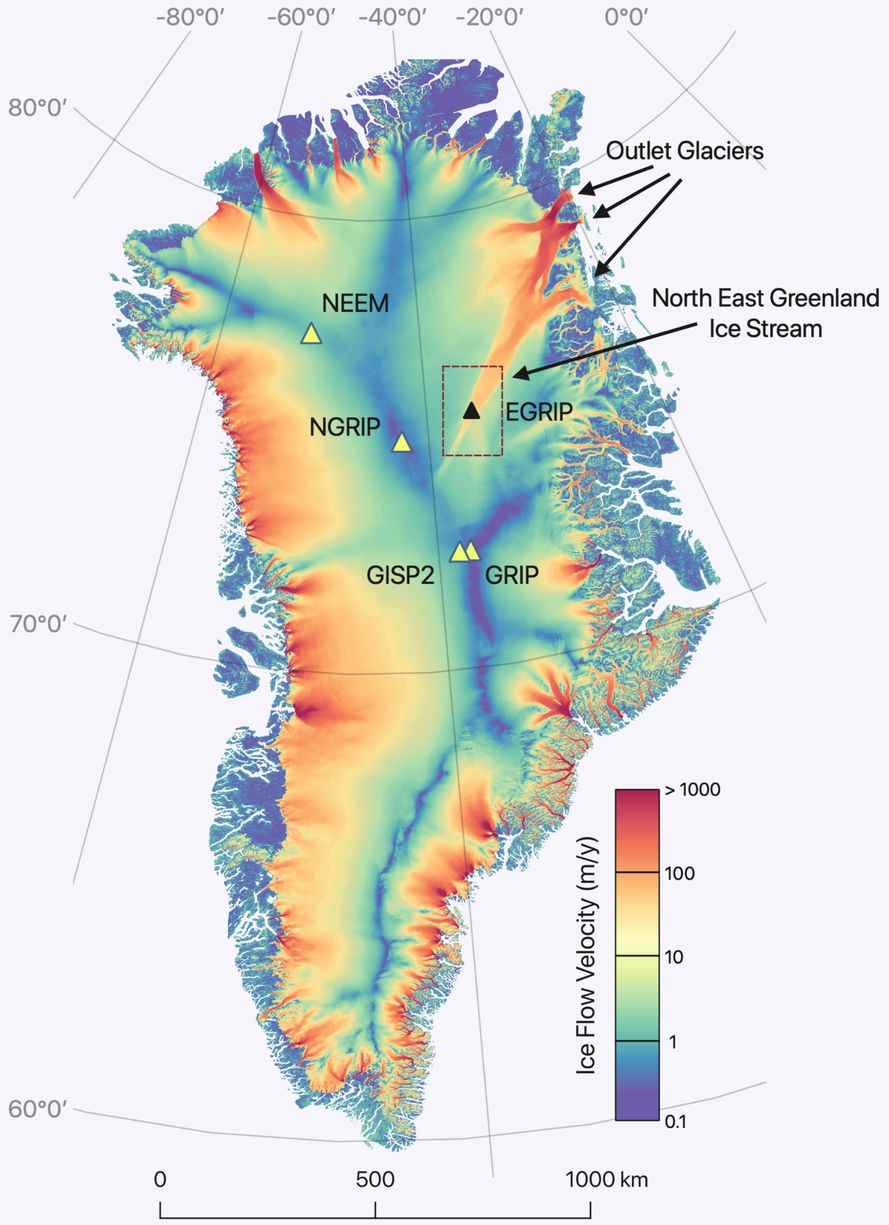
BEDROCK TOPOGRAPHY AND SUBGLACIAL LANDFORMS

of the North East Greenland Ice Stream

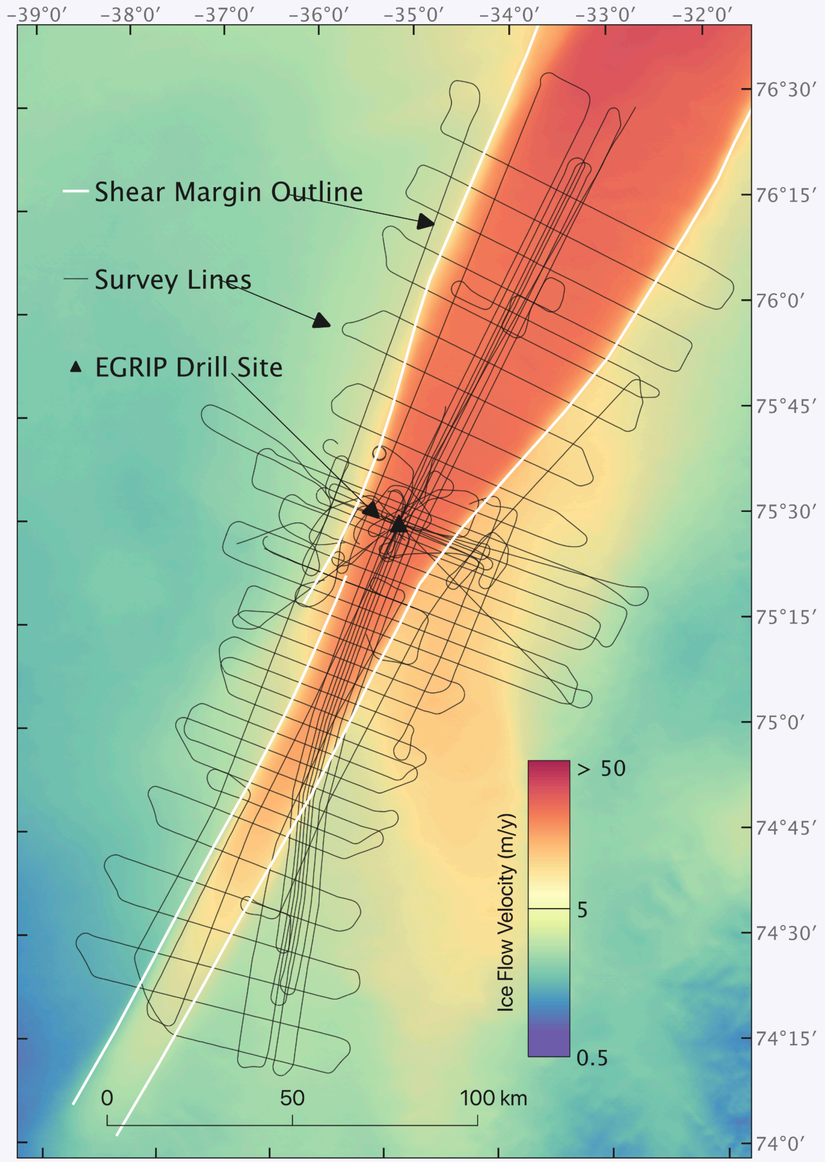


Ice Surface Velocity by Joughin and others (2018)
Projection: WGS 84 / NSIDC Sea Ice Polar Stereographic North (EPSG:3413)

Study Area

Onset of the North East Greenland Ice Stream (NEGIS)

AIRCRAFT:	AWI Polar6 Basler BT-67
INSTRUMENT:	AWI UWB Radar (MCoRDS5)
SEASON:	May 2018
SURVEY TARGET:	Radar Stratigraphy around EGRIP



Ice Surface Velocity by Joughin and others (2018)
Projection: WGS 84 / NSIDC Sea Ice Polar Stereographic North (EPSG:3413)

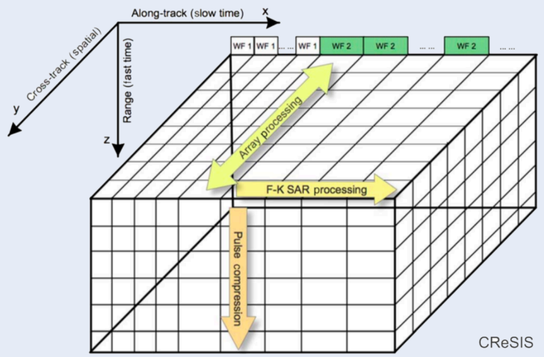
Study Area

150 km up- and downstream of EGRIP drill site

RECORDED AREA:	24 000 km²
TOTAL PROFILE LENGTH:	8233 km
GRID SPACING:	5 - 10 km
AQUISITION MODE:	Narrow Band (180-210 MHz)
TX/RX CHANNELS:	8
AIRCRAF ALTITUDE:	1200 ft above ground
AIRCRAFT VELOCITY:	160 kn

