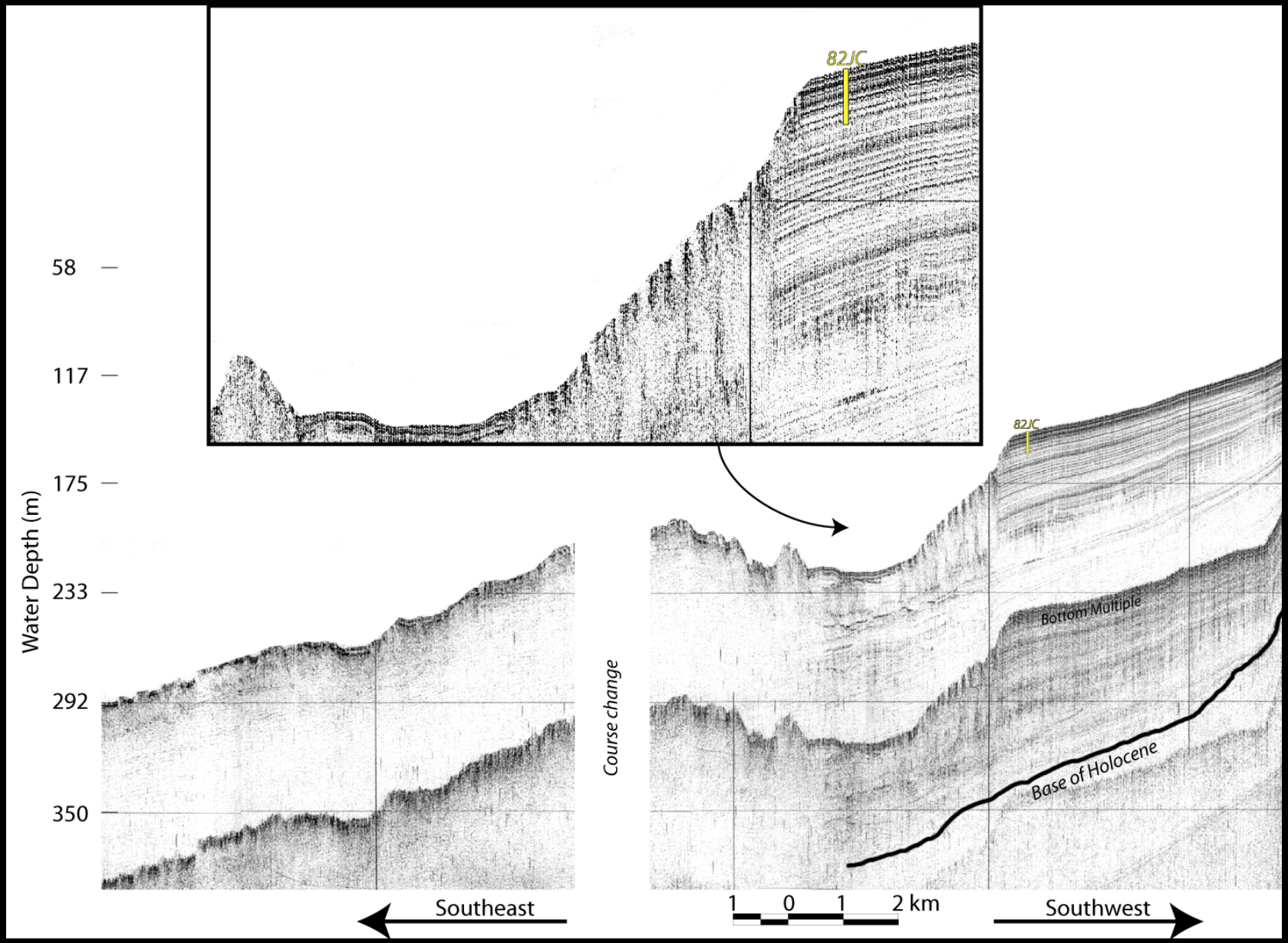


Unit 3 (10-13.5 m)

