

# Greenland Ice Sheet borehole temperature profiles

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## 1 Introduction and Methods

This is a collection of all Greenland ice borehole temperature profiles we have been able to find. Secondary data, useful to use the temperature profile, is also included when available. The secondary data includes ice thickness, the location of the borehole, and the surface velocity. Tertiary data includes the source of all secondary data (ice thickness and location are occasionally reported in different locations than the temperature profile), the date the borehole was drilled, the date the temperature profile was collected, and the dates of thickness and velocity data.

This collection exists in digital form, because few existing temperature profiles are shared digitally. Most profiles are shared only graphically in publications. We digitize these using the desktop version of WebPlotDigitizer (Rohatgi 2020). Some profiles are provided in tabular form in historical technical reports, and some are provided via personal communication.

Each profile is presented below in the Source Material section. First, for each profile the metadata is presented in a standard format. Then, subsections for the temperature, thickness, location, and velocity document where each of those data come from. When the source is personal communication via email, the body of the email (sanitized) is included as documentation, otherwise the reference graphic is included.

Uncertainty estimates are not provided, but can be determined from the reference publications, by repeat and multiple digitization of the graphic, or digitizing the data from separate publications when they exist.

After digitizing the profiles from the graphic or tables, we linearly interpolate between the points. We then convert the vertical scales (from the graphic) to each of three scales: Depth below surface, distance above bed, and normalized distance above bed.

## 2 Results

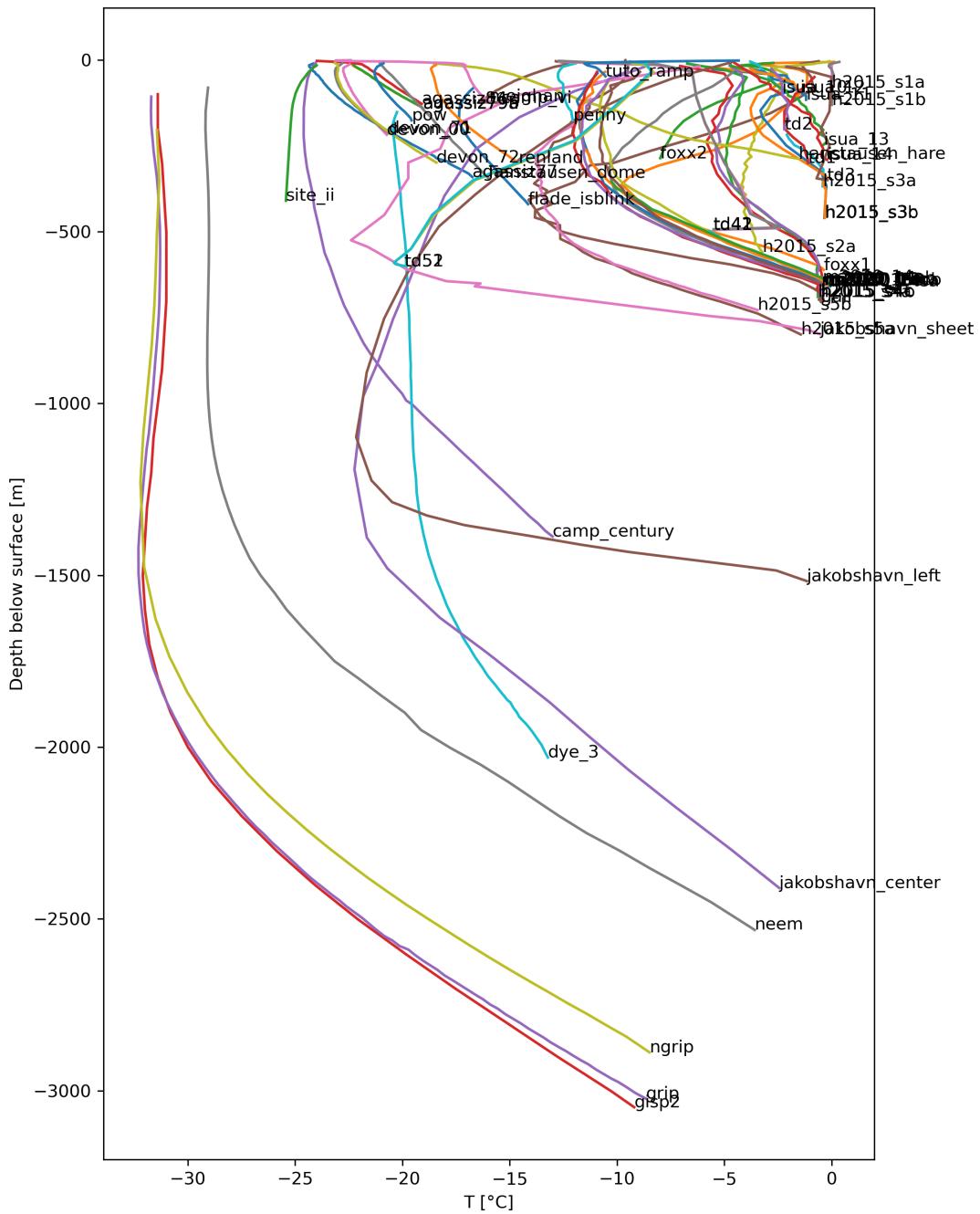


Figure 1: Temperature profiles from the surface

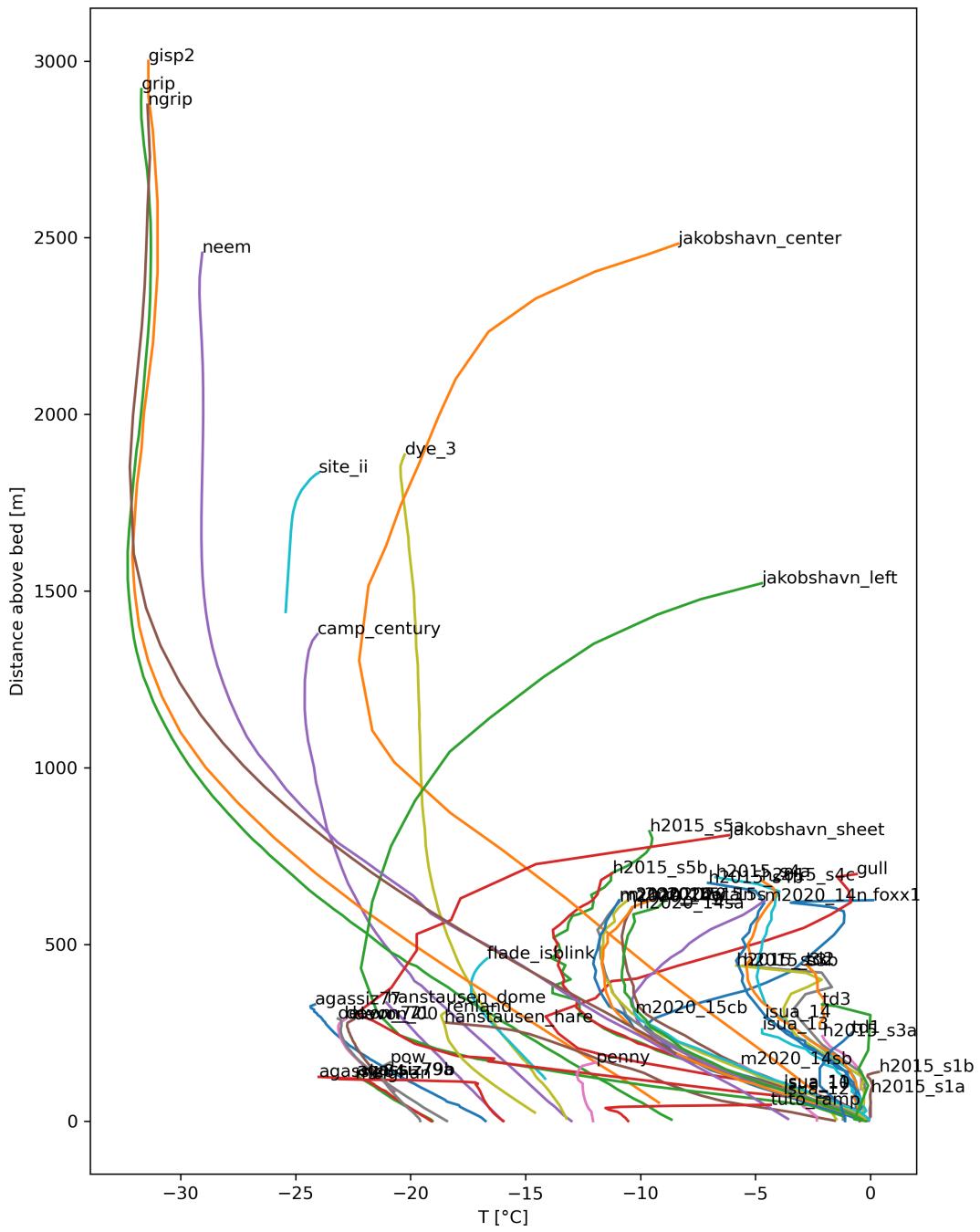


Figure 2: Temperature profiles from the bed

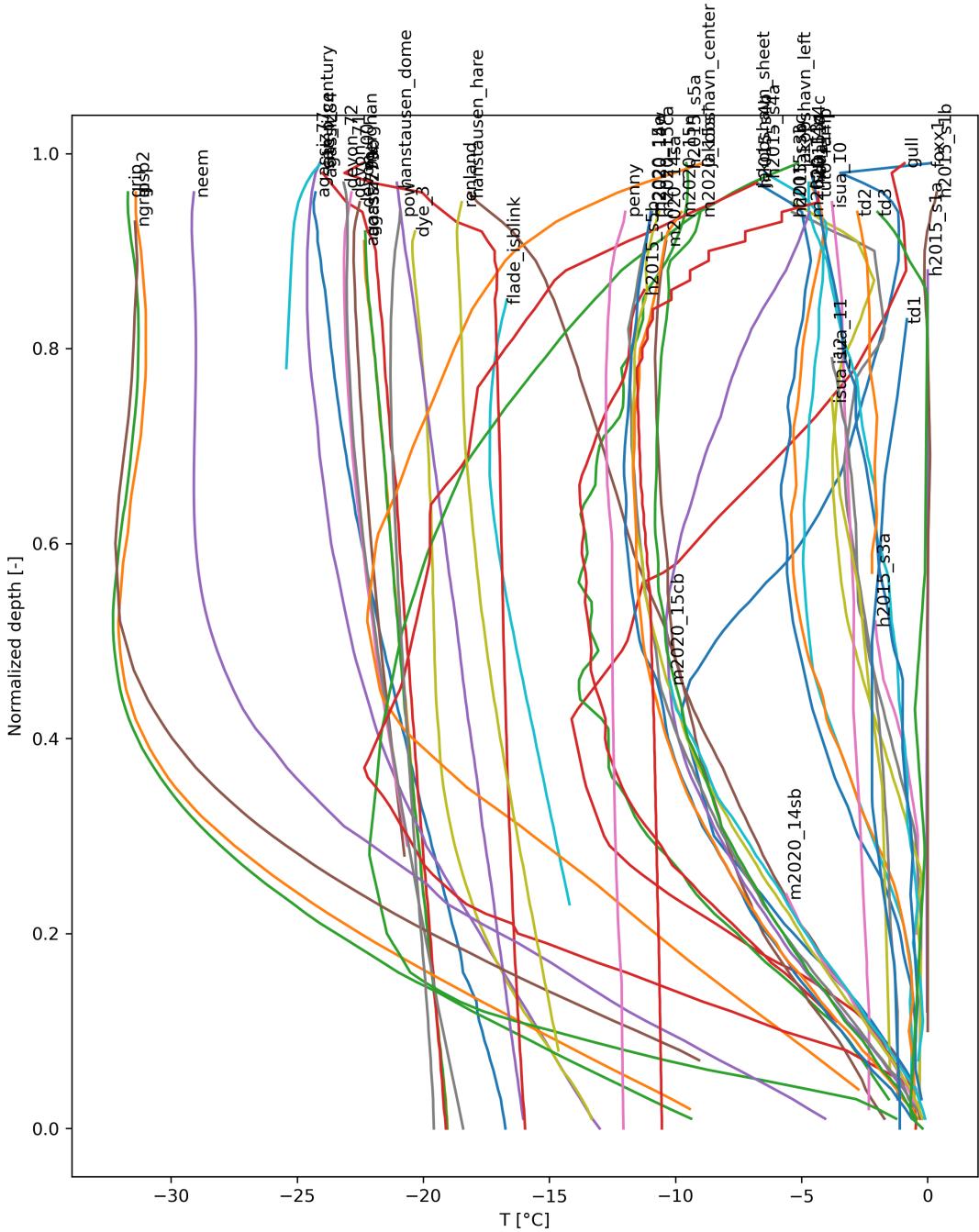


Figure 3: Temperature profiles on a normalized depth axis

### 3 Source Material

#### 3.1 Agassiz 77 borehole

Name	agassiz77
Alternate name	Agassiz 77 borehole
Data source	WIC Email
Data year(s)	1977
Depth of top measurement [m]	11.0
Depth of bottom measurement [m]	341.0
Drill year(s)	1977 (Vinther, 2008)
Longitude [ $^{\circ}$ E]	-73.1
Latitude [ $^{\circ}$ N]	80.7
Approximate location name	Agassiz Ice Cap
Location source	Vinther, 2008
Ice thickness [m]	340.9
Ice thickness year	
Ice thickness source	See data source
Surface velocity [m yr $^{-1}$ ]	
Surface velocity year	
Surface velocity source	
Measured from: Top, Bottom, Relative	T

##### 3.1.1 Temperature

- Data provided by 3rd party in XLSX format, converted to CSV.
- WIC Email: [Agassiz x4](#)
- See also Clarke et al. ([1987](#)) Figure 2.

From: William Colgan  
To: Ken Mankoff  
Subject: Agassiz x4  
Date: Wed 02 Dec 2020 04:54:17 AM PST  
Attachments: [1]Agassiz borehole T profiles.xlsx(19.6K)

Here are 4x Agassiz Ice Cap temperature profiles. All to bedrock, and all from within 2 km of the same 80.70N and 73.10W coordinate in the file.

Fra: Christian Zdanowicz  
Sendt: 2. december 2020 13:27  
Til: William Colgan <wic@geus.dk>  
Emne: RE: Prince of Wales - ice temperature?

The Agassiz T profiles are from the 1977, 1979 and 1984 boreholes, all down to bedrock. I do not have more precise information on the measurements or on the location of the boreholes than what was published (see other attached papers).

David Fisher deserves the credit for all these data, I did not generate them. You can use his Univ. of Ottawa affiliation: Department of Earth and Environmental Sciences, University of Ottawa, Ottawa, Canada, K1N 6N5.

### 3.1.2 Thickness

From email (above) stating that profile goes to bedrock.

### 3.1.3 Location

Provided in email. Note: "within 2 km of".

### 3.1.4 Velocity

Unknown

### 3.2 Agassiz 79a borehole

Name	agassiz79a
Alternate name	Agassiz ice cap 1979A borehole
Data source	WIC Email
Drill year(s)	1979 (Vinther, 2008)
Data year(s)	1979
Longitude [°E]	-73.1
Latitude [°N]	80.7
Approximate location name	Agassiz Ice Cap
Location source	Vinther, 2008
Ice thickness [m]	141.9
Ice thickness year	nan
Ice thickness source	See data source
Surface velocity [m yr <sup>-1</sup> ]	nan
Surface velocity year	nan
Surface velocity source	nan
Measured from: Top, Bottom, Relative	T
Depth of top measurement [m]	12.0
Depth of bottom measurement [m]	142.0
Coverage [% of thickness]	92

#### 3.2.1 Temperature

- Data provided by 3rd party in XLSX format, converted to CSV.
- WIC Email: [Agassiz x4](#)
- See also Clarke et al. (1987) Figure 2.

From: William Colgan  
To: Ken Mankoff  
Subject: Agassiz x4  
Date: Wed 02 Dec 2020 04:54:17 AM PST  
Attachments: [1]Agassiz borehole T profiles.xlsx(19.6K)

Here are 4x Agassiz Ice Cap temperature profiles. All to bedrock, and all from within 2 km of the same 80.70N and 73.10W coordinate in the file.

Fra: Christian Zdanowicz  
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Til: William Colgan <wic@geus.dk>  
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The Agassiz T profiles are from the 1977, 1979 and 1984 boreholes, all down to bedrock. I do not have more precise information on the measurements or on the location of the boreholes than what was published (see other attached papers).

David Fisher deserves the credit for all these data, I did not generate them. You can use his Univ. of Ottawa affiliation: Department of Earth and Environmental Sciences, University of Ottawa, Ottawa, Canada, K1N 6N5.

### 3.2.2 Thickness

From email (above) stating that profile goes to bedrock.

### 3.2.3 Location

Provided in email. Note: "within 2 km of".

### 3.2.4 Velocity

Unknown

### 3.3 Agassiz 79b borehole

Name	agassiz79b
Alternate name	Agassiz ice cap 1979B borehole
Data source	WIC Email
Drill year(s)	1979 (Vinther, 2008)
Data year(s)	1979
Longitude [°E]	-73.1
Latitude [°N]	80.7
Approximate location name	Agassiz Ice Cap
Location source	Vinther (2008)
Ice thickness [m]	141.2
Ice thickness year	nan
Ice thickness source	See data source
Surface velocity [m yr <sup>-1</sup> ]	nan
Surface velocity year	nan
Surface velocity source	nan
Measured from: Top, Bottom, Relative	T
Depth of top measurement [m]	11.0
Depth of bottom measurement [m]	141.0
Coverage [% of thickness]	92

#### 3.3.1 Temperature

- Data provided by 3rd party in XLSX format, converted to CSV.
- WIC Email: [Agassiz x4](#)
- See also Clarke et al. (1987) Figure 2.

From: William Colgan  
To: Ken Mankoff  
Subject: Agassiz x4  
Date: Wed 02 Dec 2020 04:54:17 AM PST  
Attachments: [1]Agassiz borehole T profiles.xlsx(19.6K)

Here are 4x Agassiz Ice Cap temperature profiles. All to bedrock, and all from within 2 km of the same 80.70N and 73.10W coordinate in the file.

Fra: Christian Zdanowicz  
Sendt: 2. december 2020 13:27  
Til: William Colgan <wic@geus.dk>  
Emne: RE: Prince of Wales - ice temperature?

The Agassiz T profiles are from the 1977, 1979 and 1984 boreholes, all down to bedrock. I do not have more precise information on the measurements or on the location of the boreholes than what was published (see other attached papers).

David Fisher deserves the credit for all these data, I did not generate them. You can use his Univ. of Ottawa affiliation: Department of Earth and Environmental Sciences, University of Ottawa, Ottawa, Canada, K1N 6N5.

### 3.3.2 Thickness

From email (above) stating that profile goes to bedrock.

### 3.3.3 Location

Provided in email. Note: "within 2 km of".

### 3.3.4 Velocity

Unknown

### 3.4 Agassiz 84 borehole

Name	agassiz84
Alternate name	Agassiz 1984 borehole
Data source	WIC Email
Drill year(s)	184 (Vinther, 2008)
Data year(s)	1984
Longitude [°E]	-73.1
Latitude [°N]	80.7
Approximate location name	Agassiz Ice Cap
Location source	Vinther, 2008
Ice thickness [m]	127.6
Ice thickness year	nan
Ice thickness source	See data source
Surface velocity [m yr <sup>-1</sup> ]	nan
Surface velocity year	nan
Surface velocity source	nan
Measured from: Top, Bottom, Relative	T
Depth of top measurement [m]	3.0
Depth of bottom measurement [m]	128.0
Coverage [% of thickness]	98

#### 3.4.1 Temperature

- Data provided by 3rd party in XLSX format, converted to CSV.
- WIC Email: [Agassiz x4](#)
- See also Clarke et al. (1987) Figure 2.

From: William Colgan  
To: Ken Mankoff  
Subject: Agassiz x4  
Date: Wed 02 Dec 2020 04:54:17 AM PST  
Attachments: [1]Agassiz borehole T profiles.xlsx(19.6K)

Here are 4x Agassiz Ice Cap temperature profiles. All to bedrock, and all from within 2 km of the same 80.70N and 73.10W coordinate in the file.

Fra: Christian Zdanowicz  
Sendt: 2. december 2020 13:27  
Til: William Colgan <wic@geus.dk>  
Emne: RE: Prince of Wales - ice temperature?

The Agassiz T profiles are from the 1977, 1979 and 1984 boreholes, all down to bedrock. I do not have more precise information on the measurements or on the location of the boreholes than what was published (see other attached papers).

David Fisher deserves the credit for all these data, I did not generate them. You can use his Univ. of Ottawa affiliation: Department of Earth and Environmental Sciences, University of Ottawa, Ottawa, Canada, K1N 6N5.

### 3.4.2 Thickness

From email (above) stating that profile goes to bedrock.

### 3.4.3 Location

Provided in email. Note: "within 2 km of".

### 3.4.4 Velocity

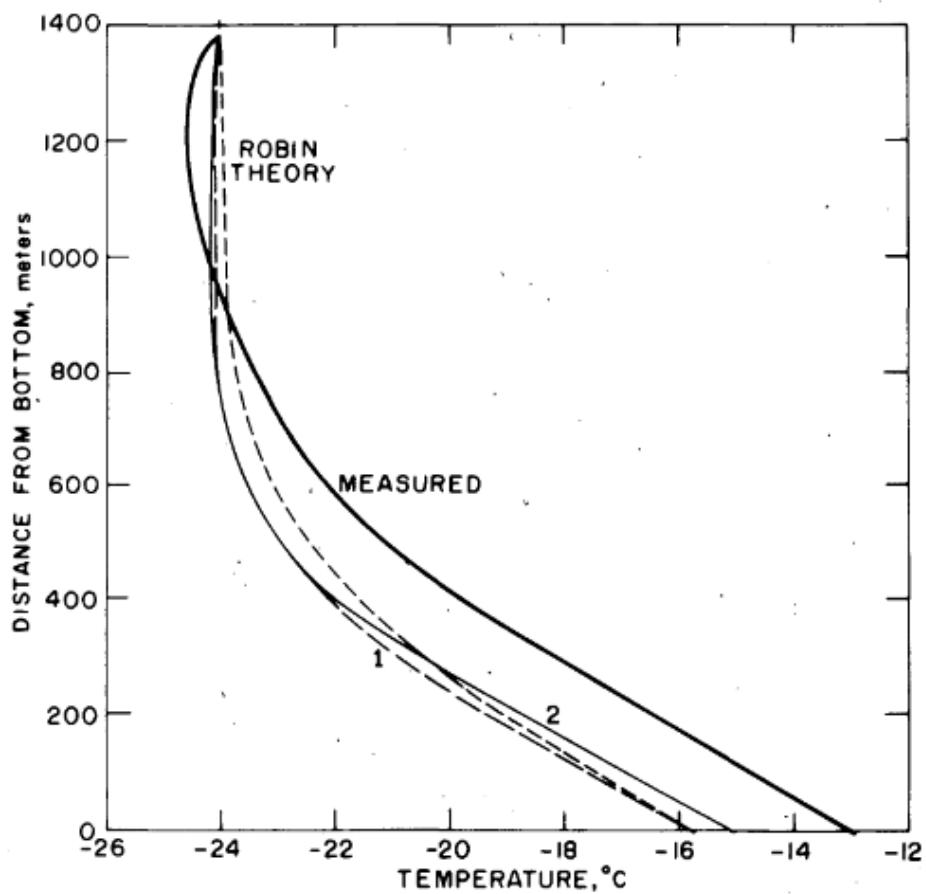
Unknown

### 3.5 Camp Century

Name	camp_century
Alternate name	Camp Century
Data source	Weertman, J.: Comparison betwe
Drill year(s)	nan
Data year(s)	nan
Longitude [ $^{\circ}$ E]	nan
Latitude [ $^{\circ}$ N]	nan
Approximate location name	Camp Century
Location source	?
Ice thickness [m]	1387
ice thickness year	?
Ice thickness source	?
Surface velocity [m yr $^{-1}$ ]	nan
Surface velocity year	nan
Surface velocity source	nan
Measured from: Top, Bottom, Relative	B
Depth of top measurement [m]	9.0
Depth of bottom measurement [m]	1387.0
Coverage [% of thickness]	99

#### 3.5.1 Temperature

- Digitized from Weertman (1968) Figure 1
- Note: Temperature depth scale is from bottom.
- Note (from Liam Colgan): Weertman (1968) shows  $\sim -12$   $^{\circ}$ C at the bed in 1966, but a small ensemble of radar analyses now show liquid bed returns since 2010.



*Figure 1. Measured (by B.L. Hansen) and theoretical temperature profiles for the Camp Century borehole. Theoretical curve 1 calculated using local value of accumulation rate gradient; curve 2 calculated using average accumulation rate gradient.*

### 3.5.2 Thickness

Unknown source - check with WIC

### 3.5.3 Location

Unknown

### 3.5.4 Velocity

Unknown

### 3.6 Devon 1998/2000 borehole

Name	devon_00
Alternate name	Devon borehole
Data source	WIC Email
Drill year(s)	1998-04-15 to 1998-05-07
Data year(s)	2000-04-15
Longitude [°E]	-82.14
Latitude [°N]	75.34
Approximate location name	Devon Ice Cap
Location source	
Ice thickness [m]	300.55
ice thickness year	
Ice thickness source	See data source
Surface velocity [m yr <sup>-1</sup> ]	
Surface velocity year	
Surface velocity source	
Measured from: Top, Bottom, Relative	T
Depth of top measurement [m]	13
Depth of bottom measurement [m]	218

#### 3.6.1 Temperature

- Provided in XLSX file via email.
  - Link to email: [VS: Prince of Wales - ice temperature?](#)
- Note that temperature profile starts at casement, 1.55 m below Y2K surface, so all depths have +1.55 added to them.

From: William Colgan  
To: Ken Mankoff  
Subject: VS: Prince of Wales - ice temperature?  
Date: Wed 02 Dec 2020 03:10:34 AM PST  
Attachments: [1]Devon 1998 borehole Ts.xlsx(12.1K)

Ken - Devon98 temperature profile. Goes down to 217 m, bed at 299m.  
Coordinates: N 75 deg 20.40, W 82 deg 08.40

Fra: Christian Zdanowicz  
Sendt: 2. december 2020 11:39  
Til: William Colgan  
Emne: RE: Prince of Wales - ice temperature?

Re: Devon ice cap 1998

N 75 deg 20.40, W 82 deg 08.40  
Alt: 1930 m asl

See Fig. 1 of attached paper for exact location.

David Fisher did the measurements using a thermistor string. [...] I may have given you false hopes on this one, because the temperatures on the deepest part of the borehole are sadly missing: David's notes say the cable broke at 216 m depth ! The bottom of the hole was at 299 m. You could take a shot at extrapolating the gradient, of course,

maybe it agrees with the 72 and 73 boreholes.

### 3.6.2 Thickness

- Reported in email, also adjusted by 1.55 m.