Workflow

Radar Data Processing

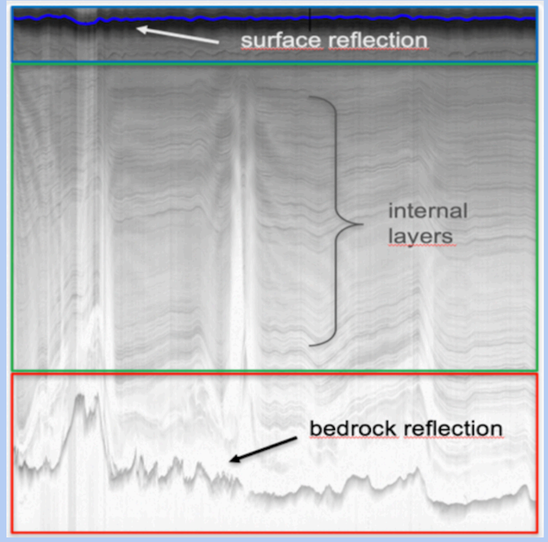


SAR Processing

Array Processing

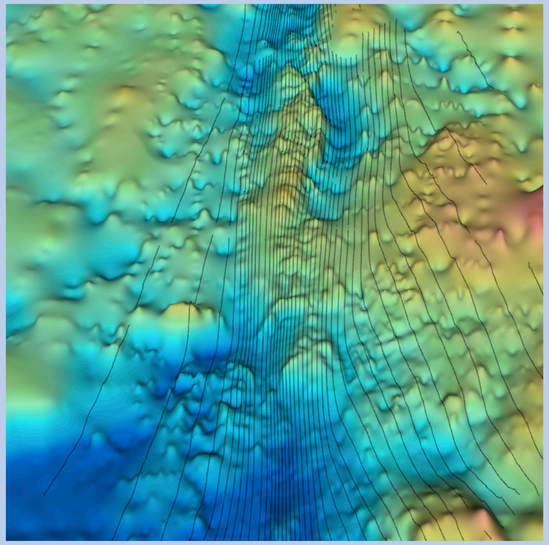
Pulse Compression

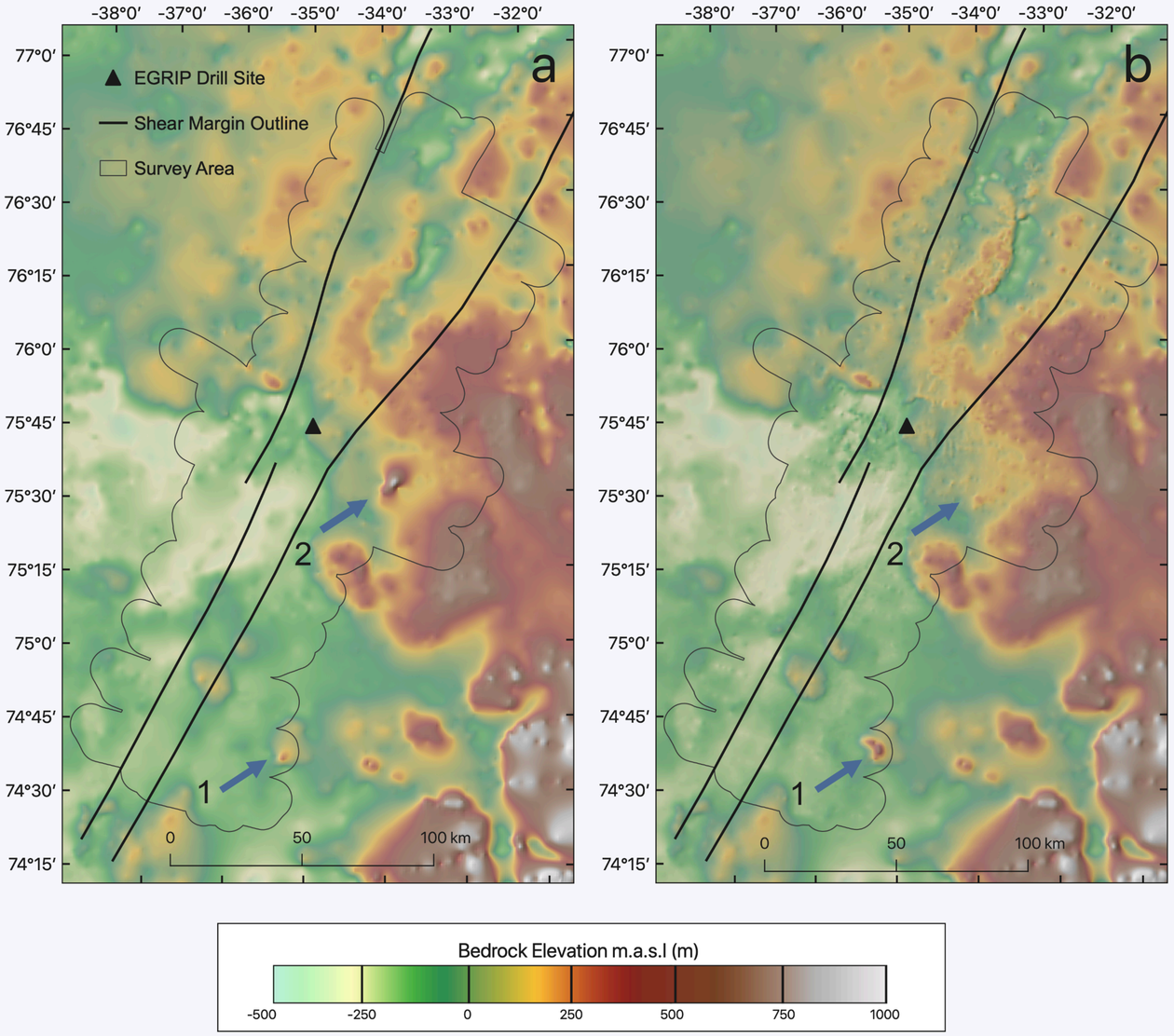
Surface and Bedrock Detection



Ice Thickness Model

Bedrock Topography





Bedrock Topography

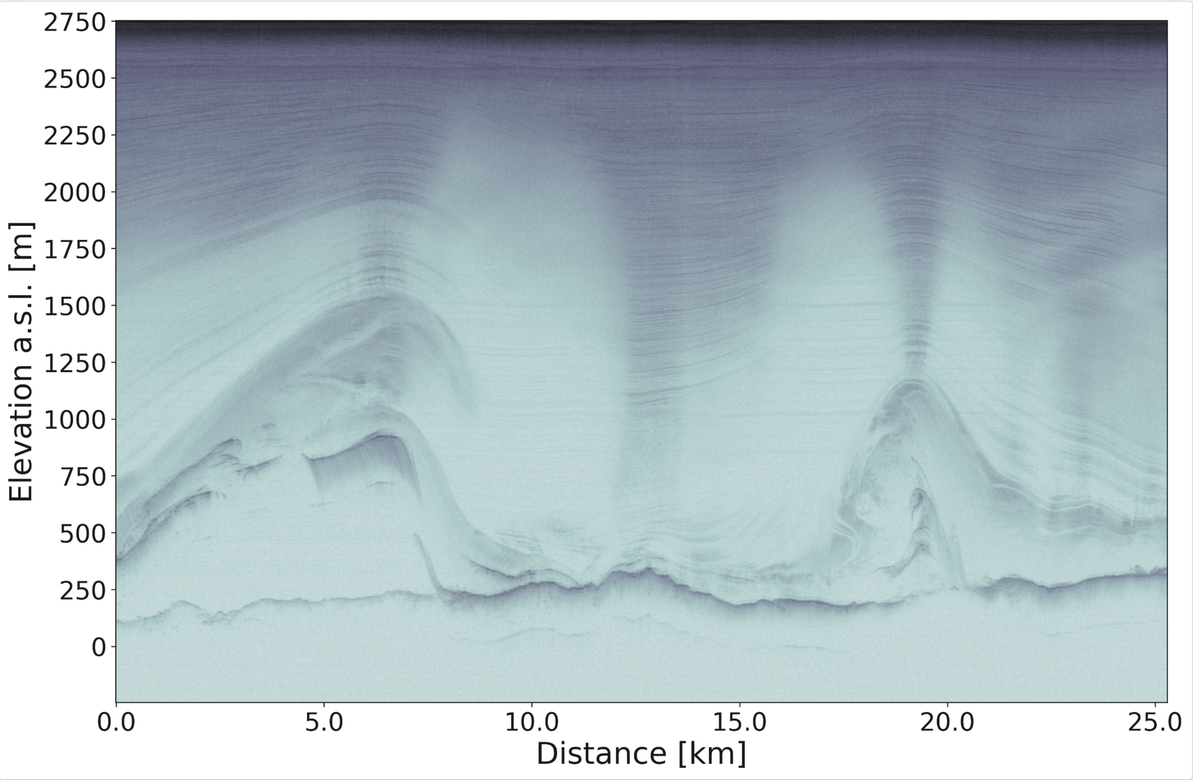
AWI EGRIP-NOR-18 <--> BedMachine v3

a) BedMachine v3 (Morlighem and others, 2017)