Modes of Cross-Shelf Sediment Transfer

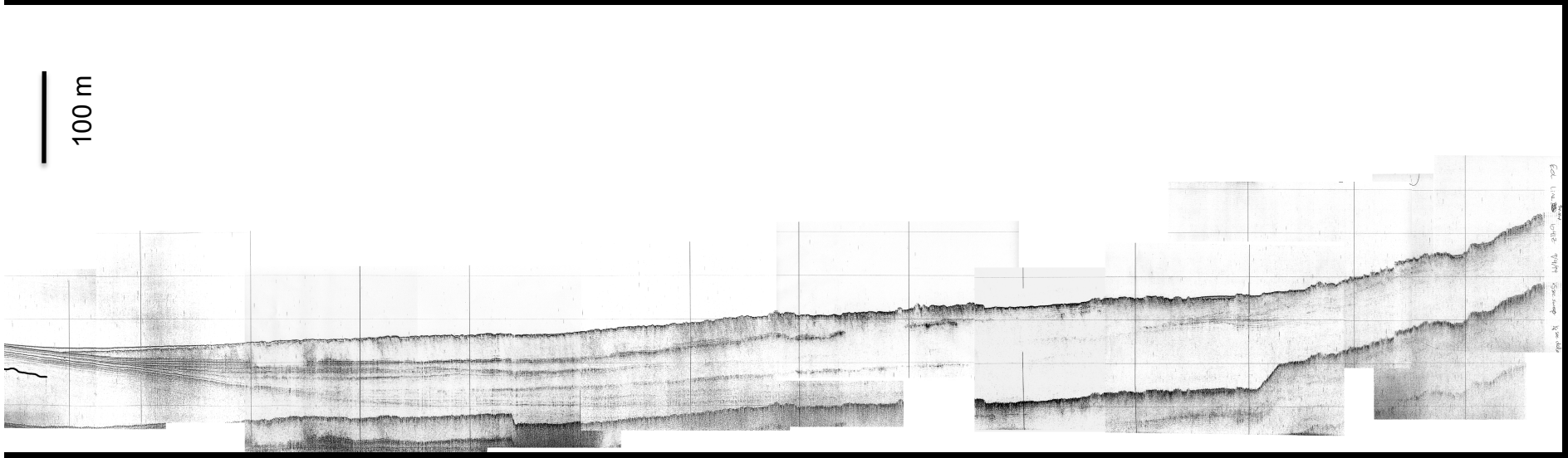


Bering Trough Stratigraphy

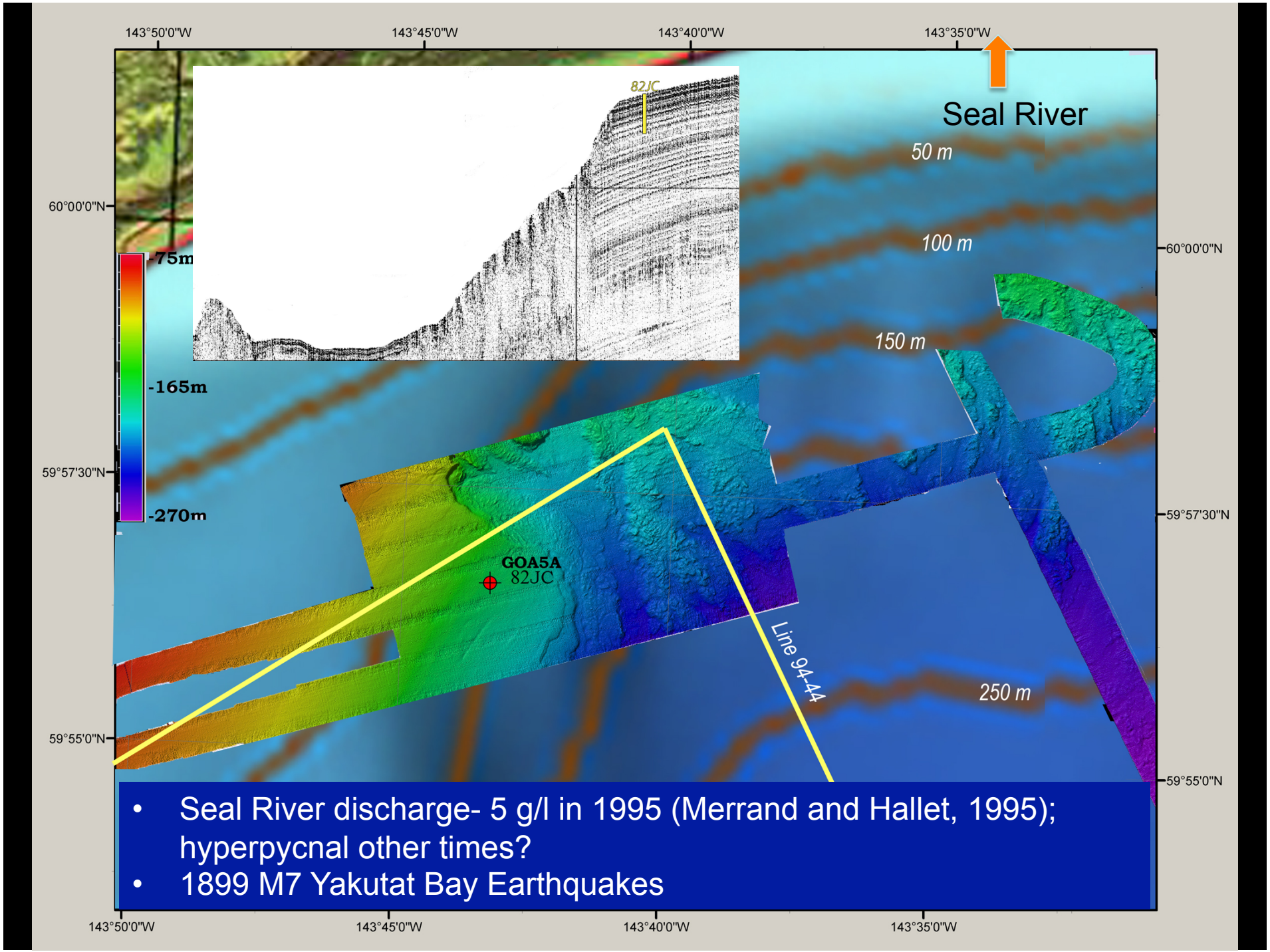


Huntec seismic reflection data courtesy of John Milliman/VIMS