### 3.6.3 Location

- Reported in email

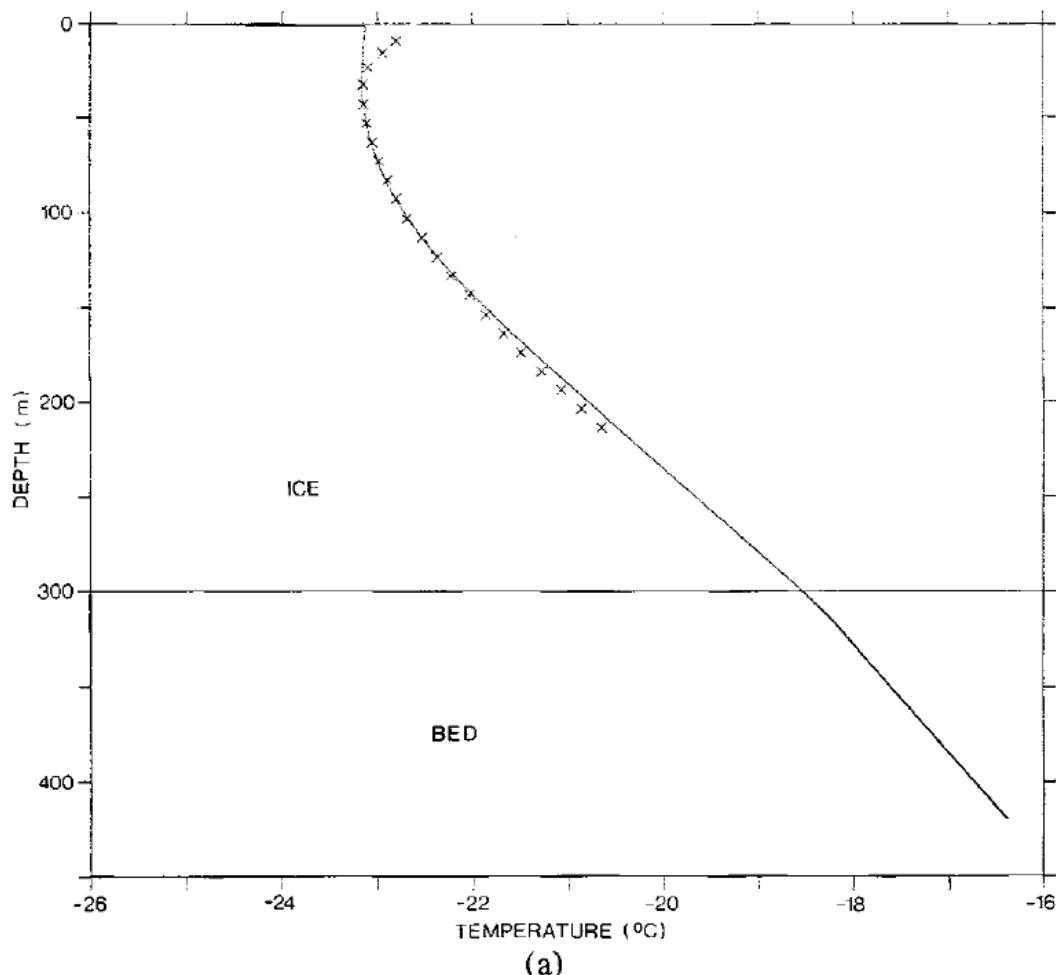
### 3.6.4 Velocity

### 3.7 Devon 1971 borehole

Name	devon_71
Alternate name	Devon borehole
Data source	Paterson, W. S. B., Clarke, G. K. C.: Comparison of
Drill year(s)	
Data year(s)	
Longitude [ $^{\circ}$ E]	
Latitude [ $^{\circ}$ N]	
Approximate location name	Devon Ice Cap
Location source	
Ice thickness [m]	300
ice thickness year	drill year
Ice thickness source	See data source
Surface velocity [ $m\ yr^{-1}$ ]	
Surface velocity year	
Surface velocity source	
Measured from: Top, Bottom, Relative	T
Depth of top measurement [m]	10
Depth of bottom measurement [m]	213

#### 3.7.1 Temperature

Digitized from Paterson et al. (1978) Figure 2a.



### 3.7.2 Thickness

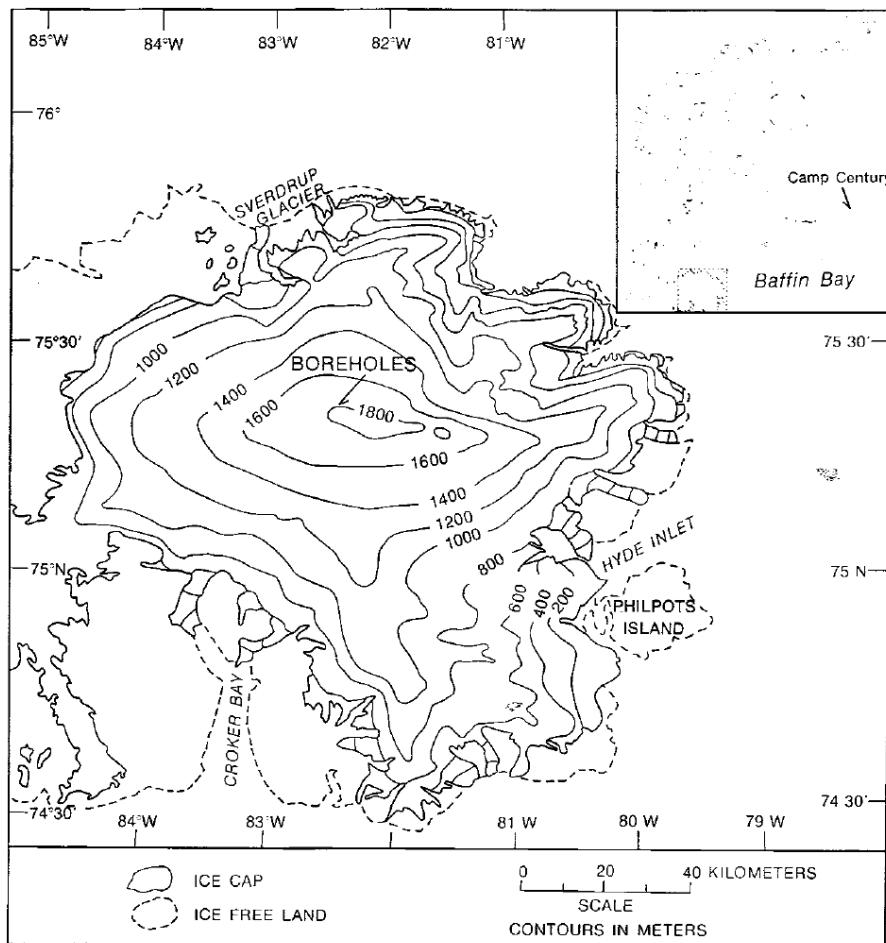
Provided by in graphics and text.

### 3.7.3 Location

Can probably be extracted from Figure 1

*Temperature profiles in the Devon Island ice cap*

6



**Figure 1.** Map of the Devon Island ice cap.

### 3.7.4 Velocity

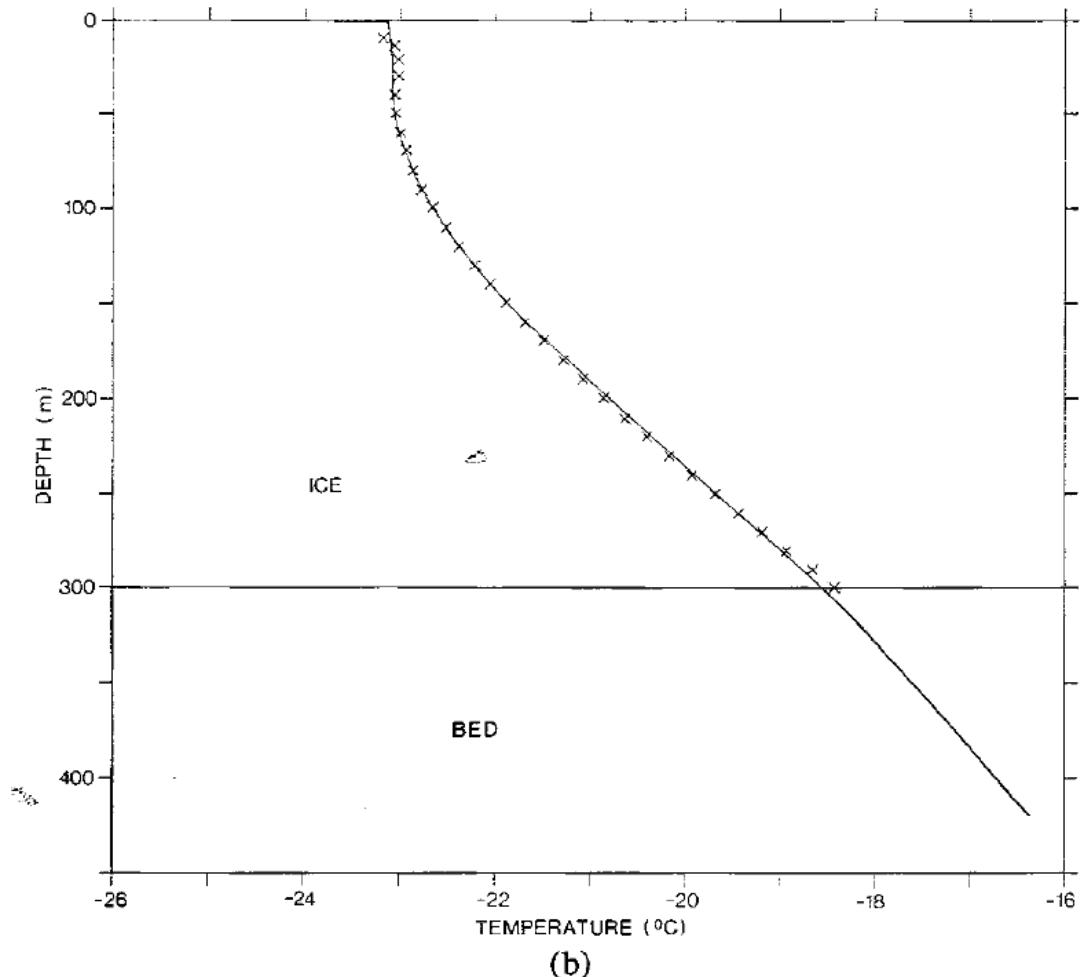
Unknown

### 3.8 Devon 1972 borehole

Name	devon_72
Alternate name	Devon borehole
Data source	Paterson, W. S. B., Clarke, G. K. C.: Comparison of
Drill year(s)	
Data year(s)	
Longitude [ $^{\circ}$ E]	-82.14
Latitude [ $^{\circ}$ N]	75.34
Approximate location name	Devon Ice Cap
Location source	
Ice thickness [m]	299
ice thickness year	drill year
Ice thickness source	See data source
Surface velocity [ $m\ yr^{-1}$ ]	
Surface velocity year	
Surface velocity source	
Measured from: Top, Bottom, Relative	T
Depth of top measurement [m]	9
Depth of bottom measurement [m]	299

#### 3.8.1 Temperature

Digitized from Paterson et al. (1978) Figure 2b.



### 3.8.2 Thickness

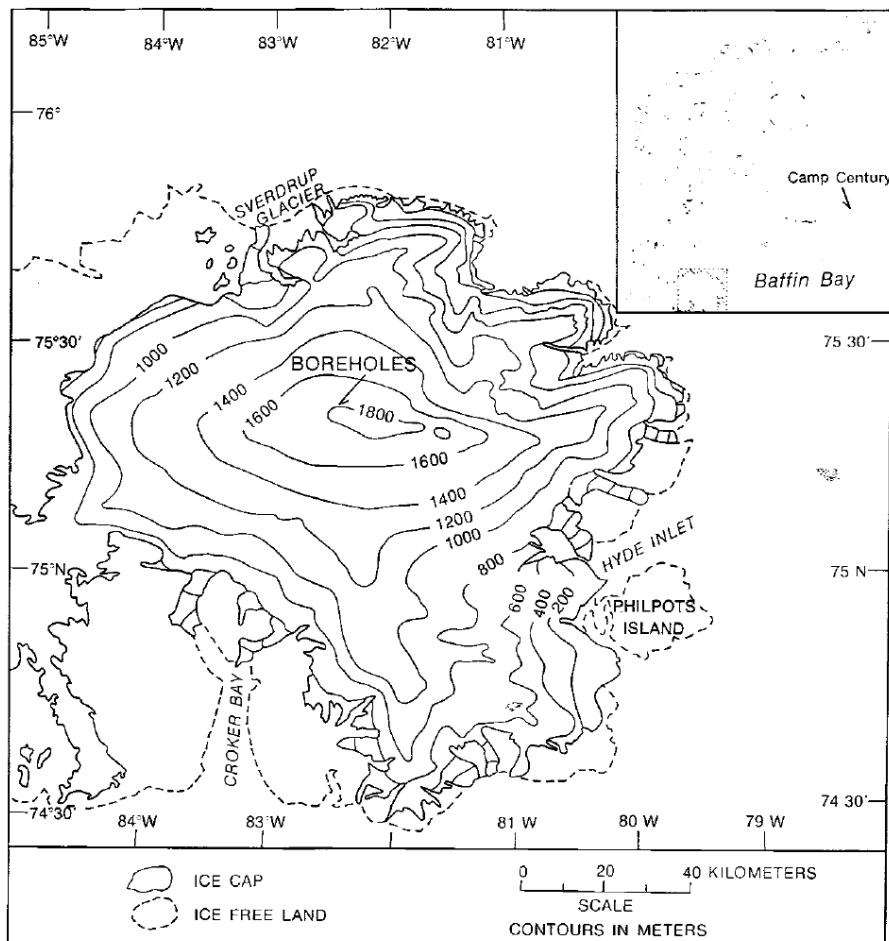
Provided by Paterson et al. (1978) in graphics and text.

### 3.8.3 Location

Can probably be extracted from Paterson et al. (1978) Figure 1

*Temperature profiles in the Devon Island ice cap*

6



**Figure 1.** Map of the Devon Island ice cap.

### 3.8.4 Velocity

Unknown

### 3.9 DYE-3

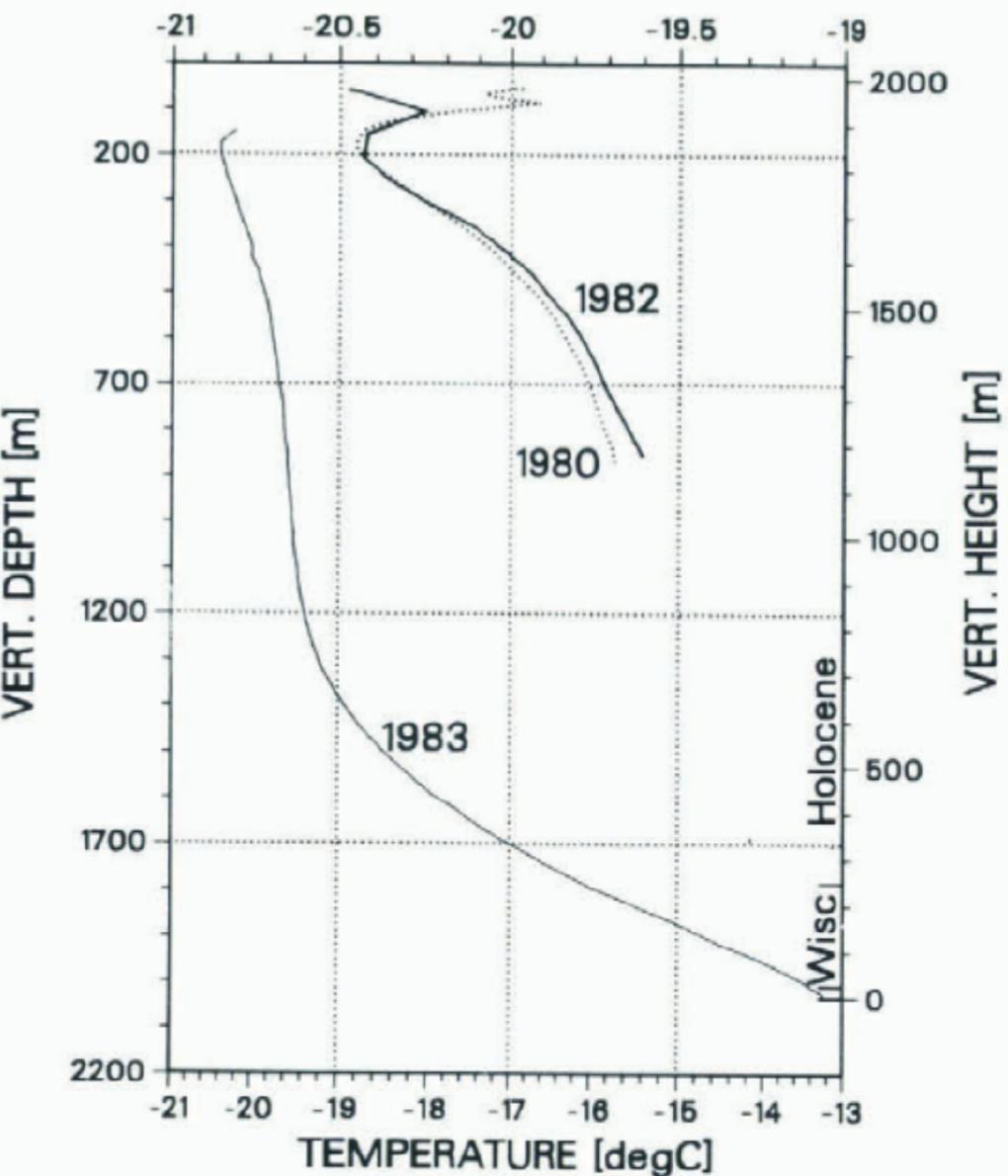
Name	dye_3
Alternate name	DYE-3
Data source	Gundestrup, N. S., Hansen, B. Lyle: Bore-Hole Survey
Drill year(s)	1979 to 1981
Data year(s)	1983
Longitude [°E]	-43.816667
Latitude [°N]	65.183333
Approximate location name	South Greenland
Location source	See data source
Ice thickness [m]	2038
ice thickness year	1983
Ice thickness source	See data source
Surface velocity [m yr <sup>-1</sup> ]	
Surface velocity year	
Surface velocity source	
Measured from: Top, Bottom, Relative	T
Depth of top measurement [m]	152
Depth of bottom measurement [m]	2030

#### 3.9.1 Temperature

Digitized from Gundestrup et al. (1984) Figure 4.

We only use 1983 profile digitized with the bottom x-axis.

The 1980 and 1982 profiles use the top x-axis (expanded temperature scale).



*Fig. 4. Hole-liquid temperature versus depth. The expanded figure is hole temperature as measured in 1980 and 1982 at the hole wall.*

### 3.9.2 Thickness

Reported in Gundestrup et al. (1984) from graphic.

### 3.9.3 Location

Reported in Gundestrup et al. (1984).

### 3.9.4 Velocity

### 3.10 Flade Isblink

Name	flade_isblink
Alternate name	Flade Isblink
Data source	Dorthe Dahl-Jensen (personal comm.)
Drill year(s)	
Data year(s)	
Longitude [°E]	-15.7029
Latitude [°N]	81.2926
Approximate location name	
Location source	
Ice thickness [m]	540
ice thickness year	
Ice thickness source	See WIC email
Surface velocity [m yr <sup>-1</sup> ]	
Surface velocity year	
Surface velocity source	
Measured from: Top, Bottom, Relative	T
Depth of top measurement [m]	80.0
Depth of bottom measurement [m]	420.0

#### 3.10.1 Temperature

- Provided by Dorthe Dahl-Jensen (personal comm.). See above.
- Link to email: [VS: Greenland geothermal?](#)
- It appears temperature was measured at some locations 2x, perhaps while lowering and raising a thermometer?

From: William Colgan  
To: Ken Mankoff  
Subject: VS: Greenland geothermal?  
Date: Tue 22 Dec 2020 11:06:16 AM PST

1. Total depth: 540 m (borehole on reached 425m).
2. Temperature data below
3. Location: 81.2926 N -15.7029 E

Fra: Dorthe Dahl-Jensen  
Sendt: 22. december 2020 16:17  
Til: William Colgan; Bo Vinther  
Emne: Re: Greenland geothermal?

Also for Flade Isblink (ref: Dahl-Jensen, personal com)

80	-16.664
90	-16.845
100	-16.994
110	-17.116
120	-17.214
130	-17.28
140	-17.335
150	-17.353
160	-17.356
420	-14.146

410	-14.277
400	-14.44
380	-14.737
360	-15.035
340	-15.333
320	-15.626
300	-15.93
280	-16.222
260	-16.505
240	-16.777
220	-17.013
200	-17.214
180	-17.364
160	-17.434
140	-17.385
120	-17.277

### 3.10.2 Thickness

From WIC email

### 3.10.3 Location

From WIC email

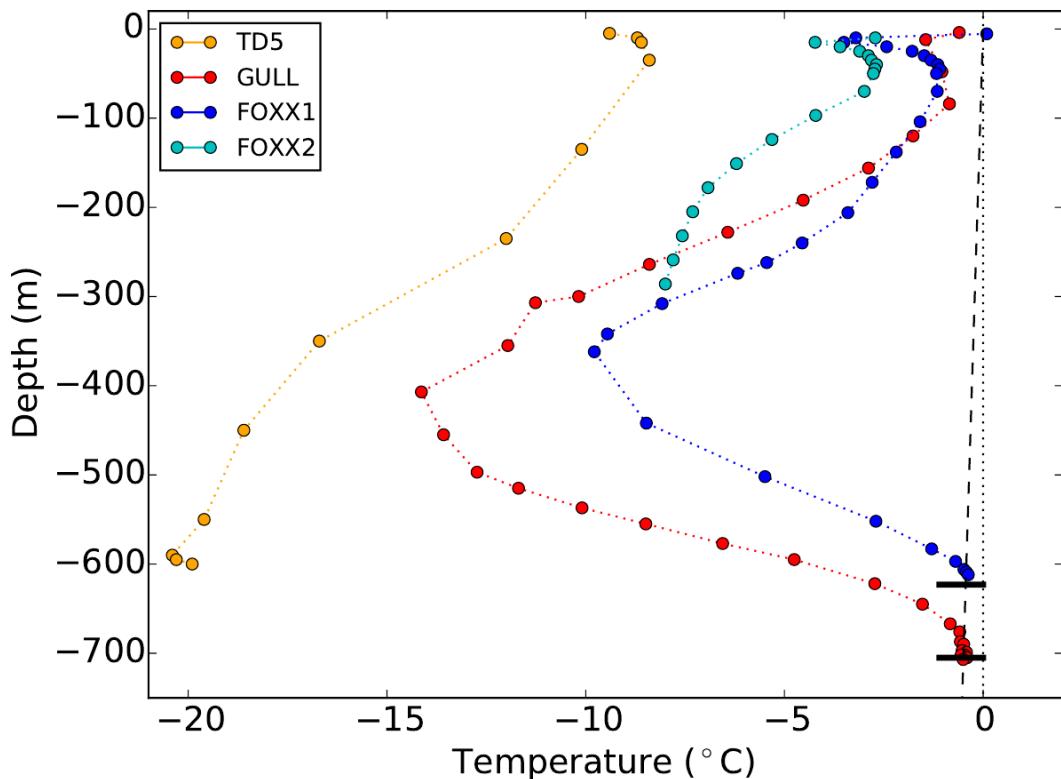
### 3.10.4 Velocity

### 3.11 FOXX1

Name	foxx1
Alternate name	FOXX
Data source	Lüthi, Martin P., Ryser, Claudia, Andrews, Lauren C
Drill year(s)	
Data year(s)	2011-2013
Longitude [°E]	
Latitude [°N]	
Approximate location name	Paakitsoq
Location source	
Ice thickness [m]	631
ice thickness year	
Ice thickness source	See data source
Surface velocity [m yr <sup>-1</sup> ]	
Surface velocity year	
Surface velocity source	
Measured from: Top, Bottom, Relative	T
Depth of top measurement [m]	105.0
Depth of bottom measurement [m]	624.0

#### 3.11.1 Temperature

- Digitized from Lüthi et al. (2015) Figure 2:



#### 3.11.2 Thickness

According to text and graphic (see black horizontal bar), temperature profile goes to the bed.

3.11.3 Location

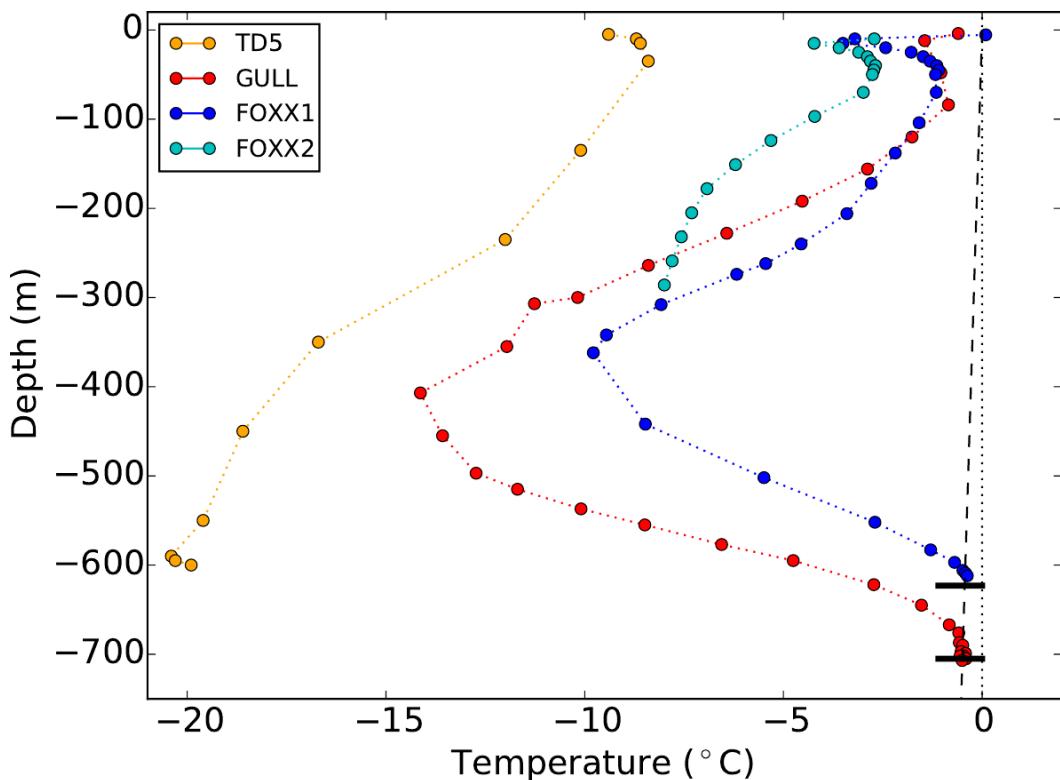
3.11.4 Velocity

### 3.12 FOXX2

Name	foxx2
Alternate name	FOXX2
Data source	Lüthi, Martin P., Ryser, Claudia, Andrews, Lauren C.
Drill year(s)	
Data year(s)	2011–2013
Longitude [°E]	
Latitude [°N]	
Approximate location name	Paakitsoq
Location source	
Ice thickness [m]	
ice thickness year	
Ice thickness source	
Surface velocity [ $\text{m yr}^{-1}$ ]	
Surface velocity year	
Surface velocity source	
Measured from: Top, Bottom, Relative	T
Depth of top measurement [m]	8.6
Depth of bottom measurement [m]	285.9

#### 3.12.1 Temperature

- Digitized from Lüthi et al. (2015) Figure 2:
- See [foxx1](#) folder for digitization.



