

*Deglaciation of the Amundsen Sea Embayment
The Prelude to Recent, Rapid Ice Retreat*

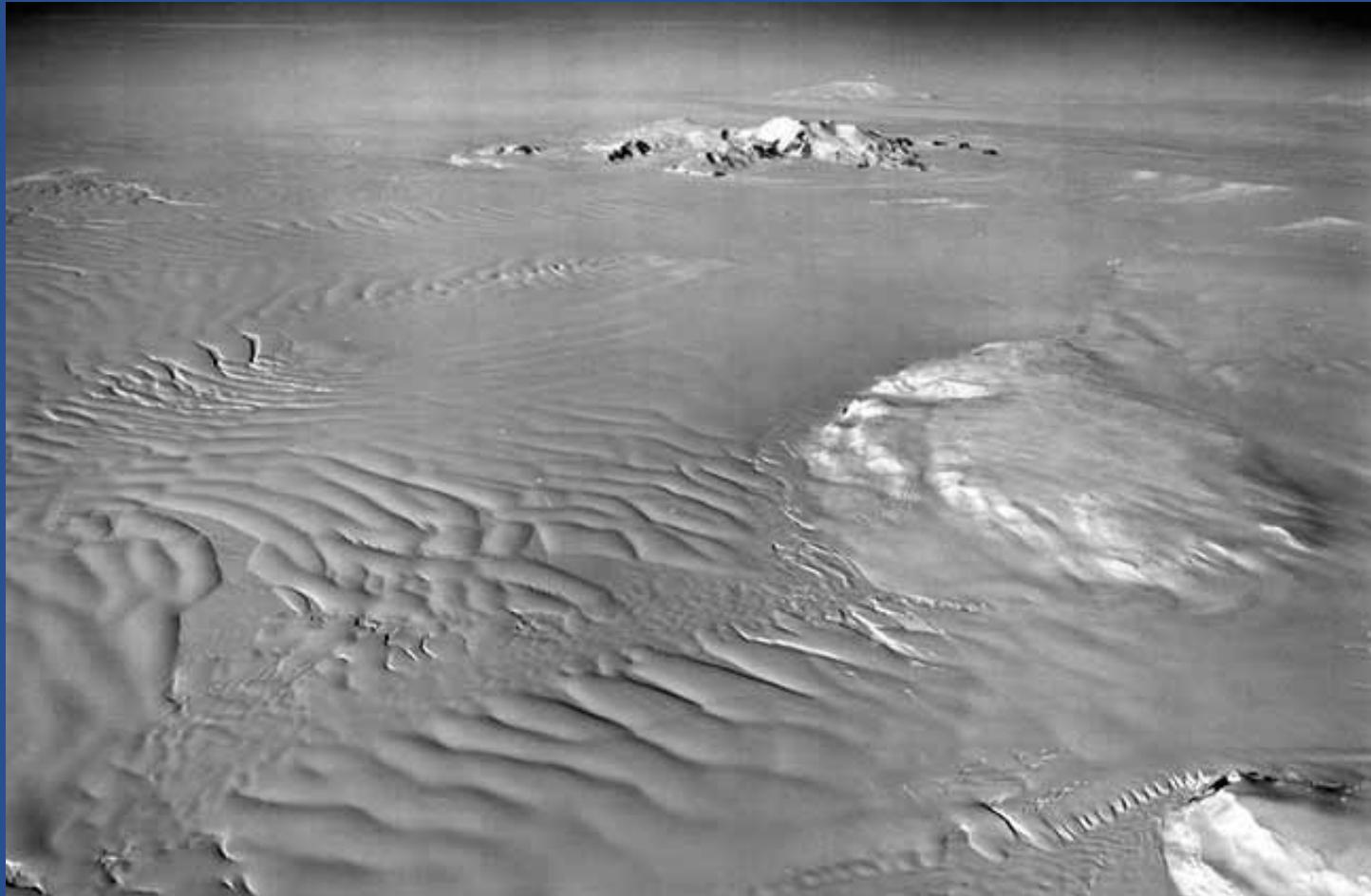
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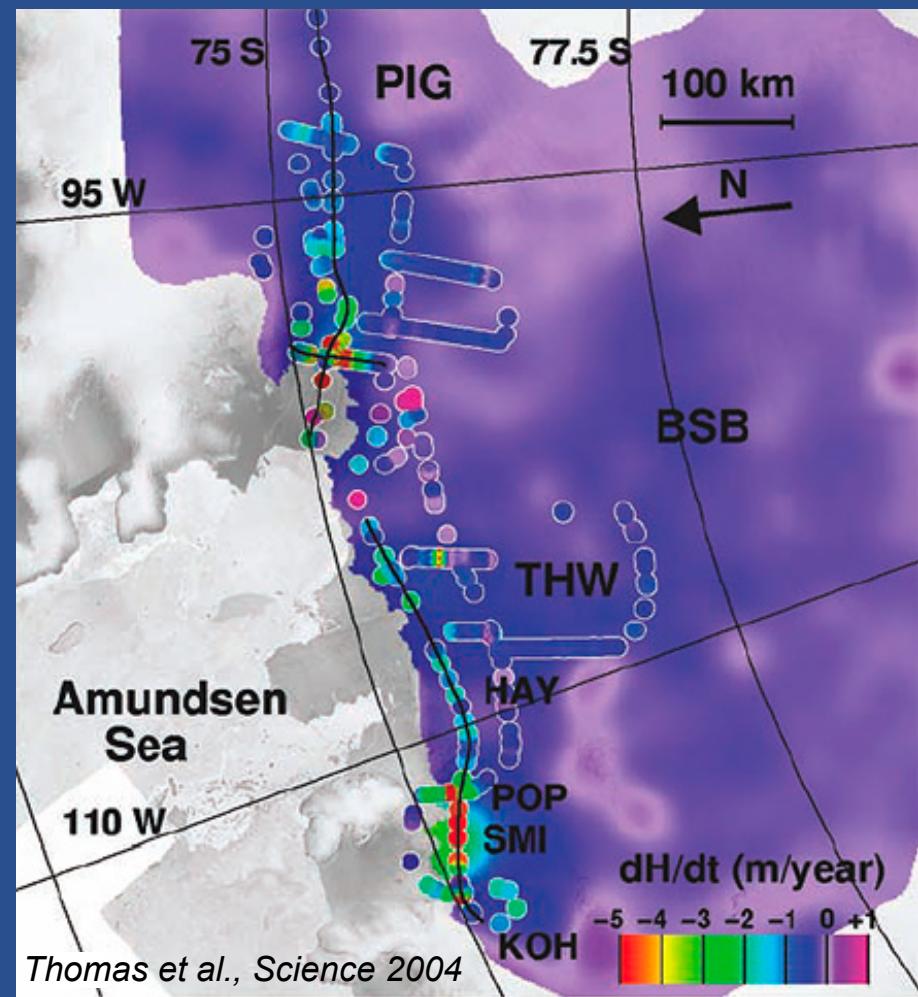
Motivation