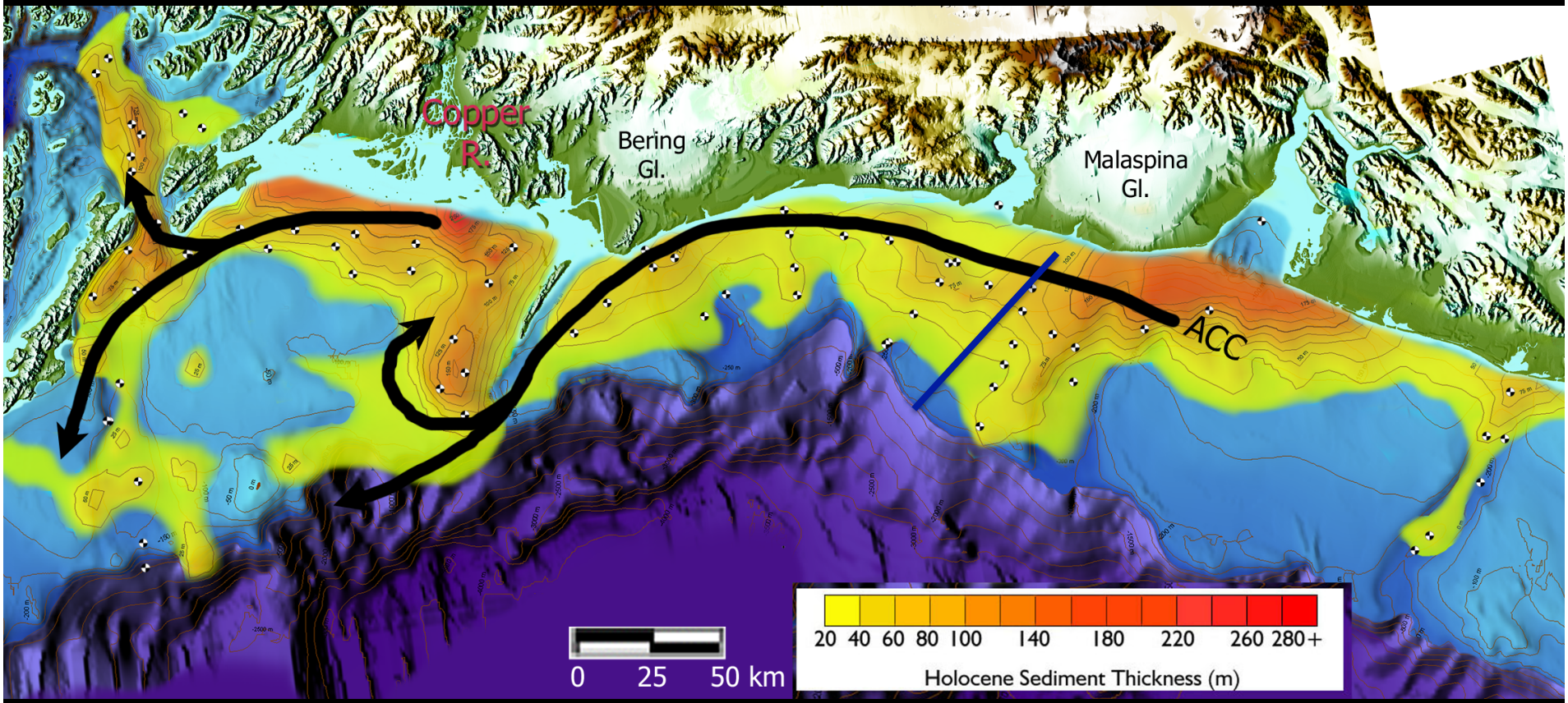
Bering Trough Stratigraphy



Huntec seismic reflection data courtesy of John Milliman/VIMS

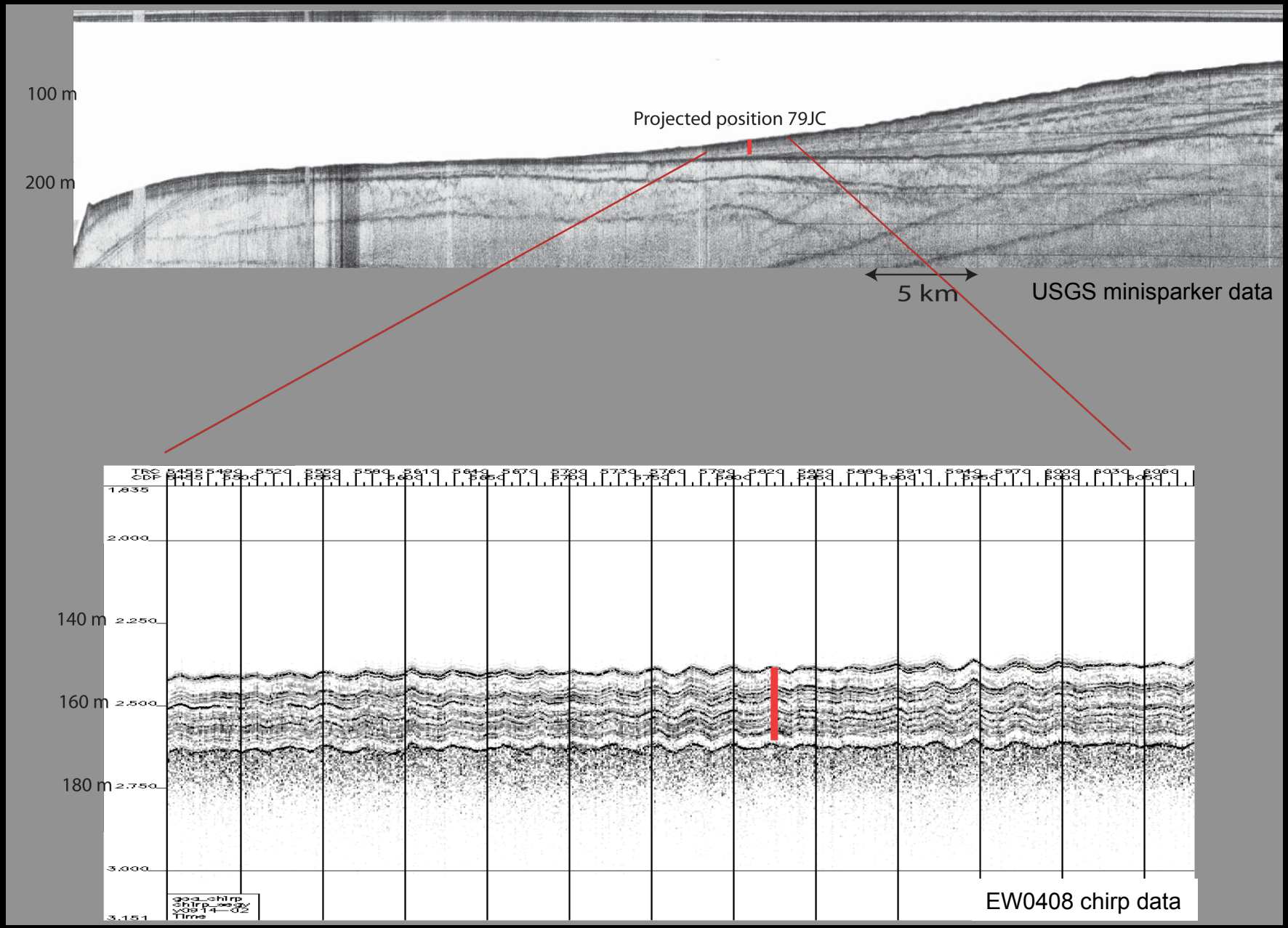

143°50'0"W
143°45'0"W
143°40'0"W
143°35'0"W
60°00'0"N
59°57'30"N
59°55'0"N
82JC
Seal River
50 m
100 m
150 m
250 m
-75m
-165m
-270m
GOA5A
82JC
Line 94-44
• Seal River discharge- 5 g/l in 1995 (Merrand and Hallet, 1995); hyperpycnal other times?
• 1899 M7 Yakutat Bay Earthquakes