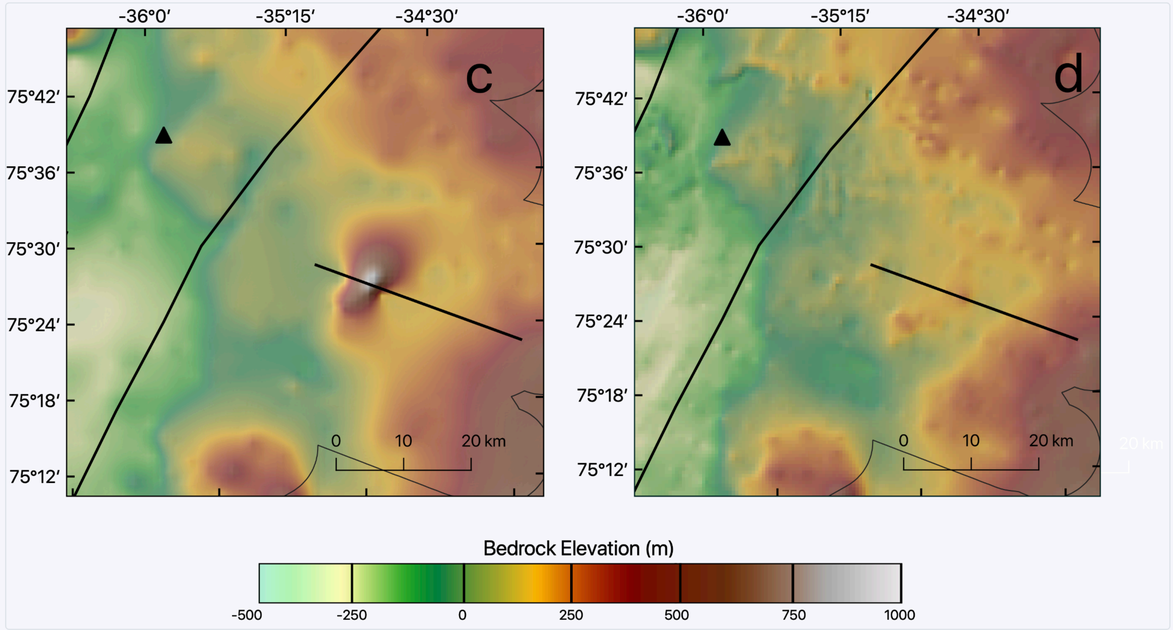
b) AWI EGRIP-NOR-18 Topography

1) BMv3 Topo < EGRIP-NOR-18

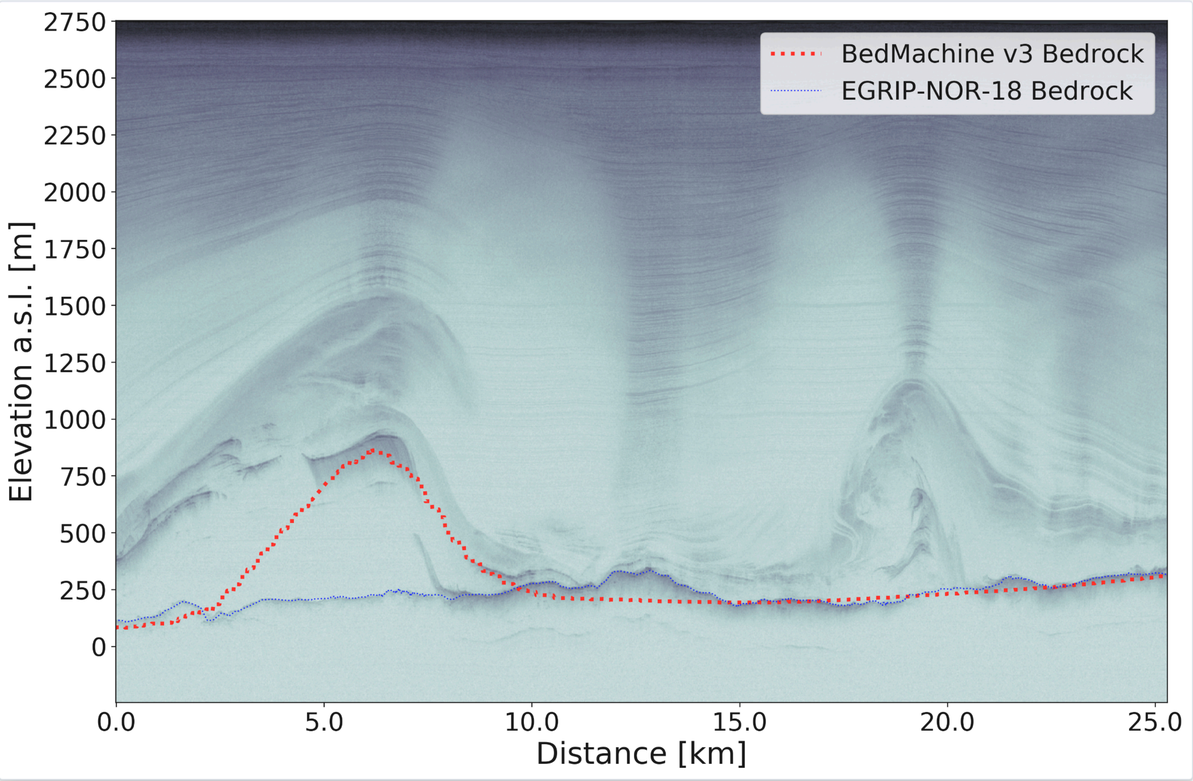
2) BMv3 Topo > EGRIP-NOR-18