#### 3.12.2 Thickness

Unknown

3.12.3 Location

3.12.4 Velocity

### 3.13 GISP II

Name	gisp2
Alternate name	GISP2; GISP II
Data source	Joe MacGregor email
Drill year(s)	
Data year(s)	1989, 1990
Longitude [ $^{\circ}$ E]	
Latitude [ $^{\circ}$ N]	
Approximate location name	
Location source	
Ice thickness [m]	3100?
Ice thickness year	
Ice thickness source	Hodge 1990? TODO: Update with BedMachine
Surface velocity [m yr $^{-1}$ ]	
Surface velocity year	
Surface velocity source	
Measured from: Top, Bottom, Relative	T
Depth of top measurement [m]	100
Depth of bottom measurement [m]	3048

#### 3.13.1 Temperature

- Data provided by 3rd party: Email [GISP2 temperature profile](#)

From: MacGregor, Joseph (GSFC-6150)  
To: William Colgan, Ken Mankoff  
Subject: GISP2 temperature profile  
Date: Wed 06 Jan 2021 12:32:46 PM PST  
Attachments: [1]tempertr.txt(3.6K)

I've attached the GISP2 temperature profile in original text file. I'm pretty sure it came from something called the GISP2 CD-ROM that had a lot of GISP2 datasets and was online back in the day.

#### 3.13.2 Thickness

- From Cuffey et al. ([1992](#)) referring to Hodge et al., 1990. TODO: Update with BedMachine

#### 3.13.3 Location

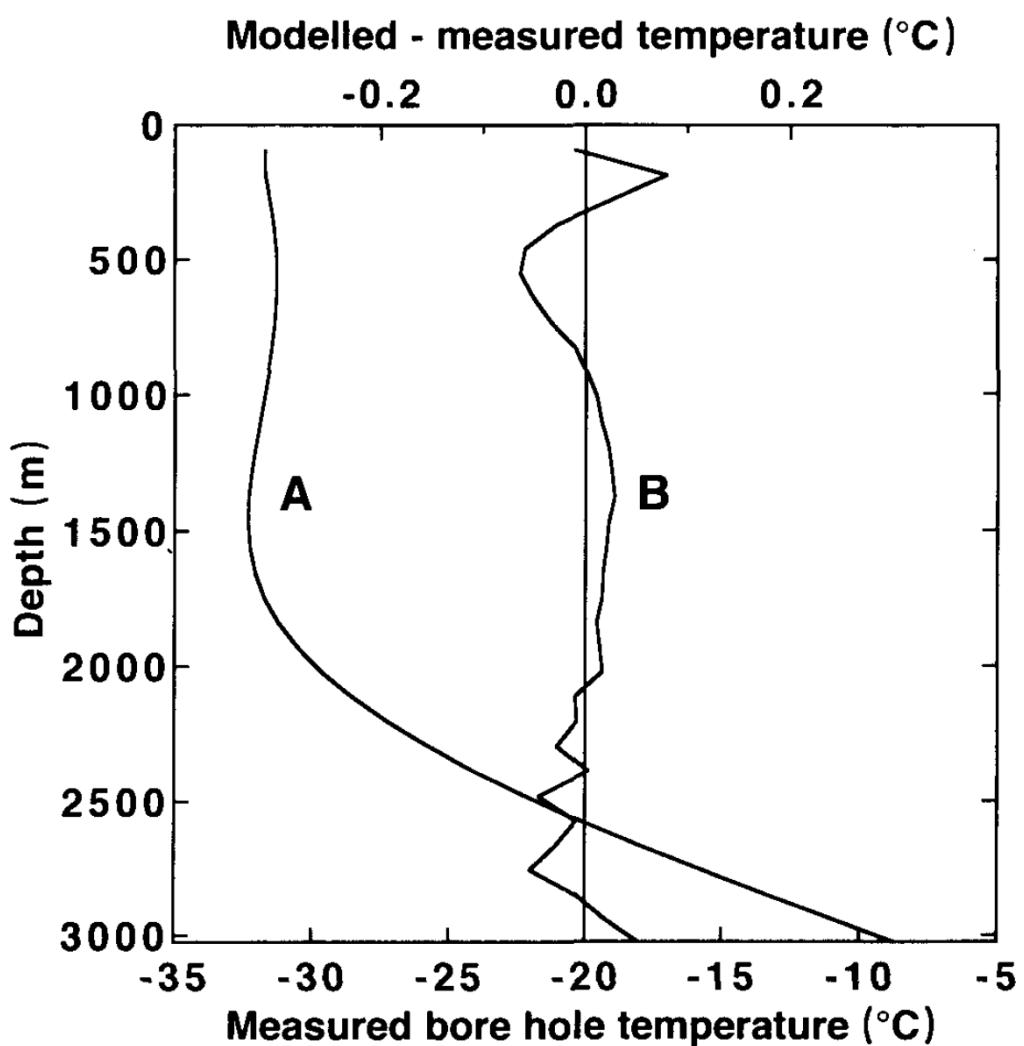
#### 3.13.4 Velocity

### 3.14 GRIP

Name	grip
Alternate name	GRIP
Data source	Johnsen, Sigfus J., Dahl-Jensen, Dorthe, Dansgaard,
Drill year(s)	1989-1992 (Vinther, 2008)
Data year(s)	
Longitude [°E]	-37.64
Latitude [°N]	72.58
Approximate location name	
Location source	Vinther (2008)
Ice thickness [m]	3027
Ice thickness year	
Ice thickness source	Montagnat, M., Azuma, N., Dahl-Jensen, D., Eichler,
Surface velocity [m yr <sup>-1</sup> ]	
Surface velocity year	
Surface velocity source	
Measured from: Top, Bottom, Relative	T
Depth of top measurement [m]	107.0
Depth of bottom measurement [m]	3023.0

#### 3.14.1 Temperature

- From Johnsen et al. (1995)



### 3.14.2 Thickness

- Reported in Montagnat et al. (2014) Table 1.

### 3.14.3 Location

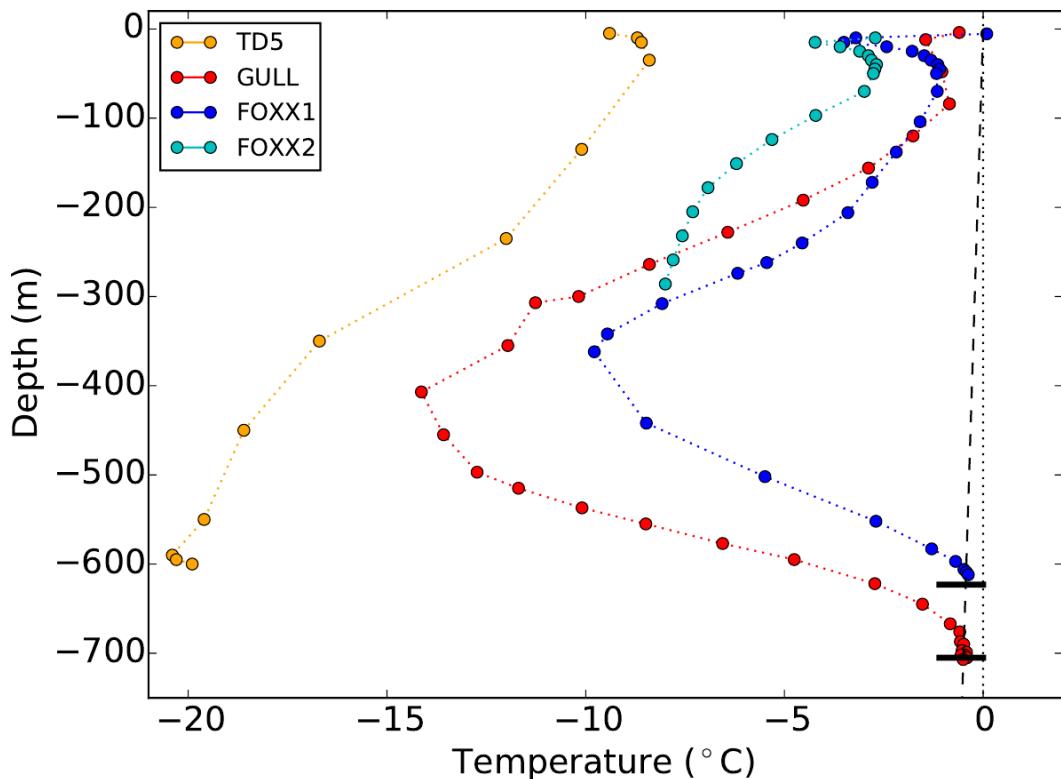
### 3.14.4 Velocity

### 3.15 GULL

Name	gull
Alternate name	GULL
Data source	Lüthi, Martin P., Ryser, Claudia, Andrews, Lauren C.
Drill year(s)	
Data year(s)	2011-2013
Longitude [°E]	
Latitude [°N]	
Approximate location name	Paakitsoq
Location source	
Ice thickness [m]	703
ice thickness year	
Ice thickness source	See data source
Surface velocity [m yr <sup>-1</sup> ]	
Surface velocity year	
Surface velocity source	
Measured from: Top, Bottom, Relative	T
Depth of top measurement [m]	4
Depth of bottom measurement [m]	704

#### 3.15.1 Temperature

- NOTE: See [FOXX1](#) for digitization.
- Digitized from Lüthi et al. (2015) Figure 2:



#### 3.15.2 Thickness

According to text and graphic (see black horizontal bar), temperature profile goes to the bed.

3.15.3 Location

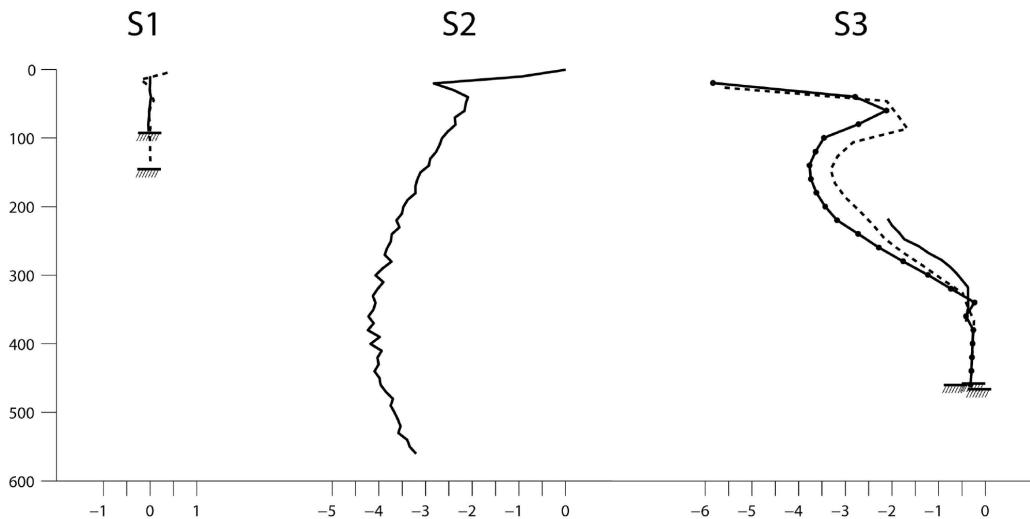
3.15.4 Velocity

### 3.16 H2015\_S1A

Name	h2015_s1a
Alternate name	
Data source	Harrington, Joel A., Humphrey, Neil F., Harper, Joe
Drill year(s)	
Data year(s)	2011-2013
Longitude [ $^{\circ}$ E]	
Latitude [ $^{\circ}$ N]	
Approximate location name	
Location source	
Ice thickness [m]	92
ice thickness year	
Ice thickness source	See data source
Surface velocity [ $m\ yr^{-1}$ ]	
Surface velocity year	
Surface velocity source	
Measured from: Top, Bottom, Relative	T
Depth of top measurement [m]	11.0
Depth of bottom measurement [m]	81.0

#### 3.16.1 Temperature

- From Harrington et al. (2015) Figure 2



#### 3.16.2 Thickness

- From Harrington et al. (2015) Table 1

#### 3.16.3 Location

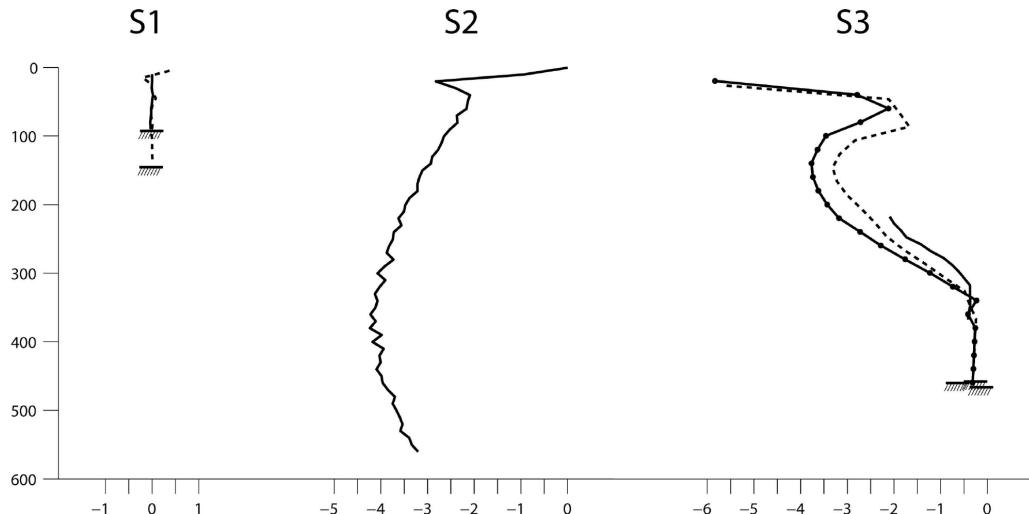
#### 3.16.4 Velocity

### 3.17 H2015\_S1B

Name	h2015_s1b
Alternate name	
Data source	Harrington, Joel A., Humphrey, Neil F., Harper, Joe
Drill year(s)	
Data year(s)	2011-2013
Longitude [ $^{\circ}$ E]	
Latitude [ $^{\circ}$ N]	
Approximate location name	
Location source	
Ice thickness [m]	145
ice thickness year	
Ice thickness source	See data source
Surface velocity [ $m\ yr^{-1}$ ]	
Surface velocity year	
Surface velocity source	
Measured from: Top, Bottom, Relative	T
Depth of top measurement [m]	6.0
Depth of bottom measurement [m]	131.0

#### 3.17.1 Temperature

- From Harrington et al. (2015) Figure 2
- See H2015\_S1A for digitization



#### 3.17.2 Thickness

- From Harrington et al. (2015) Table 1

#### 3.17.3 Location

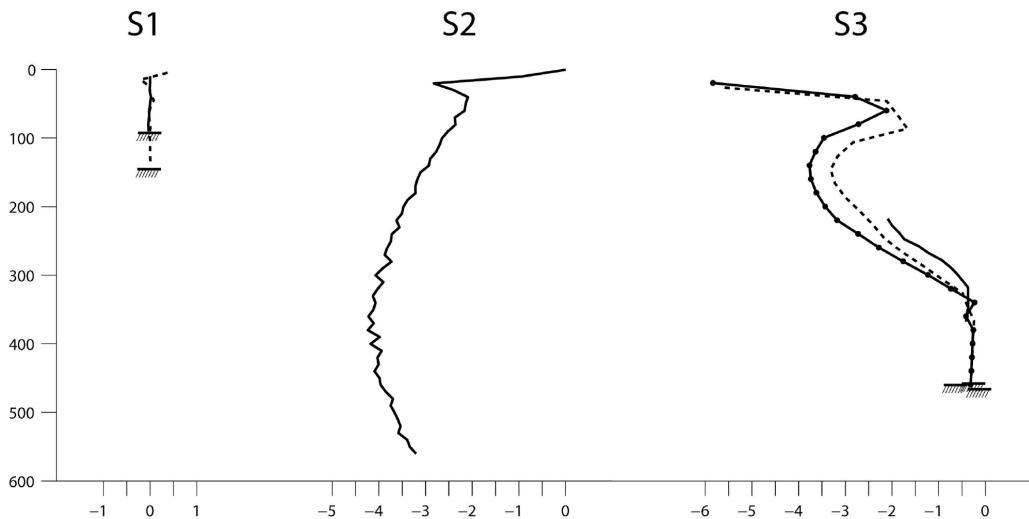
#### 3.17.4 Velocity

### 3.18 H2015\_S2A

Name	h2015_s2a
Alternate name	
Data source	Harrington, Joel A., Humphrey, Neil F., Harper, Joe
Drill year(s)	
Data year(s)	2011-2013
Longitude [ $^{\circ}$ E]	
Latitude [ $^{\circ}$ N]	
Approximate location name	
Location source	
Ice thickness [m]	
ice thickness year	
Ice thickness source	See data source
Surface velocity [ $m\ yr^{-1}$ ]	
Surface velocity year	
Surface velocity source	
Measured from: Top, Bottom, Relative	T
Depth of top measurement [m]	3.5
Depth of bottom measurement [m]	559

#### 3.18.1 Temperature

- From Harrington et al. (2015) Figure 2



#### 3.18.2 Thickness

- Unknown (Use BedMachine after finding location?)

#### 3.18.3 Location

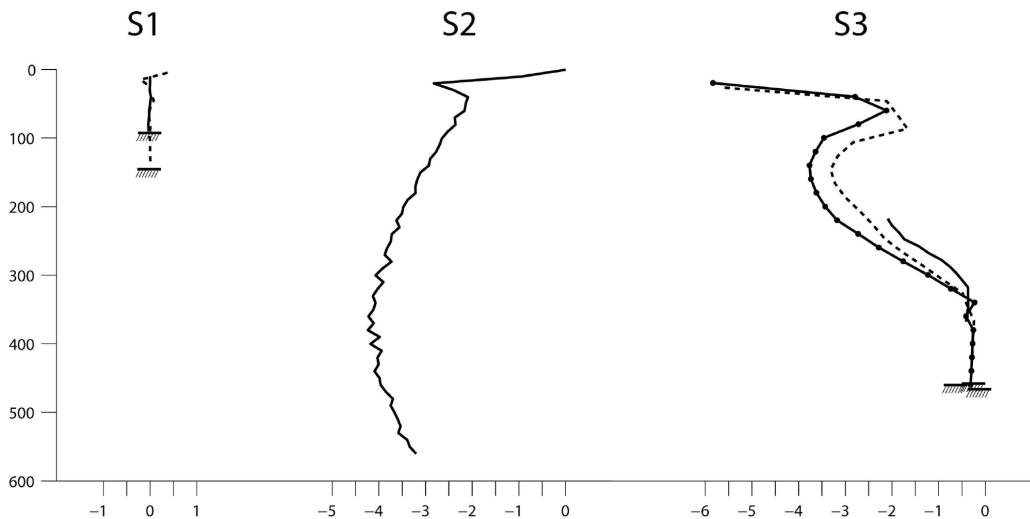
#### 3.18.4 Velocity

### 3.19 H2015\_S3A

Name	h2015_s3a
Alternate name	
Data source	Harrington, Joel A., Humphrey, Neil F., Harper, Joe
Drill year(s)	
Data year(s)	2011-2013
Longitude [ $^{\circ}$ E]	
Latitude [ $^{\circ}$ N]	
Approximate location name	
Location source	
Ice thickness [m]	458
ice thickness year	
Ice thickness source	See data source
Surface velocity [ $m\ yr^{-1}$ ]	
Surface velocity year	
Surface velocity source	
Measured from: Top, Bottom, Relative	T
Depth of top measurement [m]	218.0
Depth of bottom measurement [m]	368.0

#### 3.19.1 Temperature

- From Harrington et al. (2015) Figure 2



#### 3.19.2 Thickness

- From Harrington et al. (2015) Table 1

#### 3.19.3 Location

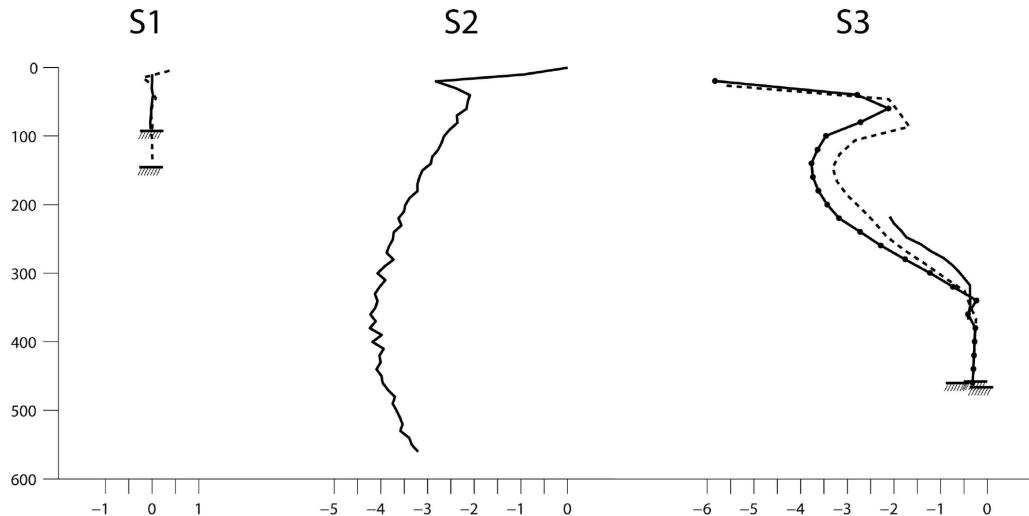
#### 3.19.4 Velocity

### 3.20 H2015\_S3B

Name	h2015_s3b
Alternate name	
Data source	Harrington, Joel A., Humphrey, Neil F., Harper, Joe
Drill year(s)	
Data year(s)	2011-2013
Longitude [ $^{\circ}$ E]	
Latitude [ $^{\circ}$ N]	
Approximate location name	
Location source	
Ice thickness [m]	466
ice thickness year	
Ice thickness source	See data source
Surface velocity [ $m\ yr^{-1}$ ]	
Surface velocity year	
Surface velocity source	
Measured from: Top, Bottom, Relative	T
Depth of top measurement [m]	27.0
Depth of bottom measurement [m]	460.0

#### 3.20.1 Temperature

- From Harrington et al. (2015) Figure 2
- See S3A for digitization file



#### 3.20.2 Thickness

- From Harrington et al. (2015) Table 1

#### 3.20.3 Location

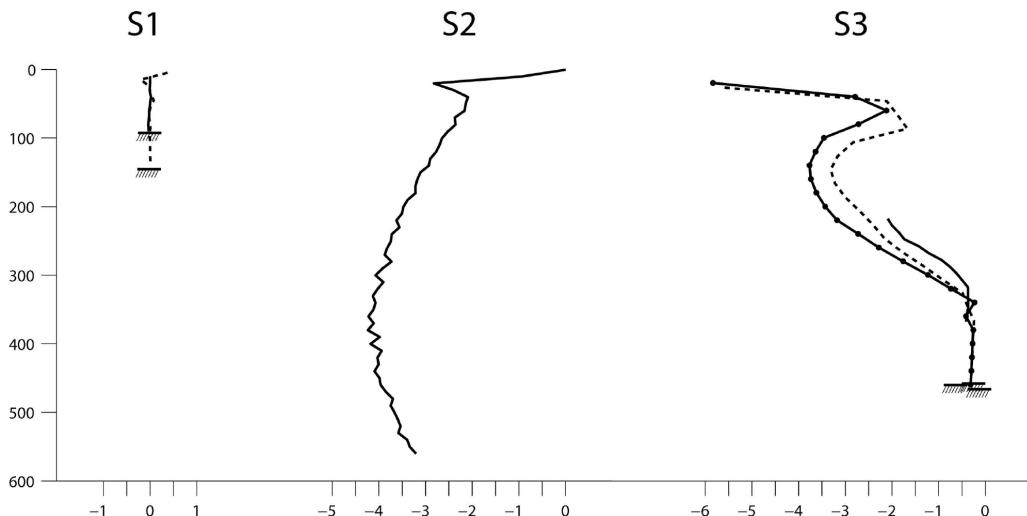
#### 3.20.4 Velocity

### 3.21 H2015\_S3C

Name	h2015_s3c
Alternate name	
Data source	Harrington, Joel A., Humphrey, Neil F., Harper, Joe
Drill year(s)	
Data year(s)	2011-2013
Longitude [ $^{\circ}$ E]	
Latitude [ $^{\circ}$ N]	
Approximate location name	
Location source	
Ice thickness [m]	460
ice thickness year	
Ice thickness source	See data source
Surface velocity [ $m\ yr^{-1}$ ]	
Surface velocity year	
Surface velocity source	
Measured from: Top, Bottom, Relative	T
Depth of top measurement [m]	20.0
Depth of bottom measurement [m]	459.0

#### 3.21.1 Temperature

- From Harrington et al. (2015) Figure 2
- See S3A for digitization file



#### 3.21.2 Thickness

- From Harrington et al. (2015) Table 1

#### 3.21.3 Location

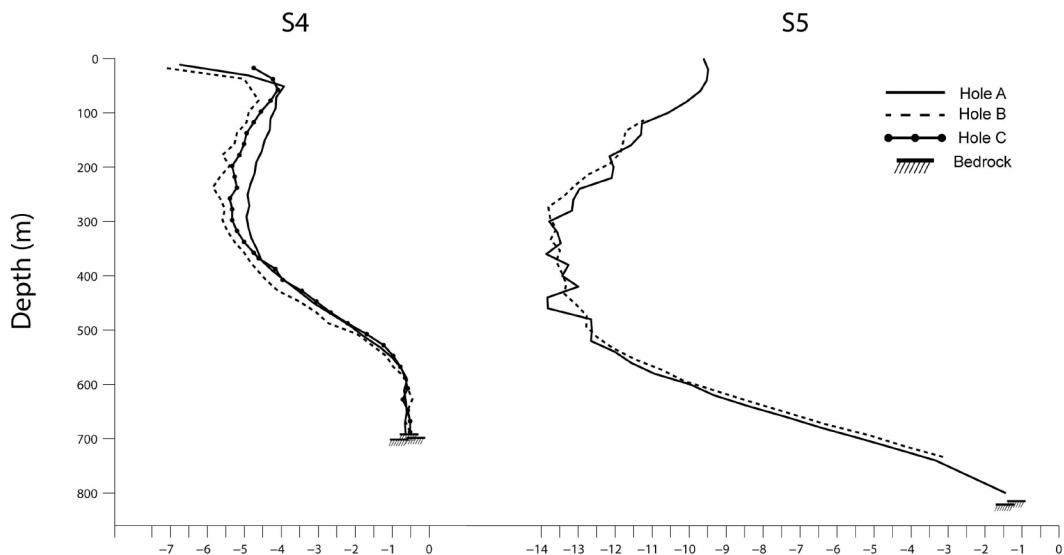
#### 3.21.4 Velocity

### 3.22 H2015\_S4A

Name	h2015_s4a
Alternate name	
Data source	Harrington, Joel A., Humphrey, Neil F., Harper, Joe
Drill year(s)	
Data year(s)	2011-2013
Longitude [ $^{\circ}$ E]	
Latitude [ $^{\circ}$ N]	
Approximate location name	
Location source	
Ice thickness [m]	701
Ice thickness year	
Ice thickness source	See data source
Surface velocity [ $m\ yr^{-1}$ ]	
Surface velocity year	
Surface velocity source	
Measured from: Top, Bottom, Relative	T
Depth of top measurement [m]	11.0
Depth of bottom measurement [m]	690.0

