









Permafrost

unter dem Meer



Paul Overduin



© Hennrichs, AWI

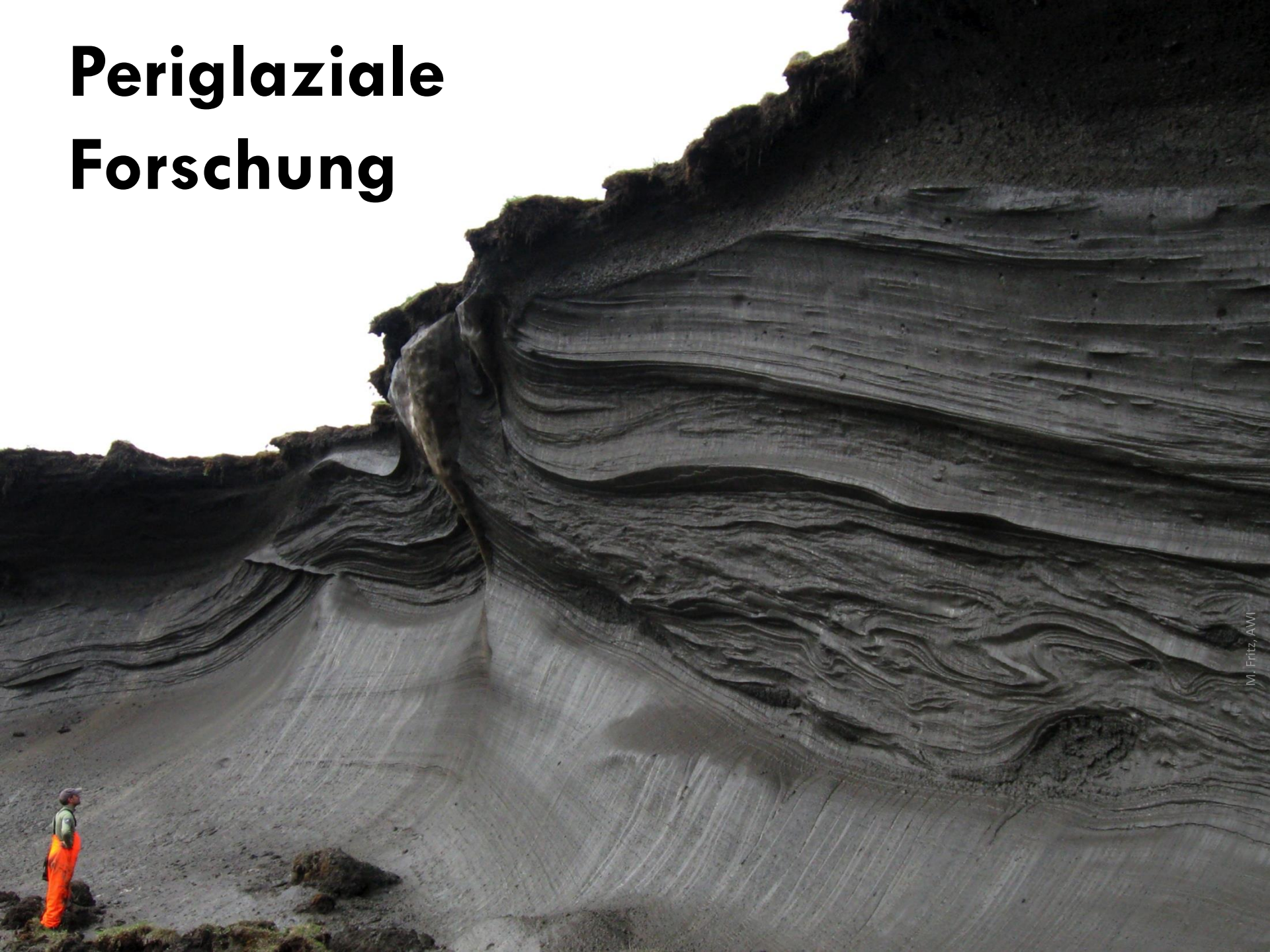


**Polar- und Meeresforschung
... in Potsdam?**

Atmosphärische Zirkulation



Periglaziale Forschung



A landscape photograph showing a vast, flat, snow-covered field in the foreground. The snow is uneven, with some darker patches of earth visible. In the middle ground, there's a strip of brown, dry-looking vegetation or grass. Beyond that, a wide, flat expanse of water or a frozen lake stretches towards the horizon. The sky is filled with large, dramatic, grey and white clouds, suggesting an overcast or stormy day. The overall mood is cold and desolate.

