Reconstructing Cordilleran Ice Sheet stability in western Canada during the Last Deglaciation

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Darvill *et al*. (2022) *Geophysical Research Letters*
Cordilleran Ice Sheet Stability During the Last Deglaciation

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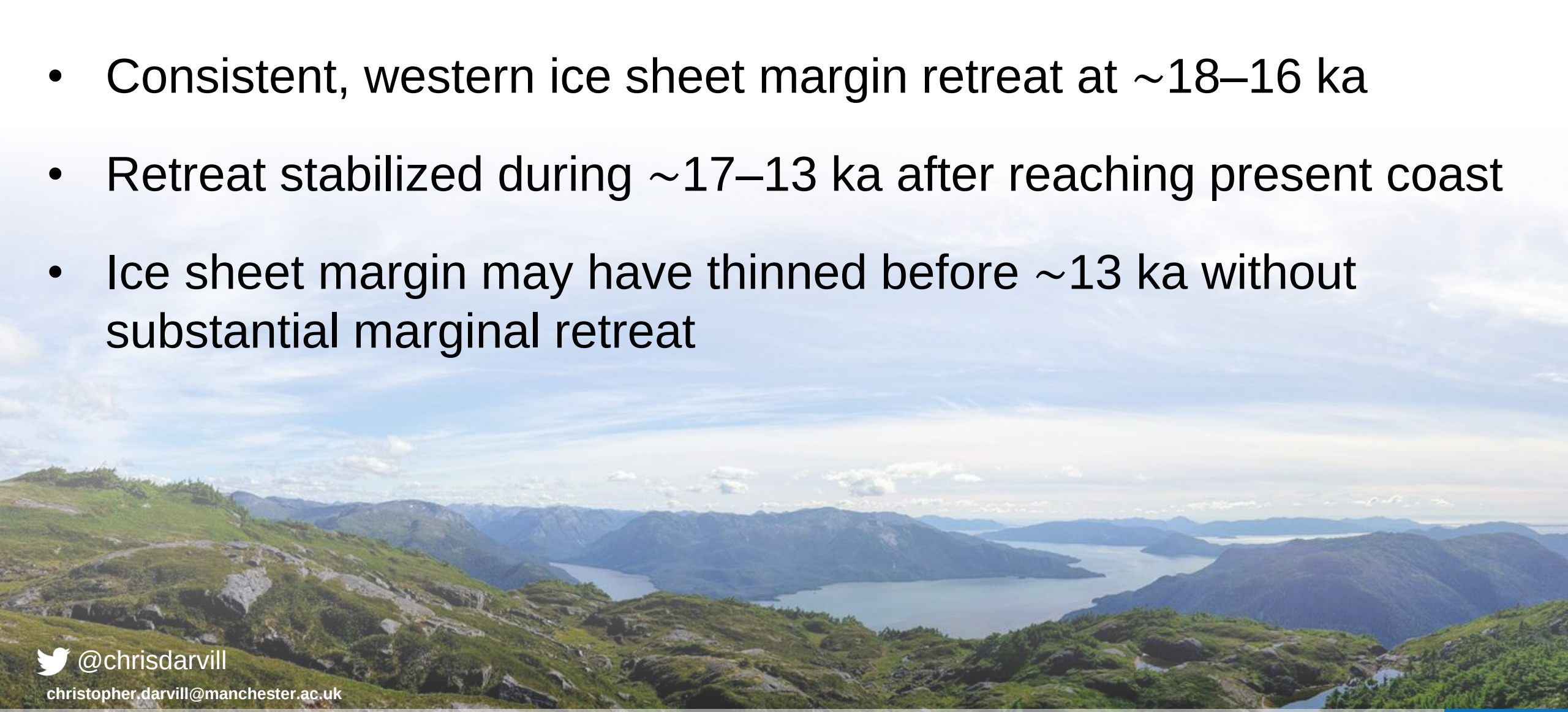
- Consistent, western ice sheet margin retreat at ~18–16 ka
- Retreat stabilized during ~17–13 ka after reaching present coast
- Ice sheet margin may have thinned before ~13 ka without substantial marginal retreat



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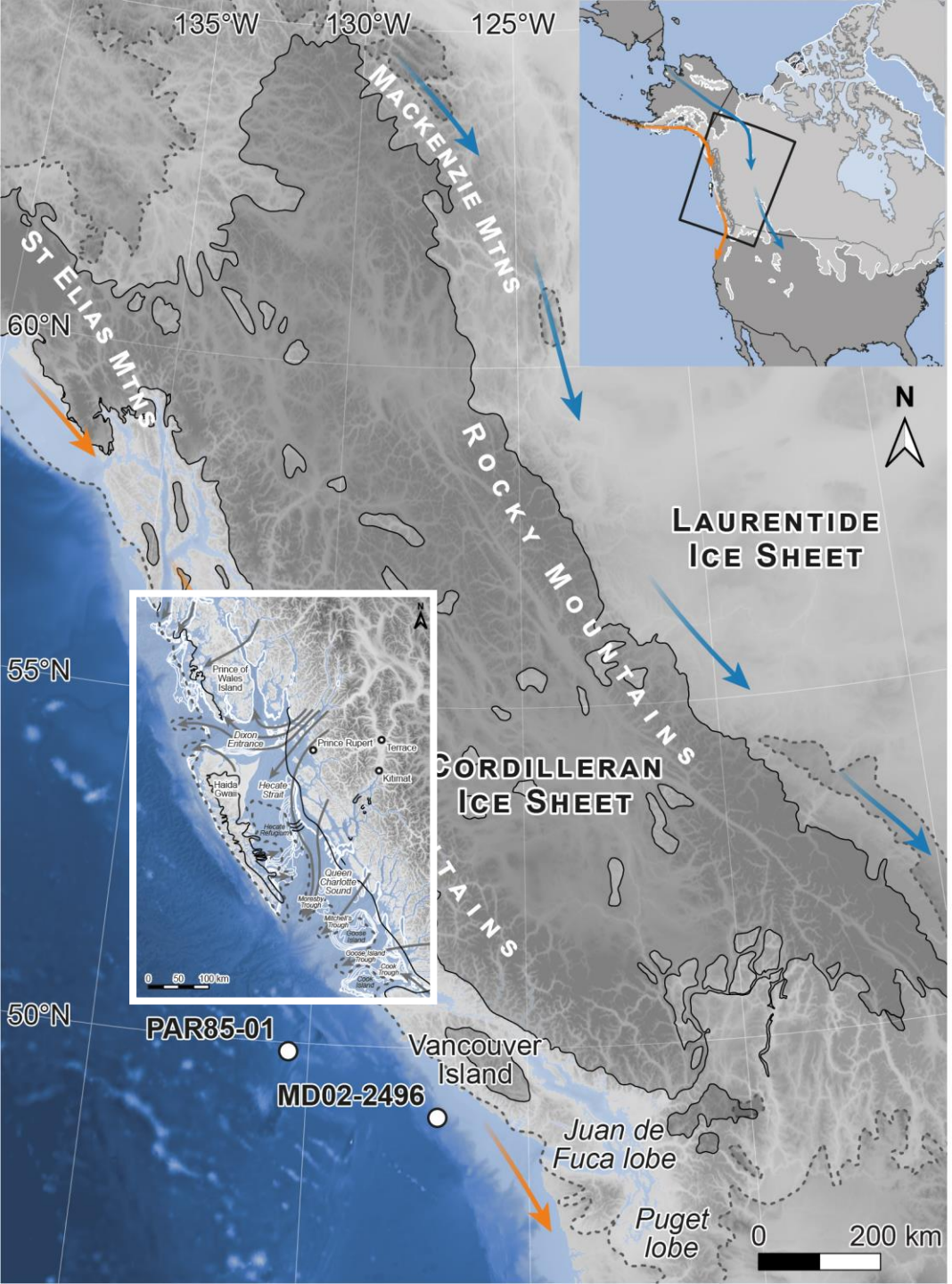