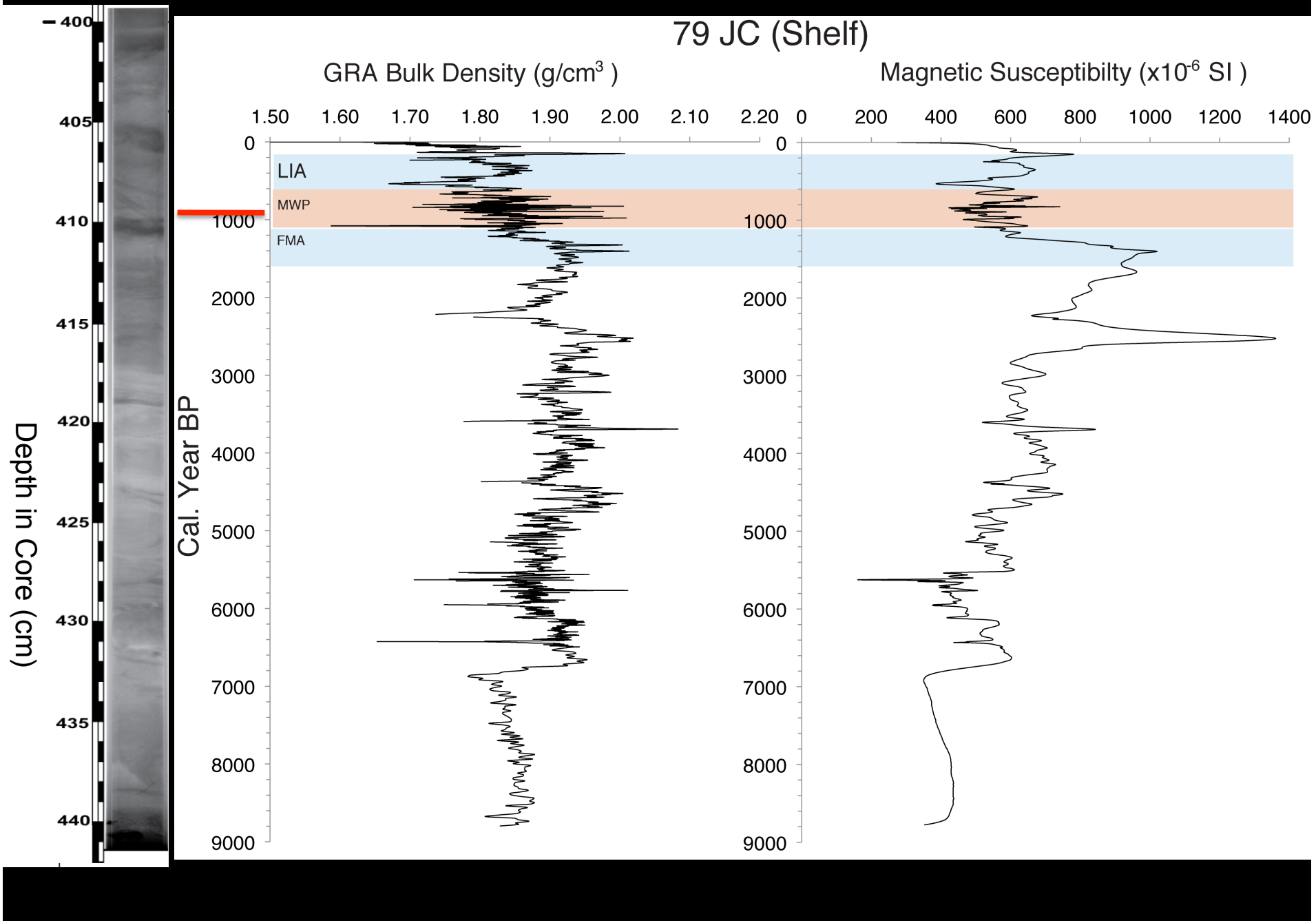
Malaspina Shelf