**DIE ARKTIS IST MEHR ALS
NUR SCHNEE UND EIS.**

Meer

Schnee und Eis

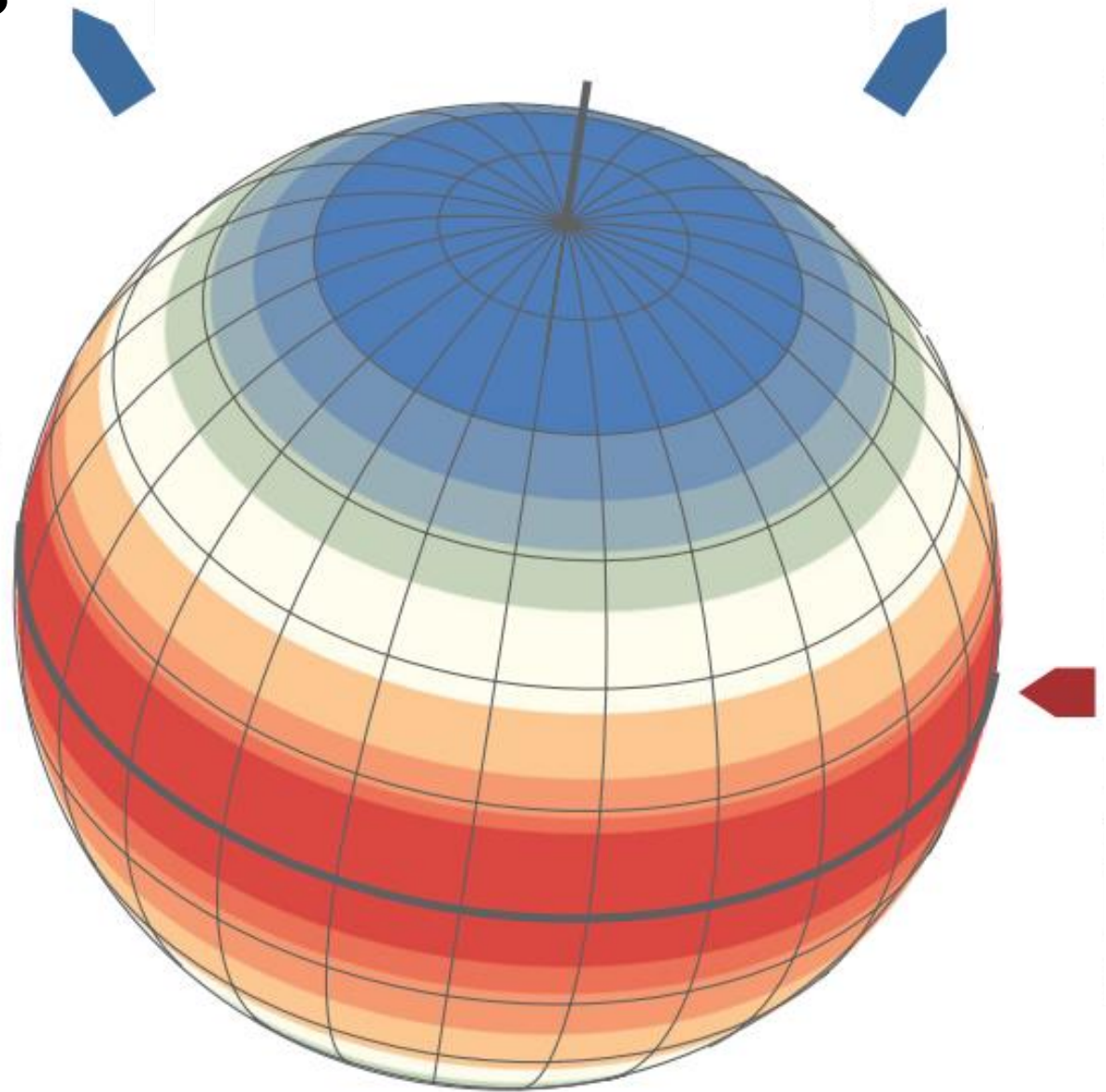
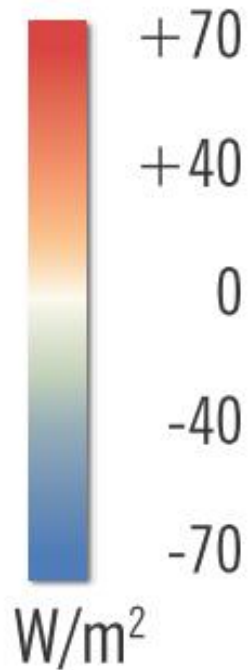