Surface lowering rates on Amundsen Sea glaciers are 1-5 m/yr

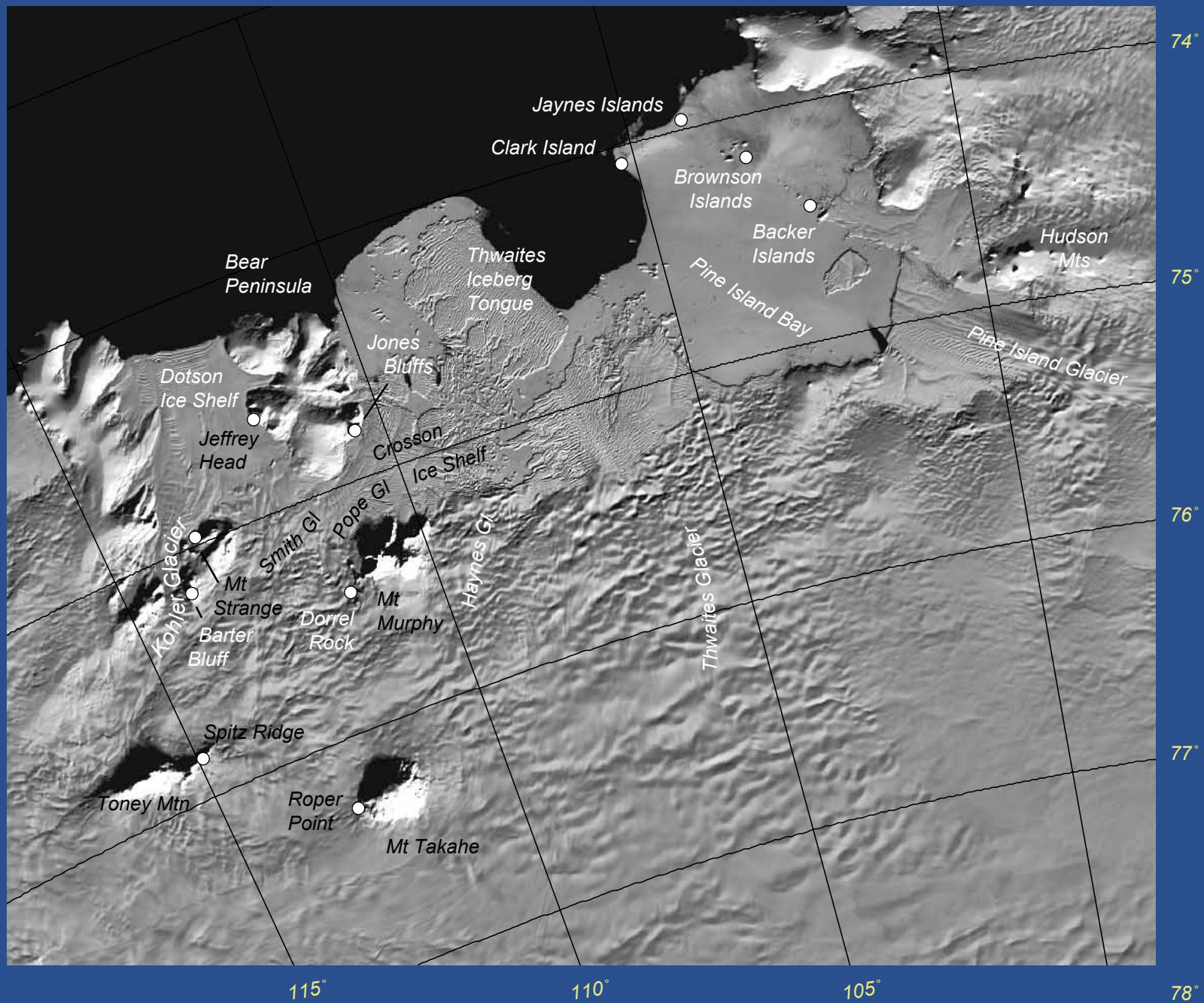
Postglacial thinning elsewhere in Antarctica – rates were 1 - 10 cm/yr

These cannot be sustained, long-term rates.