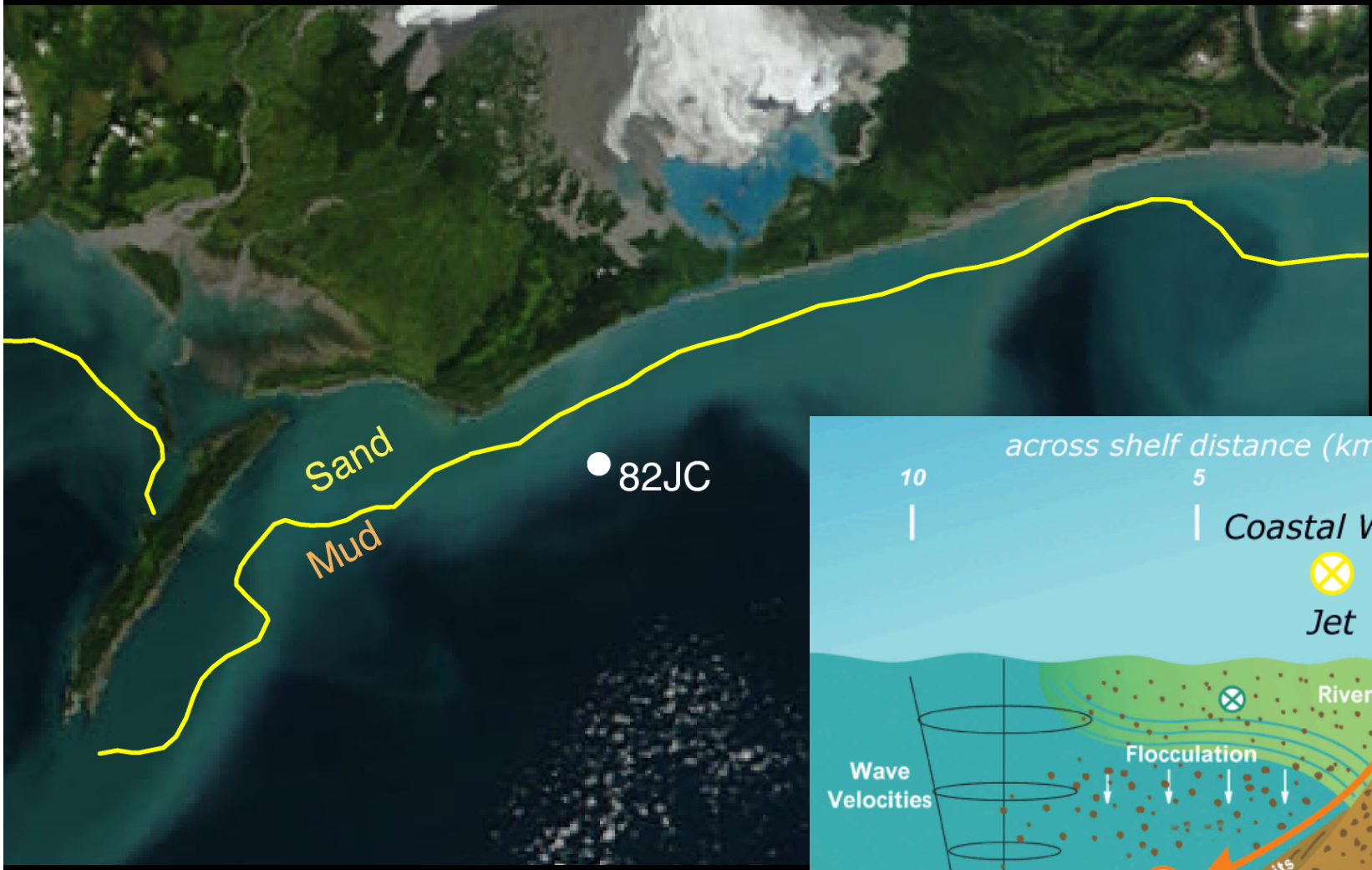
Jaeger et al (1998)