80% Reflektion



Die Arktis als Klimaanlage der Erde

Net radiation,
annual average






Meereis

Meer

Land

Grönl.
Eisschild &
Gletscher

A wide-angle photograph of a tundra landscape showing significant permafrost erosion. The terrain is characterized by dark, layered soil and rock formations, interspersed with patches of green and yellowish vegetation. In the lower right foreground, a person wearing a purple jacket and blue pants stands on a rocky outcrop, looking towards the landscape. The sky is bright and clear.

**Wie schnell und tief taut der Permafrost?
Warum taut er an manchen Orten schneller
und tiefer als an anderen?
Wieviel Kohlendioxid und Methan
gasen aus dem Boden aus?**

Was sind die wissenschaftliche Ziele?

Wohin lockt die
Wissenschaft?

Wie kommen wir dorthin?

Welche Geräte und Ausrüstung brauchen wir?

Habe ich die richtige Teilnehmer dabei?

Welche Partner haben wir vor Ort?

Sicherheit?

Gesundheit?

Reise von Potsdam nach Tiksi



Ankunft





Allein



Opel, 2011



Opel, 2011

Sanitieranlagen



die Küche



Küchendienst



5. Lutz, Jens
6. Paul, Seb
7. Misha, Sasha S.
8. Sasha M., Frank
9. Lutz, Jens
10. Paul, Seb
11. Irina, Sasha S.
12. Sasha M., Frank
13. Lutz, Jens
14. Paul, Seb
15. Irina, Sasha S.
16. Sasha M., Frank
17. Lutz, Jens
18. Paul, Seb
19. Irina, Sasha S.
20. Sasha M., Frank
21. Lutz, Jens