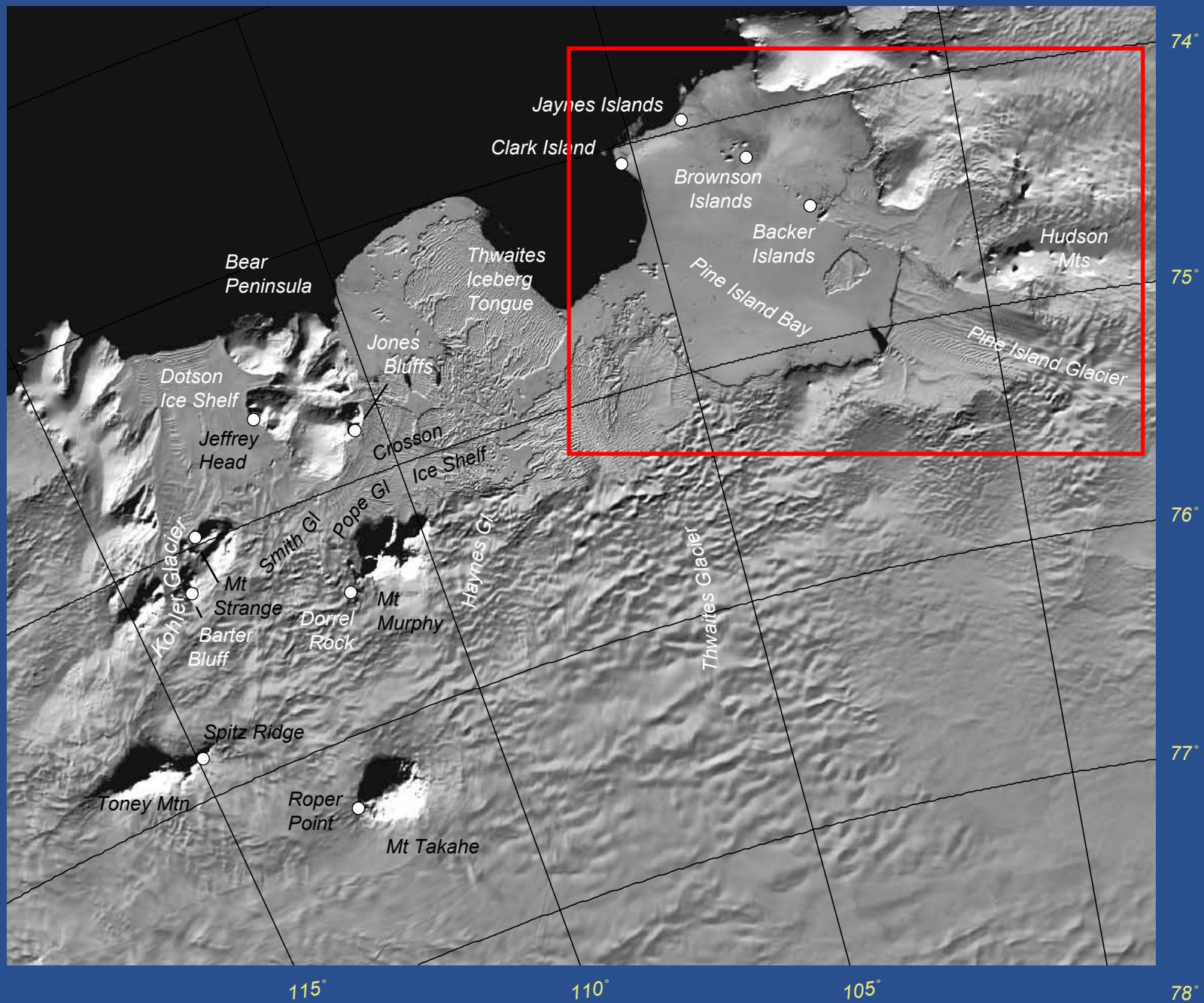
- Is the region emerging from a long-delayed glacial maximum?
- Are high rates due to recent loss of buttressing ice shelves?
- How long have these rates prevailed?
- How does recent thinning compare to millennial-scale patterns of deglaciation across the region?



Sites



Sites



Pine Island Glacier area

- Hudson Mts

*Reconstruct Pine Island
Glacier thickness from
lateral deposits above
modern glacier level.*