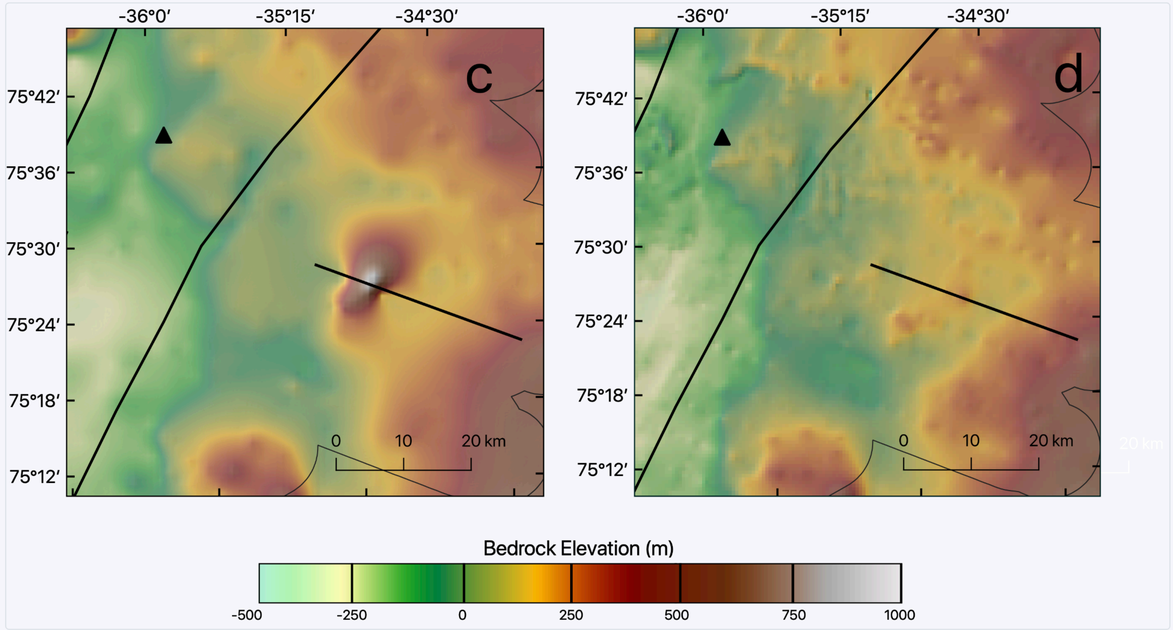


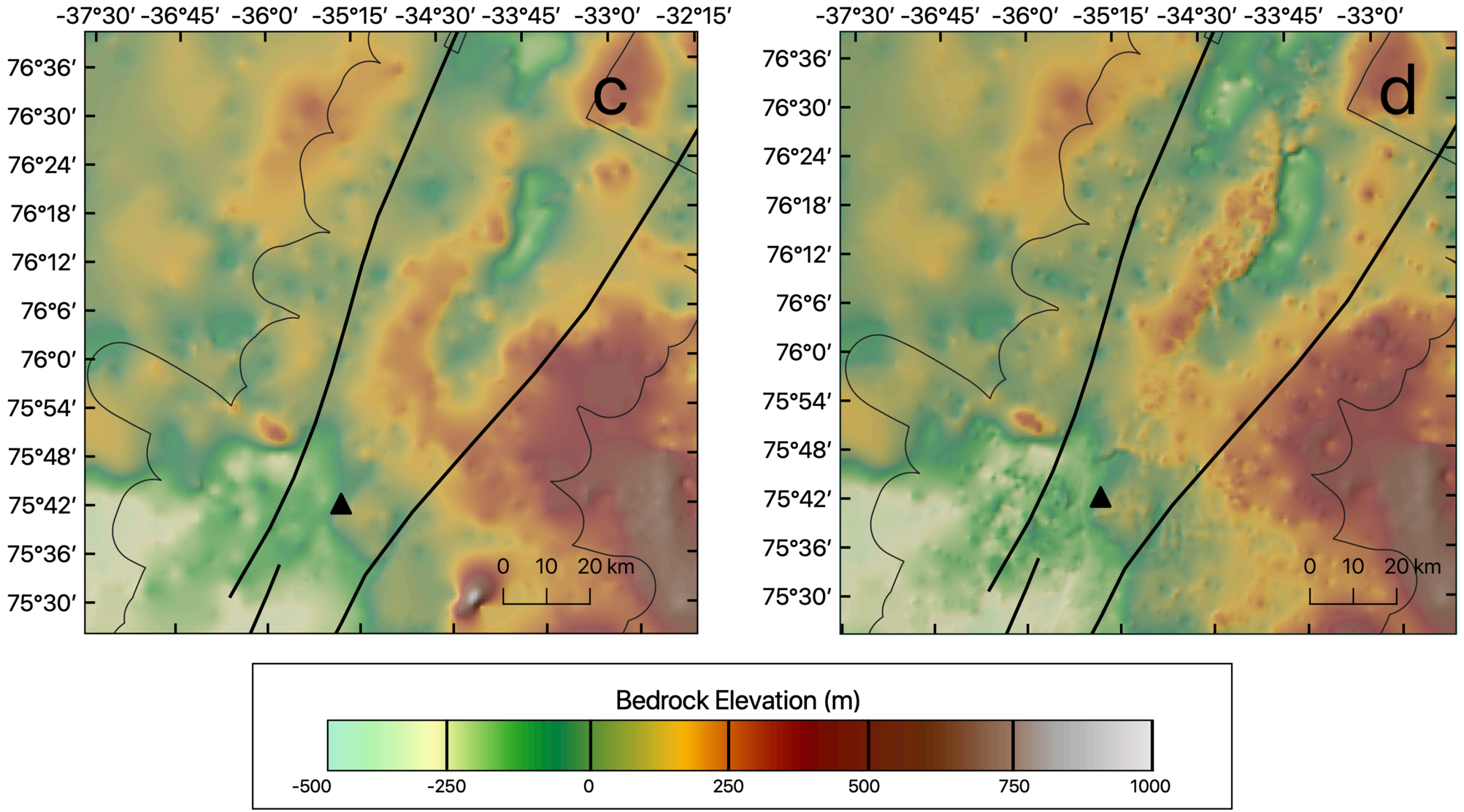
Bedrock Reflection?

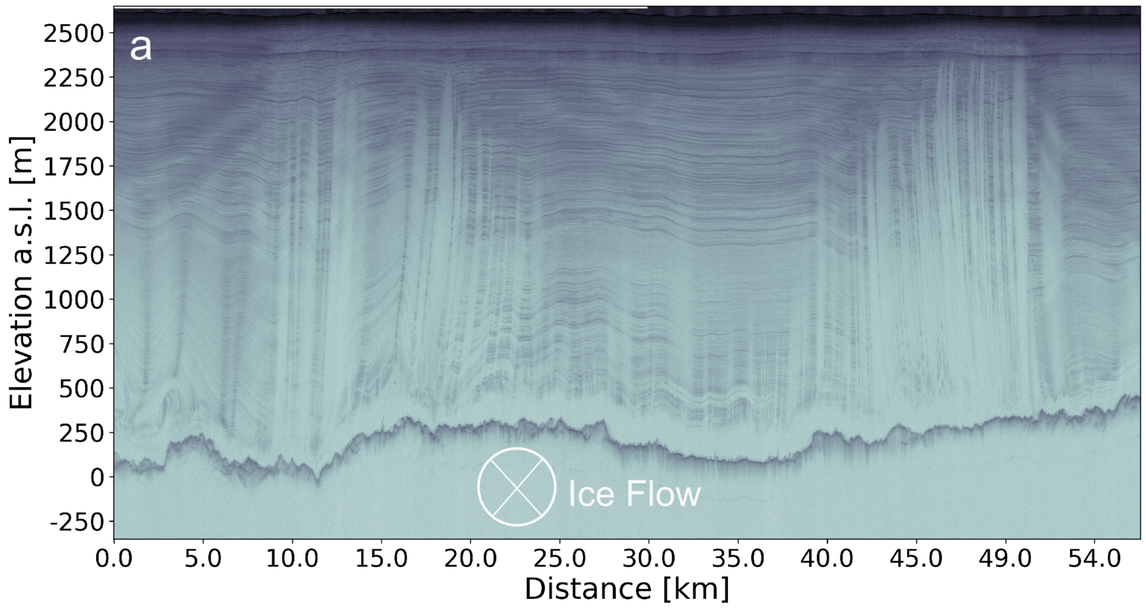


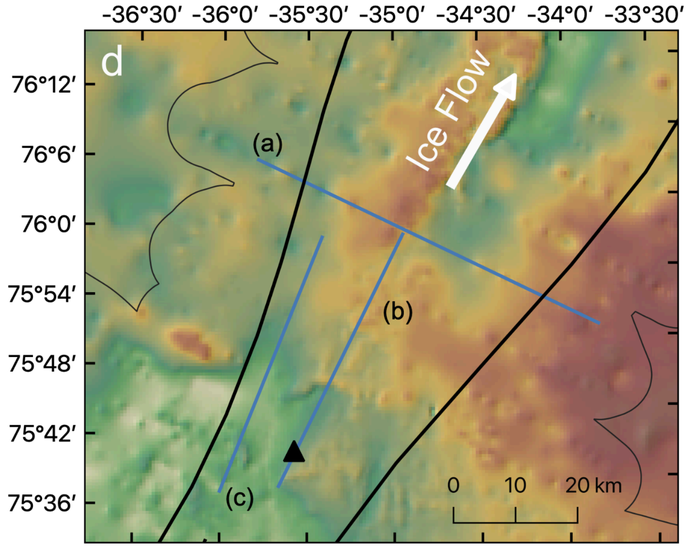
Bedrock Reflection?