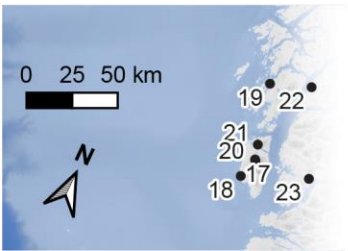
Cordilleran Ice Sheet at ~16 ka

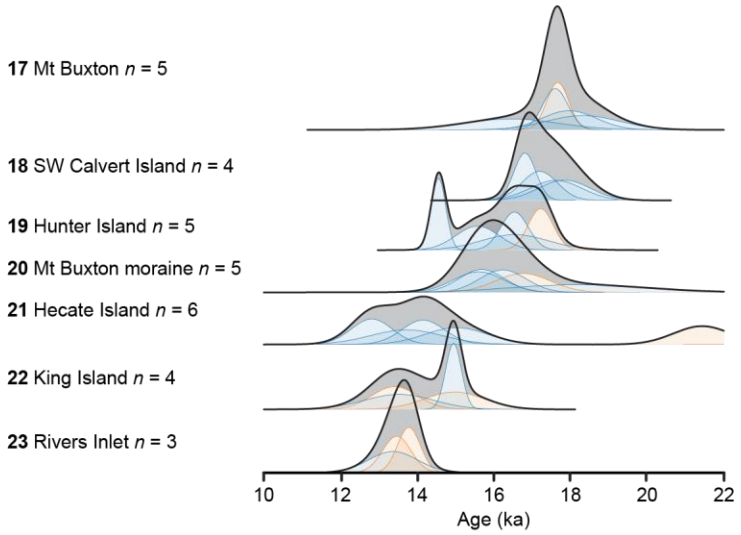
Cordilleran Ice Sheet at ~14 ka

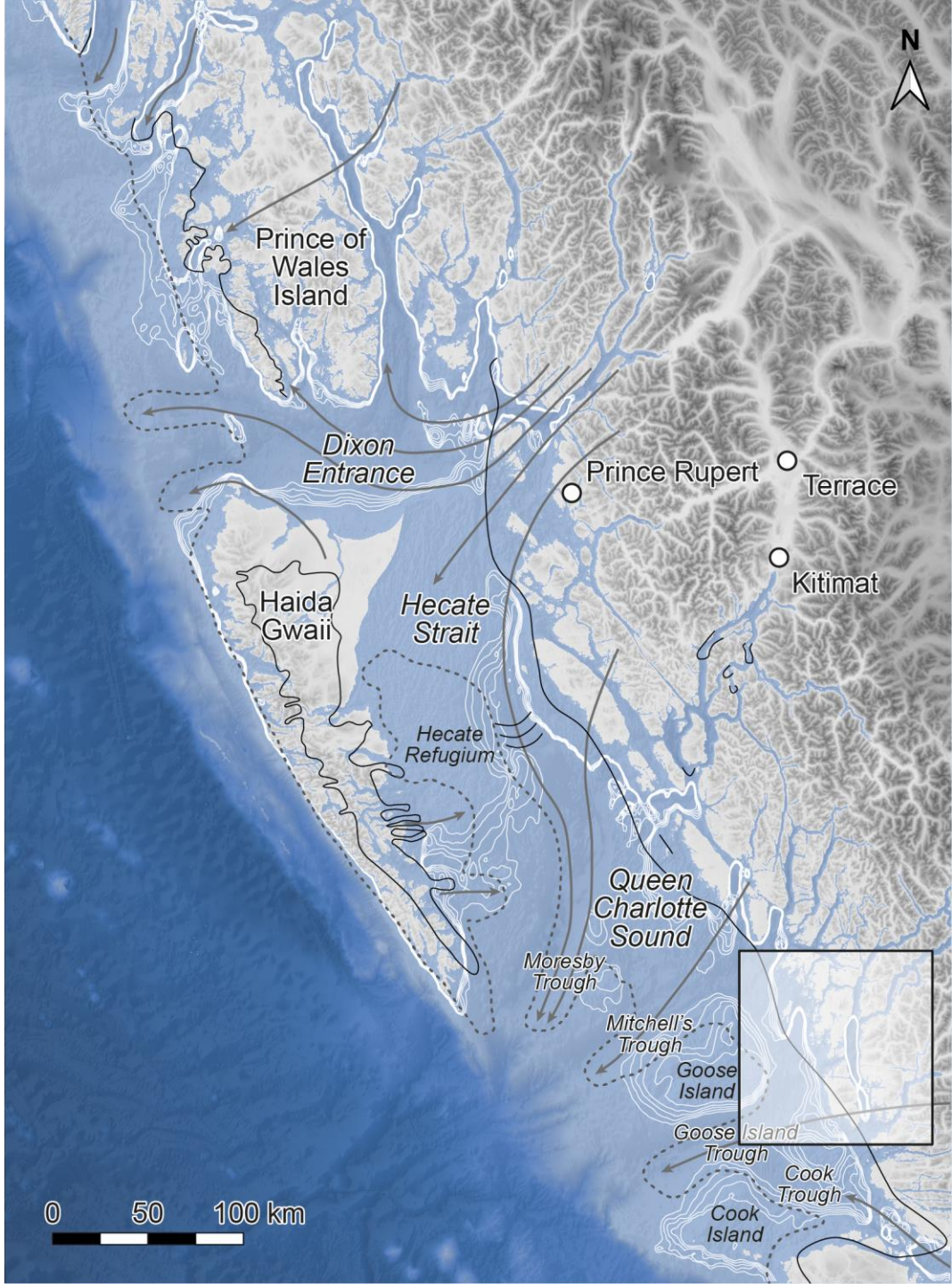
Inland migration route

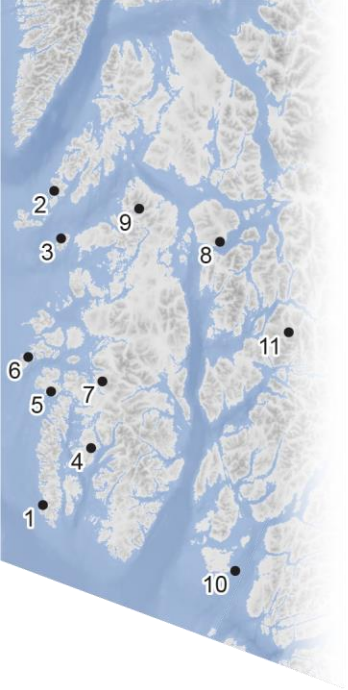
Coastal migration route

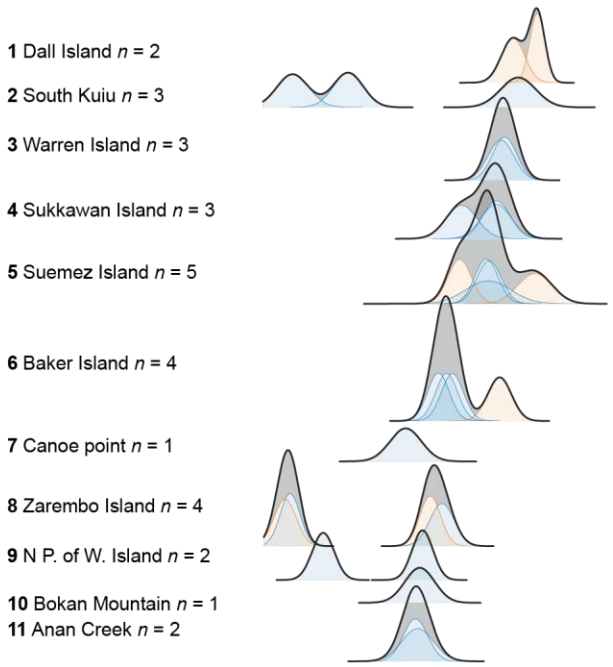