#### 3.22.1 Temperature

- From Harrington et al. (2015) Figure 2



#### 3.22.2 Thickness

- From Harrington et al. (2015) Table 1

#### 3.22.3 Location

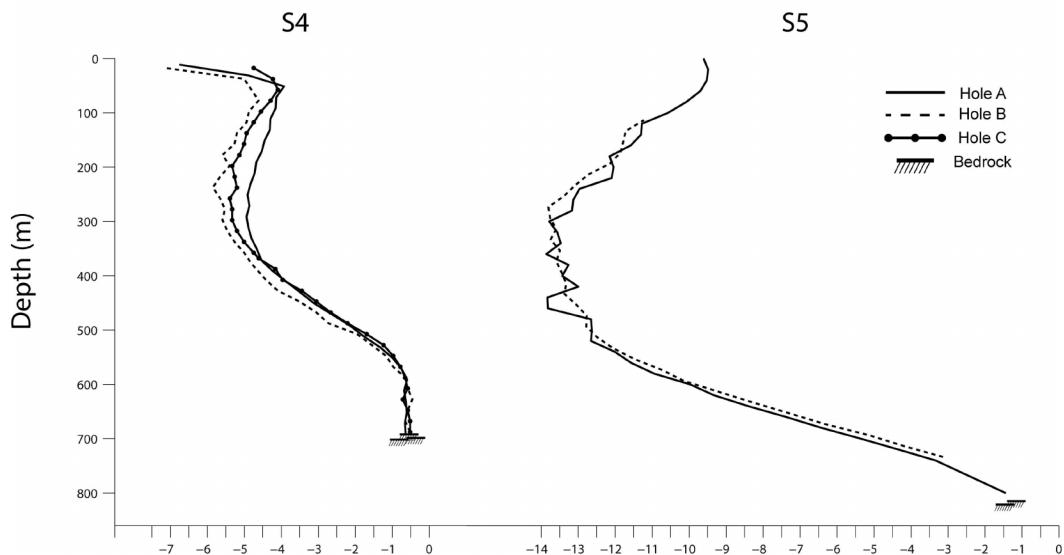
#### 3.22.4 Velocity

### 3.23 H2015\_S4B

Name	h2015_s4b
Alternate name	
Data source	Harrington, Joel A., Humphrey, Neil F., Harper, Joe
Drill year(s)	
Data year(s)	2011-2013
Longitude [ $^{\circ}$ E]	
Latitude [ $^{\circ}$ N]	
Approximate location name	
Location source	
Ice thickness [m]	692
ice thickness year	
Ice thickness source	See data source
Surface velocity [ $m\ yr^{-1}$ ]	
Surface velocity year	
Surface velocity source	
Measured from: Top, Bottom, Relative	T
Depth of top measurement [m]	18.0
Depth of bottom measurement [m]	690.0

#### 3.23.1 Temperature

- From Harrington et al. (2015) Figure 2



#### 3.23.2 Thickness

- From Harrington et al. (2015) Table 1

#### 3.23.3 Location

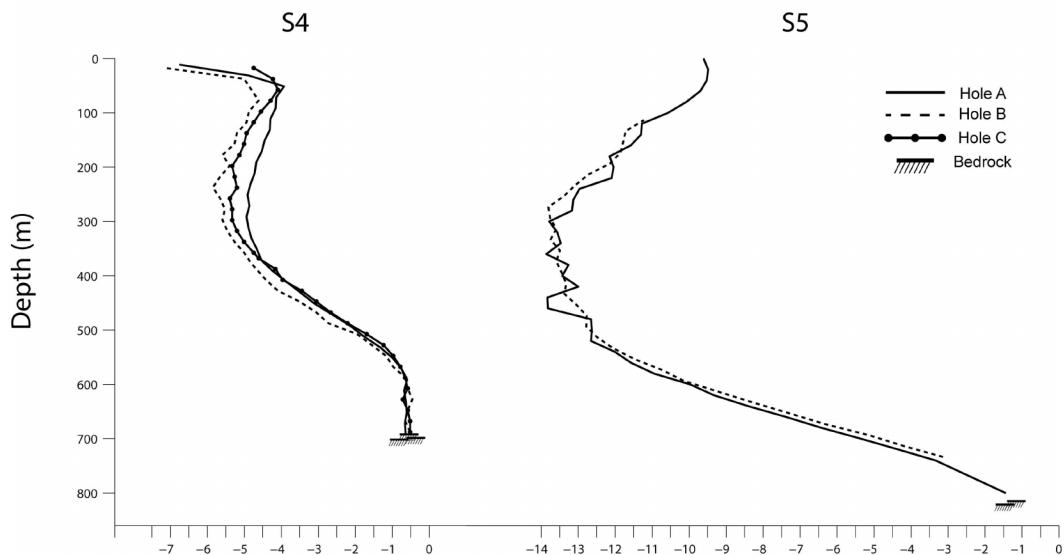
#### 3.23.4 Velocity

### 3.24 H2015\_S4C

Name	h2015_s4c
Alternate name	
Data source	Harrington, Joel A., Humphrey, Neil F., Harper, Joe
Drill year(s)	
Data year(s)	2011-2013
Longitude [ $^{\circ}$ E]	
Latitude [ $^{\circ}$ N]	
Approximate location name	
Location source	
Ice thickness [m]	698
ice thickness year	
Ice thickness source	See data source
Surface velocity [ $m\ yr^{-1}$ ]	
Surface velocity year	
Surface velocity source	
Measured from: Top, Bottom, Relative	T
Depth of top measurement [m]	17.0
Depth of bottom measurement [m]	688.0

#### 3.24.1 Temperature

- From Harrington et al. (2015) Figure 2



#### 3.24.2 Thickness

- From Harrington et al. (2015) Table 1

#### 3.24.3 Location

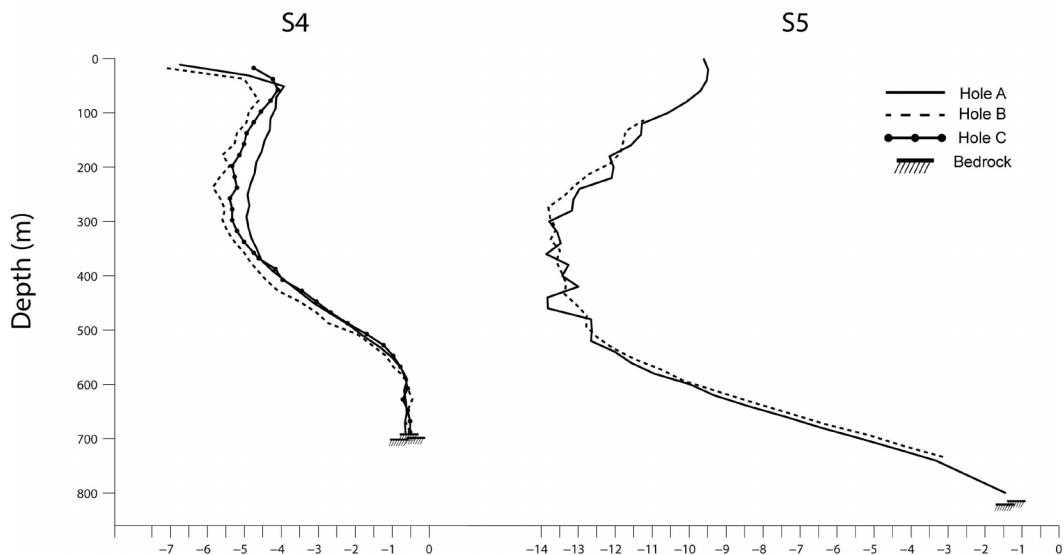
#### 3.24.4 Velocity

### 3.25 H2015\_S5A

Name	h2015_s5a
Alternate name	
Data source	Harrington, Joel A., Humphrey, Neil F., Harper, Joe
Drill year(s)	
Data year(s)	2011-2013
Longitude [ $^{\circ}$ E]	
Latitude [ $^{\circ}$ N]	
Approximate location name	
Location source	
Ice thickness [m]	821
ice thickness year	
Ice thickness source	See data source
Surface velocity [ $m\ yr^{-1}$ ]	
Surface velocity year	
Surface velocity source	
Measured from: Top, Bottom, Relative	T
Depth of top measurement [m]	1.0
Depth of bottom measurement [m]	799.0

#### 3.25.1 Temperature

- From Harrington et al. (2015) Figure 2



#### 3.25.2 Thickness

- From Harrington et al. (2015) Table 1

#### 3.25.3 Location

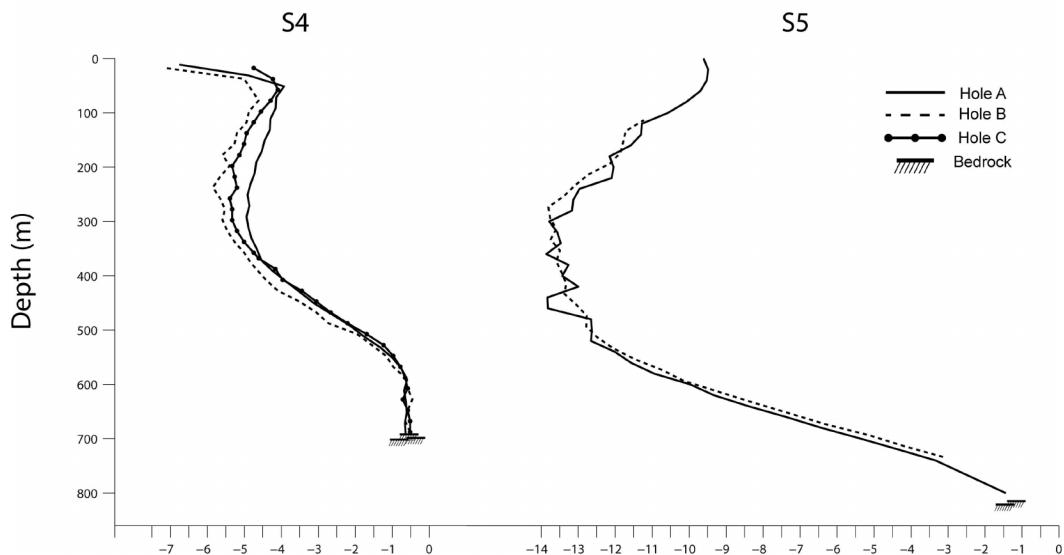
#### 3.25.4 Velocity

### 3.26 H2015\_S5B

Name	h2015_s5b
Alternate name	
Data source	Harrington, Joel A., Humphrey, Neil F., Harper, Joe
Drill year(s)	
Data year(s)	2011-2013
Longitude [ $^{\circ}$ E]	
Latitude [ $^{\circ}$ N]	
Approximate location name	
Location source	
Ice thickness [m]	815
ice thickness year	
Ice thickness source	See data source
Surface velocity [ $m\ yr^{-1}$ ]	
Surface velocity year	
Surface velocity source	
Measured from: Top, Bottom, Relative	T
Depth of top measurement [m]	114.0
Depth of bottom measurement [m]	728.0

#### 3.26.1 Temperature

- From Harrington et al. (2015) Figure 2



#### 3.26.2 Thickness

- From Harrington et al. (2015) Table 1

#### 3.26.3 Location

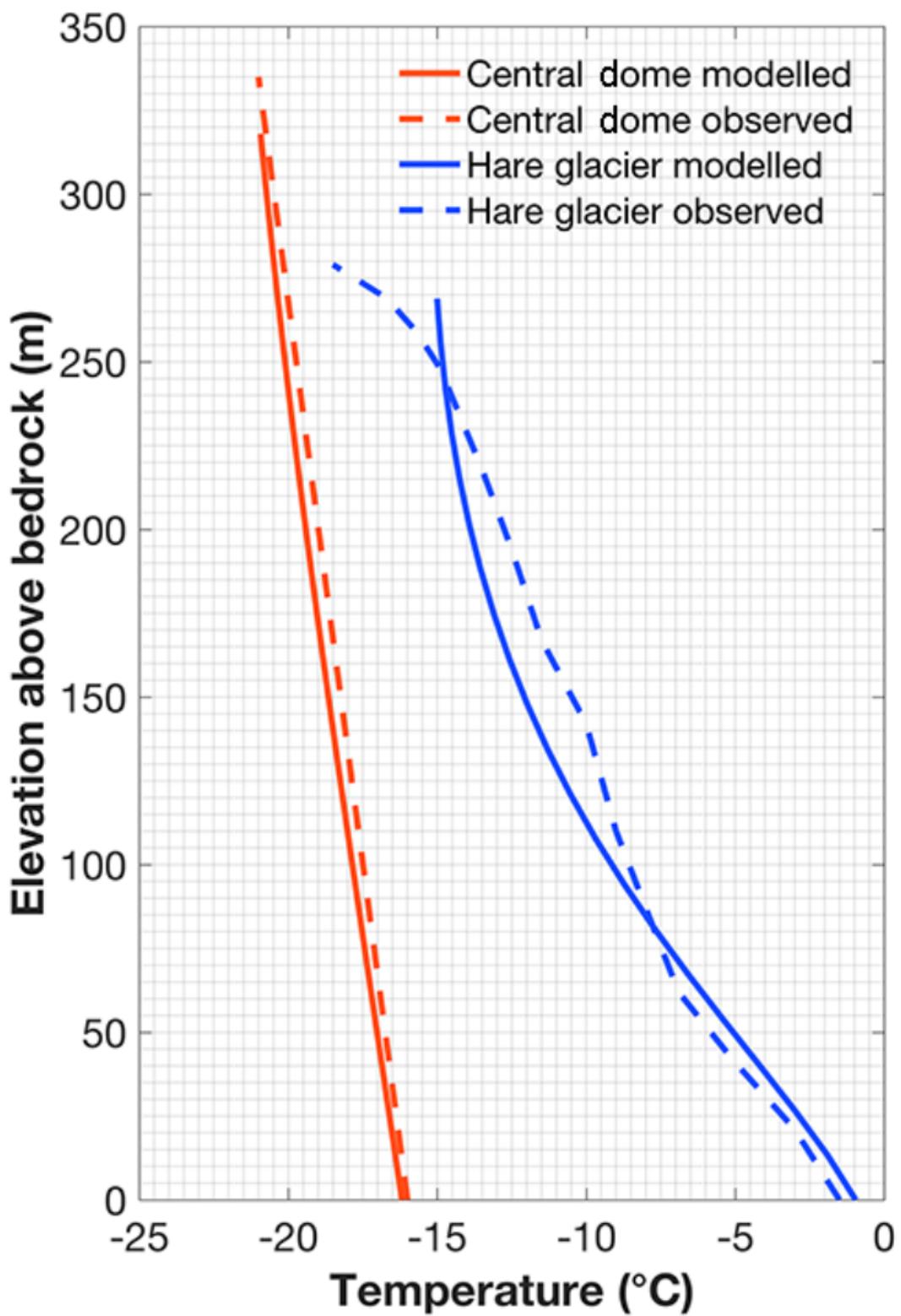
#### 3.26.4 Velocity

### 3.27 Hans Tausen Dome

Name	hanstausen_dome
Alternate name	Hans Tausen Dome
Data source	Zekollari, Harry, Huybrechts, Philippe, Noël, Brice
Drill year(s)	
Data year(s)	
Longitude [°E]	
Latitude [°N]	
Approximate location name	
Location source	
Ice thickness [m]	345
Ice thickness year	
Ice thickness source	See data source
Surface velocity [m yr <sup>-1</sup> ]	
Surface velocity year	
Surface velocity source	
Measured from: Top, Bottom, Relative	B
Depth of top measurement [m]	10.0
Depth of bottom measurement [m]	344.0

#### 3.27.1 Temperature

- From Zekollari et al. (2017) Figure 6



### 3.27.2 Thickness

- From Zekollari et al. (2017) text.

### 3.27.3 Location

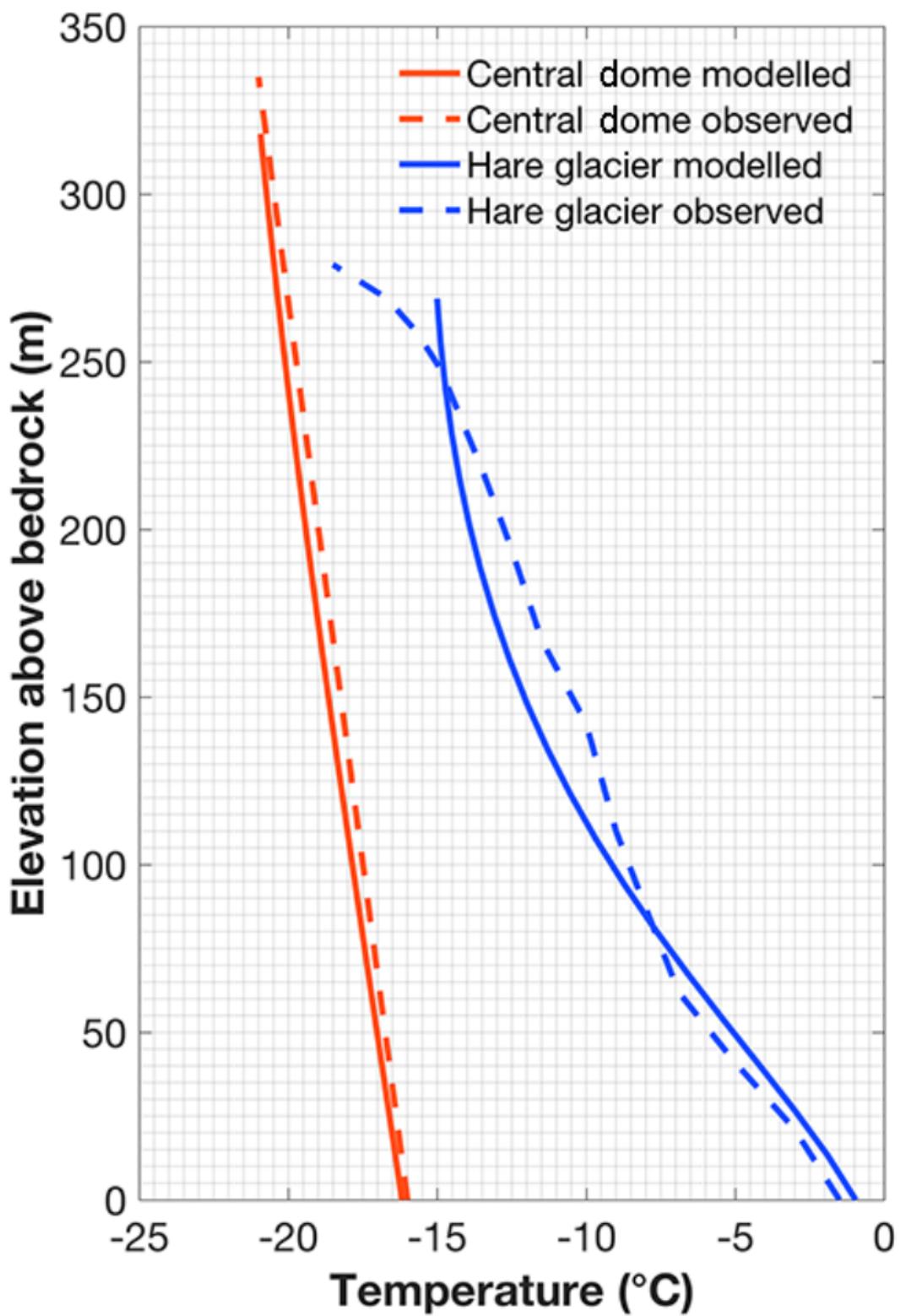
### 3.27.4 Velocity

### 3.28 Hans Tausen Hare

Name	hanstausen_hare
Alternate name	Hans Tausen Hare
Data source	Zekollari, Harry, Huybrechts, Philippe, Noël, Brice
Drill year(s)	
Data year(s)	
Longitude [°E]	
Latitude [°N]	
Approximate location name	
Location source	
Ice thickness [m]	289
Ice thickness year	
Ice thickness source	See data source
Surface velocity [m yr <sup>-1</sup> ]	
Surface velocity year	
Surface velocity source	
Measured from: Top, Bottom, Relative	B
Depth of top measurement [m]	10.0
Depth of bottom measurement [m]	288.0

#### 3.28.1 Temperature

- From Zekollari et al. (2017) Figure 6
- See Hans Tausen Dome folder for digitization file.



### 3.28.2 Thickness

- From Zekollari et al. (2017) text.

### 3.28.3 Location

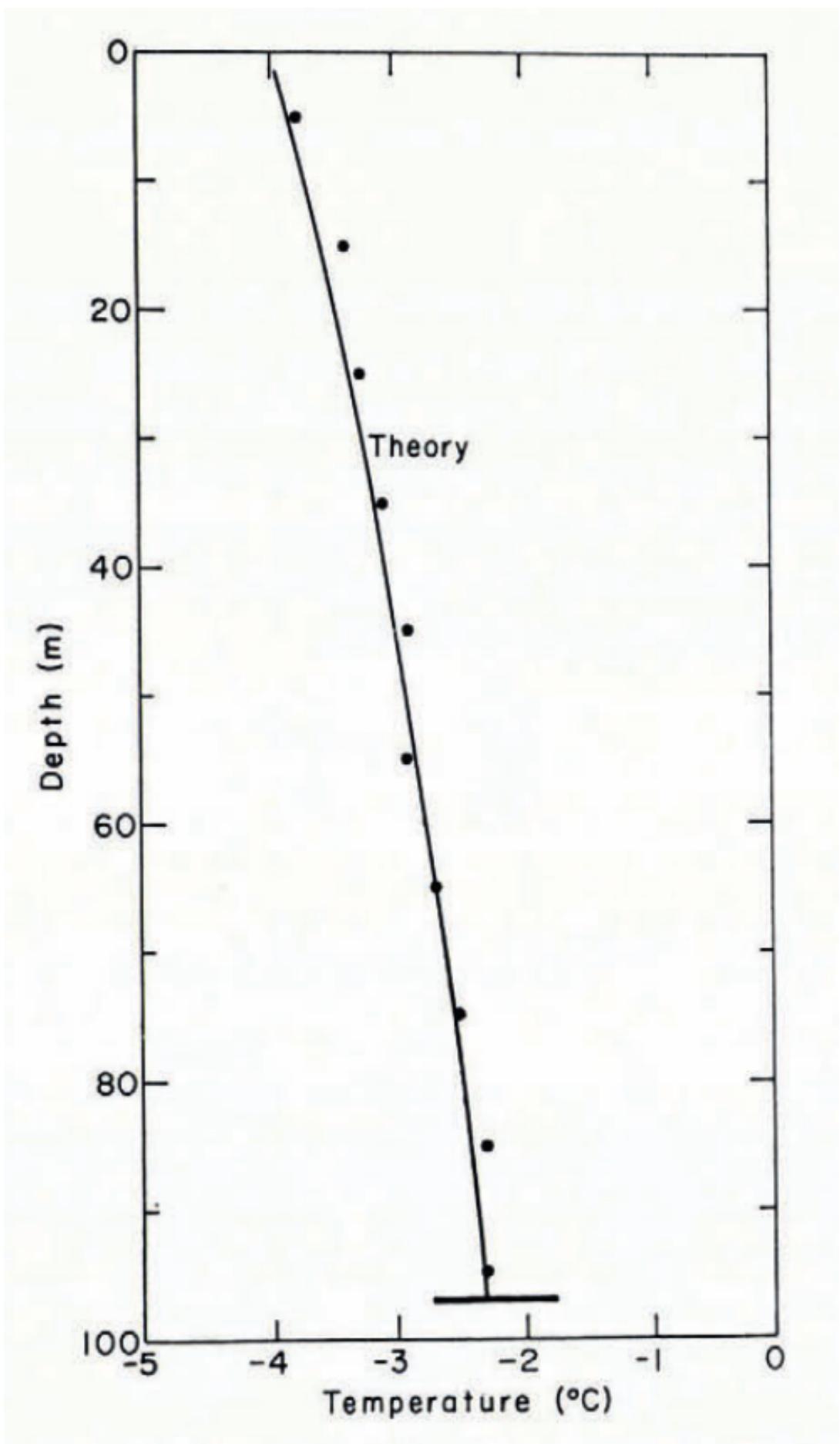
### 3.28.4 Velocity

### 3.29 Isua 10

Name	isua_10
Alternate name	Isua
Data source	Colbeck, S. C., Gow, A. J.: The Margin of the Greeni
Drill year(s)	
Data year(s)	1972-1973
Longitude [°E]	-49.75
Latitude [°N]	65.2093
Approximate location name	
Location source	
Ice thickness [m]	97
Ice thickness year	
Ice thickness source	See data source
Surface velocity [m yr <sup>-1</sup> ]	
Surface velocity year	
Surface velocity source	
Measured from: Top, Bottom, Relative	T
Depth of top measurement [m]	5.0
Depth of bottom measurement [m]	95.0

#### 3.29.1 Temperature

- Temperature profiles from Colbeck et al. (1979) Figure 5.



### 3.29.2 Thickness

- Thickness from Colbeck et al. (1979) Table 1.