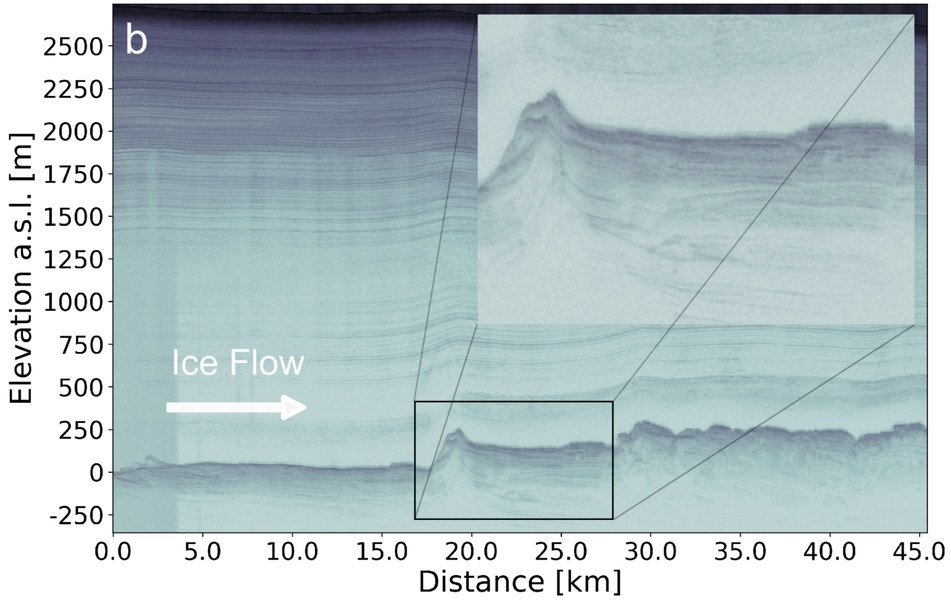


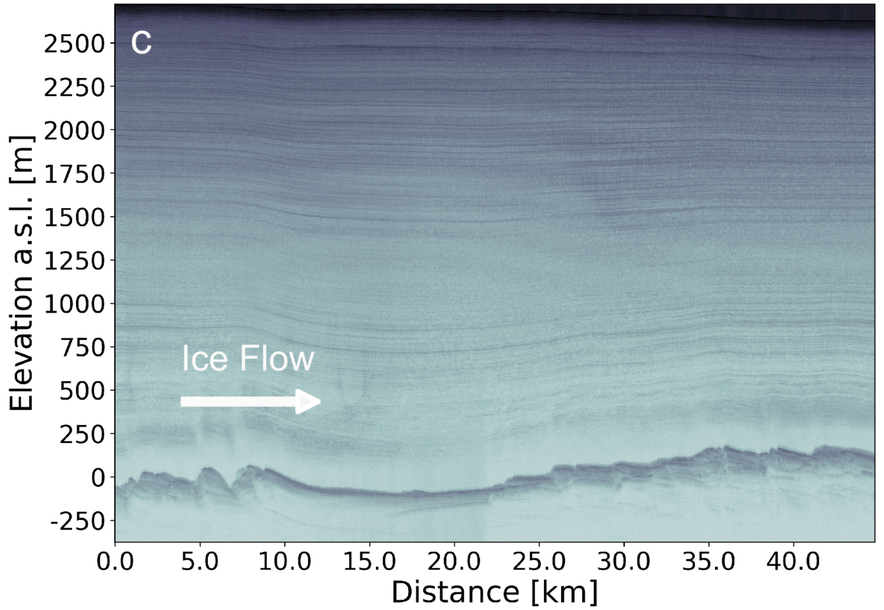


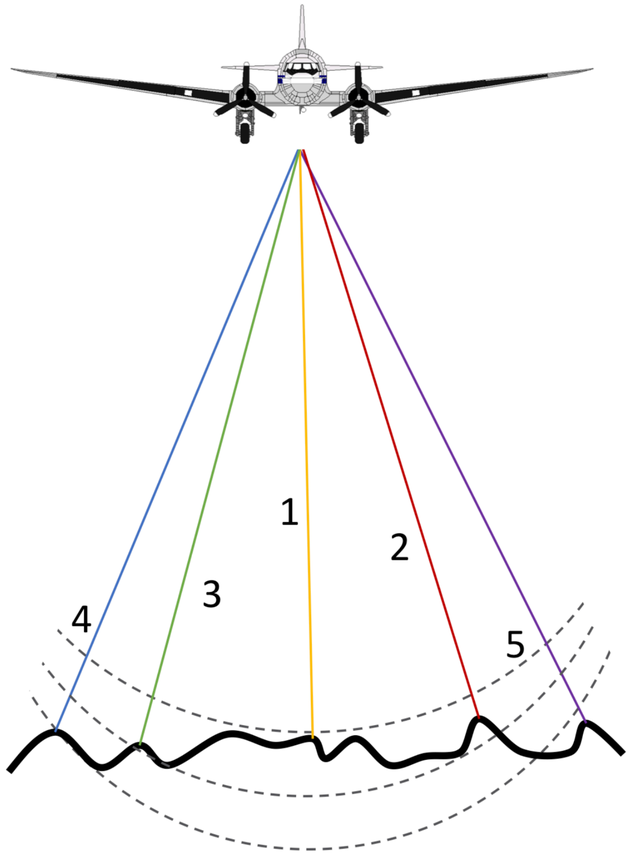

-37°30′ -36°45′ -36°0′ -35°15′ -34°30′ -33°45′ -33°0′ -32°15′
76°36′
76°30′
76°24′
76°18′
76°12′
76°6′
76°0′
75°54′
75°48′
75°42′
75°36′
75°30′
c
0 10 20 km
-37°30′ -36°45′ -36°0′ -35°15′ -34°30′ -33°45′ -33°0′
76°36′
76°30′
76°24′
76°18′
76°12′
76°6′
76°0′
75°54′
75°48′
75°42′
75°36′
75°30′
d
0 10 20 km
Bedrock Elevation (m)
-500 -250 0 250 500 750 1000

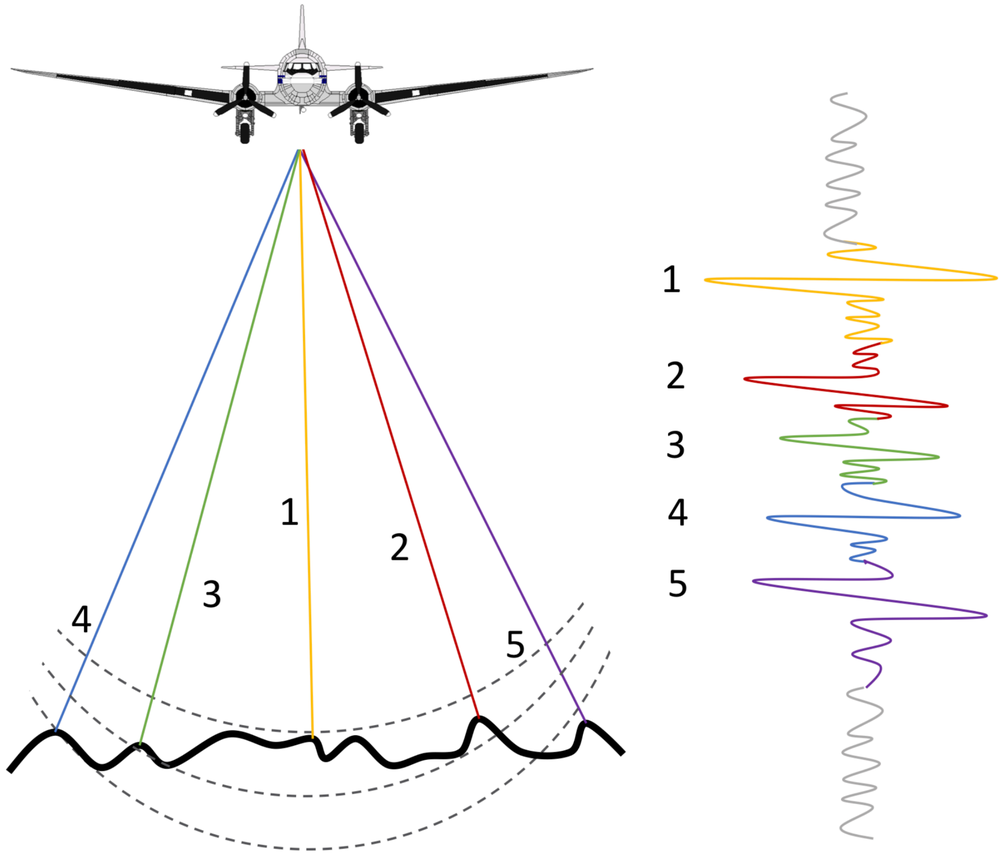

a
Elevation a.s.l. [m]
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
-250
Ice Flow
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
45.0
49.0
54.0
Distance [km]