Darvill *et al*. (2018) *GRL*



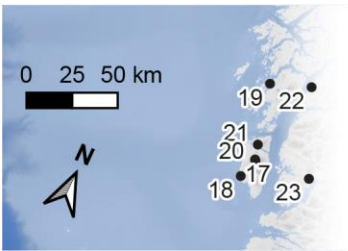


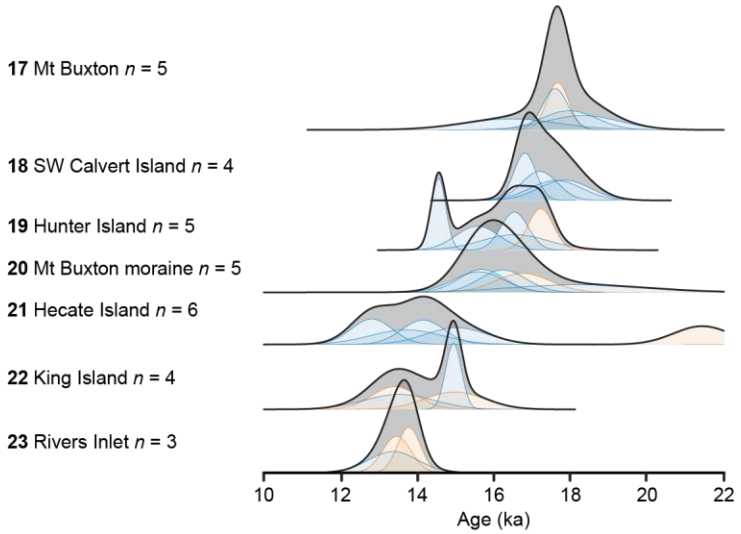


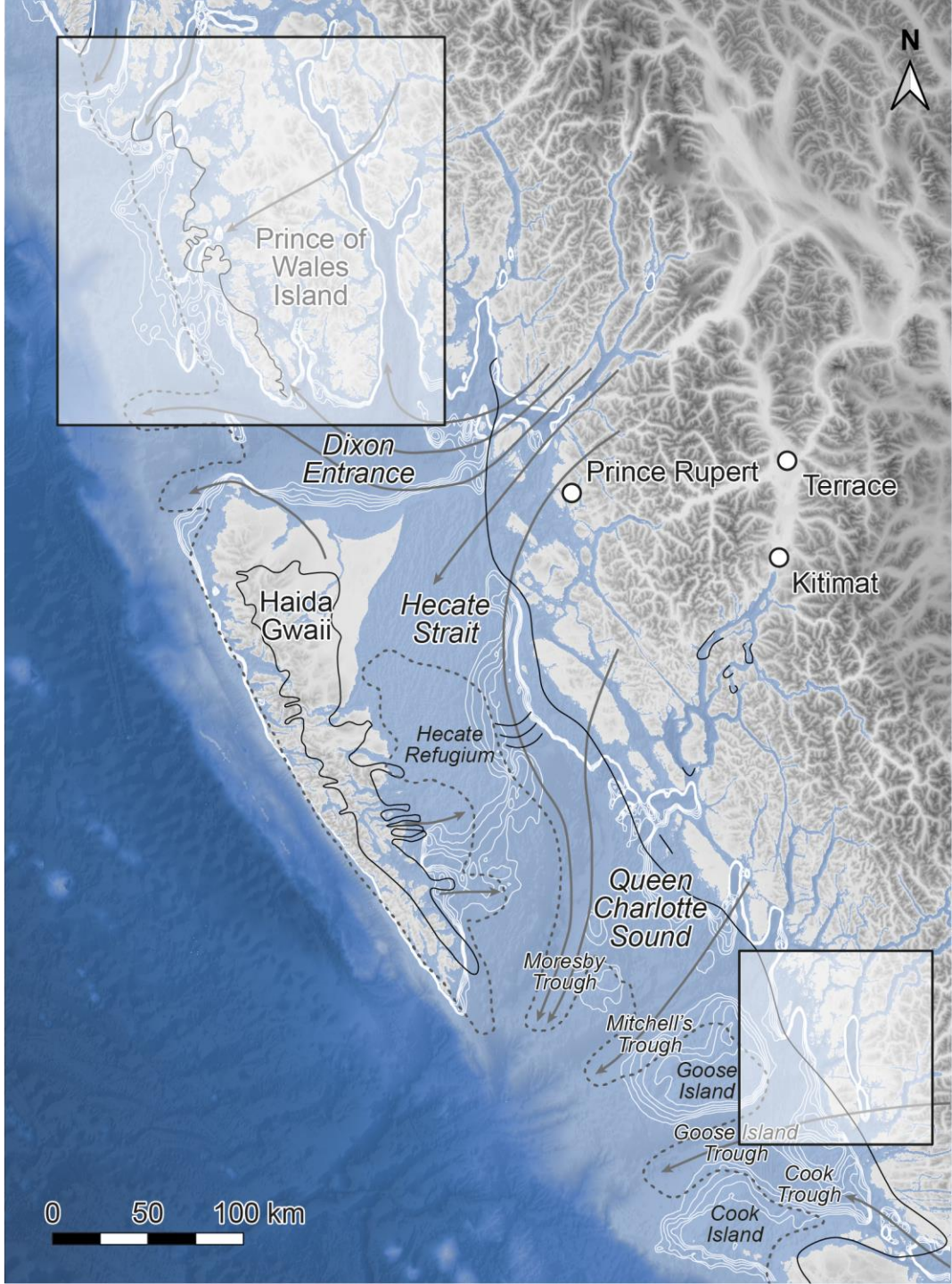


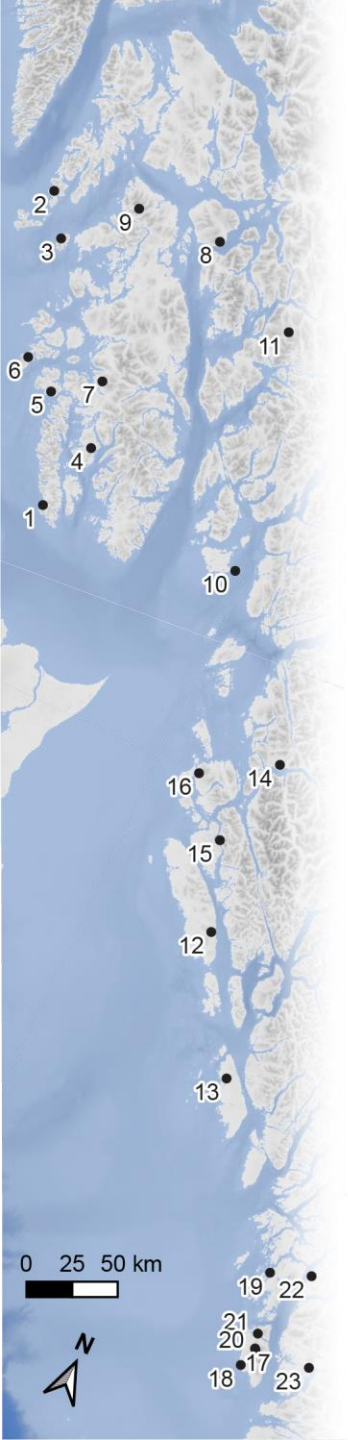


Lesnek *et al*. (2018) *Sci. Adv.*





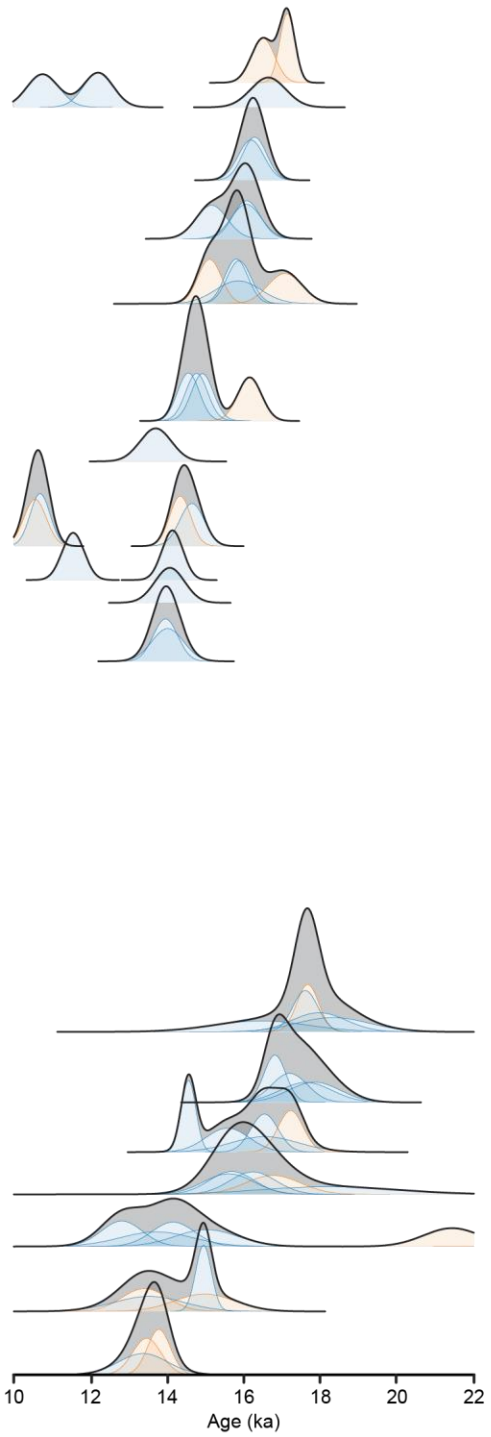