### 3.29.3 Location

- Locations of boreholes from email from WIC: [Isua Site – SW Greenland](#)

From: William Colgan

To: Ken Mankoff

Subject: Isua Site -- SW Greenland

Date: Wed 09 Dec 2020 06:58:05 AM PST

Attachments: [1]image002.jpg(147.6K),  
[2]Colbeck1979\_fig3\_rectif.tfw(122),  
[3]Colbeck1979\_fig3\_rectif.tif(6.4M),  
[4]Colbeck1979\_fig3\_rectif.tif.aux.xml(7.9K),  
[5]Colbeck1979\_fig3\_rectif.tif.ovr(2.1M),  
[6]Colbert1979\_core\_sites\_10-14.cpg(9),  
[7]Colbert1979\_core\_sites\_10-14.dbf(766),  
[8]Colbert1979\_core\_sites\_10-14.prj(568),  
[9]Colbert1979\_core\_sites\_10-14.sbn(256),  
[10]Colbert1979\_core\_sites\_10-14.sbx(171),  
[11]Colbert1979\_core\_sites\_10-14.shp(325),  
[12]Colbert1979\_core\_sites\_10-14.shx(191)

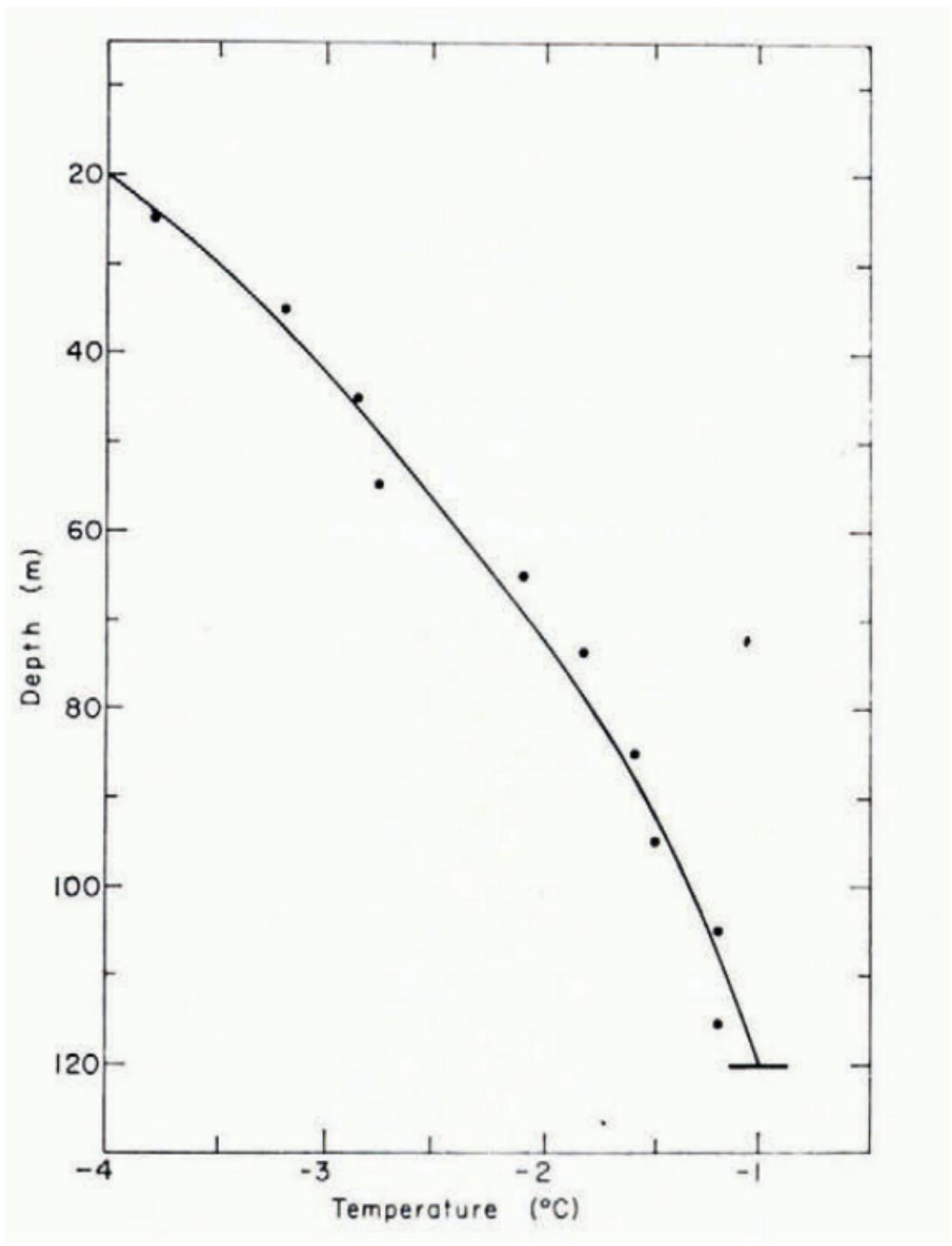
### 3.29.4 Velocity

### 3.30 Isua 11

Name	isua_11
Alternate name	Isua
Data source	Colbeck, S. C., Gow, A. J.: The Margin of the Greeni
Drill year(s)	
Data year(s)	1972-1973
Longitude [°E]	-49.7510
Latitude [°N]	65.2072
Approximate location name	
Location source	
Ice thickness [m]	120
Ice thickness year	
Ice thickness source	See data source
Surface velocity [m yr <sup>-1</sup> ]	
Surface velocity year	
Surface velocity source	
Measured from: Top, Bottom, Relative	T
Depth of top measurement [m]	25.0
Depth of bottom measurement [m]	116.0

#### 3.30.1 Temperature

- Temperature profiles from Colbeck et al. (1979) Figure 6.



### 3.30.2 Thickness

- Thickness from Colbeck et al. (1979) Table 1.

### 3.30.3 Location

- Locations of boreholes from email from WIC: [Isua Site – SW Greenland](#)

From: William Colgan  
To: Ken Mankoff  
Subject: Isua Site -- SW Greenland  
Date: Wed 09 Dec 2020 06:58:05 AM PST  
Attachments: [1]image002.jpg(147.6K),  
[2]Colbeck1979\_fig3\_rectif.tfw(122),

```
[3]Colbeck1979_fig3_rectif.tif(6.4M),  
[4]Colbeck1979_fig3_rectif.tif.aux.xml(7.9K),  
[5]Colbeck1979_fig3_rectif.tif.ovr(2.1M),  
[6]Colbert1979_core_sites_10-14.cpg(9),  
[7]Colbert1979_core_sites_10-14.dbf(766),  
[8]Colbert1979_core_sites_10-14.prj(568),  
[9]Colbert1979_core_sites_10-14.sbn(256),  
[10]Colbert1979_core_sites_10-14.sbx(171),  
[11]Colbert1979_core_sites_10-14.shp(325),  
[12]Colbert1979_core_sites_10-14.shx(191)
```

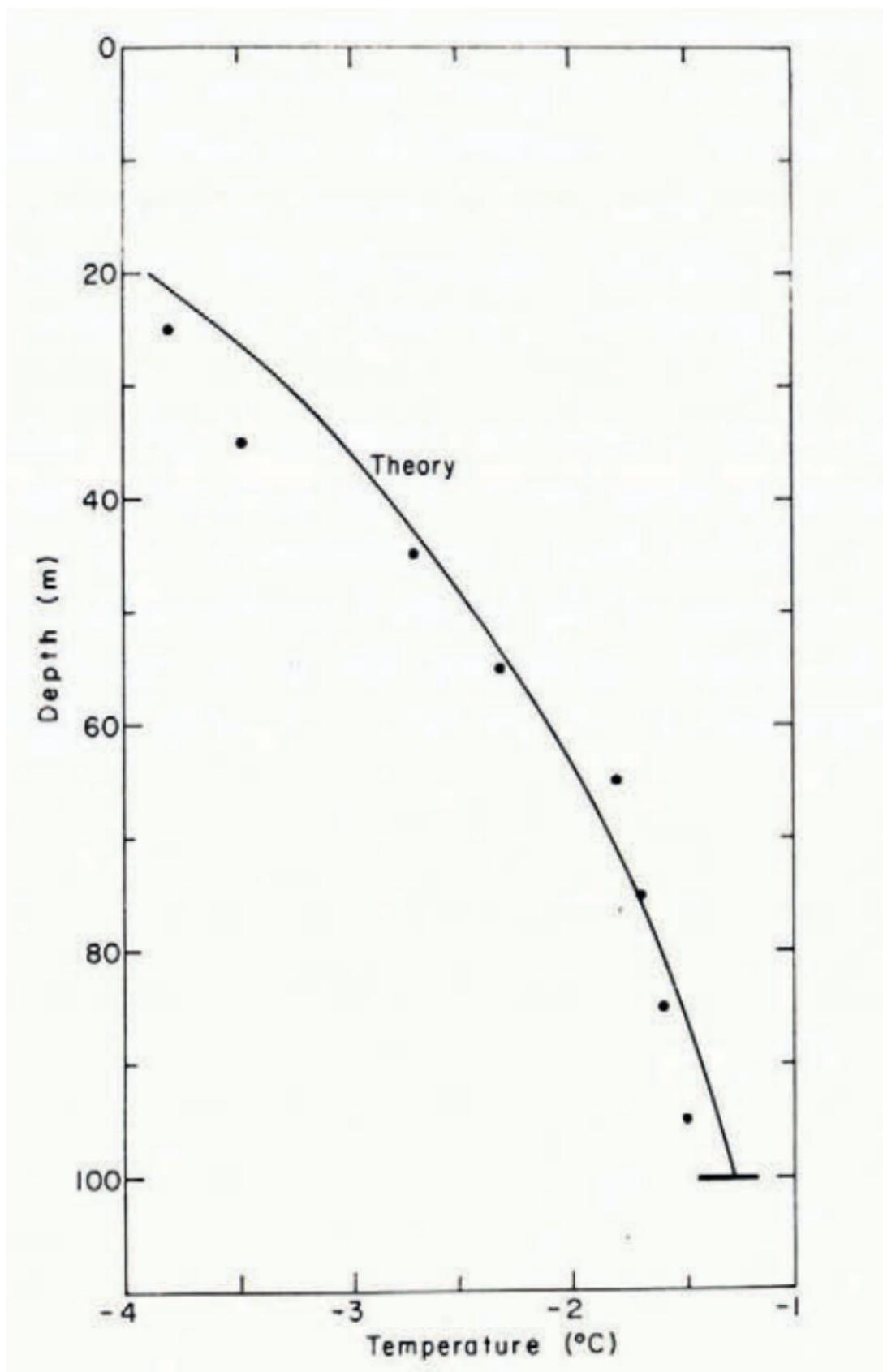
### 3.30.4 Velocity

### 3.31 Isua 12

Name	isua_12
Alternate name	Isua
Data source	Colbeck, S. C., Gow, A. J.: The Margin of the Greeni
Drill year(s)	
Data year(s)	1972-1973
Longitude [°E]	-49.753
Latitude [°N]	65.2039
Approximate location name	
Location source	
Ice thickness [m]	100
Ice thickness year	
Ice thickness source	See data source
Surface velocity [m yr <sup>-1</sup> ]	
Surface velocity year	
Surface velocity source	
Measured from: Top, Bottom, Relative	T
Depth of top measurement [m]	25.0
Depth of bottom measurement [m]	95.0

#### 3.31.1 Temperature

- Temperature profiles from Colbeck et al. (1979) Figure 7.



### 3.31.2 Thickness

- Thickness from Colbeck et al. (1979) Table 1.

### 3.31.3 Location

- Locations of boreholes from email from WIC: [Isua Site – SW Greenland](#)

From: William Colgan  
To: Ken Mankoff  
Subject: Isua Site -- SW Greenland  
Date: Wed 09 Dec 2020 06:58:05 AM PST  
Attachments: [1]image002.jpg(147.6K),  
[2]Colbeck1979\_fig3\_rectif.tfw(122),  
[3]Colbeck1979\_fig3\_rectif.tif(6.4M),  
[4]Colbeck1979\_fig3\_rectif.tif.aux.xml(7.9K),  
[5]Colbeck1979\_fig3\_rectif.tif.ovr(2.1M),  
[6]Colbert1979\_core\_sites\_10-14.cpg(9),  
[7]Colbert1979\_core\_sites\_10-14.dbf(766),  
[8]Colbert1979\_core\_sites\_10-14.prj(568),  
[9]Colbert1979\_core\_sites\_10-14.sbn(256),  
[10]Colbert1979\_core\_sites\_10-14.sbx(171),  
[11]Colbert1979\_core\_sites\_10-14.shp(325),  
[12]Colbert1979\_core\_sites\_10-14.shx(191)

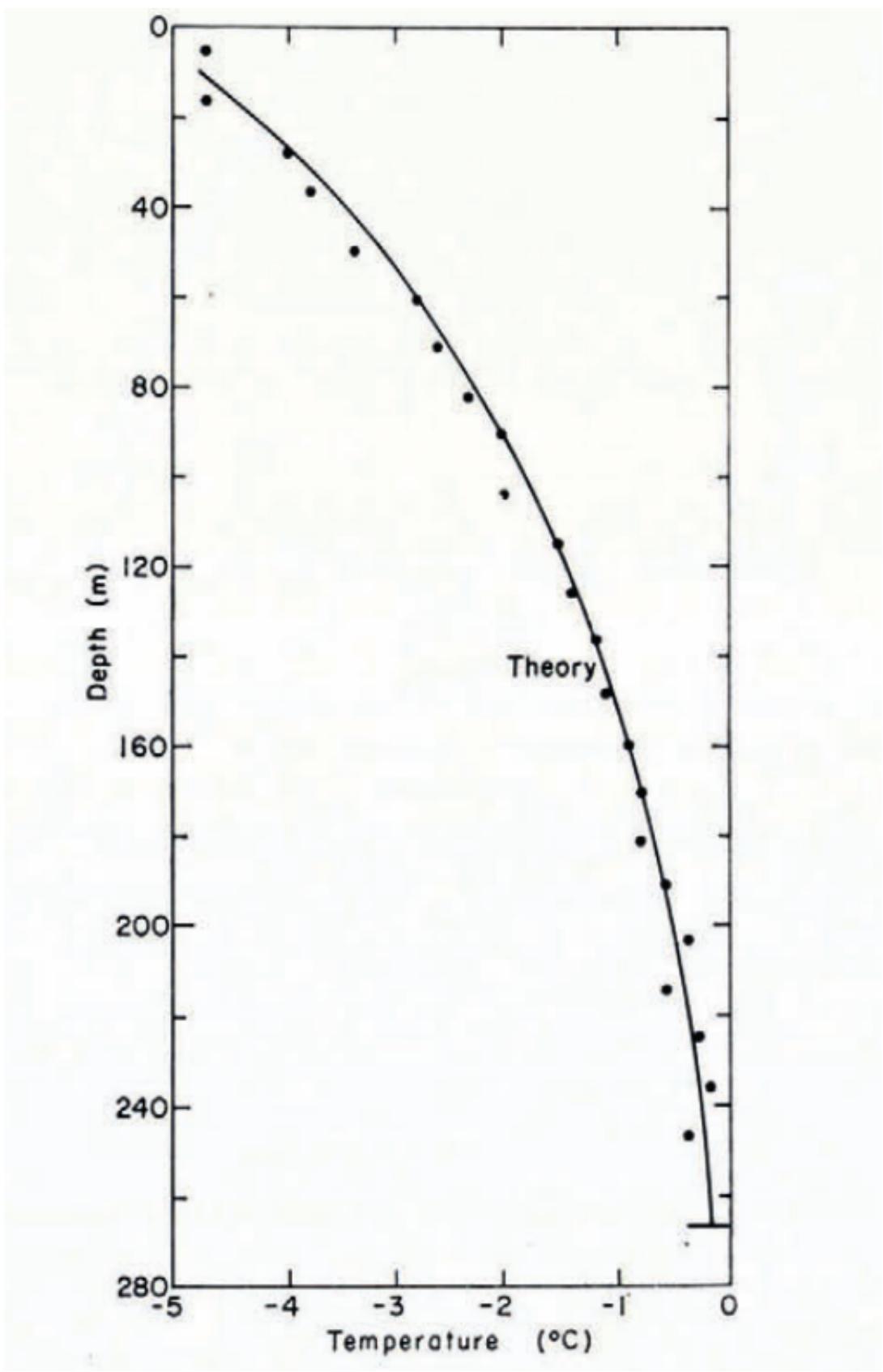
### 3.31.4 Velocity

### 3.32 Isua 13

Name	isua_13
Alternate name	Isua
Data source	Colbeck, S. C., Gow, A. J.: The Margin of the Greeni
Drill year(s)	
Data year(s)	1972-1973
Longitude [°E]	-49.7456
Latitude [°N]	65.2069
Approximate location name	
Location source	
Ice thickness [m]	265
Ice thickness year	
Ice thickness source	See data source
Surface velocity [m yr <sup>-1</sup> ]	
Surface velocity year	
Surface velocity source	
Measured from: Top, Bottom, Relative	T
Depth of top measurement [m]	6.0
Depth of bottom measurement [m]	247.0

#### 3.32.1 Temperature

- Temperature profiles from Colbeck et al. (1979) Figure 8.



### 3.32.2 Thickness

- Thickness from Colbeck et al. (1979) Table 1.

### 3.32.3 Location

- Locations of boreholes from email from WIC: [Isua Site – SW Greenland](#)

From: William Colgan  
To: Ken Mankoff  
Subject: Isua Site -- SW Greenland  
Date: Wed 09 Dec 2020 06:58:05 AM PST  
Attachments: [1]image002.jpg(147.6K),  
[2]Colbeck1979\_fig3\_rectif.tfw(122),  
[3]Colbeck1979\_fig3\_rectif.tif(6.4M),  
[4]Colbeck1979\_fig3\_rectif.tif.aux.xml(7.9K),  
[5]Colbeck1979\_fig3\_rectif.tif.ovr(2.1M),  
[6]Colbert1979\_core\_sites\_10-14.cpg(9),  
[7]Colbert1979\_core\_sites\_10-14.dbf(766),  
[8]Colbert1979\_core\_sites\_10-14.prj(568),  
[9]Colbert1979\_core\_sites\_10-14.sbn(256),  
[10]Colbert1979\_core\_sites\_10-14.sbx(171),  
[11]Colbert1979\_core\_sites\_10-14.shp(325),  
[12]Colbert1979\_core\_sites\_10-14.shx(191)

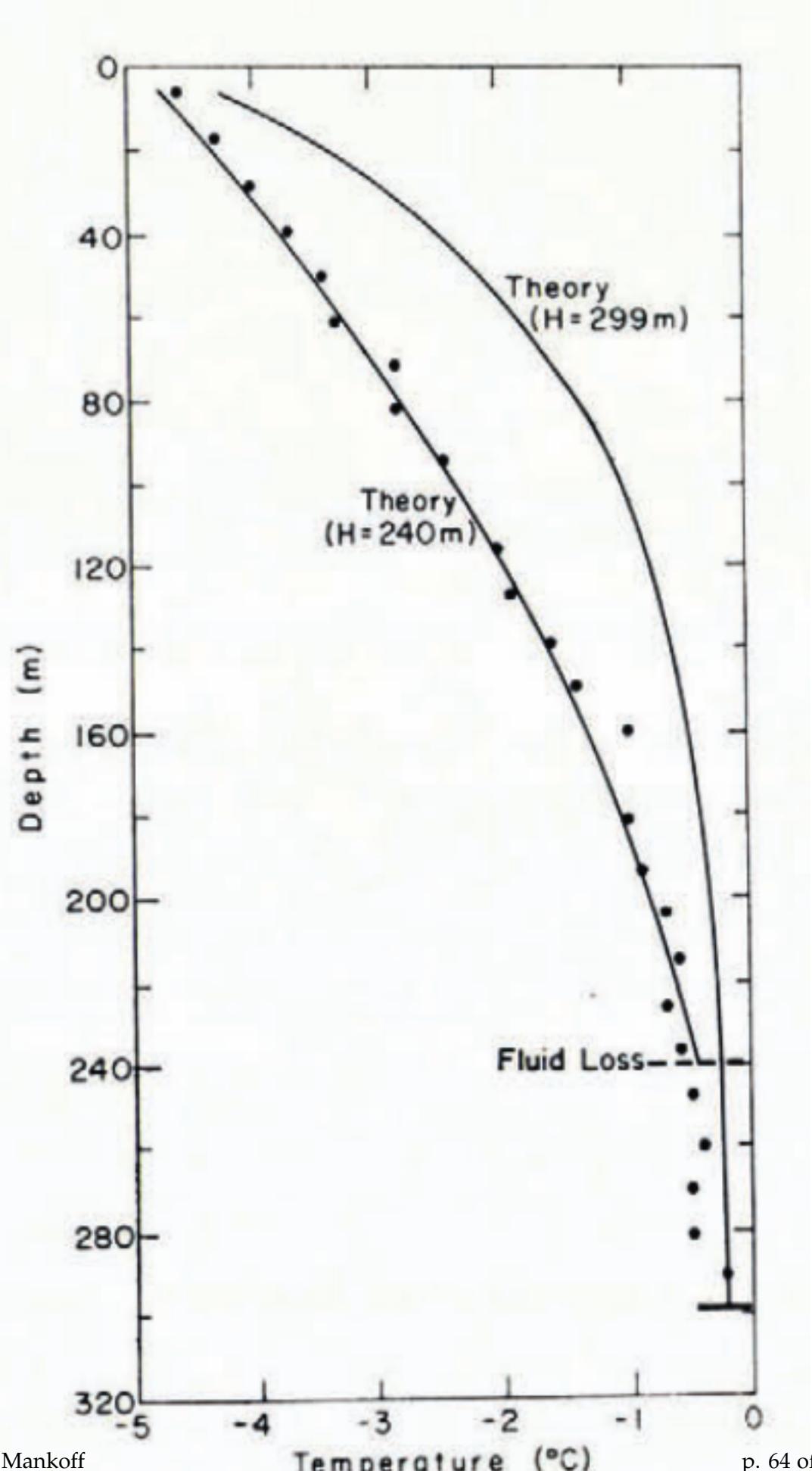
### 3.32.4 Velocity

### 3.33 Isua 14

Name	isua_14
Alternate name	Isua
Data source	Colbeck, S. C., Gow, A. J.: The Margin of the Greeni
Drill year(s)	
Data year(s)	1972-1973
Longitude [°E]	-49.7443
Latitude [°N]	65.2058
Approximate location name	
Location source	
Ice thickness [m]	299
Ice thickness year	
Ice thickness source	See data source
Surface velocity [m yr <sup>-1</sup> ]	
Surface velocity year	
Surface velocity source	
Measured from: Top, Bottom, Relative	T
Depth of top measurement [m]	6.0
Depth of bottom measurement [m]	237.0

#### 3.33.1 Temperature

- Temperature profiles from Colbeck et al. (1979) Figure 11.



### 3.33.2 Thickness

- Thickness from Colbeck et al. (1979) Table 1.

### 3.33.3 Location

- Locations of boreholes from email from WIC: [Isua Site – SW Greenland](#)

From: William Colgan

To: Ken Mankoff

Subject: Isua Site -- SW Greenland

Date: Wed 09 Dec 2020 06:58:05 AM PST

Attachments: [1]image002.jpg(147.6K),  
[2]Colbeck1979\_fig3\_rectif.tfw(122),  
[3]Colbeck1979\_fig3\_rectif.tif(6.4M),  
[4]Colbeck1979\_fig3\_rectif.tif.aux.xml(7.9K),  
[5]Colbeck1979\_fig3\_rectif.tif.ovr(2.1M),  
[6]Colbert1979\_core\_sites\_10-14.cpg(9),  
[7]Colbert1979\_core\_sites\_10-14.dbf(766),  
[8]Colbert1979\_core\_sites\_10-14.prj(568),  
[9]Colbert1979\_core\_sites\_10-14.sbn(256),  
[10]Colbert1979\_core\_sites\_10-14.sbx(171),  
[11]Colbert1979\_core\_sites\_10-14.shp(325),  
[12]Colbert1979\_core\_sites\_10-14.shx(191)

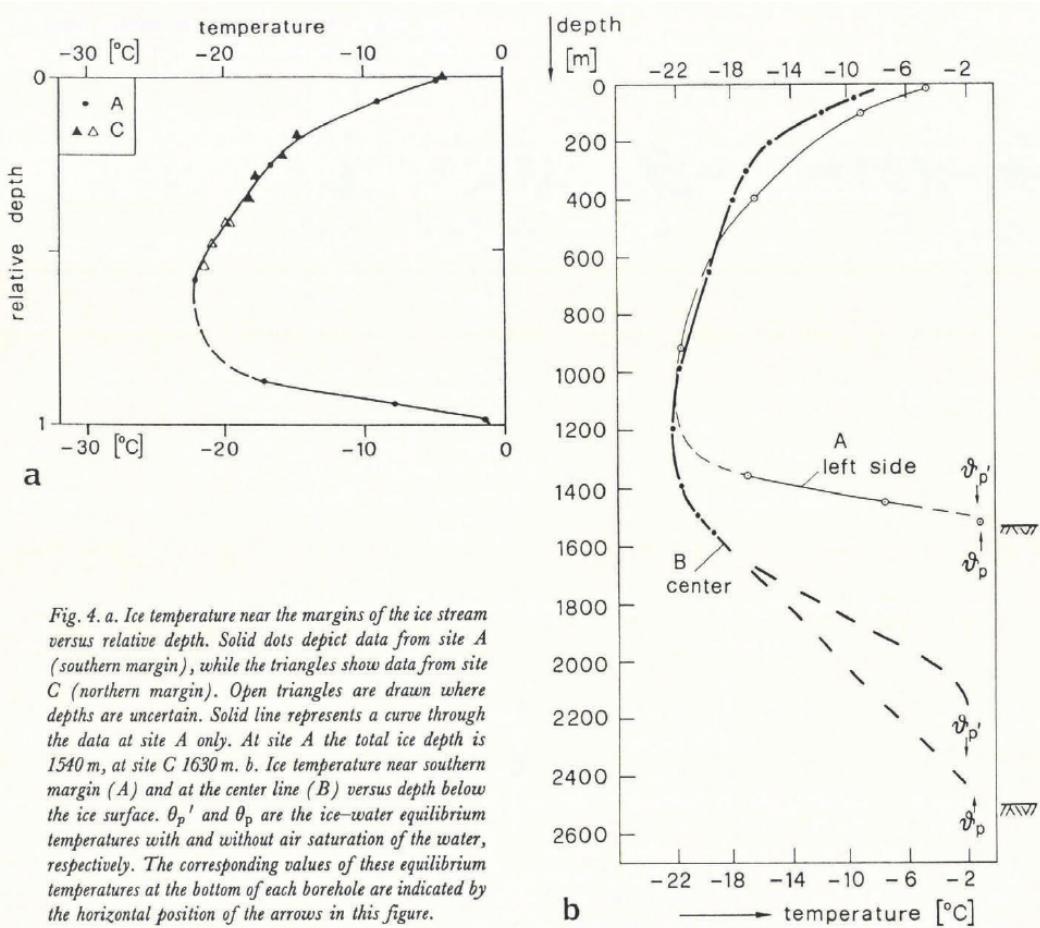
### 3.33.4 Velocity

### 3.34 Jakobshavn center

Name	jakobshavn_center
Alternate name	
Data source	Iken, A., Echelmeyer, ., Harrison, W., Funk, M.: Me
Drill year(s)	
Data year(s)	
Longitude [ $^{\circ}$ E]	
Latitude [ $^{\circ}$ N]	
Approximate location name	
Location source	
Ice thickness [m]	2495
Ice thickness year	
Ice thickness source	See data source
Surface velocity [ $m \text{ yr}^{-1}$ ]	
Surface velocity year	
Surface velocity source	
Measured from: Top, Bottom, Relative	T
Depth of top measurement [m]	12.0
Depth of bottom measurement [m]	2410.0

#### 3.34.1 Temperature

- From Iken et al. (1993) Figure 4 panel b,  $v_p$  digitized



### 3.34.2 Thickness

- From Iken et al. (1993).