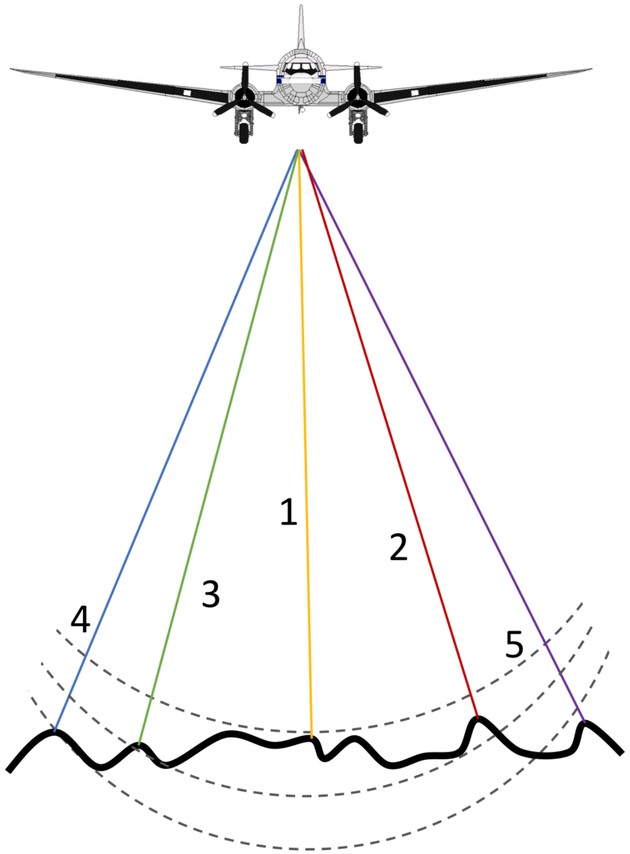

-36°30′
-36°0′
-35°30′
-35°0′
-34°30′
-34°0′
-33°30′
76°12′
76°6′
76°0′
75°54′
75°48′
75°42′
75°36′
d
Ice Flow
(a)
(b)
(c)
0
10
20 km


b
Elevation a.s.l. [m]
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
-250
Ice Flow
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
45.0
Distance [km]


c
Elevation a.s.l. [m]
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
-250
Ice Flow
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
Distance [km]


1
2
3
4
5


1
2
3
4
5
1
2
3
4
5


1
2
3
4
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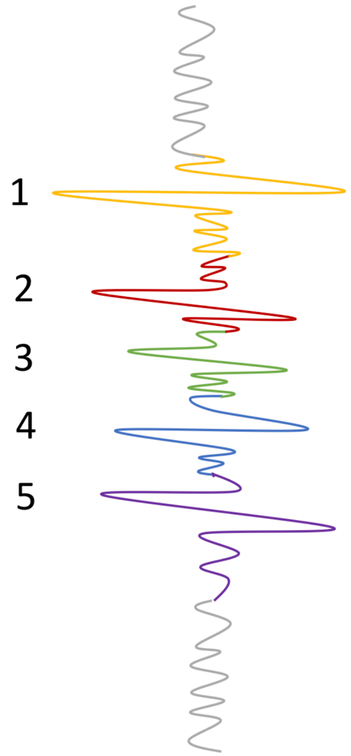
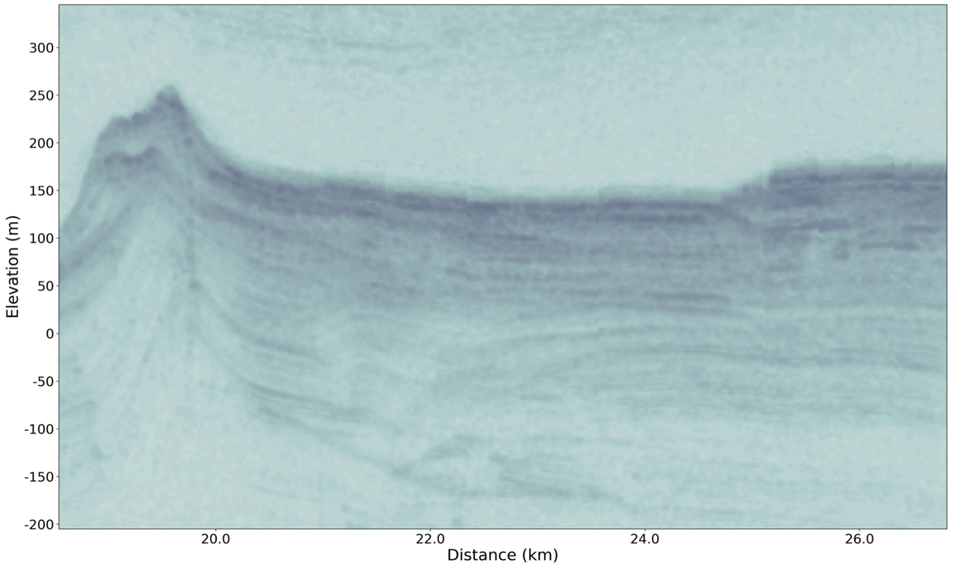
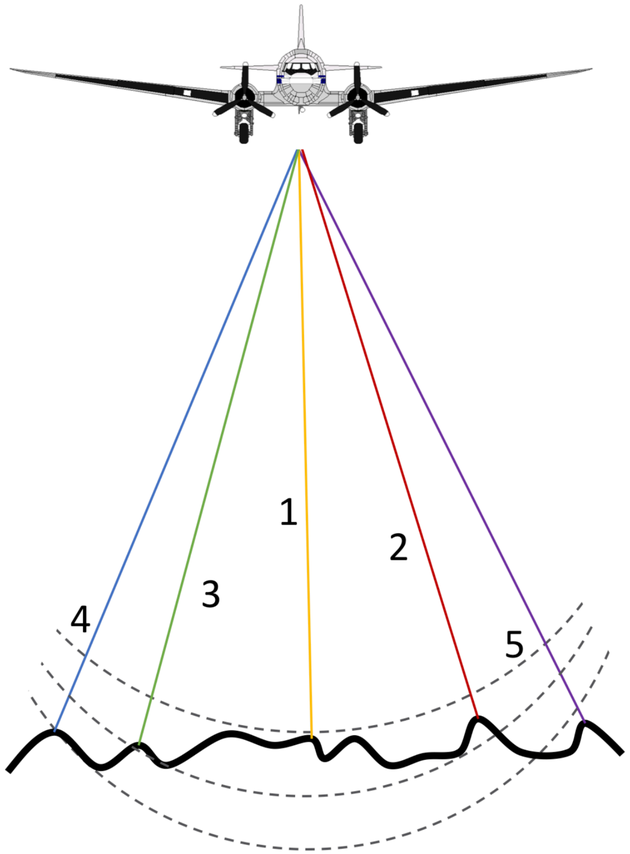
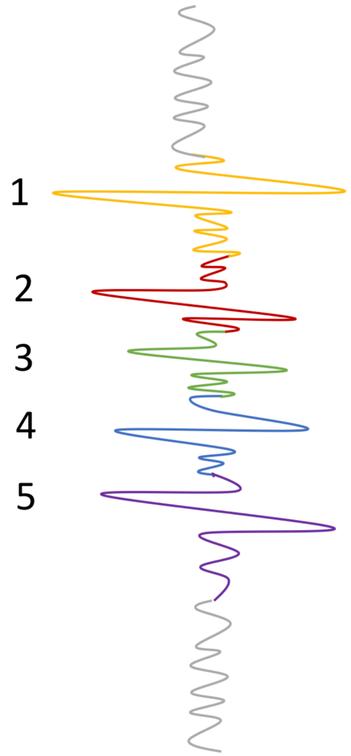
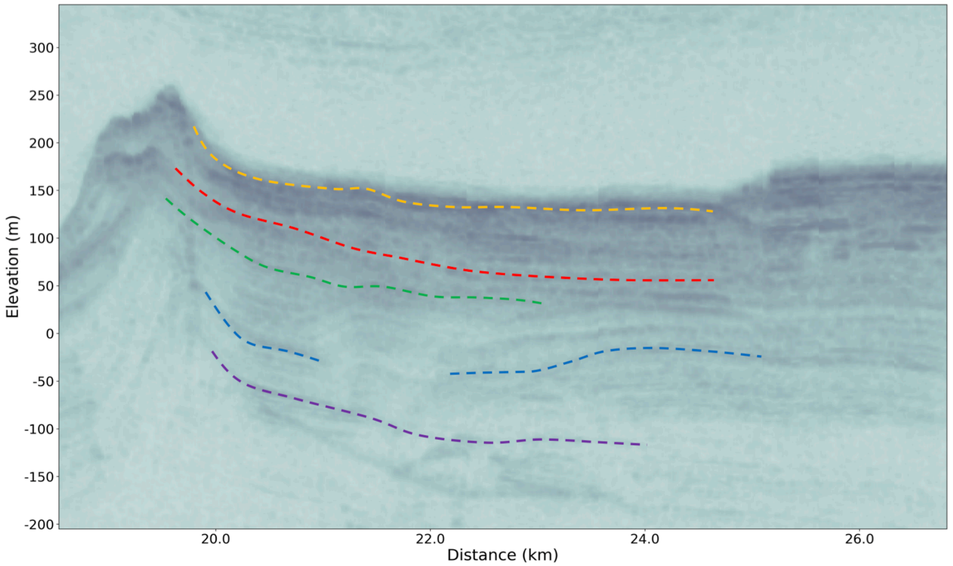
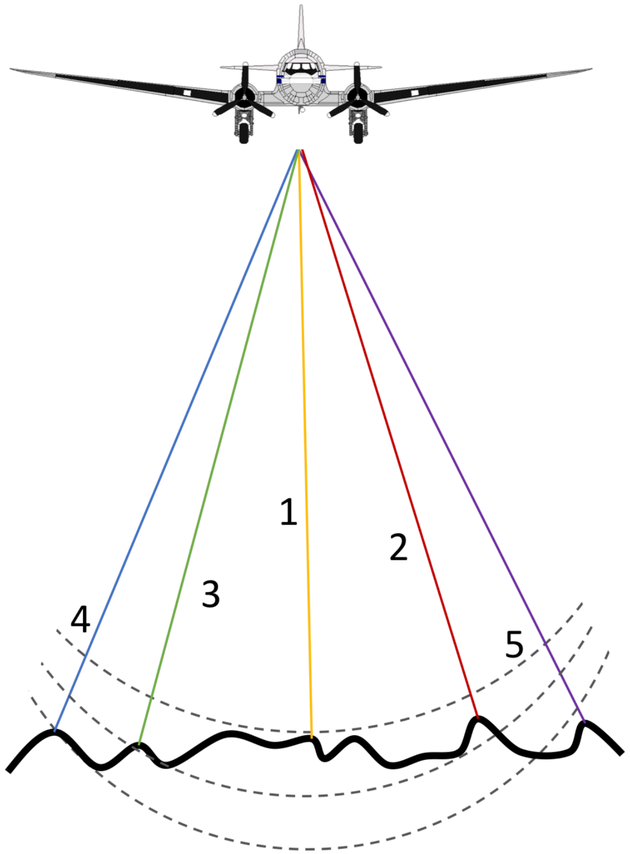