Zeltlager

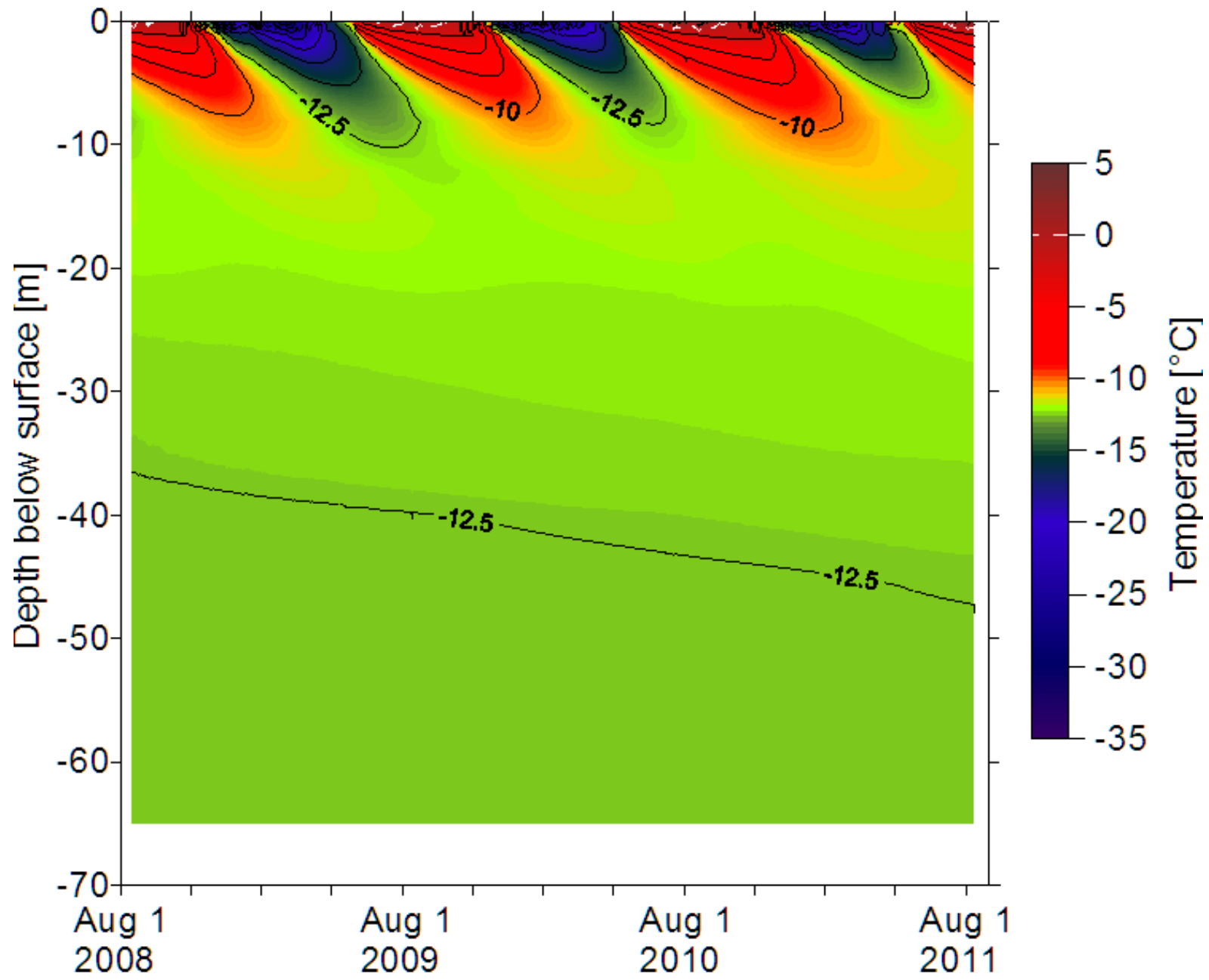


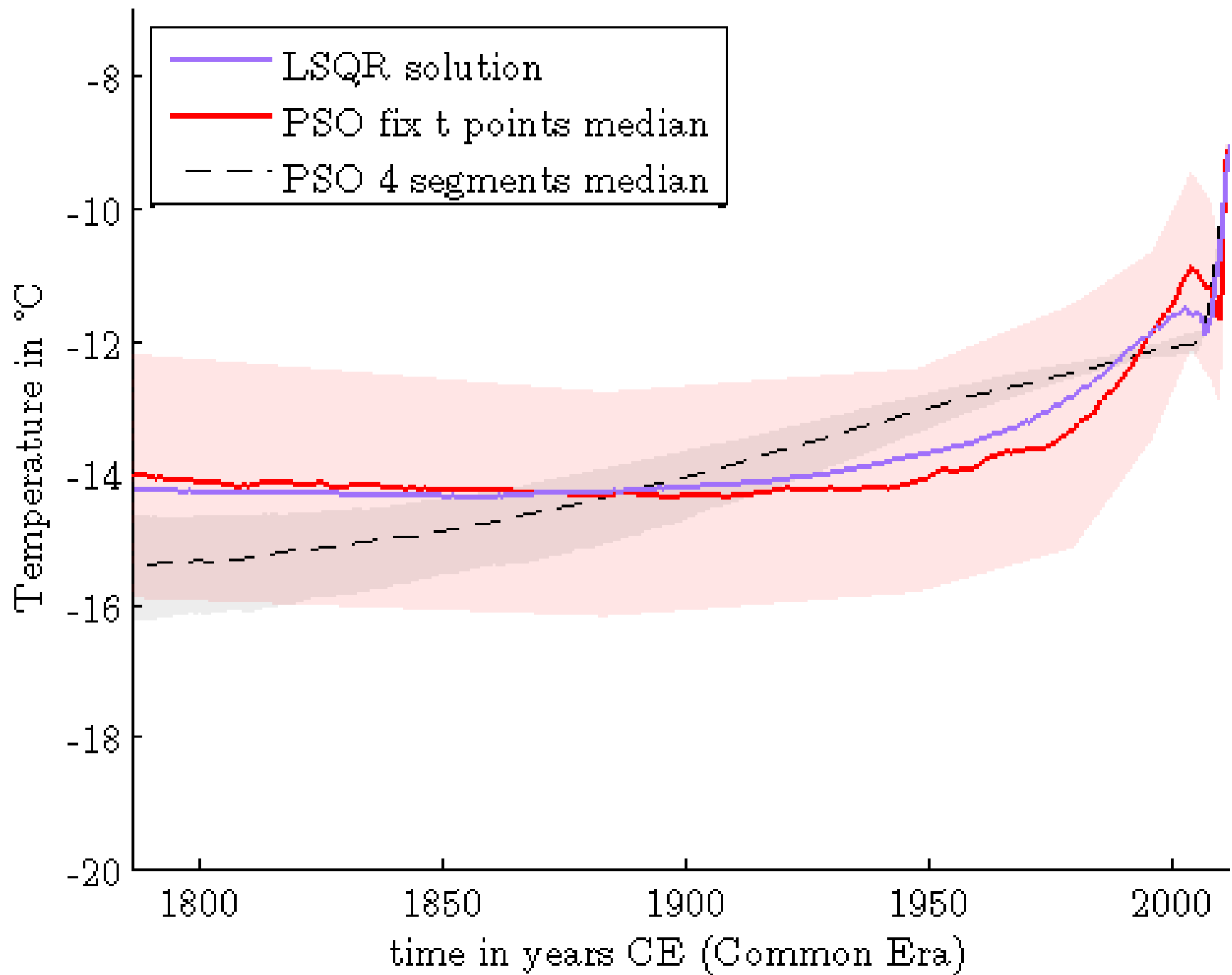
Baranskaya, 2011

Permafrost Fieberthermometer