### 3.34.3 Location

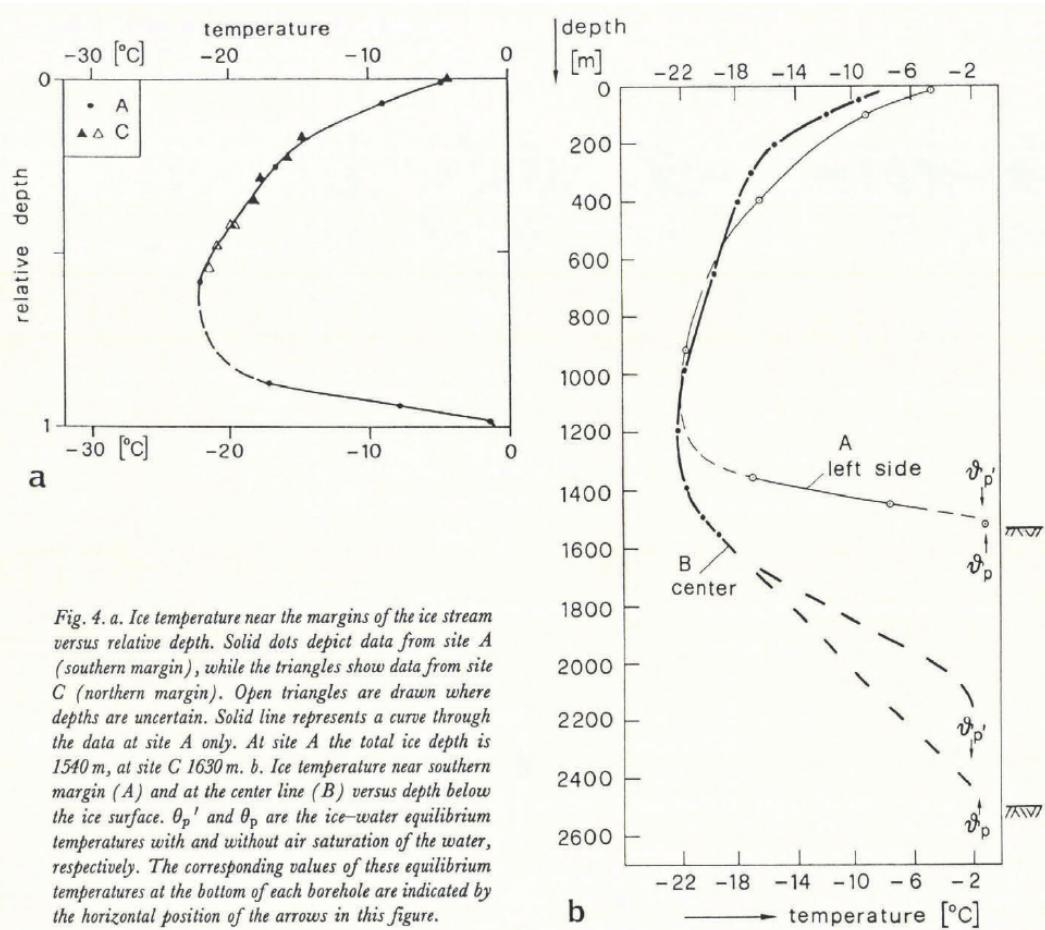
### 3.34.4 Velocity

### 3.35 Jakobshavn left

Name	jakobshavn_left
Alternate name	
Data source	Iken, A., Echelmeyer, ., Harrison, W., Funk, M.: Me
Drill year(s)	
Data year(s)	
Longitude [ $^{\circ}$ E]	
Latitude [ $^{\circ}$ N]	
Approximate location name	
Location source	
Ice thickness [m]	1530
Ice thickness year	
Ice thickness source	See data source
Surface velocity [m yr $^{-1}$ ]	
Surface velocity year	
Surface velocity source	
Measured from: Top, Bottom, Relative	T
Depth of top measurement [m]	8.0
Depth of bottom measurement [m]	1517.0

#### 3.35.1 Temperature

- From Iken et al. (1993) Figure 4 panel b,  $v_p$  digitized



### 3.35.2 Thickness

- From Iken et al. (1993).

### 3.35.3 Location

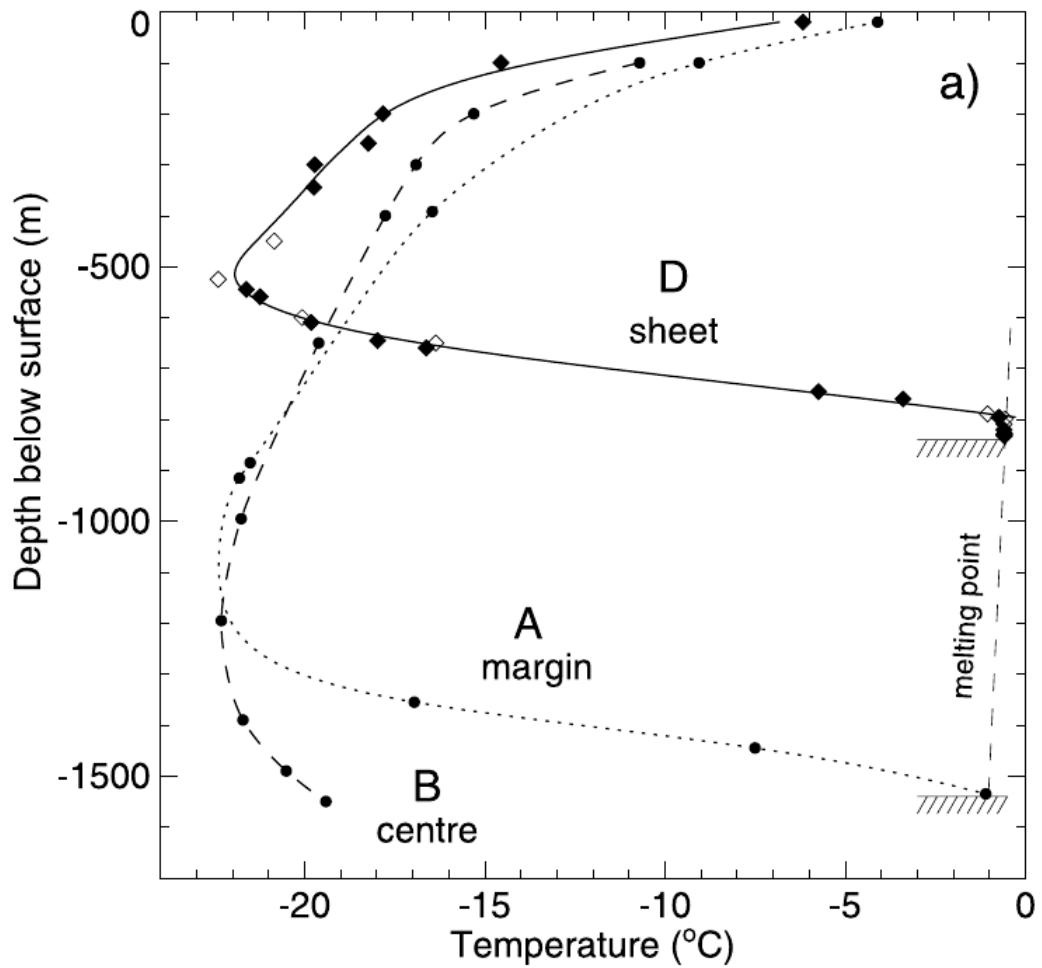
### 3.35.4 Velocity

### 3.36 Jakobshavn sheet

Name	jakobshavn_sheet
Alternate name	
Data source	Lüthi, Martin, Funk, Martin, Iken, Almut, Gogineni,
Drill year(s)	
Data year(s)	
Longitude [°E]	
Latitude [°N]	
Approximate location name	
Location source	
Ice thickness [m]	828
Ice thickness year	
Ice thickness source	See data source
Surface velocity [m yr <sup>-1</sup> ]	
Surface velocity year	
Surface velocity source	
Measured from: Top, Bottom, Relative	T
Depth of top measurement [m]	19.0
Depth of bottom measurement [m]	798.0

#### 3.36.1 Temperature

- From Lüthi et al. (2002) Figure 7 (a)
- Additional profiles (margin, centre) are from Iken et al. (1993) and named "jakobshavn\_center" and "jakobshavn\_left".



### 3.36.2 Thickness

- From Lüthi et al. (2002).

### 3.36.3 Location

### 3.36.4 Velocity

### 3.37 McDowell (2020) 14N

Name	m2020_14n
Alternate name	
Data source	McDowell, Ian E., Humphrey, Neil F., Harper, Joel T.
Drill year(s)	
Data year(s)	2017
Longitude [°E]	
Latitude [°N]	
Approximate location name	
Location source	
Ice thickness [m]	660
Ice thickness year	
Ice thickness source	See data source
Surface velocity [m yr <sup>-1</sup> ]	
Surface velocity year	
Surface velocity source	
Measured from: Top, Bottom, Relative	B
Depth of top measurement [m]	37.0
Depth of bottom measurement [m]	647.0

#### 3.37.1 Temperature

- From McDowell et al. (2020) Figure 2.

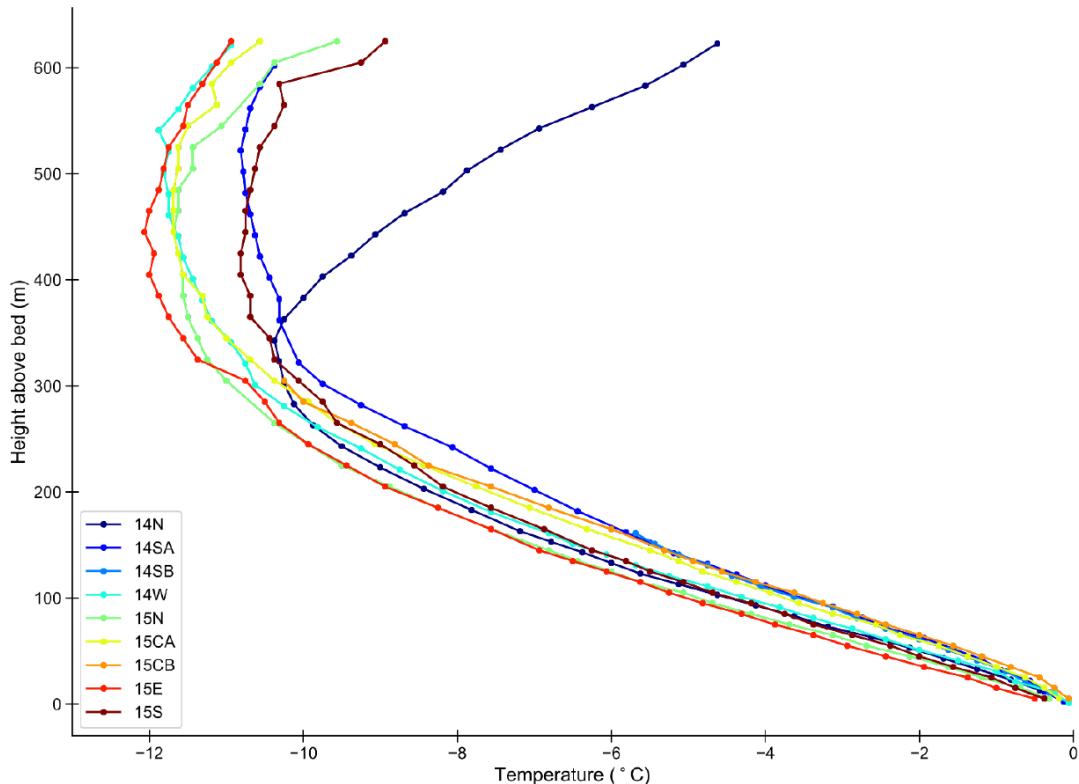


Figure 2: Temperature profiles for each borehole plotted with respect to each sensor's height above the bed. Sensor locations are marked with points and temperatures between sensors are linearly interpolated.

#### 3.37.2 Thickness

- From McDowell et al. (2020) thickness reported as 640 to 680 m. Here we set to 660.

3.37.3 Location

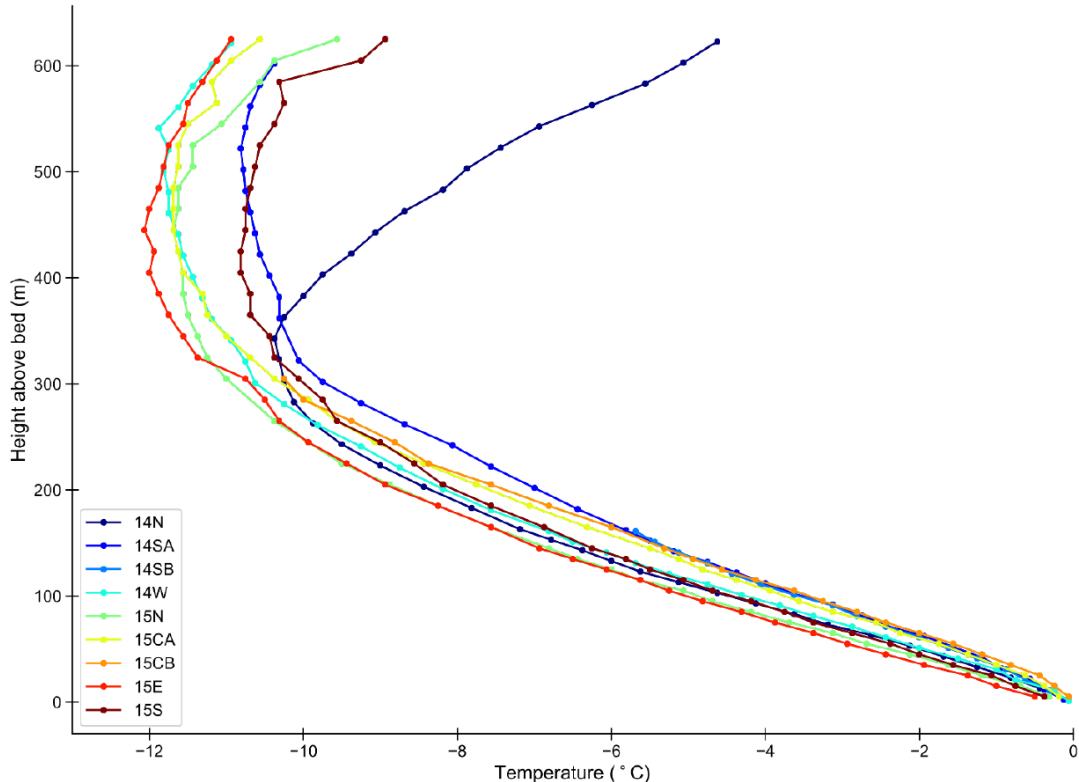
3.37.4 Velocity

### 3.38 McDowell (2020) 14SA

Name	m2020_14sa
Alternate name	
Data source	McDowell, Ian E., Humphrey, Neil F., Harper, Joel T
Drill year(s)	
Data year(s)	2017
Longitude [°E]	
Latitude [°N]	
Approximate location name	
Location source	
Ice thickness [m]	660
Ice thickness year	
Ice thickness source	See data source
Surface velocity [m yr <sup>-1</sup> ]	
Surface velocity year	
Surface velocity source	
Measured from: Top, Bottom, Relative	B
Depth of top measurement [m]	58.0
Depth of bottom measurement [m]	659.0

#### 3.38.1 Temperature

- From McDowell et al. (2020) Figure 2.



**Figure 2: Temperature profiles for each borehole plotted with respect to each sensor's height above the bed. Sensor locations are marked with points and temperatures between sensors are linearly interpolated.**

#### 3.38.2 Thickness

- From McDowell et al. (2020) thickness reported as 640 to 680 m. Here we set to 660.

3.38.3 Location

3.38.4 Velocity

### 3.39 McDowell (2020) 14SB

Name	m2020_14sb
Alternate name	
Data source	McDowell, Ian E., Humphrey, Neil F., Harper, Joel T.
Drill year(s)	
Data year(s)	2017
Longitude [°E]	
Latitude [°N]	
Approximate location name	
Location source	
Ice thickness [m]	660
Ice thickness year	
Ice thickness source	See data source
Surface velocity [m yr <sup>-1</sup> ]	
Surface velocity year	
Surface velocity source	
Measured from: Top, Bottom, Relative	B
Depth of top measurement [m]	499.0
Depth of bottom measurement [m]	650.0

#### 3.39.1 Temperature

- From McDowell et al. (2020) Figure 2.

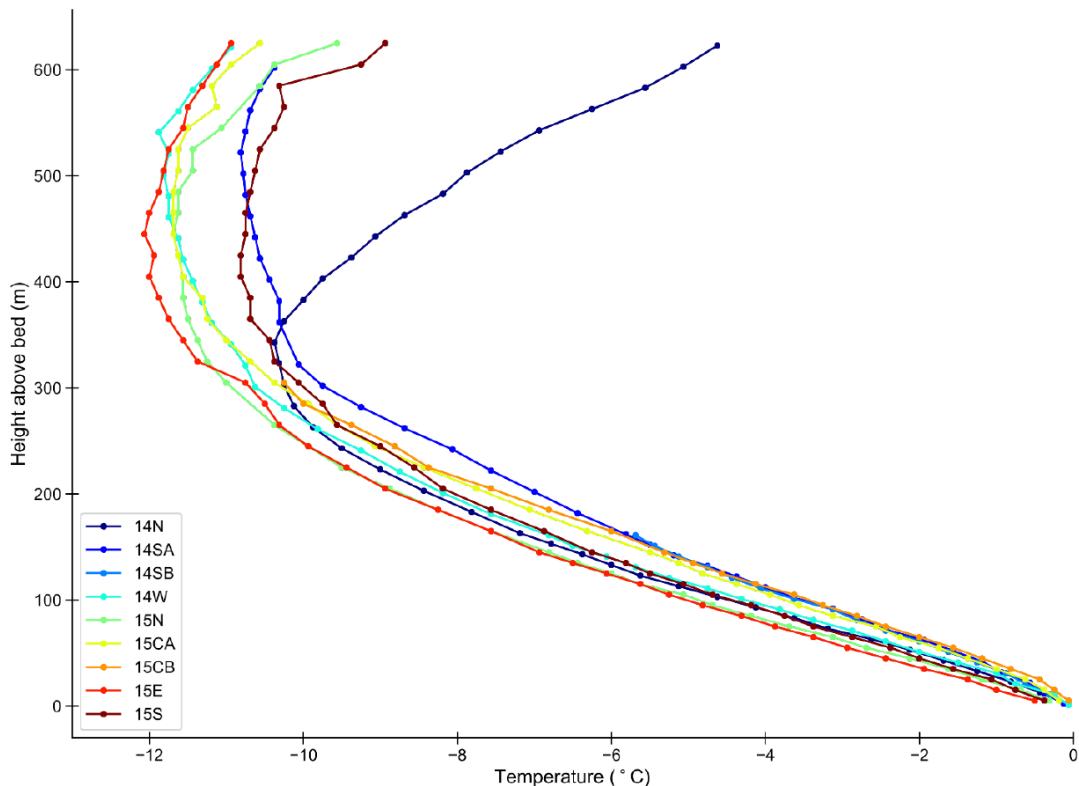


Figure 2: Temperature profiles for each borehole plotted with respect to each sensor's height above the bed. Sensor locations are marked with points and temperatures between sensors are linearly interpolated.

#### 3.39.2 Thickness

- From McDowell et al. (2020) thickness reported as 640 to 680 m. Here we set to 660.

3.39.3 Location

3.39.4 Velocity

### 3.40 McDowell (2020) 14W

Name	m2020_14w
Alternate name	
Data source	McDowell, Ian E., Humphrey, Neil F., Harper, Joel T.
Drill year(s)	
Data year(s)	2017
Longitude [°E]	
Latitude [°N]	
Approximate location name	
Location source	
Ice thickness [m]	660
Ice thickness year	
Ice thickness source	See data source
Surface velocity [m yr <sup>-1</sup> ]	
Surface velocity year	
Surface velocity source	
Measured from: Top, Bottom, Relative	B
Depth of top measurement [m]	39.0
Depth of bottom measurement [m]	659.0

#### 3.40.1 Temperature

- From McDowell et al. (2020) Figure 2.

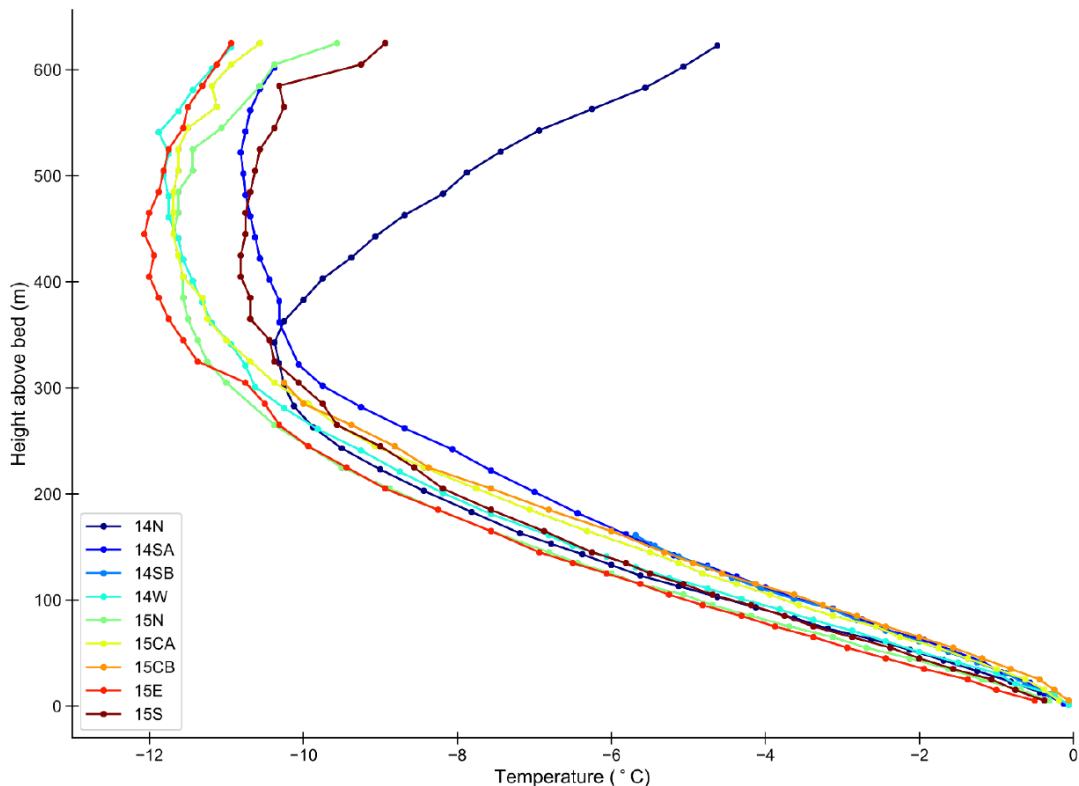


Figure 2: Temperature profiles for each borehole plotted with respect to each sensor's height above the bed. Sensor locations are marked with points and temperatures between sensors are linearly interpolated.

#### 3.40.2 Thickness

- From McDowell et al. (2020) thickness reported as 640 to 680 m. Here we set to 660.

3.40.3 Location

3.40.4 Velocity

### 3.41 McDowell (2020) 14CA

Name	m2020_15ca
Alternate name	
Data source	McDowell, Ian E., Humphrey, Neil F., Harper, Joel T.
Drill year(s)	
Data year(s)	2017
Longitude [°E]	
Latitude [°N]	
Approximate location name	
Location source	
Ice thickness [m]	660
Ice thickness year	
Ice thickness source	See data source
Surface velocity [m yr <sup>-1</sup> ]	
Surface velocity year	
Surface velocity source	
Measured from: Top, Bottom, Relative	B
Depth of top measurement [m]	35.0
Depth of bottom measurement [m]	654.0

#### 3.41.1 Temperature

- From McDowell et al. (2020) Figure 2.

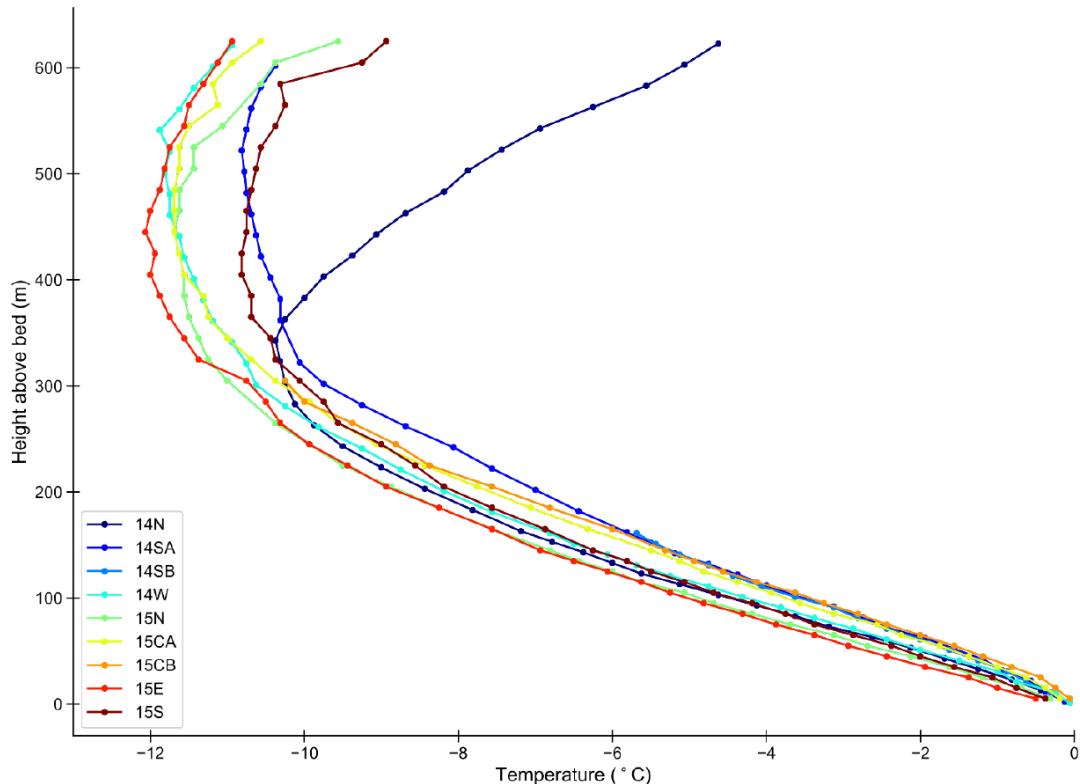


Figure 2: Temperature profiles for each borehole plotted with respect to each sensor's height above the bed. Sensor locations are marked with points and temperatures between sensors are linearly interpolated.

#### 3.41.2 Thickness

- From McDowell et al. (2020) thickness reported as 640 to 680 m. Here we set to 660.