1
2
3
4
5

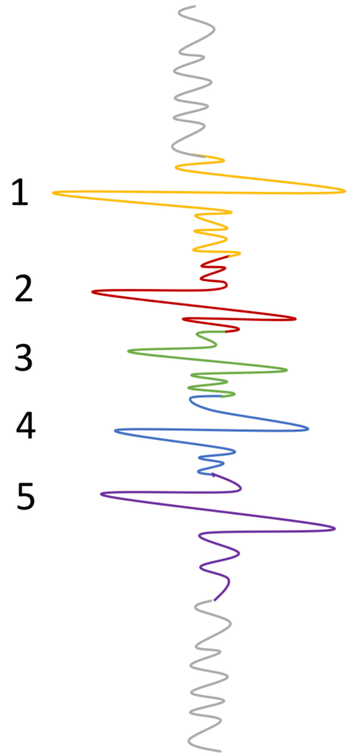

Elevation (m)
300
250
200
150
100
50
0
-50
-100
-150
-200
20.0
22.0
24.0
26.0
Distance (km)

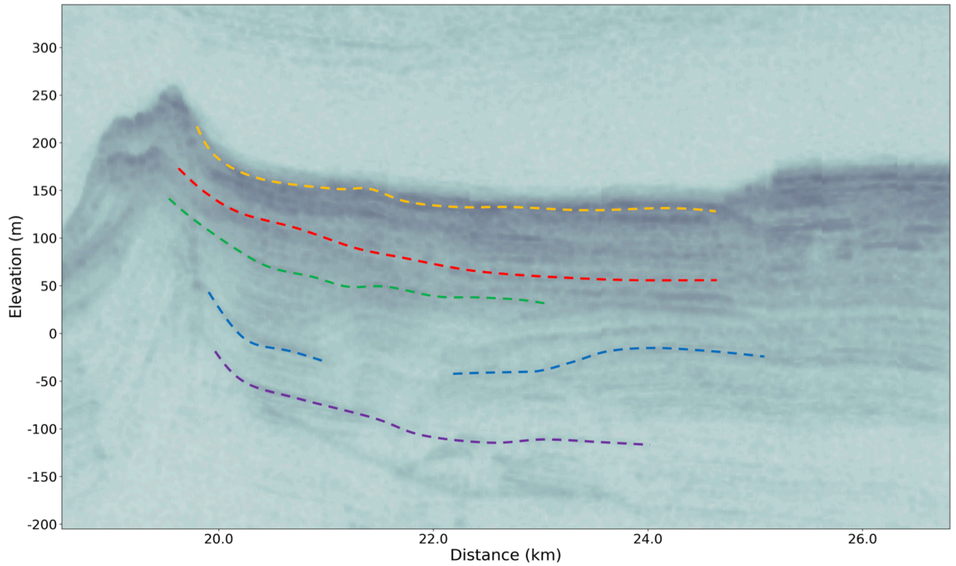

1
2
3
4
5

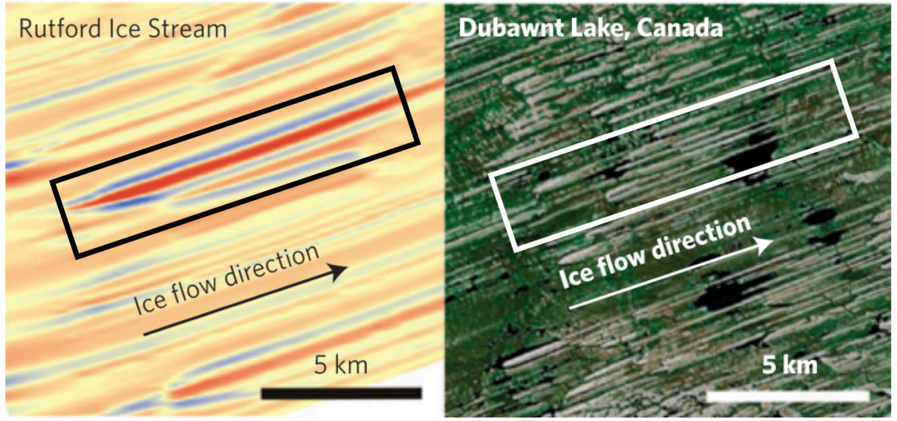

1
2
3
4
5


Elevation (m)
300
250
200
150
100
50
0
-50
-100
-150
-200
20.0
22.0
24.0
26.0
Distance (km)