Bohrlochtemperaturen

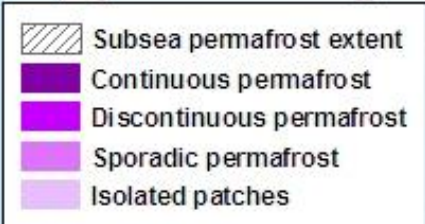
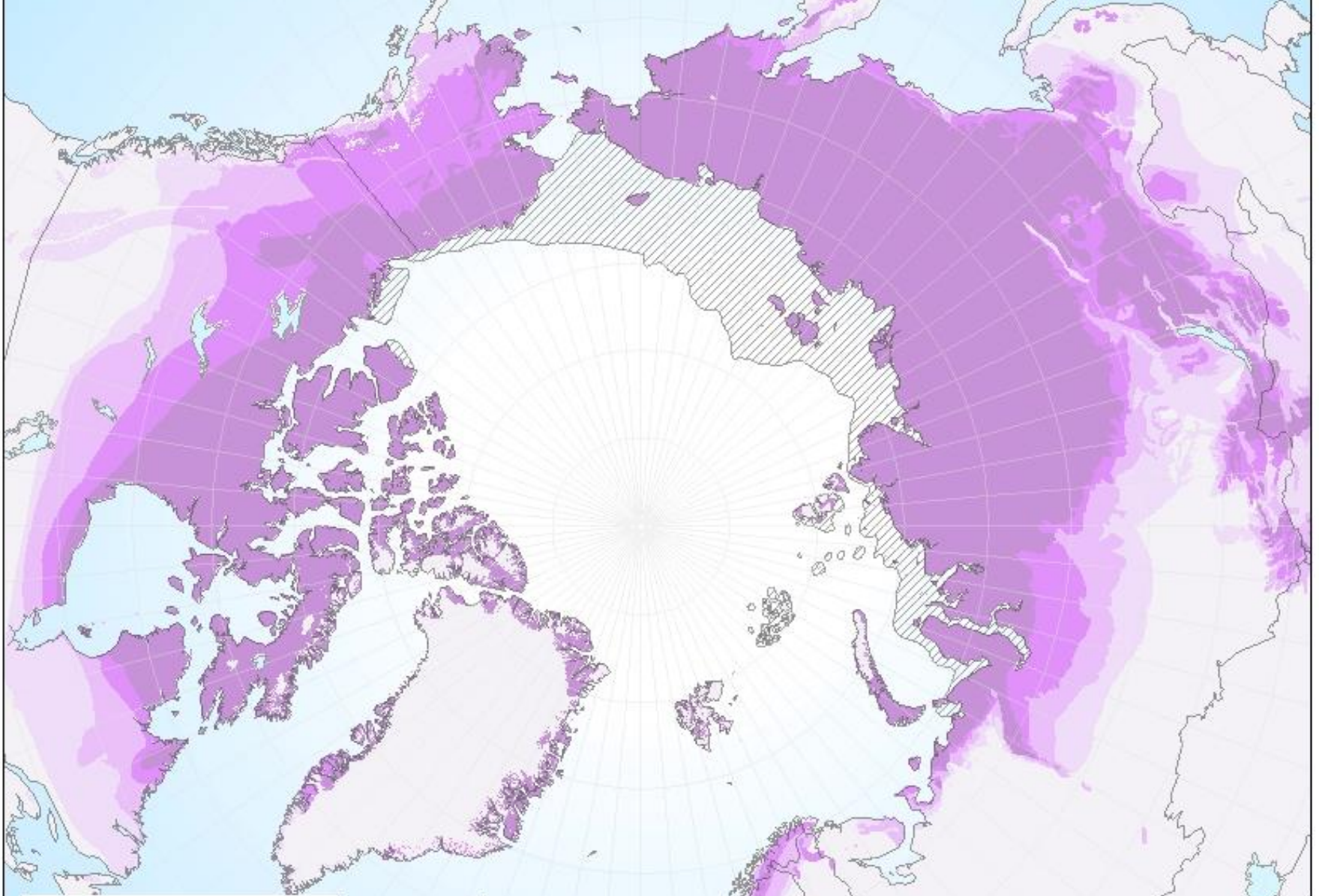






Was ist Permafrost?