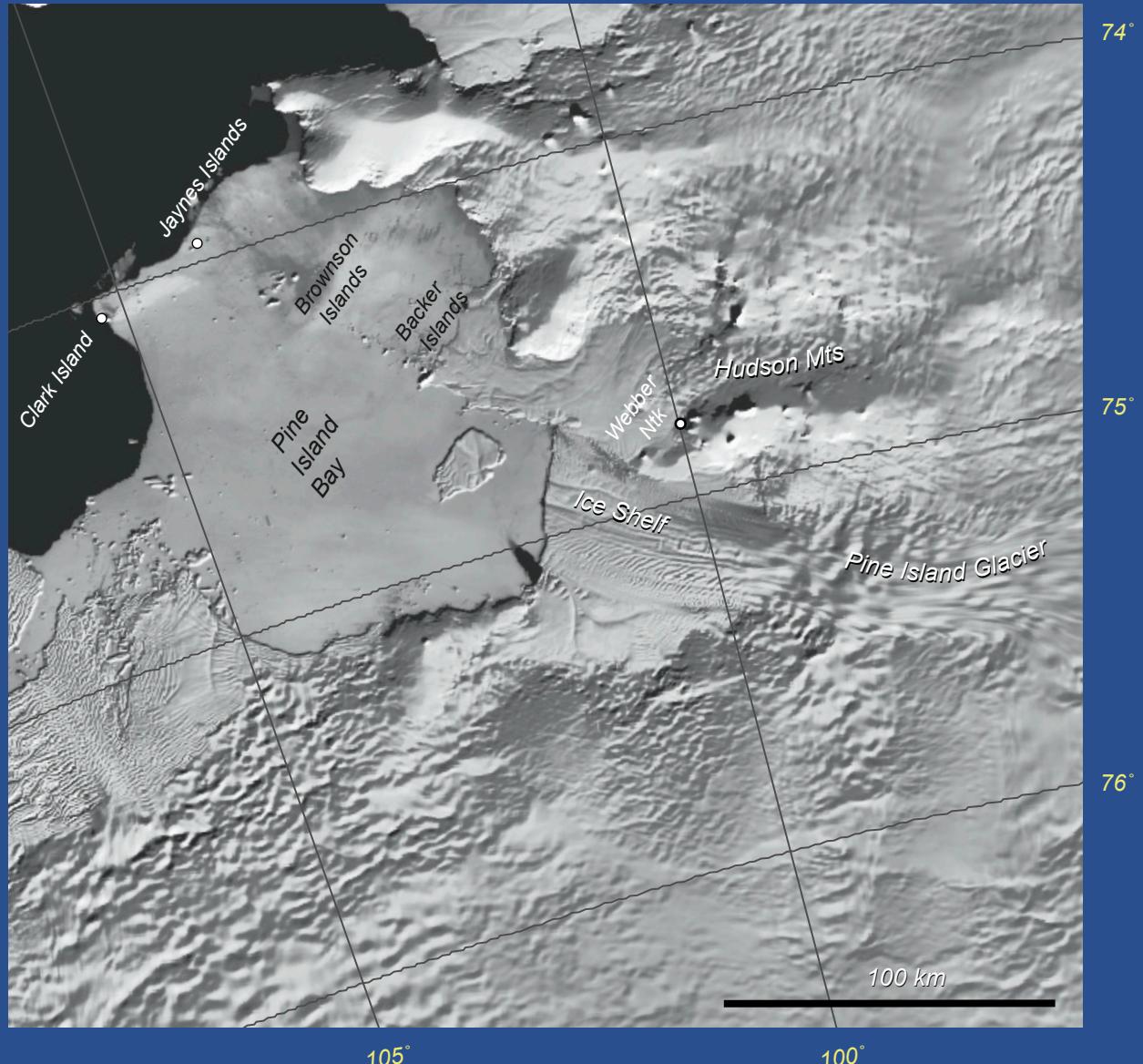
*Mike Bentley and Jo
Johnson*

*[BAS-GRADES; Glacial
Retreat in Antarctica and
Deglaciation of the Earth
System]*

- Pine Island Bay

*Determine the exposure
history of islands in Pine
Island Bay.*

*Deglaciation, ice-shelf
collapse or isostatic
emergence?*



Pine Island Glacier area

- Pine Island Bay

Determine the exposure history of islands in Pine Island Bay.

Deglaciation, ice-shelf collapse or isostatic emergence?



Pine Island Glacier area

- *Pine Island Bay*

Determine the exposure history of islands in Pine Island Bay.

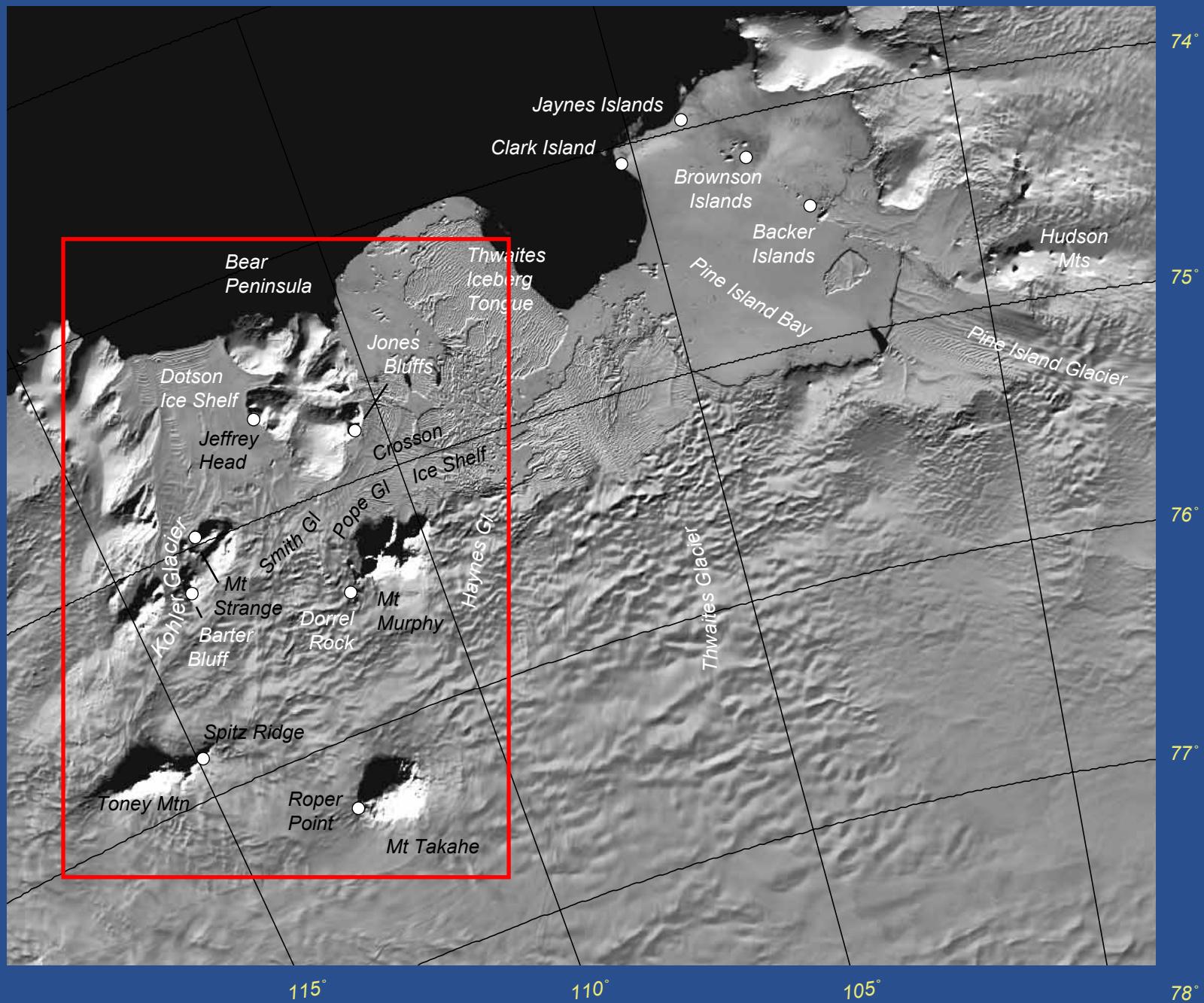
Deglaciation, ice-shelf collapse or isostatic emergence?