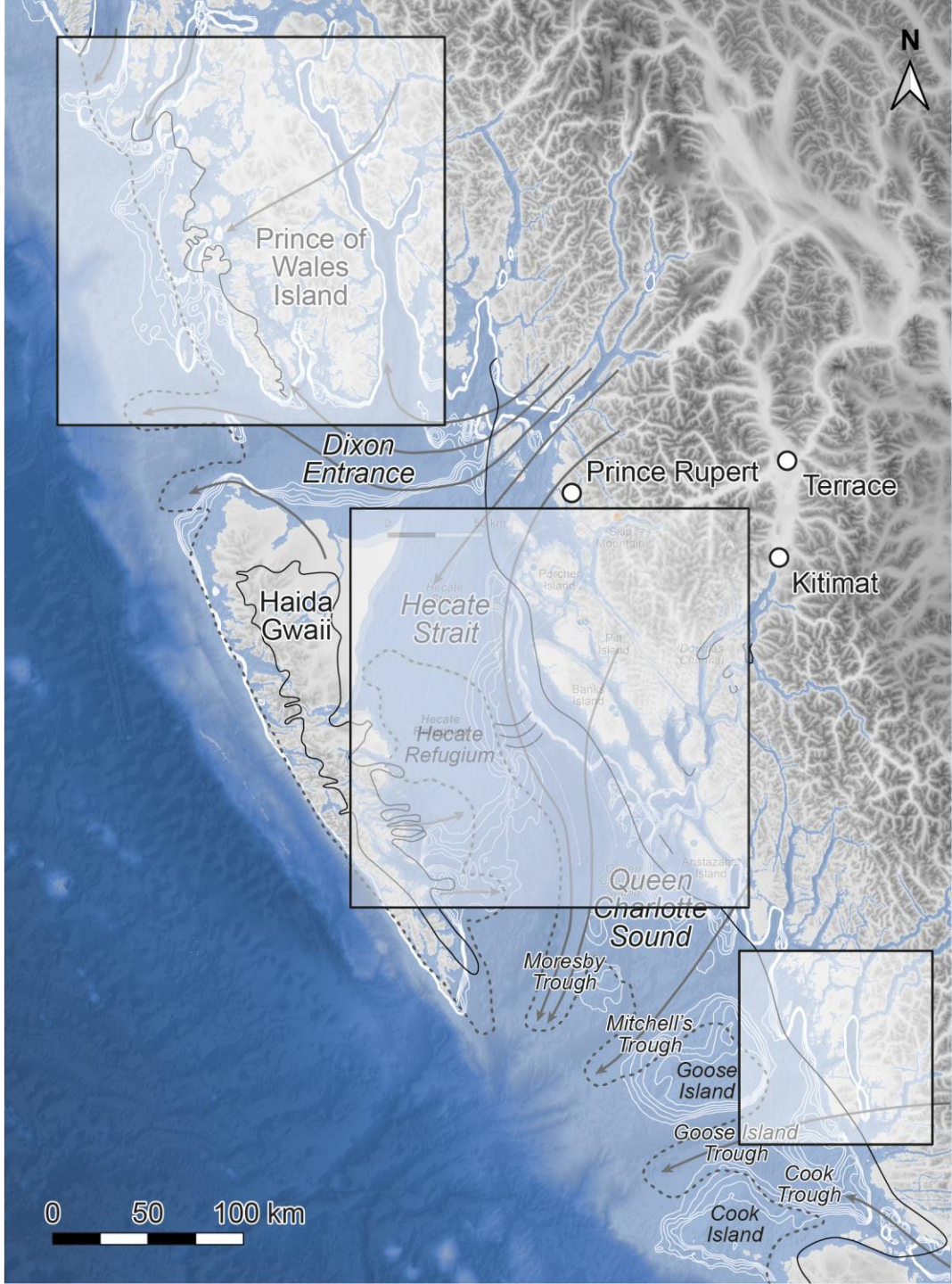


1 Dall Island *n* = 2
2 South Kuiu *n* = 3
3 Warren Island *n* = 3
4 Sukkawan Island *n* = 3
5 Suemez Island *n* = 5
6 Baker Island *n* = 4
7 Canoe point *n* = 1
8 Zarembo Island *n* = 4
9 N P. of W. Island *n* = 2
10 Bokan Mountain *n* = 1
11 Anan Creek *n* = 2