- **Dauerhaft gefrorener Boden** mit einer Bodentemperatur $\leq 0^{\circ}\text{C}$ für mind. zwei Jahre in Folge
- Bedeckt ein Viertel des Landes der Nordhalbkugel
- Kann über 1,5 km dick sein



Permafrost Verteilung

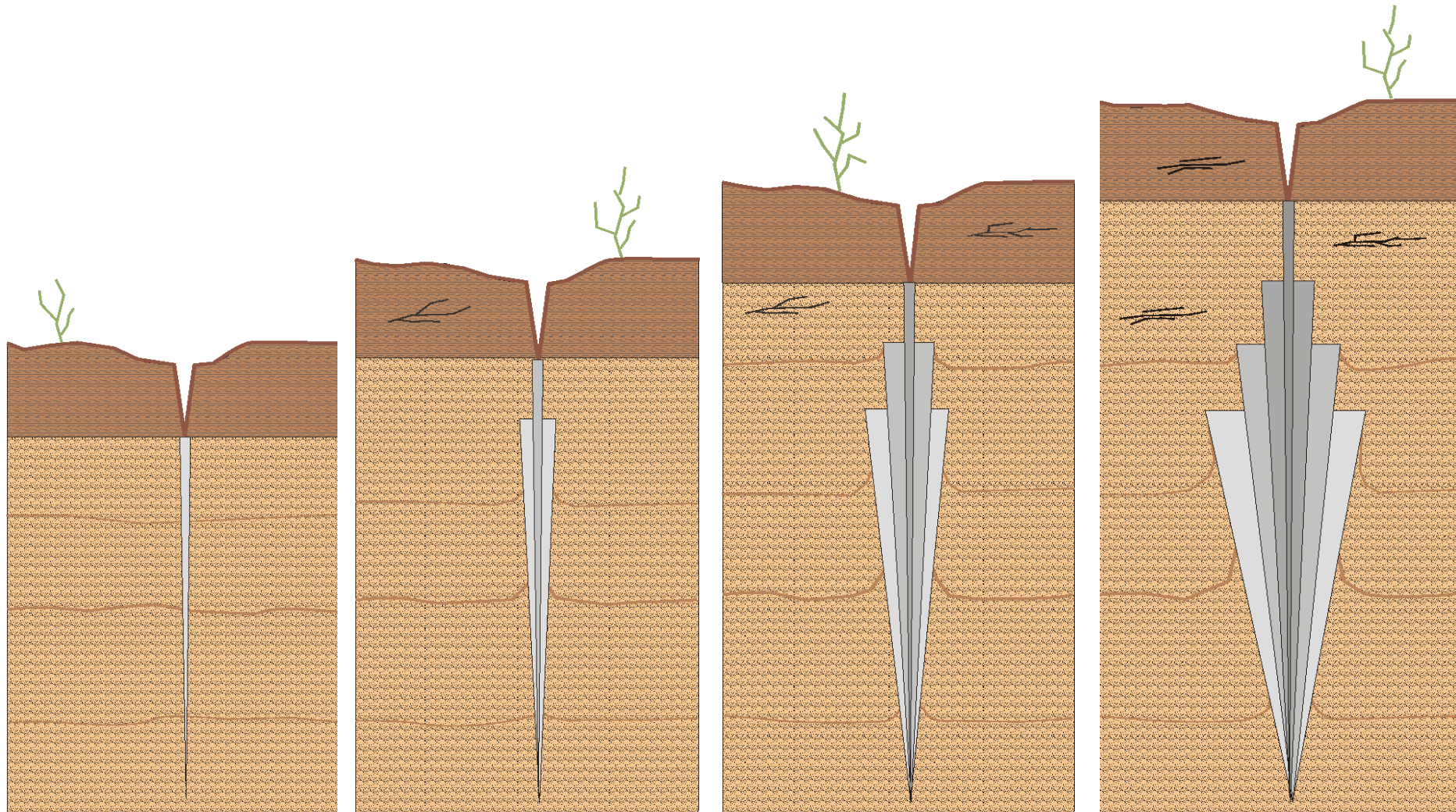
Der Tundra von oben





Woher kommt das Eis?