C-14 dating of marine sediment and biological deposits.

Exposure dating of emerged rock surfaces.



Sites



Pope Glacier flowline

- Mt Takahe to Mt Murphy

What was the LGM ice thickness, age and postglacial thinning history of Pope Glacier?

Evidence of thicker ice at Mt Takahe.

Reported glacial deposits at Dorrel Rock, Sechrist Pk, Turtle Pk (see Jo's poster), Grew Pk, Callender Pk

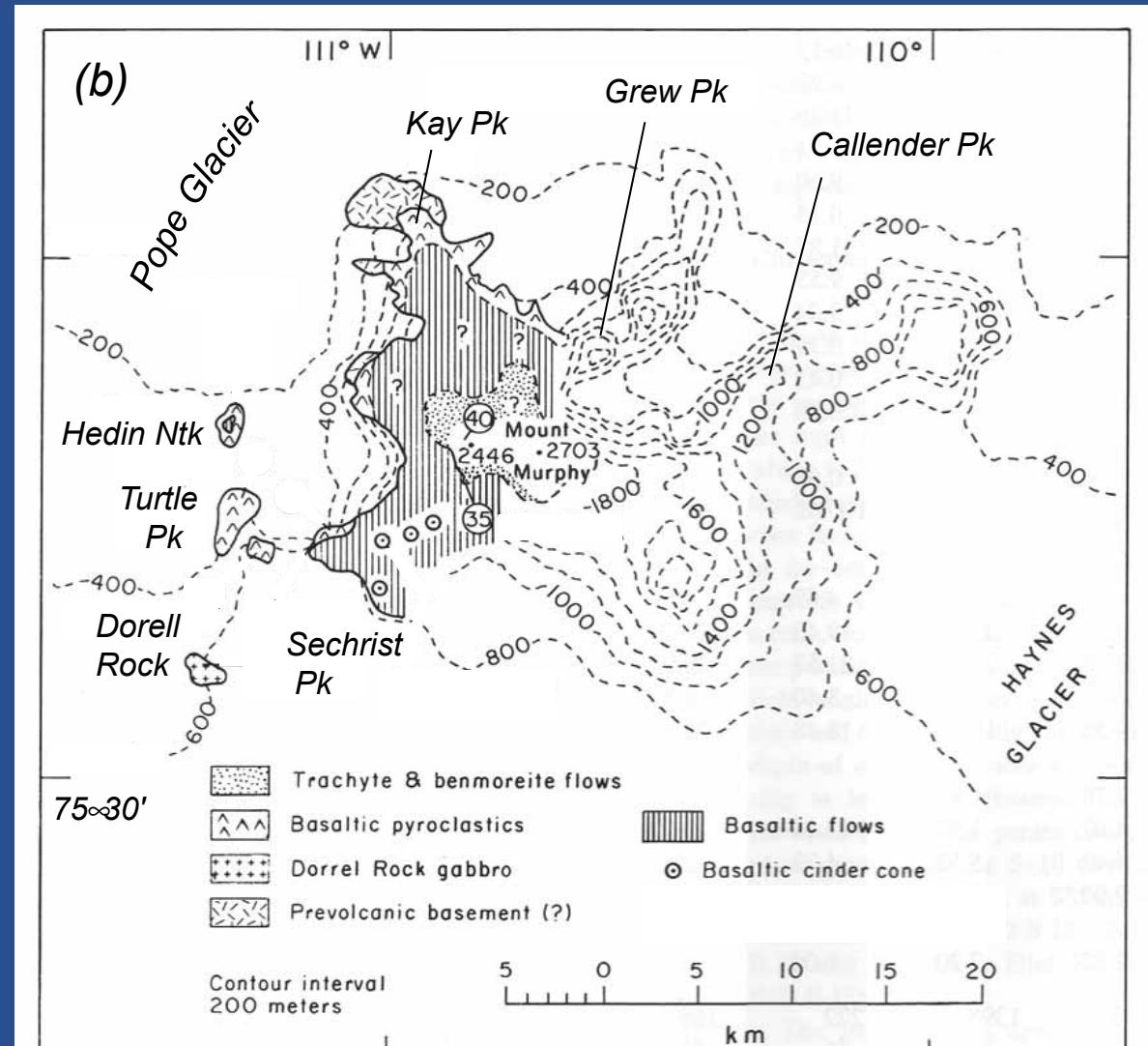


Fig. B.1.2. Geologic sketch map of Mount Murphy and neighboring nunataks. Geology is by W.E. LeMasurier; base map is the Mount Murphy quadrangle (1973), scale 1:250,000 USGS Reconnaissance Series, Antarctica, U.S. Geological Survey.