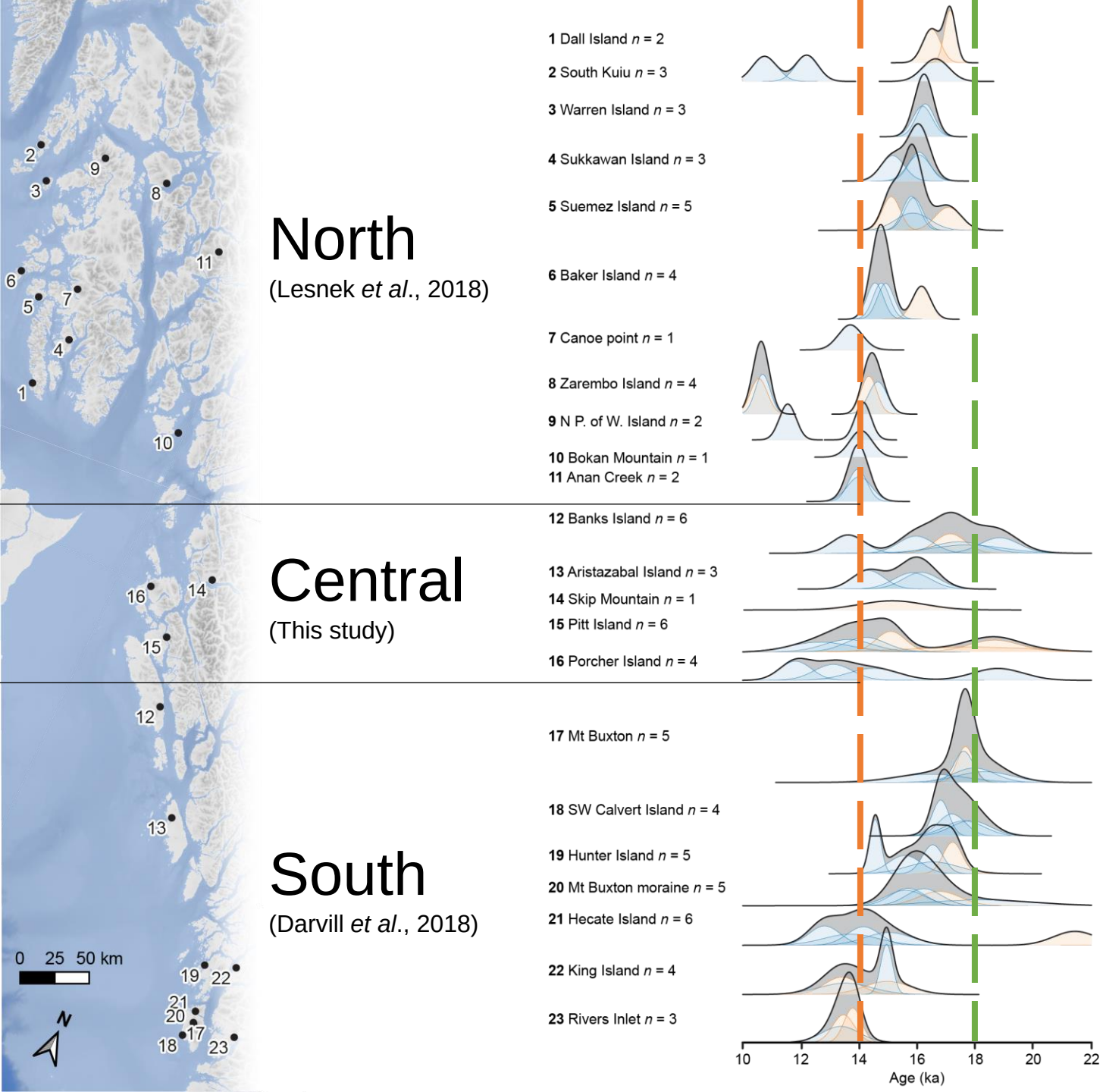
This study

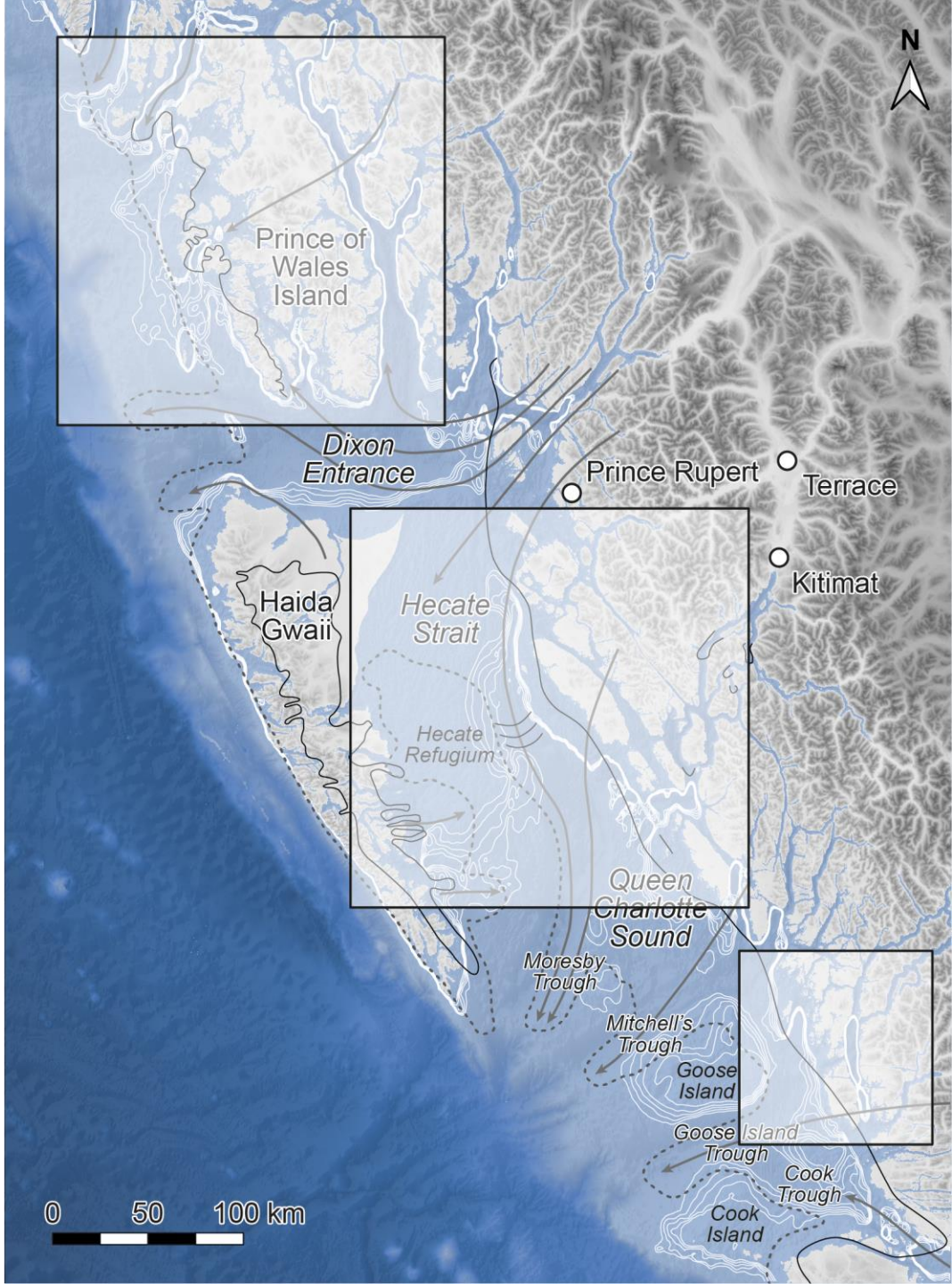
17 Mt Buxton *n* = 5
18 SW Calvert Island *n* = 4
19 Hunter Island *n* = 5
20 Mt Buxton moraine *n* = 5
21 Hecate Island *n* = 6
22 King Island *n* = 4
23 Rivers Inlet *n* = 3