Wie kommt das Eis in den Boden?





Opel, 2011





**PERMAFROST SPEICHERT
DOPPELT SOVIEL KOHLENSTOFF
WIE IN DER ATMOSPHERE
ENTHALTEN IST.**

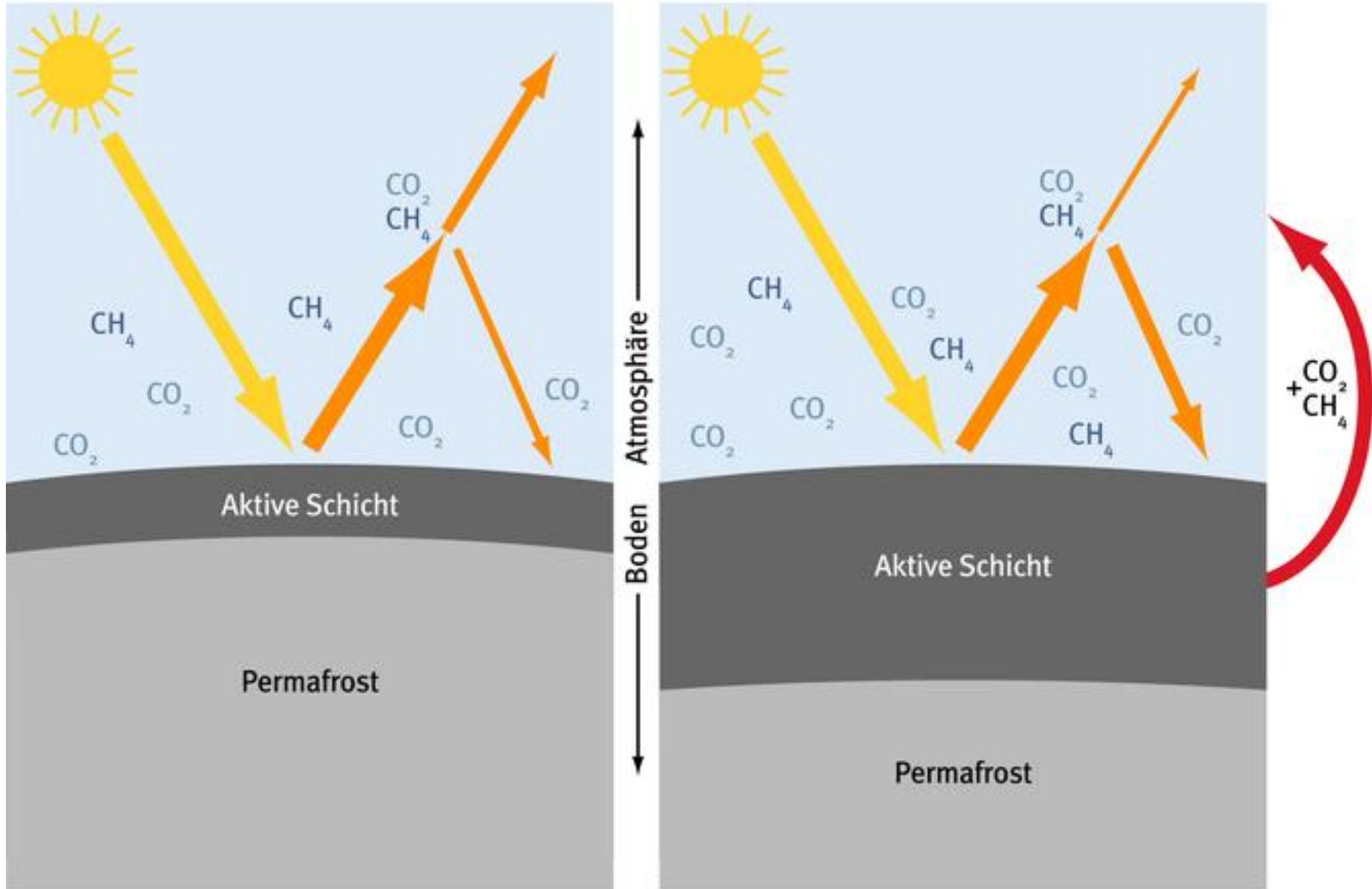


KOHLLENSTOFF?