3.41.3 Location

3.41.4 Velocity

### 3.42 McDowell (2020) 14CB

Name	m2020_15cb
Alternate name	
Data source	McDowell, Ian E., Humphrey, Neil F., Harper, Joel T.
Drill year(s)	
Data year(s)	2017
Longitude [°E]	
Latitude [°N]	
Approximate location name	
Location source	
Ice thickness [m]	660
Ice thickness year	
Ice thickness source	See data source
Surface velocity [m yr <sup>-1</sup> ]	
Surface velocity year	
Surface velocity source	
Measured from: Top, Bottom, Relative	B
Depth of top measurement [m]	355.0
Depth of bottom measurement [m]	655.0

#### 3.42.1 Temperature

- From McDowell et al. (2020) Figure 2.

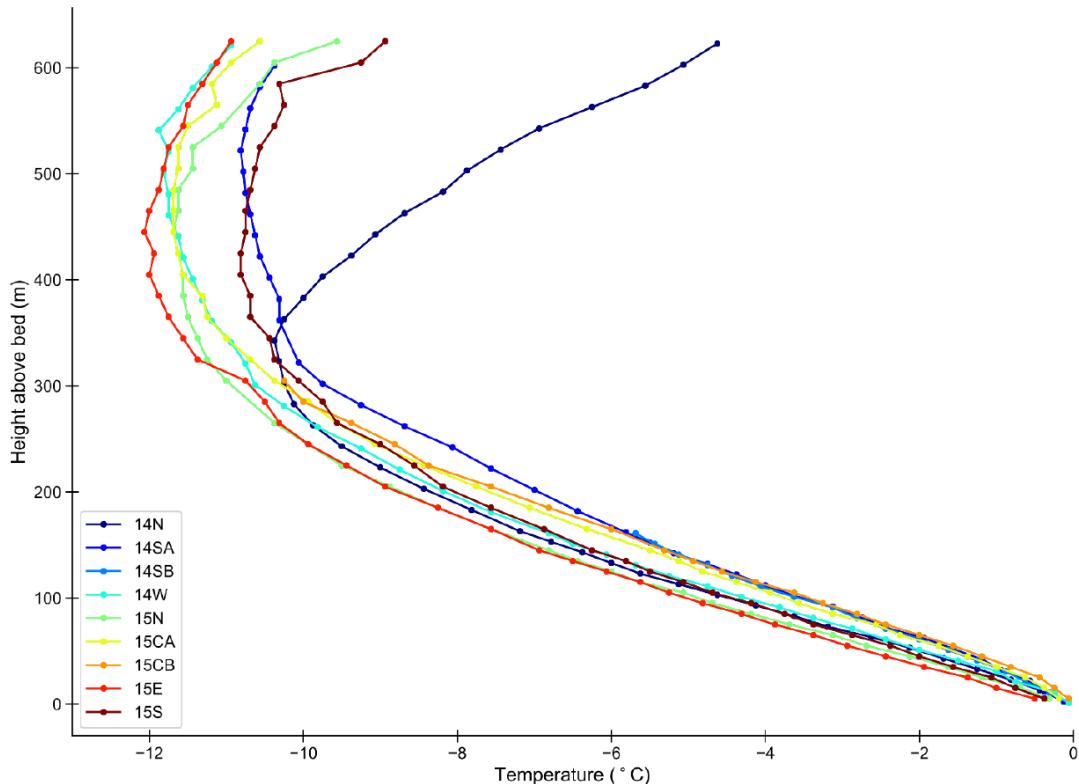


Figure 2: Temperature profiles for each borehole plotted with respect to each sensor's height above the bed. Sensor locations are marked with points and temperatures between sensors are linearly interpolated.

#### 3.42.2 Thickness

- From McDowell et al. (2020) thickness reported as 640 to 680 m. Here we set to 660.

3.42.3 Location

3.42.4 Velocity

### 3.43 McDowell (2020) 14E

Name	m2020_15e
Alternate name	
Data source	McDowell, Ian E., Humphrey, Neil F., Harper, Joel T.
Drill year(s)	
Data year(s)	2017
Longitude [°E]	
Latitude [°N]	
Approximate location name	
Location source	
Ice thickness [m]	660
Ice thickness year	
Ice thickness source	See data source
Surface velocity [m yr <sup>-1</sup> ]	
Surface velocity year	
Surface velocity source	
Measured from: Top, Bottom, Relative	B
Depth of top measurement [m]	35.0
Depth of bottom measurement [m]	656.0

#### 3.43.1 Temperature

- From McDowell et al. (2020) Figure 2.

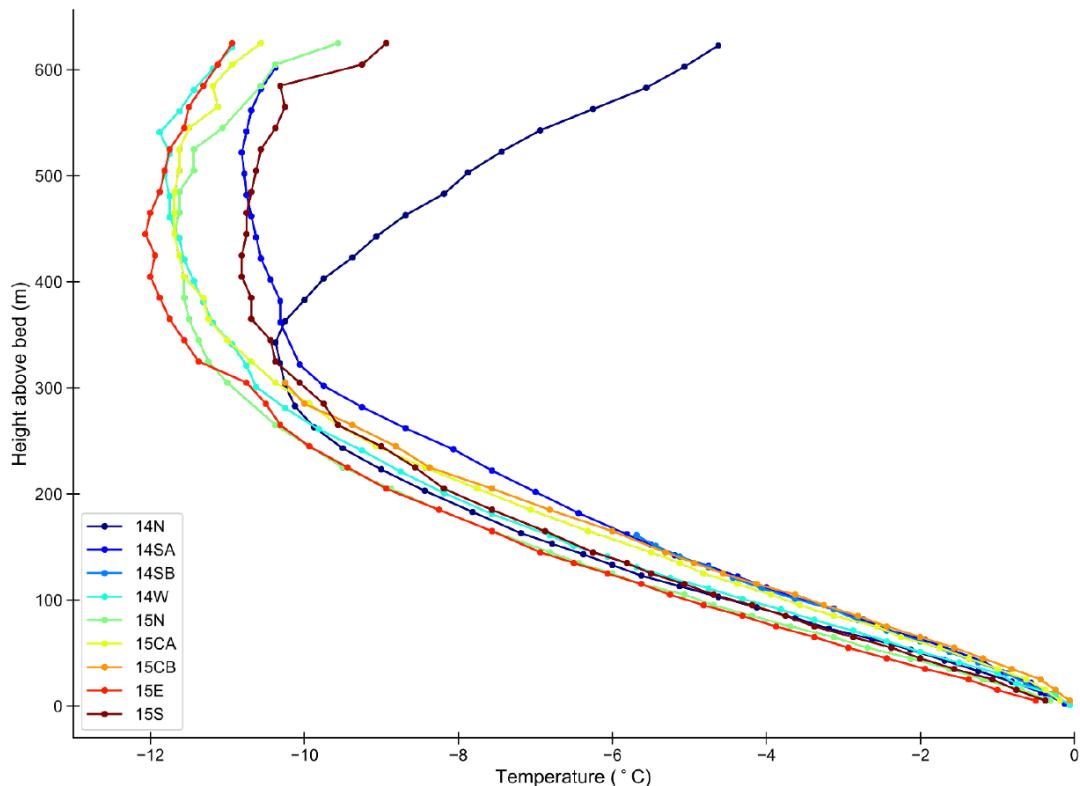


Figure 2: Temperature profiles for each borehole plotted with respect to each sensor's height above the bed. Sensor locations are marked with points and temperatures between sensors are linearly interpolated.

#### 3.43.2 Thickness

- From McDowell et al. (2020) thickness reported as 640 to 680 m. Here we set to 660.

3.43.3 Location

3.43.4 Velocity

### 3.44 McDowell (2020) 15N

Name	m2020_15n
Alternate name	
Data source	McDowell, Ian E., Humphrey, Neil F., Harper, Joel T.
Drill year(s)	
Data year(s)	2017
Longitude [°E]	
Latitude [°N]	
Approximate location name	
Location source	
Ice thickness [m]	660
Ice thickness year	
Ice thickness source	See data source
Surface velocity [m yr <sup>-1</sup> ]	
Surface velocity year	
Surface velocity source	
Measured from: Top, Bottom, Relative	B
Depth of top measurement [m]	35.0
Depth of bottom measurement [m]	655.0

#### 3.44.1 Temperature

- From McDowell et al. (2020) Figure 2.

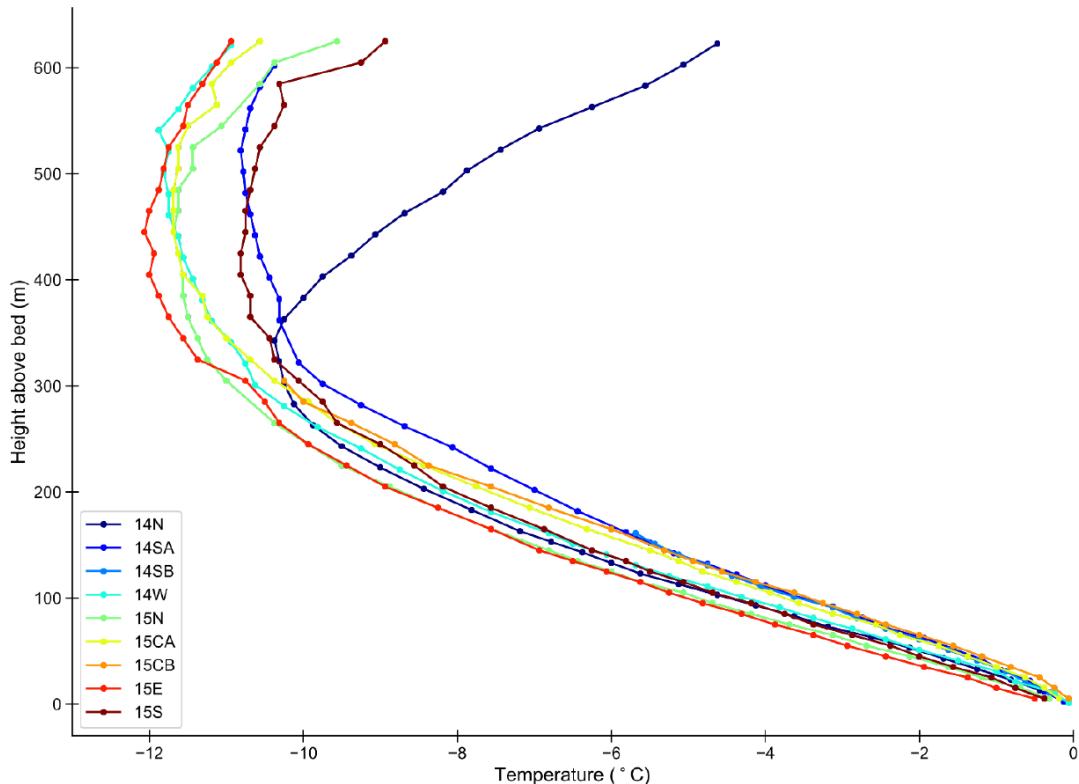


Figure 2: Temperature profiles for each borehole plotted with respect to each sensor's height above the bed. Sensor locations are marked with points and temperatures between sensors are linearly interpolated.

#### 3.44.2 Thickness

- From McDowell et al. (2020) thickness reported as 640 to 680 m. Here we set to 660.

3.44.3 Location

3.44.4 Velocity

### 3.45 McDowell (2020) 15S

Name	m2020_15s
Alternate name	
Data source	McDowell, Ian E., Humphrey, Neil F., Harper, Joel T.
Drill year(s)	
Data year(s)	2017
Longitude [°E]	
Latitude [°N]	
Approximate location name	
Location source	
Ice thickness [m]	660
Ice thickness year	
Ice thickness source	See data source
Surface velocity [m yr <sup>-1</sup> ]	
Surface velocity year	
Surface velocity source	
Measured from: Top, Bottom, Relative	B
Depth of top measurement [m]	35.0
Depth of bottom measurement [m]	655.0

#### 3.45.1 Temperature

- From McDowell et al. (2020) Figure 2.

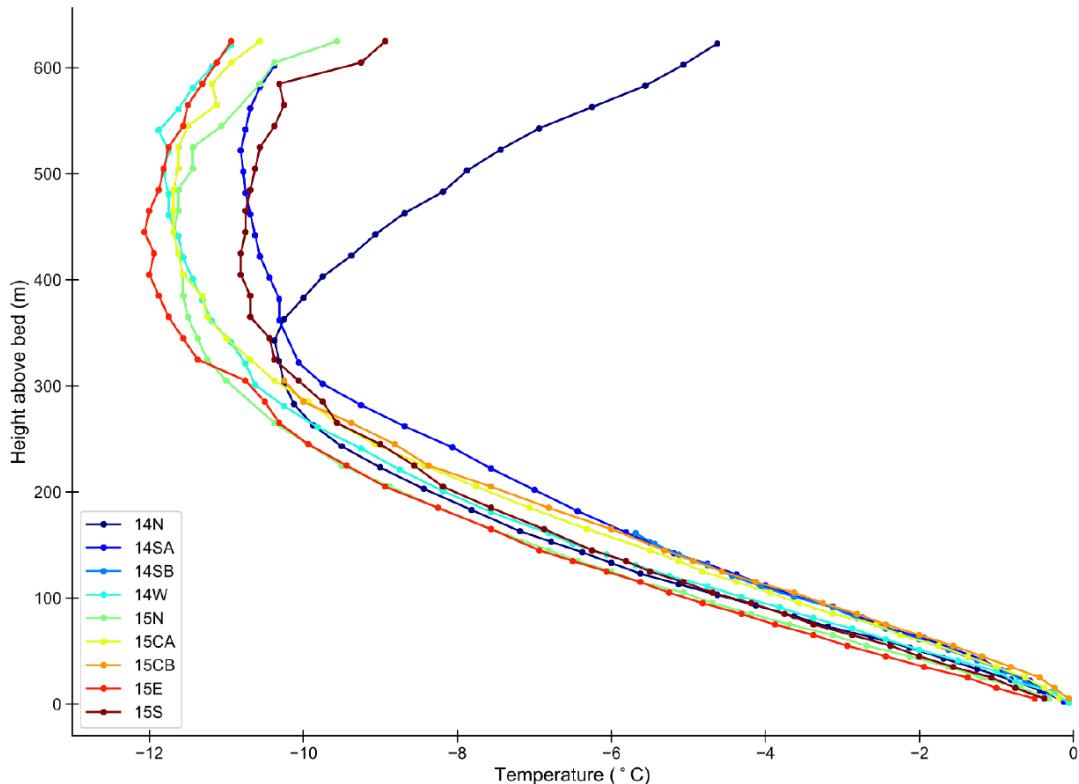


Figure 2: Temperature profiles for each borehole plotted with respect to each sensor's height above the bed. Sensor locations are marked with points and temperatures between sensors are linearly interpolated.

#### 3.45.2 Thickness

- From McDowell et al. (2020) thickness reported as 640 to 680 m. Here we set to 660.

3.45.3 Location

3.45.4 Velocity

### 3.46 Meighan

Name	meighan
Alternate name	Meighan Ice Cap
Data source	Paterson, W. S. B.: A temperature profile through the ice cap, 1965
Drill year(s)	
Data year(s)	1965
Longitude [ $^{\circ}$ E]	
Latitude [ $^{\circ}$ N]	
Approximate location name	
Location source	
Ice thickness [m]	121.2
Ice thickness year	
Ice thickness source	See data source
Surface velocity [m yr $^{-1}$ ]	
Surface velocity year	
Surface velocity source	
Measured from: Top, Bottom, Relative	T
Depth of top measurement [m]	1.0
Depth of bottom measurement [m]	121.0

#### 3.46.1 Temperature

- Table (no graphic) from Paterson ([1968](#)) Table 1.
- Result is average of 1966 and 1967 columns.

#### 3.46.2 Thickness

- From Paterson ([1968](#)).

#### 3.46.3 Location

#### 3.46.4 Velocity

### 3.47 NEEM

Name	neem
Alternate name	NEEM
Data source	MacGregor, Joseph A., Li, Jilu, Paden, John D., Cata
Drill year(s)	2008 through 2012
Data year(s)	2011
Longitude [°E]	-51.06
Latitude [°N]	77.45
Approximate location name	Northwest Greenland
Location source	Dahl-Jensen, D., Albert, Mary R., Aldahan, A., Azuma
Ice thickness [m]	2538
Ice thickness year	
Ice thickness source	MacGregor, Joseph A., Fahnestock, Mark A., Catania,
Surface velocity [m yr <sup>-1</sup> ]	
Surface velocity year	
Surface velocity source	
Measured from: Top, Bottom, Relative	R
Depth of top measurement [m]	91.0
Depth of bottom measurement [m]	2509.0

### 3.47.1 Temperature

- Data provided by 3rd party in MAT format, converted to CSV
    - Email 1: [Re: \[EXTERNAL\] Re: GISP2 temperature profile](#)
    - Email 2: [Fwd: NEEM temperature profile](#)
  - See also MacGregor et al. (2015) Figure 6.

From: MacGregor, Joseph (GSFC-6150)  
To: Ken Mankoff  
Subject: Re: [EXTERNAL] Re: GISP2 temperature profile  
Date: Wed 06 Jan 2021 03:27:40 PM PST  
Attachments: [1]neem\_temp.mat(5.0K), [2]NEEM\_Tz.pdf(99.3K),  
[3]NEEM-D 11MAY30b 50m.txt(1.9K)

See attached for NEEM [...] includes a mild linear interpolation to handle the convection cell.

### 3.47.2 Thickness

- Reported as 2540 in Dahl-Jensen et al. (2013).
  - Reported as 2538 in MacGregor et al. (2016), with some extra details in Table 1.

### 3.47.3 Location

- From Dahl-Jensen et al. (2013).

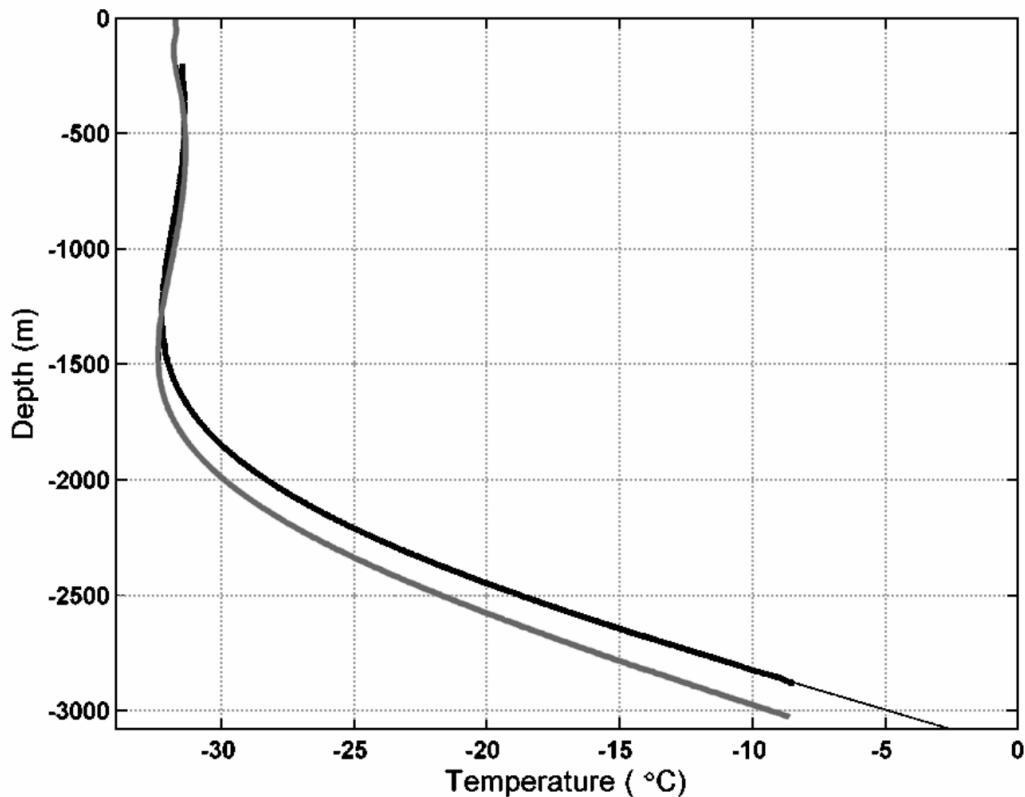
### 3.47.4 Velocity

### 3.48 NGRIP

Name	ngrip
Alternate name	NGRIP
Data source	Dahl-Jensen, Dorthe, Gundestrup, Niels, Gogineni, S
Drill year(s)	1996-2004 (Vinther, 2008)
Data year(s)	
Longitude [ $^{\circ}$ E]	-42.32
Latitude [ $^{\circ}$ N]	75.10
Approximate location name	
Location source	Vinther (2008)
Ice thickness [m]	3080
Ice thickness year	
Ice thickness source	See data source
Surface velocity [ $m\ yr^{-1}$ ]	
Surface velocity year	
Surface velocity source	
Measured from: Top, Bottom, Relative	T
Depth of top measurement [m]	204.0
Depth of bottom measurement [m]	2888.0

#### 3.48.1 Temperature

- From Dahl-Jensen et al. (2003) Figure 1. Black line digitized as NGRIP. Gray line is GRIP temperature profile.



#### 3.48.2 Thickness

- From Dahl-Jensen et al. (2003) (abstract)

3.48.3 Location

3.48.4 Velocity

### 3.49 Penny

Name	penny
Alternate name	Penny Ice Cap
Data source	WIC
Drill year(s)	
Data year(s)	1996
Longitude [°E]	-65.2
Latitude [°N]	67.3
Approximate location name	
Location source	
Ice thickness [m]	176
Ice thickness year	
Ice thickness source	Data file + WIC email (see also Fisher 1998)
Surface velocity [m yr <sup>-1</sup> ]	
Surface velocity year	
Surface velocity source	
Measured from: Top, Bottom, Relative	T
Depth of top measurement [m]	10.0
Depth of bottom measurement [m]	176.0

#### 3.49.1 Temperature

- Data provided from Liam email: [Penny T profile?](#)

From: William Colgan  
To: Ken Mankoff  
Subject: Penny T profile?  
Date: Wed 09 Dec 2020 03:17:20 AM PST  
Attachments: [1]Penny 1996 borehole T profile.xlsx(303.9K)

Hey Ken - Here is the last of the Canadian Arctic Ice Caps. Penny! For the IceTemp database

Penny site:  
Latitude N 67 deg 18'  
Longitude W 65 deg 12'

Fra: Christian Zdanowicz  
Sendt: 2. december 2020 13:27  
Til: William Colgan  
Emne: RE: Prince of Wales - ice temperature?

So here you are (attachments). There were two T profiles measured through Penny ice cap, one in the 1996 borehole, one in the 1998 borehole. I distrust the 1998 profile, because it is likely that the termistor got stuck in the borehole, as the constant Ts below 140 m suggest (see figure in the Excel spreadsheet). The T profile in the 1996 borehole, measured in 1997, is more trustworthy. See attached paper (JGR 2012) for borehole locations.

David Fisher deserves the credit for all these data, I did not generate them. You can use his Univ. of Ottawa affiliation: Department of Earth and Environmental Sciences, University of Ottawa, Ottawa, Canada, K1N 6N5.

#### 3.49.2 Thickness

- From WIC email

### 3.49.3 Location

- From WIC email

### 3.49.4 Velocity

### 3.50 Prince of Wales

Name	pow
Alternate name	Prince of Wales
Data source	WIC
Drill year(s)	
Data year(s)	2005-05-15
Longitude [°E]	-80.395
Latitude [°N]	78.3897
Approximate location name	
Location source	
Ice thickness [m]	176
Ice thickness year	
Ice thickness source	WIC
Surface velocity [m yr <sup>-1</sup> ]	
Surface velocity year	
Surface velocity source	
Measured from: Top, Bottom, Relative	T
Depth of top measurement [m]	10.0
Depth of bottom measurement [m]	176.0

#### 3.50.1 Temperature

- Email from WIC: [VS: Prince of Wales - ice temperature?](#)

From: William Colgan  
To: Ken Mankoff  
Subject: VS: Prince of Wales - ice temperature?  
Date: Wed 02 Dec 2020 03:06:55 AM PST  
Attachments: [1]PoW\_T\_profile.xlsx(20.2K)

Ken, Here is "Prince of Wales Icefield" on Ellesmere ("PoW") for the IceTemp database. Full

Coordinates: N 78 deg 23.382, W 80 deg 23.700

Fra: Christian Zdanowicz  
Sendt: 2. december 2020 10:48  
Til: William Colgan  
Emne: RE: Prince of Wales - ice temperature?

Here is what I have. Not much, unfortunately, but better than nothing. The measurements were made on 15 May 2005, the day after the drill reached bedrock. The borehole had been started on 3 May 2005, so surface air may have circulated in the borehole for up to 10 days between start and end of drilling (although borehole was closed with a lid between drilling days).

The measurements were done with Richard Brancker Research Ltd (RBR; now RBR Global: <https://rbr-global.com/>) programmable probe model RBR TR-1050. (manual attached, for reference). The coefficients of the quadratic calibration equation that relates measured vs. certified temperature were -0.000251638, 0.00000239321E-06, and -0.00000063277540 (deg C).

The actual depths recorded are very approximate. This is the way I made the measurements: I suspended the RBR temperature probe on a long string marked at

one-metre intervals. Because of the weight of the string itself, it was impossible to guess "by feel" when the probe touched the bottom of the borehole. Instead, I lowered the probe down to the 180 m mark, which is slightly deeper than the borehole (~176 m). I then raised the probe 10 metres every hours. The probe was programmed to take one reading every hour on the hour, and I raised the probe about 5 minutes into the hour to allow 50 minutes at every level for the probe to equilibrate with the ambient temperature.

### 3.50.2 Thickness

- Email from WIC: [VS: Prince of Wales - ice temperature?](#)

### 3.50.3 Location

- Email from WIC: [VS: Prince of Wales - ice temperature?](#)

### 3.50.4 Velocity

### 3.51 Renland

Name	renland
Alternate name	Renland
Data source	BMV
Drill year(s)	
Data year(s)	1988
Longitude [ $^{\circ}$ E]	-26.768
Latitude [ $^{\circ}$ N]	71.306
Approximate location name	
Location source	
Ice thickness [m]	324.4
Ice thickness year	
Ice thickness source	Vinther, B. M., Clausen, H. B., Fisher, D. A., Koerner, R. W., and Alley, R. B., 2008, The Greenland ice core chronology 2000 (GICC08) dataset, 1900–2000 AD, <i>Journal of Climate</i> , v. 21, p. 3493–3510.
Surface velocity [m yr $^{-1}$ ]	
Surface velocity year	
Surface velocity source	
Measured from: Top, Bottom, Relative	T
Depth of top measurement [m]	15.0
Depth of bottom measurement [m]	300.0

#### 3.51.1 Temperature

- Mentioned in Vinther et al. (2008)
- As per email from Bo Vinther ([SV: SV: Renland ice temperature profile?](#)),
  - Surface velocity small
  - The position of the 1988 site is: 71.306N, 26.768W.
  - In 1988 the drill got stuck at 324.4m depth - radar measurements suggested a depth of some 321+/-5m (Johnsen et al. 1992)
  - Temperature provided as XLS attachment in email: [SV: Renland ice temperature profile?](#)
- From Johnsen et al. (1992)
  - Basal temperature inferred to be -13 °C (p. 7)

#### 3.51.2 Thickness

- Ice core length is 325 from Vinther et al. (2008).