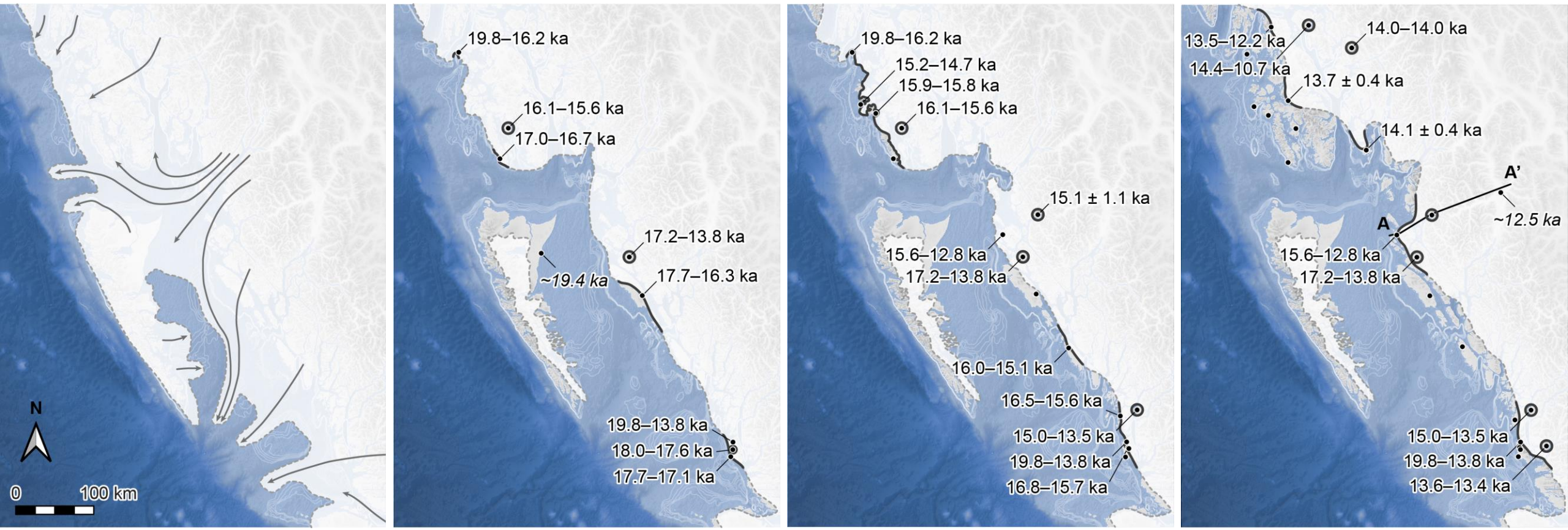


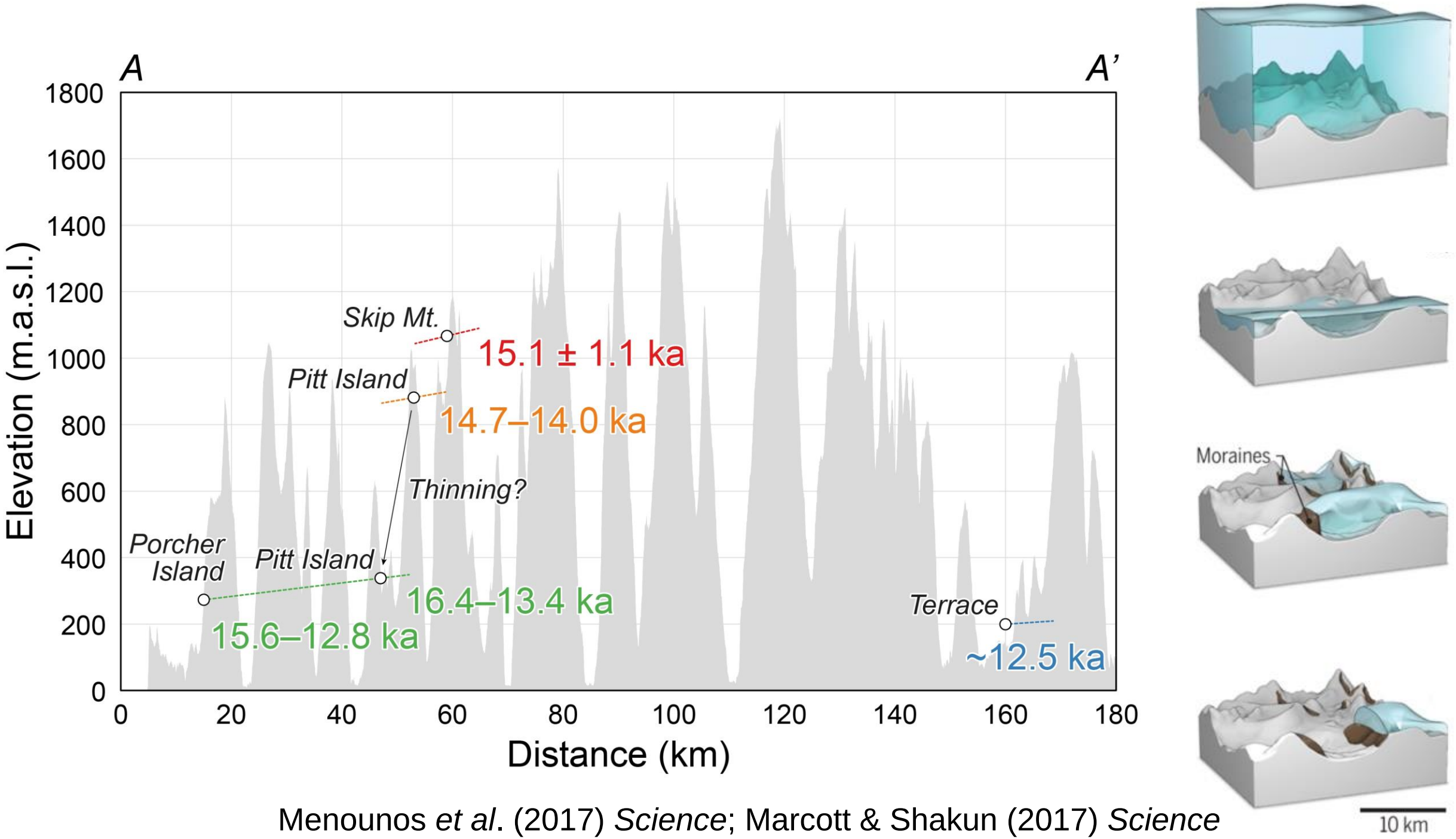



0
50 km
N
Skip Mountain
Porcher Island
Hecate Strait
Pitt Island
Douglas Channel
Banks Island
Hecate Refugium
Queen Charlotte Sound
Aristazabal Island
11-SKM
15.1 ± 1.1 ka
12-POR
13.1 ± 0.7 ka
16-PIT
13.6 ± 0.8 ka
07-BNK
17.4 ± 0.9 ka
03-ARZ
16.1 ± 0.6 ka