Pope Glacier flowline

- *Mt Murphy*



Smith and Kohler Glacier flowlines

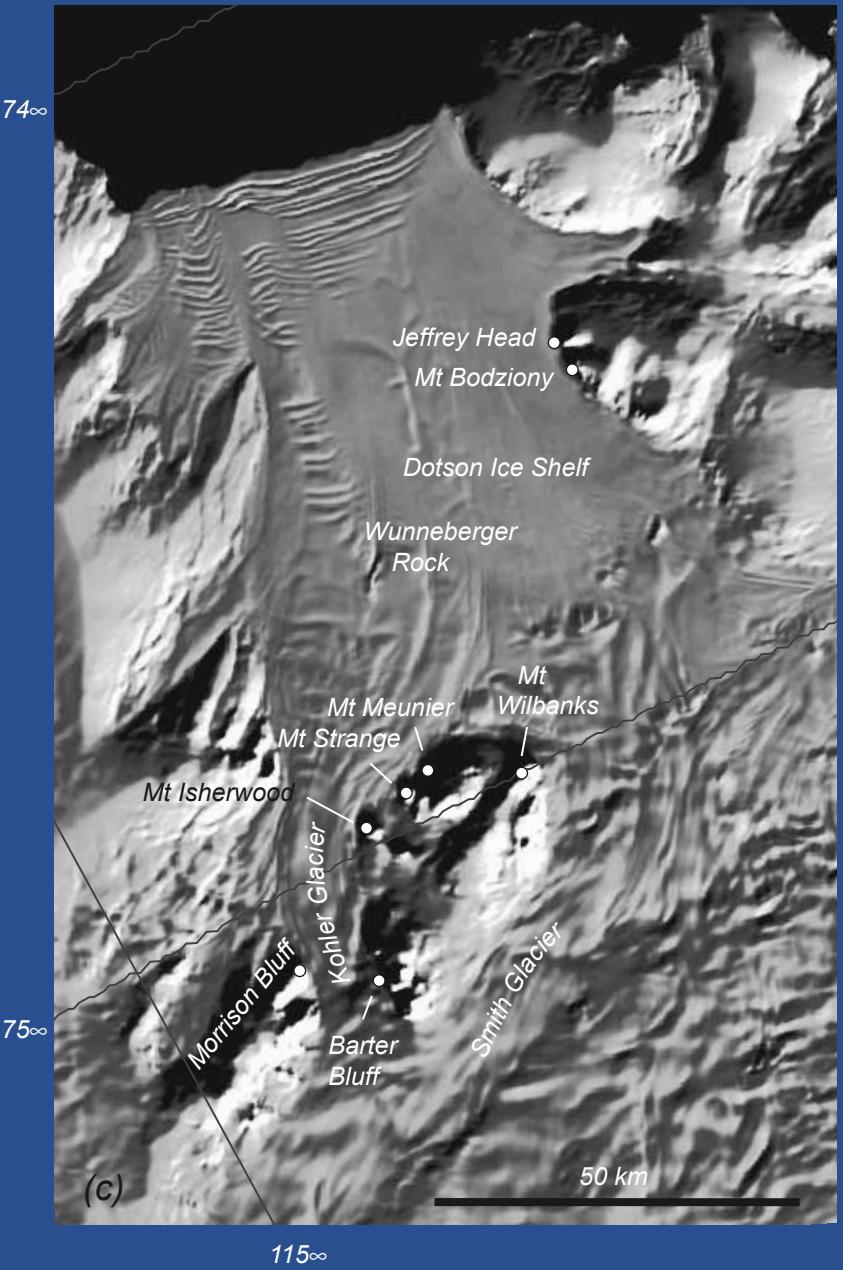
- Toney Mtn to Dotson Ice Shelf

What was the LGM ice thickness along Smith and Kohler Glaciers?

When was the glacial maximum in this region?

What was the postglacial thinning history?

Almost nothing is known about the glacial history of this region.