#### 3.51.3 Location

- From Vinther et al. (2008) and email

I'm afraid I don't have a surface velocity (but it is likely small, as the drilling was near the dome of the ice cap). The position of the 1988 site is: 71.306N, 26.768W. In 1988 the drill got stuck at 324.4m depth - radar measurements suggested a depth of some 321+/-5m (see attached paper). I think they had to use glycol to free the drill - if so, this explains the lack of measurements near the bottom (as temperatures would anyway be disturbed by glycol induced melting).

#### 3.51.4 Velocity

## 3.52 Site II

Name	site_ii
Alternate name	Site II
Data source	Hansen, B. L., Landauer, J. K.: Some results of ice
Drill year(s)	1957 (Summer)
Data year(s)	1958 (late June)
Longitude [°E]	-56.066667
Latitude [°N]	76.983333
Approximate location name	
Location source	WIC Email
Ice thickness [m]	1851
ice thickness year	
Ice thickness source	BedMachine
Surface velocity [m yr <sup>-1</sup> ]	
Surface velocity year	
Surface velocity source	
Measured from: Top, Bottom, Relative	T
Depth of top measurement [m]	
Depth of bottom measurement [m]	

### 3.52.1 Temperature

- Digitized from Hansen et al. (1958) Figure 3:
- WARNING: Depth reported in [ft] not [m].
- WARNING: From text,

Final values will not be assigned to the 1958 data until the equipment has been returned from Greenland and recalibrated.

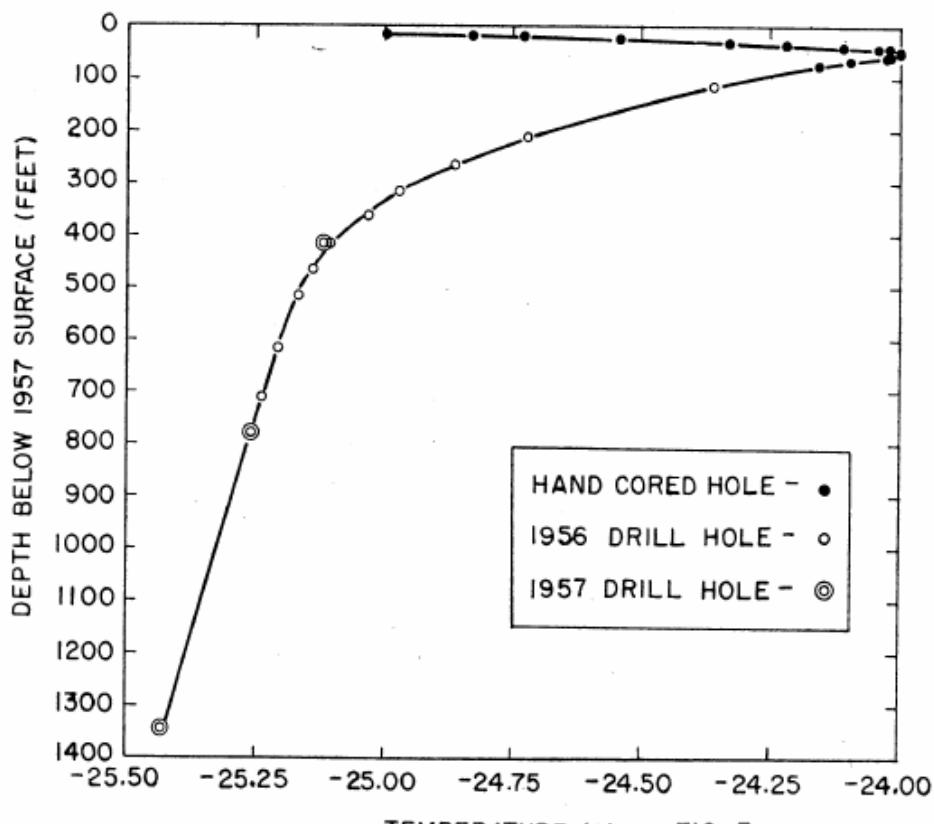


FIG. 3

Fig. 3

### 3.52.2 Thickness

Link to email: [Site II - temperature](#)

From: William Colgan  
 To: Ken Mankoff  
 Subject: Site II - temperature  
 Date: Sun 20 Dec 2020 11:37:39 PM PST

Here's a temperature record for "Site II" Greenland. This temperature record only goes to 1346 ft, and total ice thickness is estimated in a similar record at "6800 ft" (might be better to just interpolate from BedMachine). This will be too shallow to extrapolate a basal temperature, but I think it is a very useful ice temperature record in general, similar to Camp VI.

Coordinates: 76°59N 56°04W

BedMachine has Site II as 1851 m total ice thickness. So lets go with that, instead of "6800 ft".

### 3.52.3 Location

Email from WIC (see above)

### 3.52.4 Velocity

### 3.53 TD1

Name	td1
Alternate name	
Data source	Unknown PDF: Shallow88II.pdf
Drill year(s)	
Data year(s)	1988-05-19
Longitude [°E]	-50.13
Latitude [°N]	69.45
Approximate location name	Paakitsoq
Location source	Unknown PDF: Shallow88II.pdf
Ice thickness [m]	300
Ice thickness year	
Ice thickness source	Unknown PDF: Shallow88II.pdf
Surface velocity [m yr <sup>-1</sup> ]	
Surface velocity year	
Surface velocity source	
Measured from: Top, Bottom, Relative	T
Depth of top measurement [m]	50.0
Depth of bottom measurement [m]	300.0

#### 3.53.1 Temperature

- See Shallow88II.pdf

From: Martin Luethi  
To: Ken Mankoff  
Subject: Re: TD5 from Thomsen 1991  
Date: Thu 01 Oct 2020 02:27:19 PM PDT  
Attachments: [1]thompson\_profiles.zip(2.9M)

Ken Mankoff writes:

>> I'm looking for the source of the TD5 temperature profile you show in  
>> your 2015 "Heat sources" paper in The Cryosphere. Your Figure 2 shows  
>> TD5 and your text references Thomsen et al. 1991, and Thomsen &  
>> Thorning, 1992.

Good questions. I probably don't have these papers, but I have some of the profiles. I got them as paper copies from Heinz Blatter, and later also some of them from Thomas Phillips. It's been a while, so I don't have any details.

I also added some data from profiles I found in EGIG publications.

#### 3.53.2 Thickness

- From PDF

#### 3.53.3 Location

- From PDF

#### 3.53.4 Velocity

### 3.54 TD2

Name	td2
Alternate name	
Data source	Unknown PDF: See tdi
Drill year(s)	
Data year(s)	1988-05-19
Longitude [ $^{\circ}$ E]	-50.13
Latitude [ $^{\circ}$ N]	69.45
Approximate location name	Paakitsoq
Location source	Unknown PDF: See tdi
Ice thickness [m]	470
Ice thickness year	
Ice thickness source	Unknown PDF: See tdi
Surface velocity [m yr $^{-1}$ ]	
Surface velocity year	
Surface velocity source	
Measured from: Top, Bottom, Relative	T
Depth of top measurement [m]	27.0
Depth of bottom measurement [m]	202.0

#### 3.54.1 Temperature

- See tdi Shallow88II.pdf

#### 3.54.2 Thickness

- From PDF

#### 3.54.3 Location

- From PDF

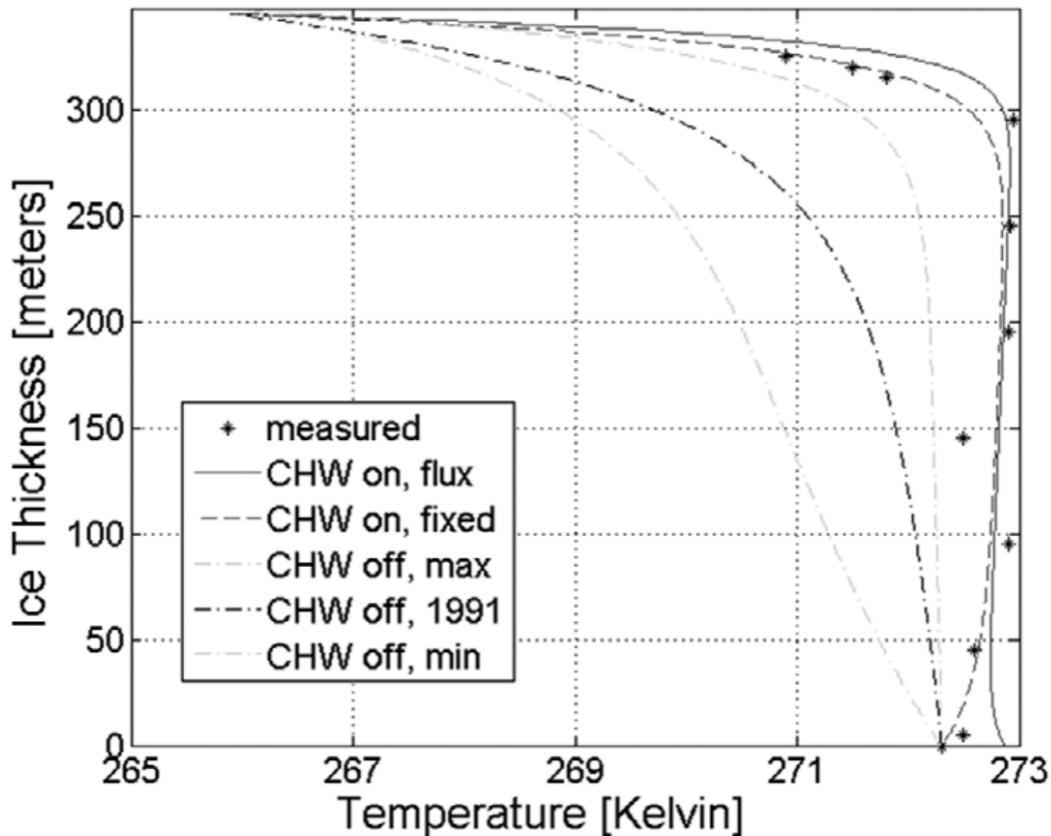
#### 3.54.4 Velocity

### 3.55 TD3

Name	td3
Alternate name	
Data source	Unknown PDF: See td1. Also Phillips (2010)
Drill year(s)	
Data year(s)	1988-08-18
Longitude [ $^{\circ}$ E]	-50.1
Latitude [ $^{\circ}$ N]	69.483
Approximate location name	Paakitsoq
Location source	Unknown PDF: See td1. Also Phillips (2010)
Ice thickness [m]	350
Ice thickness year	
Ice thickness source	Unknown PDF: See td1. Also Phillips (2010)
Surface velocity [m yr $^{-1}$ ]	
Surface velocity year	
Surface velocity source	
Measured from: Top, Bottom, Relative	T
Depth of top measurement [m]	20.0
Depth of bottom measurement [m]	350.0

#### 3.55.1 Temperature

- See td1 Shallow88II.pdf
- Also see Phillips et al. (2010) Figure 4.



#### 3.55.2 Thickness

- From unknown PDF (see td1). Also reported in Phillips et al. (2010).

### 3.55.3 Location

- From unknown PDF (see td1). Also reported in Phillips et al. (2010).

### 3.55.4 Velocity

### 3.56 TD41

Name	td41
Alternate name	
Data source	Unknown PDF: See tdi
Drill year(s)	
Data year(s)	1991-11-05
Longitude [ $^{\circ}$ E]	-49.683
Latitude [ $^{\circ}$ N]	69.533
Approximate location name	Paakitsoq
Location source	Unknown PDF: See tdi
Ice thickness [m]	>600
Ice thickness year	
Ice thickness source	Unknown PDF: See tdi
Surface velocity [m yr $^{-1}$ ]	
Surface velocity year	
Surface velocity source	
Measured from: Top, Bottom, Relative	T
Depth of top measurement [m]	5.0
Depth of bottom measurement [m]	495.0

#### 3.56.1 Temperature

- See tdi Shallow88II.pdf

#### 3.56.2 Thickness

- From PDF

#### 3.56.3 Location

- From PDF

#### 3.56.4 Velocity

### 3.57 TD42

Name	td42
Alternate name	
Data source	Unknown PDF: See td1
Drill year(s)	
Data year(s)	1991-08-28
Longitude [ $^{\circ}$ E]	-49.683
Latitude [ $^{\circ}$ N]	69.533
Approximate location name	Paakitsoq
Location source	Unknown PDF: See td1
Ice thickness [m]	>600
Ice thickness year	
Ice thickness source	Unknown PDF: See td1
Surface velocity [m yr $^{-1}$ ]	
Surface velocity year	
Surface velocity source	
Measured from: Top, Bottom, Relative	T
Depth of top measurement [m]	3.0
Depth of bottom measurement [m]	493.0

#### 3.57.1 Temperature

- See td1 Shallow88II.pdf

#### 3.57.2 Thickness

- From PDF

#### 3.57.3 Location

- From PDF. Same location as td41. Unknown if same borehole.

#### 3.57.4 Velocity

### 3.58 TD51

Name	td51
Alternate name	
Data source	Unknown PDF: See <a href="#">td1</a> and Lüthi (2015)
Drill year(s)	
Data year(s)	1990-06-09
Longitude [°E]	-49.3
Latitude [°N]	69.566
Approximate location name	Paakitsoq / Swiss Camp
Location source	Unknown PDF: See <a href="#">td1</a> and Lüthi (2015)
Ice thickness [m]	>600
Ice thickness year	
Ice thickness source	Unknown PDF: See <a href="#">td1</a> and Lüthi (2015)
Surface velocity [m yr <sup>-1</sup> ]	
Surface velocity year	
Surface velocity source	
Measured from: Top, Bottom, Relative	T
Depth of top measurement [m]	5.0
Depth of bottom measurement [m]	600.0

#### 3.58.1 Temperature

- See [td1 Shallow88II.pdf](#) and Lüthi et al. (2015)

#### 3.58.2 Thickness

- From PDF

#### 3.58.3 Location

- From PDF

#### 3.58.4 Velocity

### 3.59 TD52

Name	td52
Alternate name	
Data source	Unknown PDF: See td1 and Lüthi (2015)
Drill year(s)	
Data year(s)	1991-05-25
Longitude [°E]	-49.3
Latitude [°N]	69.566
Approximate location name	Paakitsoq / Swiss Camp
Location source	Unknown PDF: See td1 and Lüthi (2015)
Ice thickness [m]	>600
Ice thickness year	
Ice thickness source	Unknown PDF: See td1 and Lüthi (2015)
Surface velocity [m yr <sup>-1</sup> ]	
Surface velocity year	
Surface velocity source	
Measured from: Top, Bottom, Relative	T
Depth of top measurement [m]	5.0
Depth of bottom measurement [m]	600.0

#### 3.59.1 Temperature

- See td1 Shallow88II.pdf. Also shown in Lüthi et al. (2015).

#### 3.59.2 Thickness

- From PDF

#### 3.59.3 Location

- From PDF. Same as td51. Unknown if same borehole.

#### 3.59.4 Velocity

## 3.60 TD6

Name	td6
Alternate name	
Data source	Tech Report
Drill year(s)	
Data year(s)	
Longitude [°E]	
Latitude [°N]	
Approximate location name	
Location source	
Ice thickness [m]	
Ice thickness year	
Ice thickness source	
Surface velocity [m yr <sup>-1</sup> ]	
Surface velocity year	
Surface velocity source	
Measured from: Top, Bottom, Relative	T
Depth of top measurement [m]	
Depth of bottom measurement [m]	

### 3.60.1 Temperature

- See thomsen.pdf

### 3.60.2 Thickness

### 3.60.3 Location

### 3.60.4 Velocity

### 3.61 TD7

Name	td7
Alternate name	
Data source	Tech Report
Drill year(s)	
Data year(s)	
Longitude [ $^{\circ}$ E]	
Latitude [ $^{\circ}$ N]	
Approximate location name	
Location source	
Ice thickness [m]	
Ice thickness year	
Ice thickness source	
Surface velocity [m yr $^{-1}$ ]	
Surface velocity year	
Surface velocity source	
Measured from: Top, Bottom, Relative	T
Depth of top measurement [m]	
Depth of bottom measurement [m]	

#### 3.61.1 Temperature

- See td6 thomsen.pdf

#### 3.61.2 Thickness

#### 3.61.3 Location

#### 3.61.4 Velocity

## 3.62 TD8

Name	td8
Alternate name	
Data source	Tech Report
Drill year(s)	
Data year(s)	
Longitude [ $^{\circ}$ E]	
Latitude [ $^{\circ}$ N]	
Approximate location name	
Location source	
Ice thickness [m]	
Ice thickness year	
Ice thickness source	
Surface velocity [m yr $^{-1}$ ]	
Surface velocity year	
Surface velocity source	
Measured from: Top, Bottom, Relative	T
Depth of top measurement [m]	
Depth of bottom measurement [m]	

### 3.62.1 Temperature

- See td6 thomsen.pdf

### 3.62.2 Thickness

### 3.62.3 Location

### 3.62.4 Velocity

### 3.63 Tuto Ramp

Name	tuto_ramp
Alternate name	Tuto Ramp
Data source	Davis, RM: Approach roads, Greenland 1960-1964 ,
Data year(s)	1962 (August)
Depth of top measurement [m]	
Depth of bottom measurement [m]	
Drill year(s)	
Longitude [ $^{\circ}$ E]	-68.287295
Latitude [ $^{\circ}$ N]	76.41133
Approximate location name	Thule Approach Road(?)
Location source	
Ice thickness [m]	48
Ice thickness year	
Ice thickness source	See data source
Surface velocity [m yr $^{-1}$ ]	1.0
Surface velocity year	
Surface velocity source	WIC Email
Measured from: Top, Bottom, Relative	T(ish)

#### 3.63.1 Temperature

- From Davis (1967) Figure 31.
- Digitized only August 1962 profile

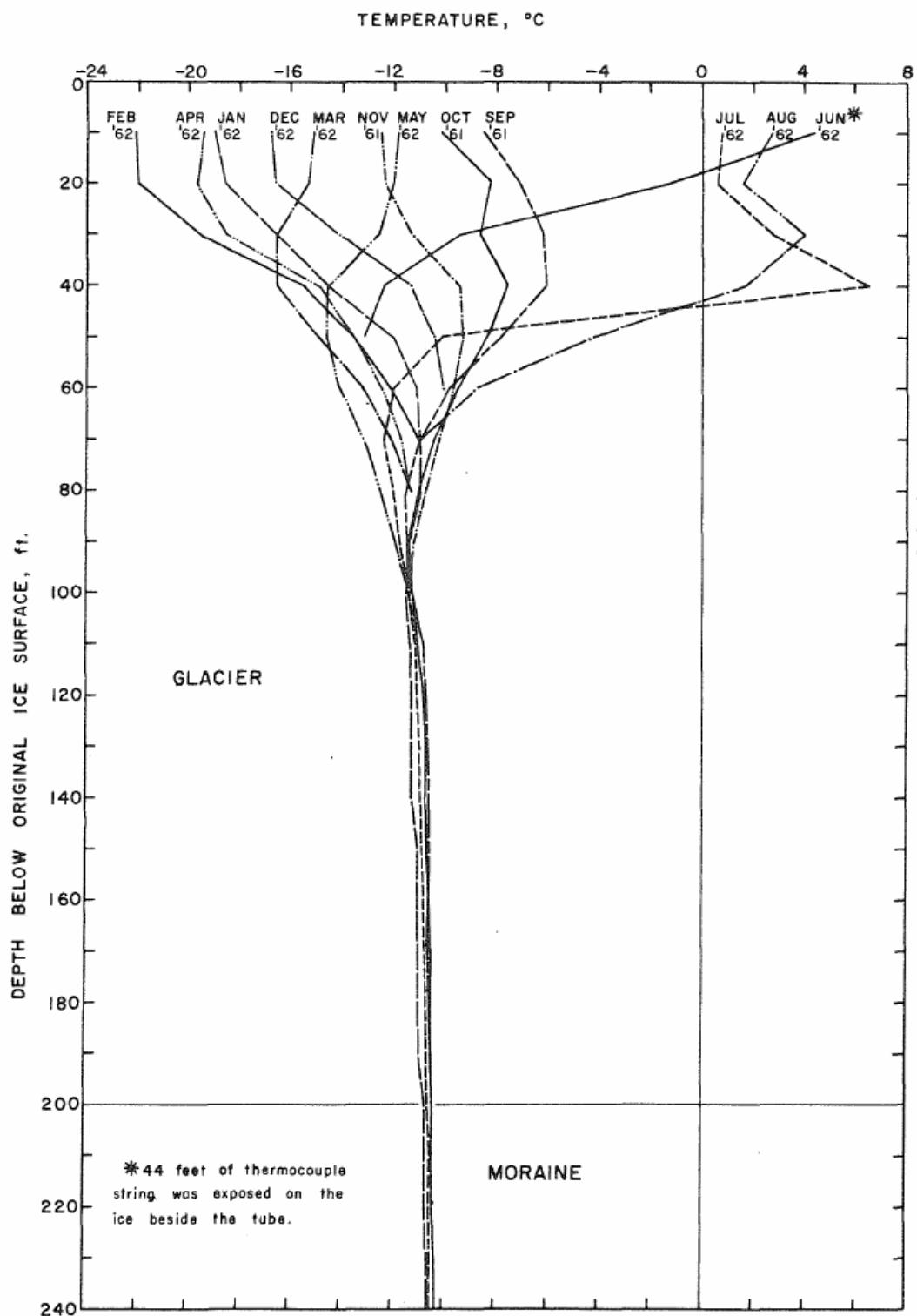


Figure 31. D-11, thermal regime in glacier ice.

### 3.63.2 Thickness

- Depth from text interpreted to mean that ice surface starts at 44 ft on cable and bottom is at 200 ft on cable -> thickness is 156 ft or  $156 \times 0.3048 = 47.5488$

### 3.63.3 Location

- Location comes from WIC digitizing some map and emailing me coordinates.

### 3.63.4 Velocity

- From WIC email

## 4 Uncertainty

Most of sources are digitized from graphics and the reported uncertainty is much less than the line-width relative to graph temperature scale. Therefore, we can ignore reported uncertainties. Instead, uncertainty can be estimated from the cases when the same data is presented multiple times, ideally in fundamentally different graphics in different publications, or comparing a digitized graphic to the original non-digitized source if it is available.

### 4.1 NEEM

We have two sources for the NEEM data: 1) MacGregor et al. (2015) relative depth profile graphic and 2) Data provided via email.

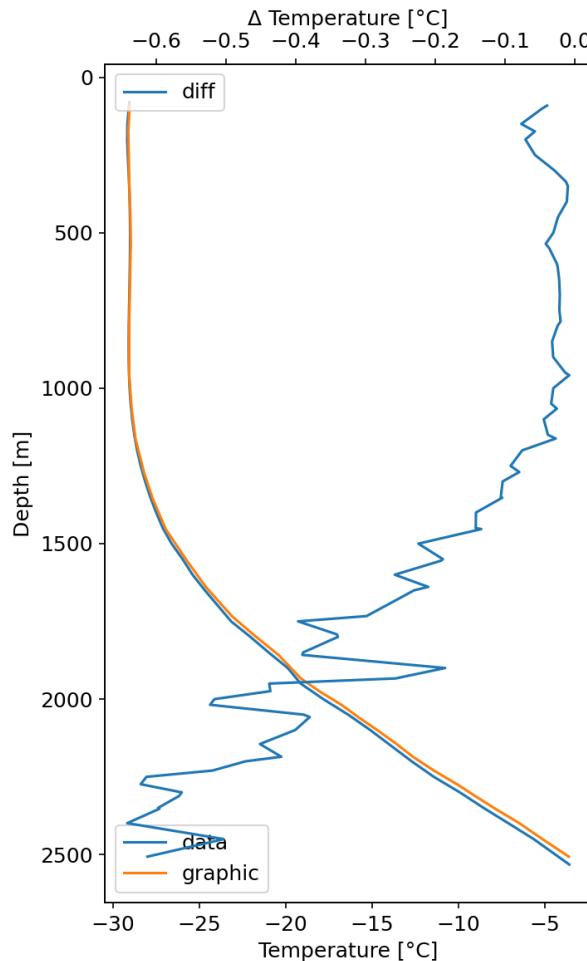


Figure 4: Digitization error for the NEEM borehole temperature profile. This is likely a worst-case scenario for digitization error because the graphic used a wide line (uncertain temperature), only spanned  $\sim 1/3$  of the page, but spanned  $\sim 30^\circ$  of temperature (low resolution temperature), and had a highly compressed y-axis (uncertain depth)

### 4.2 Agassiz

The Agassiz boreholes were provided as data. By digitizing graphics from papers (e.g. Clarke (1987), we can find a measure of the digitization error.

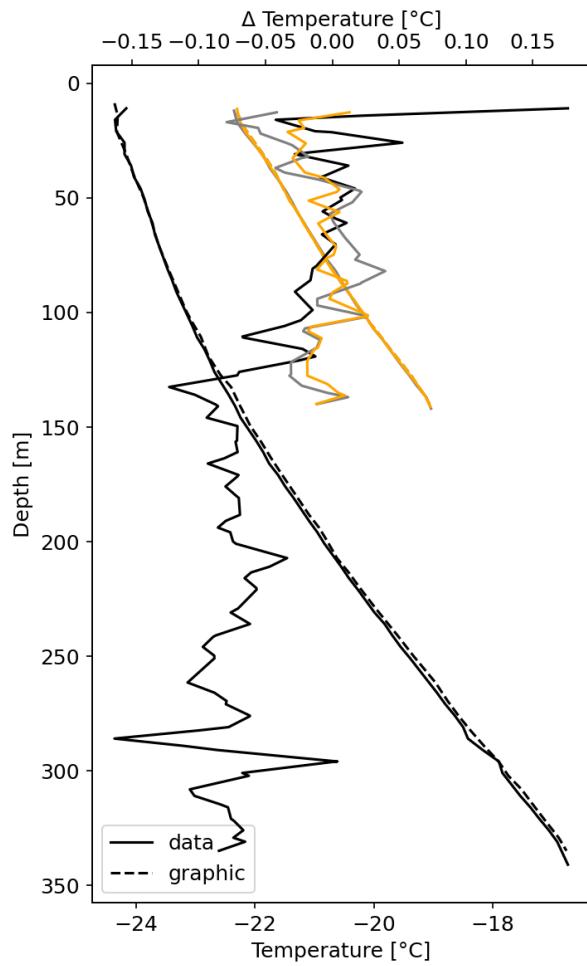


Figure 5: Digitization error for Agassiz borehole temperature profiles. Black is A77 data, graphic, and difference (noisy line, top x-axis). Gray and orange are the difference between the Clarke (1987) A79 profile from the graphic and the A79A and A79B data profiles, respectively.

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