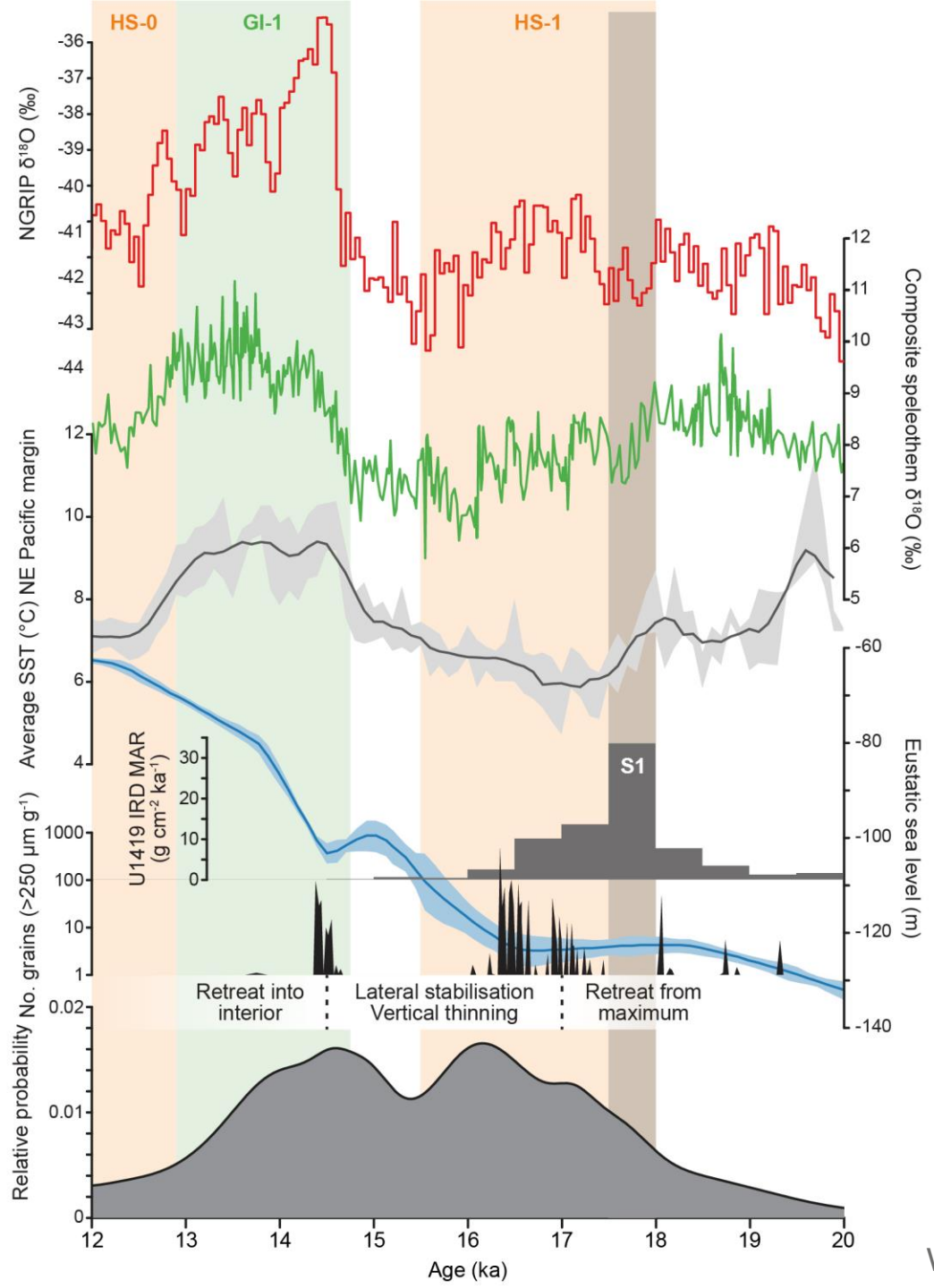

North
(Lesnek et al., 2018)
Central
(This study)
South
(Darvill et al., 2018)
1 Dall Island n = 2
2 South Kuiu n = 3
3 Warren Island n = 3
4 Sukkawan Island n = 3
5 Suemez Island n = 5
6 Baker Island n = 4
7 Canoe point n = 1
8 Zarembo Island n = 4
9 N P. of W. Island n = 2
10 Bokan Mountain n = 1
11 Anan Creek n = 2
12 Banks Island n = 6
13 Aristazabal Island n = 3
14 Skip Mountain n = 1
15 Pitt Island n = 6
16 Porcher Island n = 4
17 Mt Buxton n = 5
18 SW Calvert Island n = 4
19 Hunter Island n = 5
20 Mt Buxton moraine n = 5
21 Hecate Island n = 6
22 King Island n = 4
23 Rivers Inlet n = 3
10 12 14 16 18 20 22
Age (ka)
0 25 50 km
N


N
Prince of Wales Island
Dixon Entrance
Prince Rupert
Terrace
Kitimat
Haida Gwaii
Hecate Strait
Hecate Refugium
Queen Charlotte Sound
Moresby Trough
Mitchell's Trough
Goose Island
Goose Island Trough
Cook Trough
Cook Island
0 50 100 km


>18.0 ka
18.0–16.0 ka
16.0–14.5 ka
14.5–12.8 ka
N
0
100 km
19.8–16.2 ka
16.1–15.6 ka
17.0–16.7 ka
17.2–13.8 ka
~19.4 ka
17.7–16.3 ka
19.8–13.8 ka
18.0–17.6 ka
17.7–17.1 ka
19.8–16.2 ka