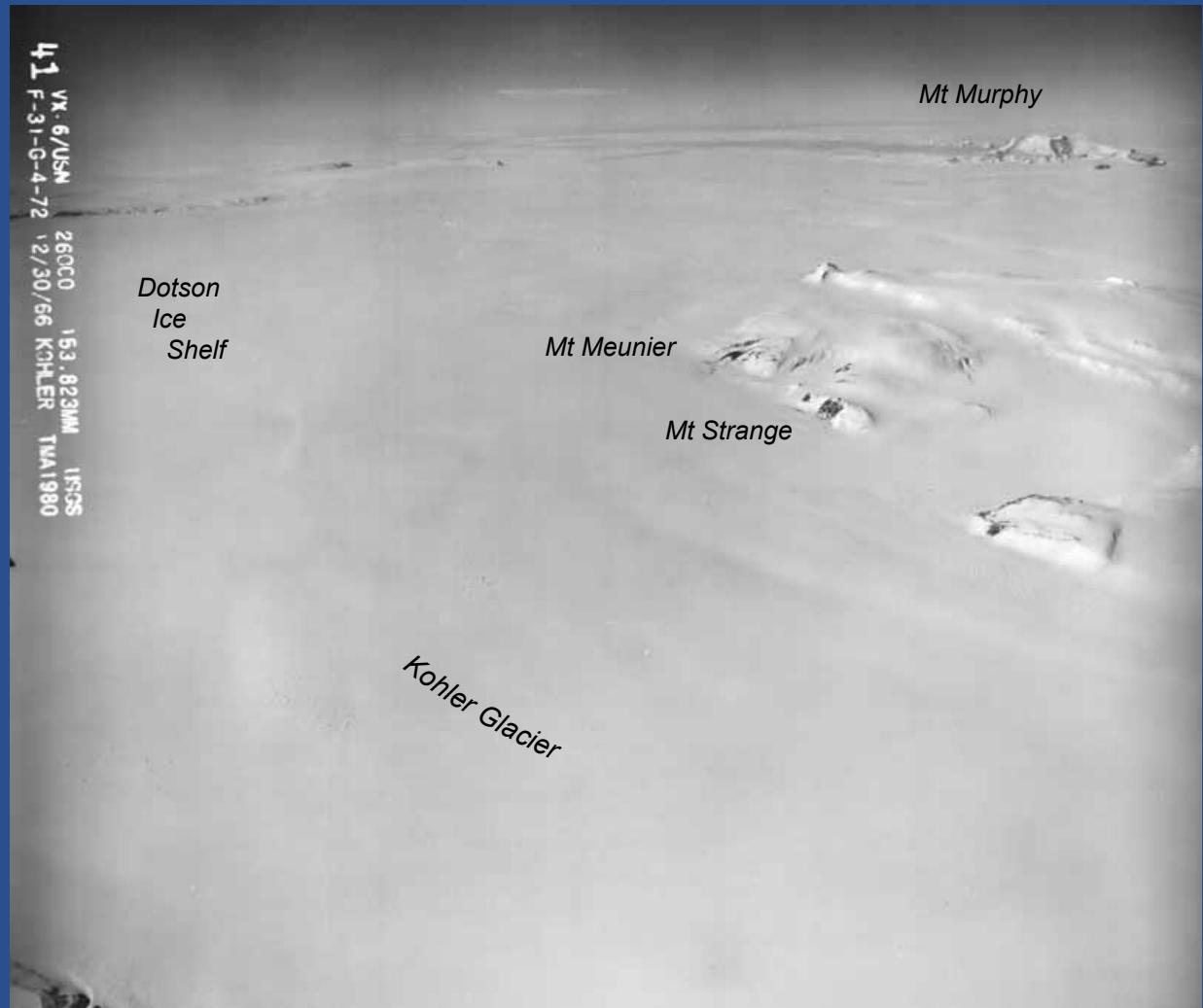


Smith and Kohler Glacier flowlines

*Steep bluffs overlook
glaciers.*

*300 - 400 m relief
(potential thinning
history if deposits are
preserved)*

*Upper 'Marie Byrd
Land Surface' is
exposed in places -
scattered erratics and
striated bedrock found
at Hunt Bluff (see Jo
Johnson's poster).*



Smith and Kohler Glacier flowlines

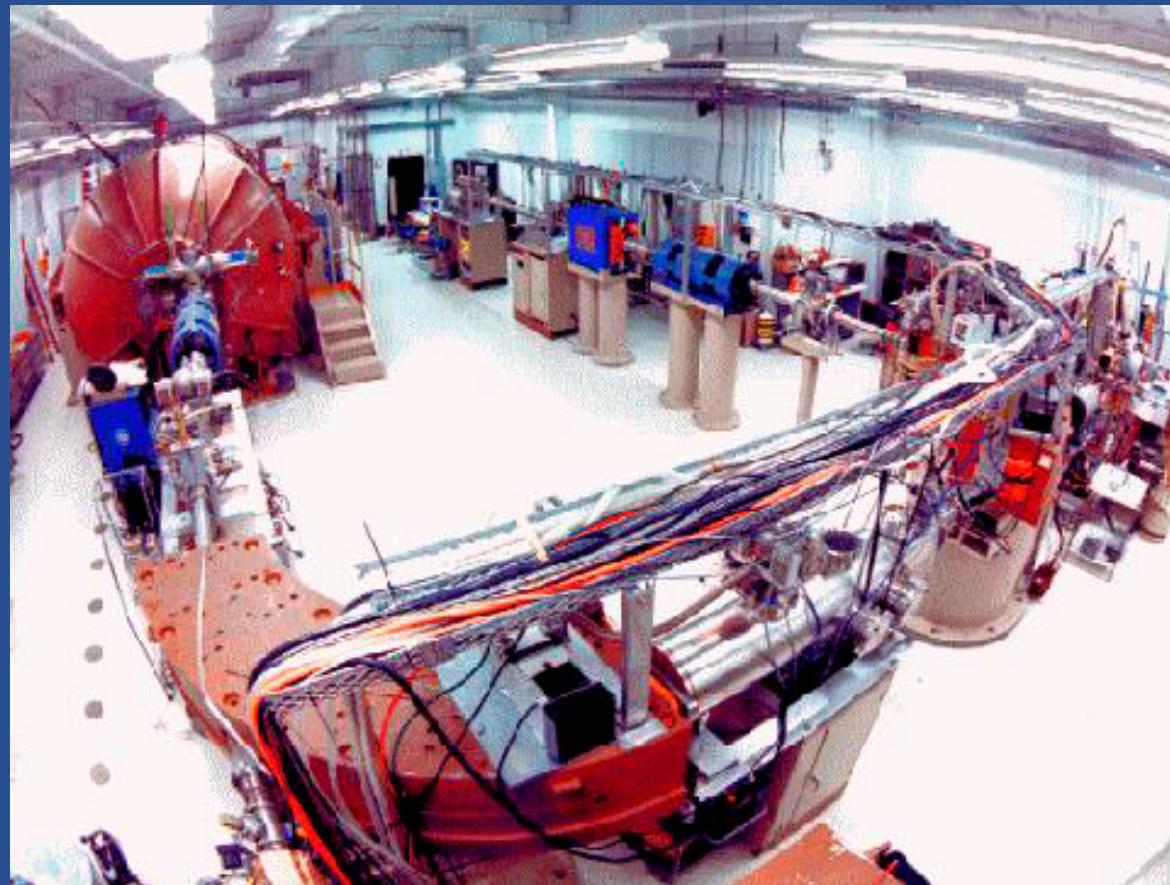


*Jeffrey Head, overlooking
Dotson Ice Shelf*



Complementary experience and analytical capabilities

- *Coastal sedimentology and geomorphology, C-14 dating - University of Maine*
We will need to date very young deposits and surfaces with cosmogenic nuclides
- *For granitic rocks, high sensitivity Be-10, Cl-36_K (UW)*
- *For basic volcanic rocks, He-3, Ne-21 (Harvard), Cl-36_{Ca} (UW)*