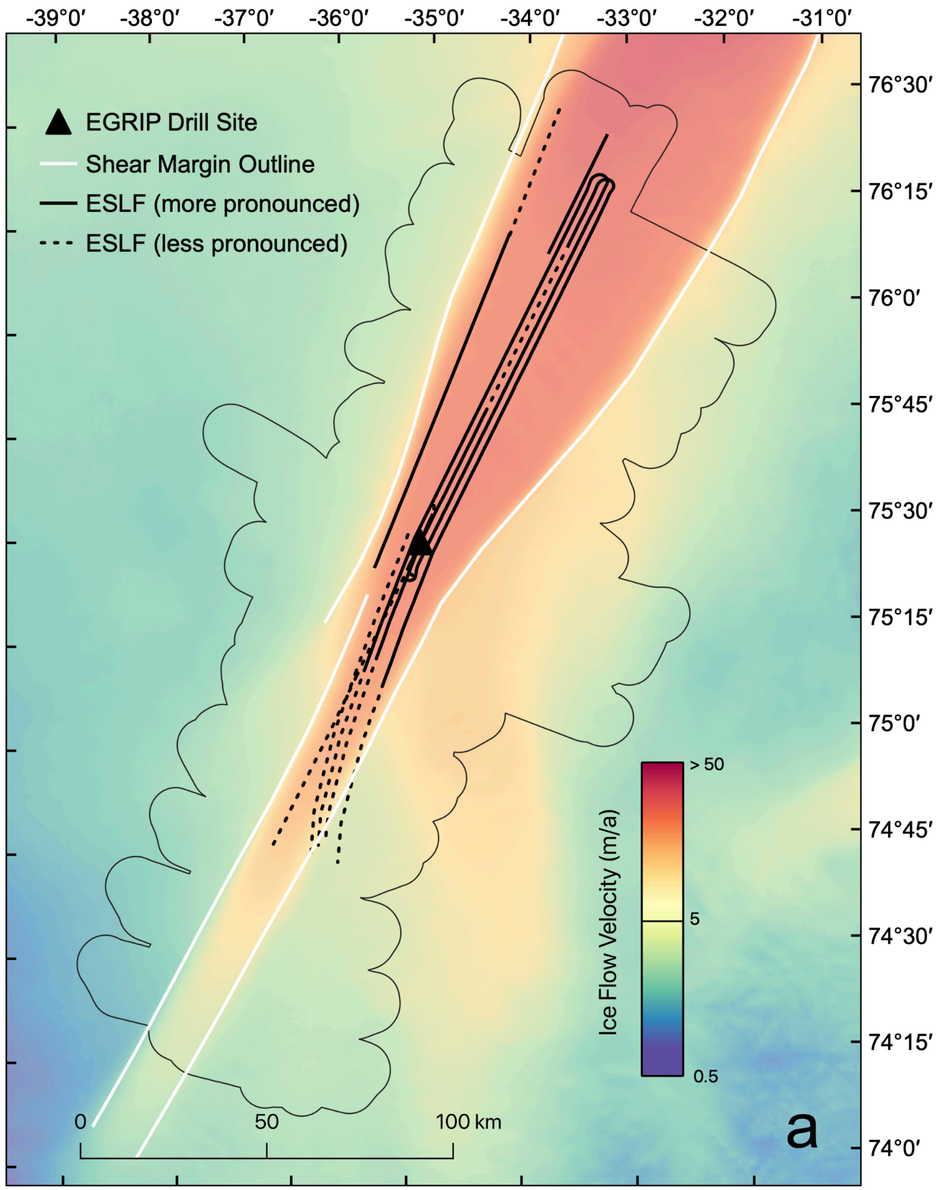








King et al. (2009)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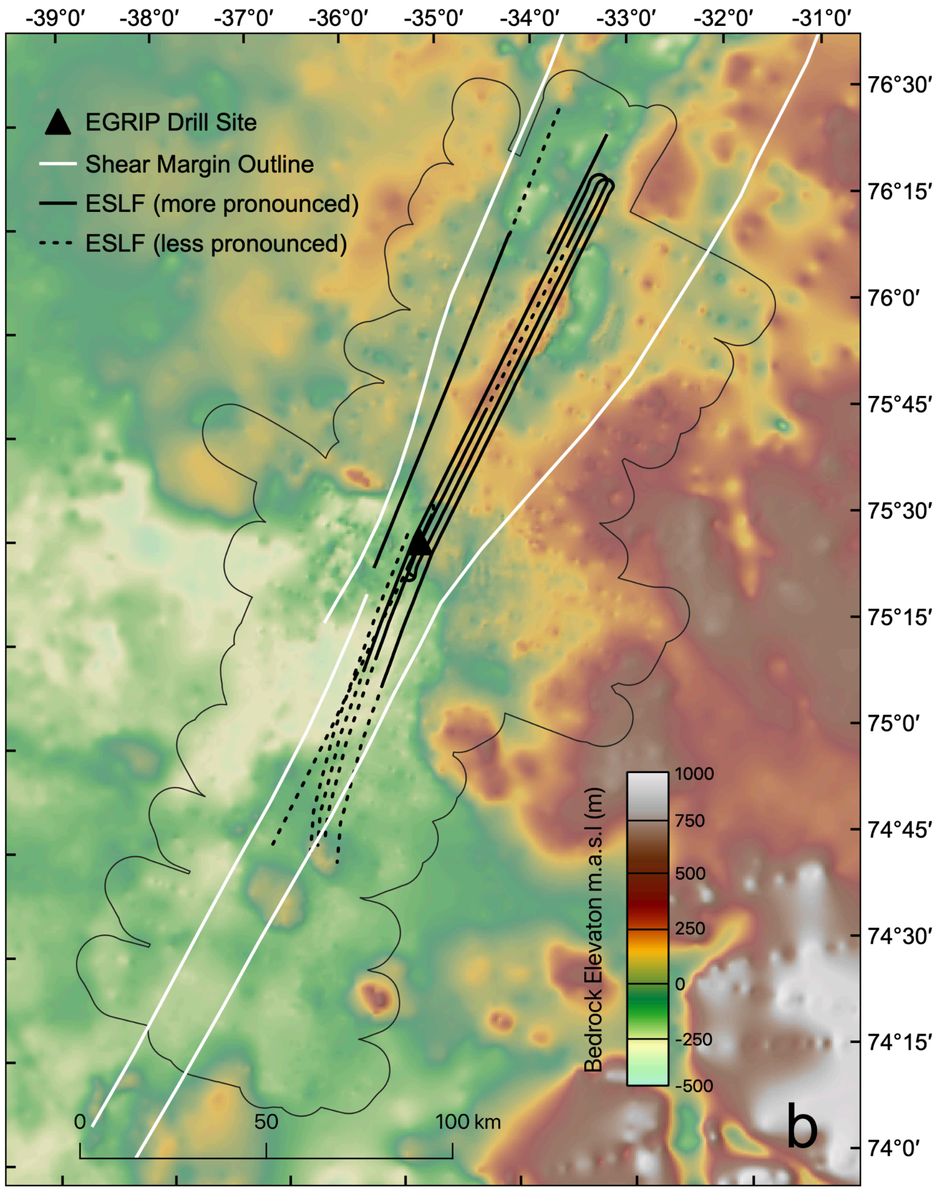
76°30′
76°15′
76°0′
75°45′
75°30′
75°15′
75°0′
74°45′
74°30′
74°15′
74°0′
EGRIP Drill Site
Shear Margin Outline
ESLF (more pronounced)
ESLF (less pronounced)
Ice Flow Velocity (m/a)
> 50
5
0.5
0
50
100 km
a


-39°0′
-38°0′
-37°0′
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-35°0′
-34°0′
-33°0′
-32°0′
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76°30′
76°15′
76°0′
75°45′
75°30′
75°15′
75°0′
74°45′
74°30′
74°15′
74°0′
EGRIP Drill Site
Shear Margin Outline
ESLF (more pronounced)
ESLF (less pronounced)
Bedrock Elevaton m.a.s.l (m)
1000
750
500
250
0
-250
-500
0
50
100 km
b

Data Availability

PANGAEA

Data Publisher for Earth and Environmental Science

DATASETS:

EGRIP-NOR-18 Bedrock Topography (500m grid, Geotiff)

TWT between surface and bedrock reflection (csv table)

Additional metadata e.g. survey outline (Shapefiles)

DOI:

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STATUS: under review