Malaspina Shelf Clinoform




79 JC (Shelf)
GRA Bulk Density (g/cm3)
Magnetic Susceptibilty (x10-6 SI)
Depth in Core (cm)
Cal. Year BP
LIA
MWP
FMA
400
405
410
415
420
425
430
435
440
1.50
1.60
1.70
1.80
1.90
2.00
2.10
2.20
0
200
400
600
800
1000
1200
1400
0
1000
2000
3000
4000
5000
6000
7000
8000
9000

Sediment Transfer on Temperate Paraglacial Continental Shelves

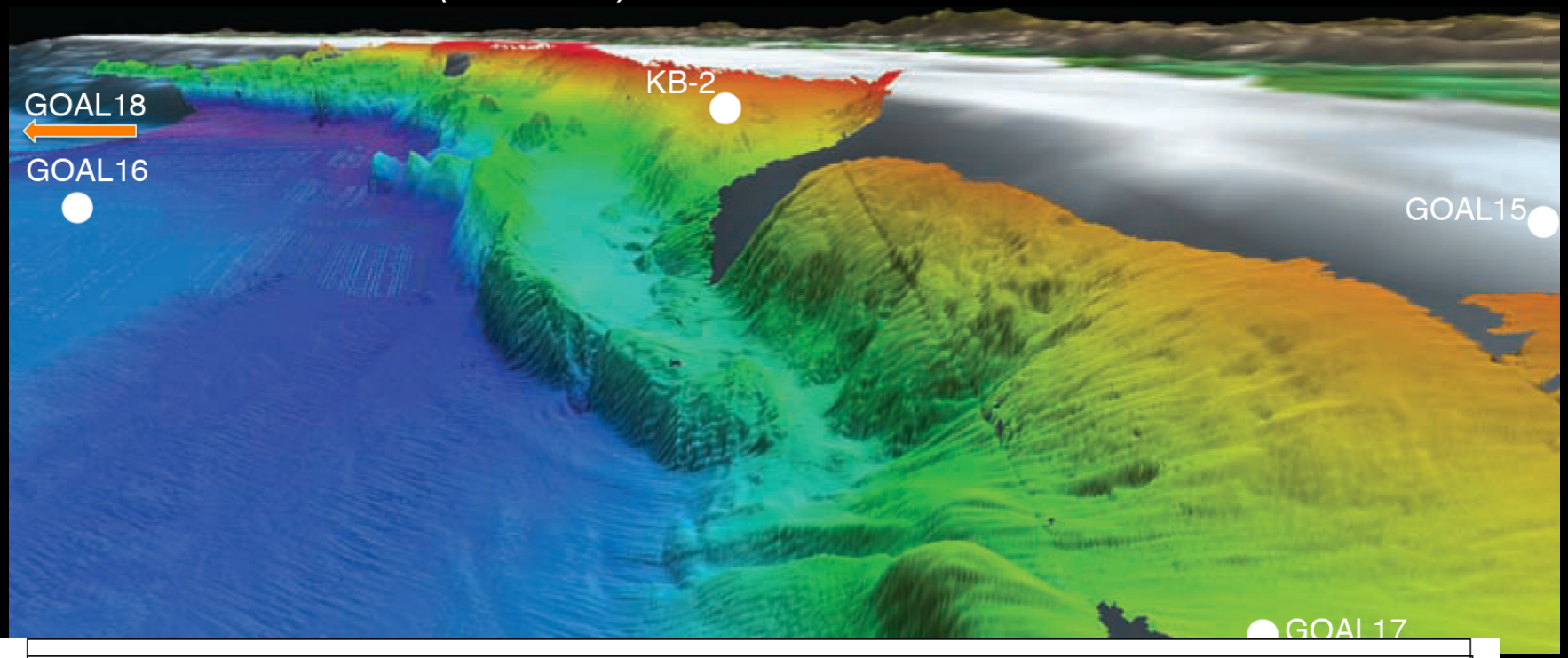


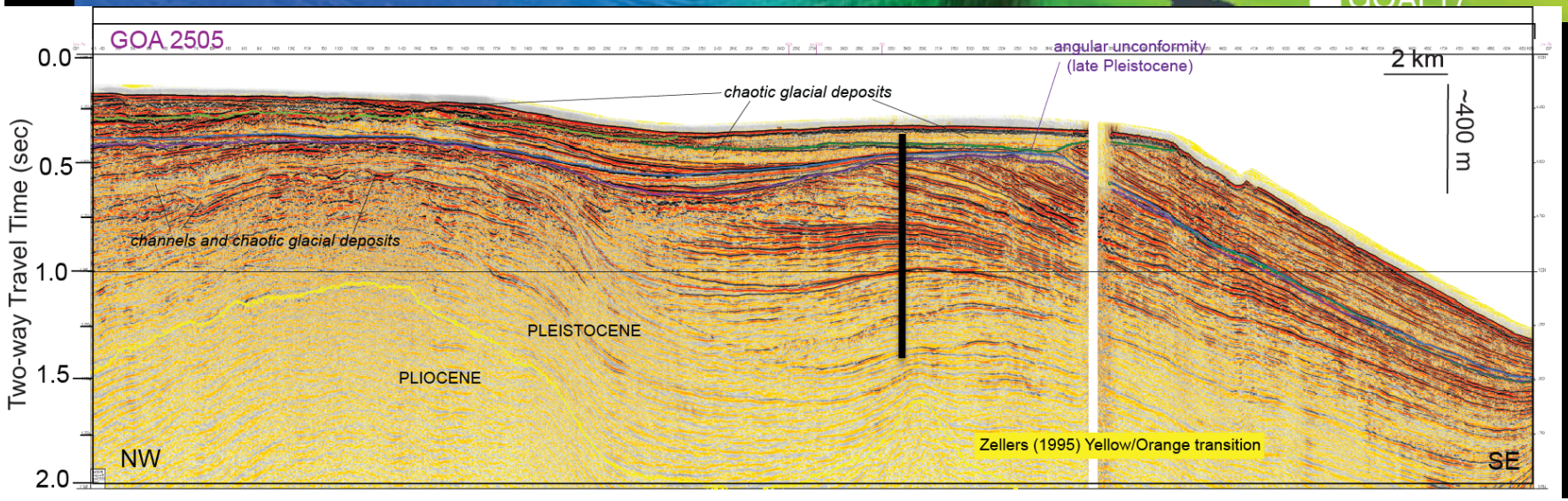
After Geyer and Traykovski (2002)

Posters-

Reese et al., Gulick et al. (T22, T23)

IODP Southern Alaska Expedition
August-Sept 2012





Take Aways

- Temperate Alaskan glacial systems create recognizable shelf sedimentary signals associated with changes in glacial mass balance
- Paraglacial shelf sedimentary lithofacies sourced from terrestrial glacial events resemble mud-rich event-dominated temperate/tropical shelf facies
- Late Holocene shelf lithofacies may be model for early-mid Pleistocene (41-ky forcing) Alaskan glacimarine stratigraphy