15.2–14.7 ka
15.9–15.8 ka
16.1–15.6 ka
15.1 ± 1.1 ka
15.6–12.8 ka
17.2–13.8 ka
16.0–15.1 ka
16.5–15.6 ka
15.0–13.5 ka
19.8–13.8 ka
16.8–15.7 ka
13.5–12.2 ka
14.0–14.0 ka
14.4–10.7 ka
13.7 ± 0.4 ka
14.1 ± 0.4 ka
A'
~12.5 ka
A
15.6–12.8 ka
17.2–13.8 ka
15.0–13.5 ka
19.8–13.8 ka
13.6–13.4 ka



Menounos *et al*. (2017) *Science*; Marcott & Shakun (2017) *Science*



NGRIP record and stratigraphy

Asian Monsoon strength

Average Sea Surface Temperature

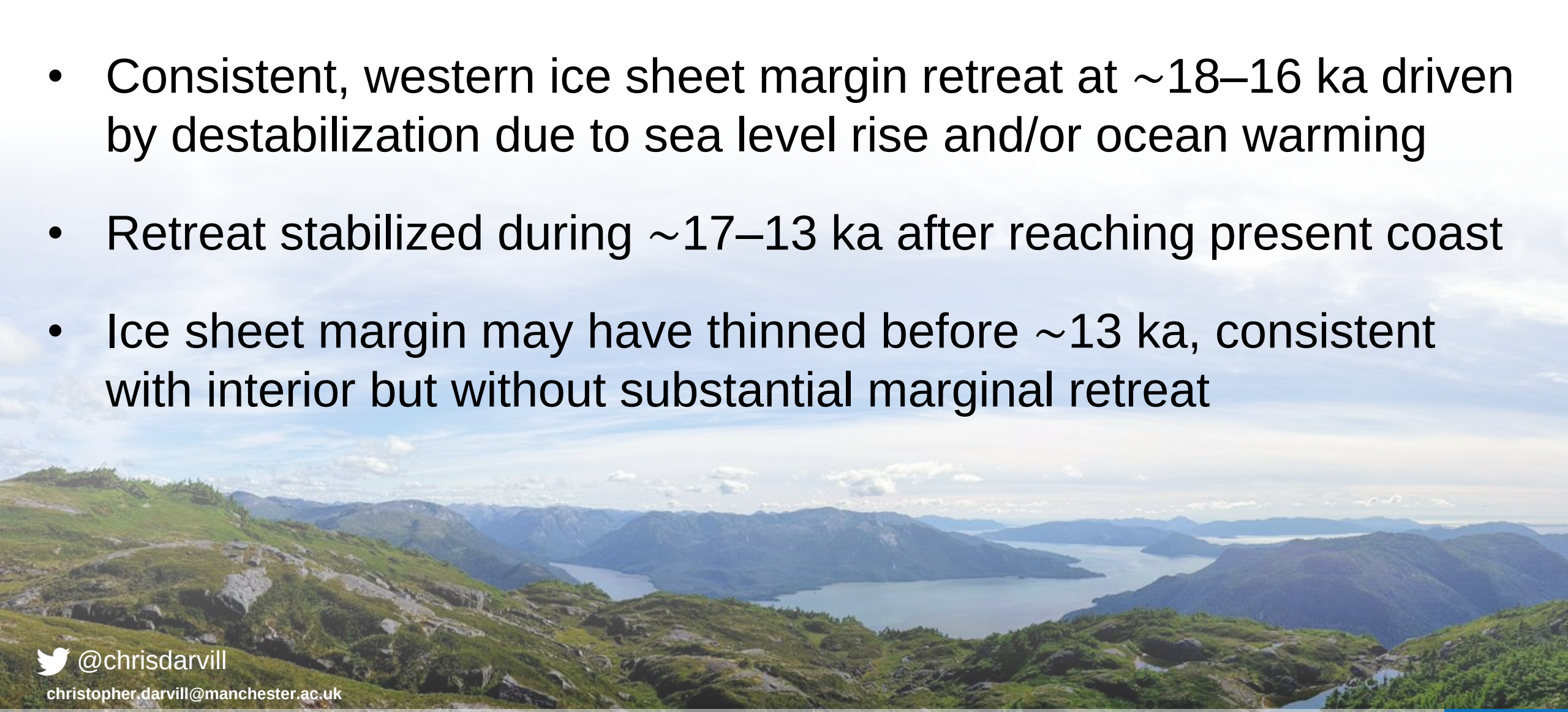
Ice-rafted debris

Eustatic sea level

All exposure ages from coast

Andersen et al. (2004) Nature; Lambeck et al. (2014) PNAS; Taylor et al (2014) EPSL; Walczak et al. (2020) Science; Cheng *et al*. (2016) *Nature*; Praetorius *et al*. (2020) *Sci. Adv.*

- Consistent, western ice sheet margin retreat at ~18–16 ka driven by destabilization due to sea level rise and/or ocean warming
- Retreat stabilized during ~17–13 ka after reaching present coast
- Ice sheet margin may have thinned before ~13 ka, consistent with interior but without substantial marginal retreat



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