Field logistics

- Two field seasons (5-7 weeks). Work from lightweight camps.
- Two field parties, rotating people (especially students) as opportunities allow.
- Pine Island Bay is the biggest challenge - access to the islands by helicopter or boat from the Nathaniel B Palmer?
- Otter or overland traverse to Mt Takahe and Mt Murphy from Inland WAIS. Sites around Mt Murphy are accessible by skidoo.
- Access and camp moves along Smith and Kohler Glaciers by Otter.

Education and Outreach

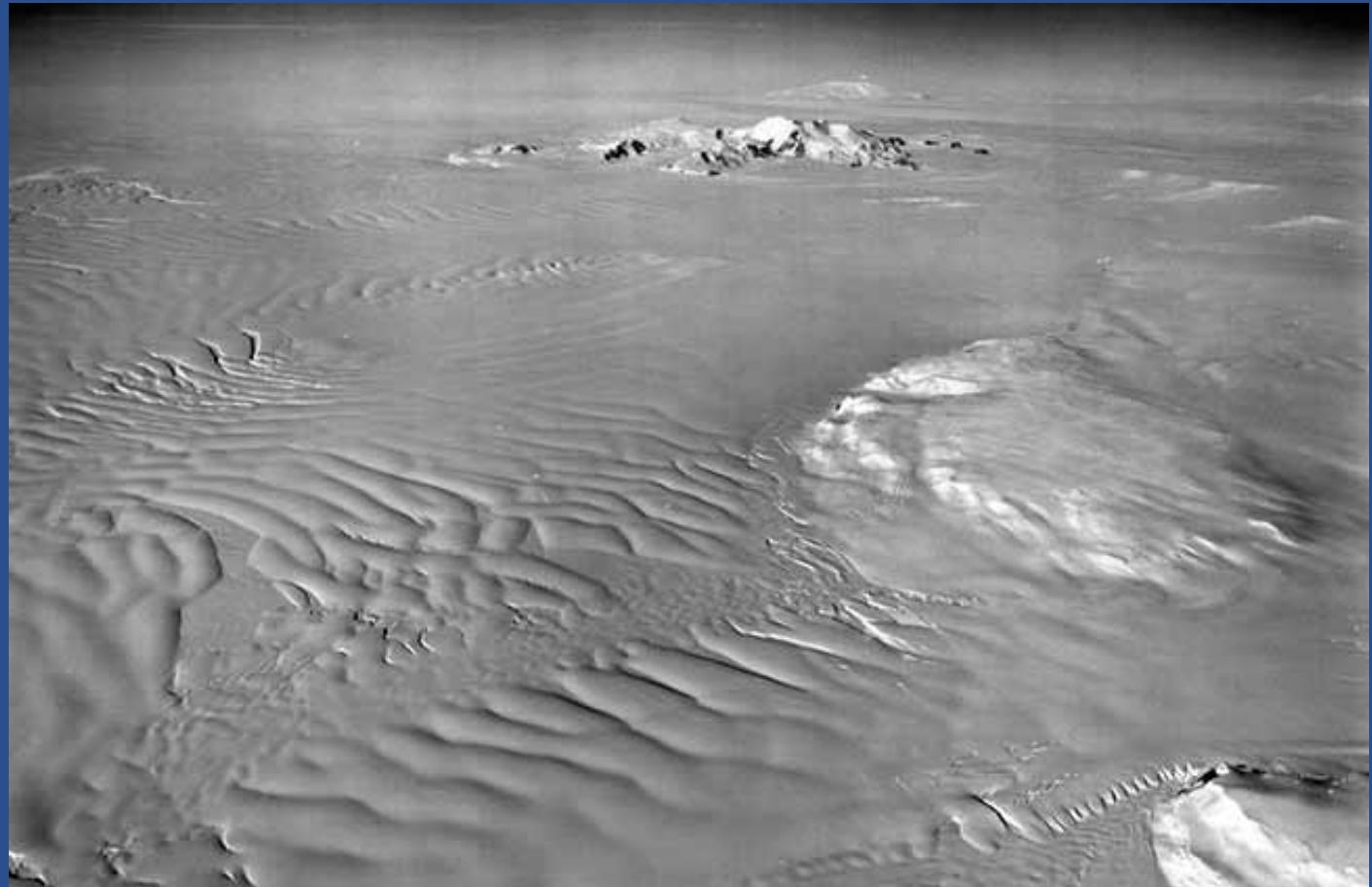
- Graduate students at Maine and UW.
- "Virtual basecamp" web portal, co-ordinated with ARCUS' proposed "Antarctic Alive" program.
- Happy to entertain the media - we work in the most scenic places!



Summary

Recent rates of ice loss in the Amundsen Sea cannot be sustained, long-term rates.

- *How long have these rates prevailed?*
- *How does recent thinning compare to millennial-scale patterns of deglaciation across the region?*
- *Aim to provide long-term context for recent, rapid deglaciation.*



- *Thanks to Wes LeMasurier and Bill Macintosh for sharing advice, field experience, and photos.*