KANN ALS TREIBHAUSGAS

FREIGESETZT WERDEN ...

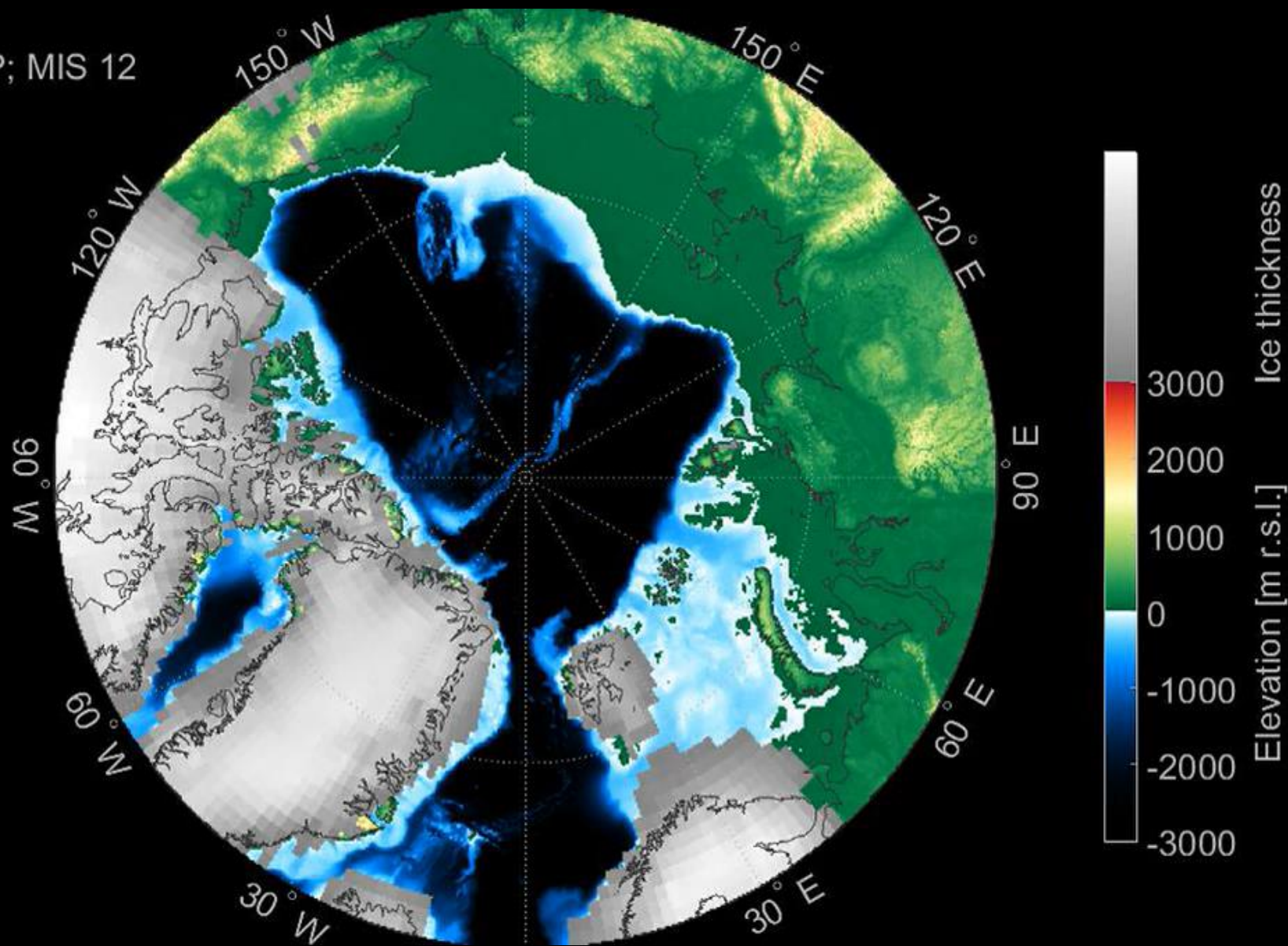
Rückkopplung durch Permafrost



A topographic map of the Arctic Ocean region, showing the ocean floor bathymetry and surrounding landmasses. The ocean floor is depicted with various shades of blue and cyan, indicating different depths. The landmasses are shown in shades of brown and tan, with white areas representing snow or ice. The text "The Arctic Ocean" is overlaid on the map in the upper left quadrant.

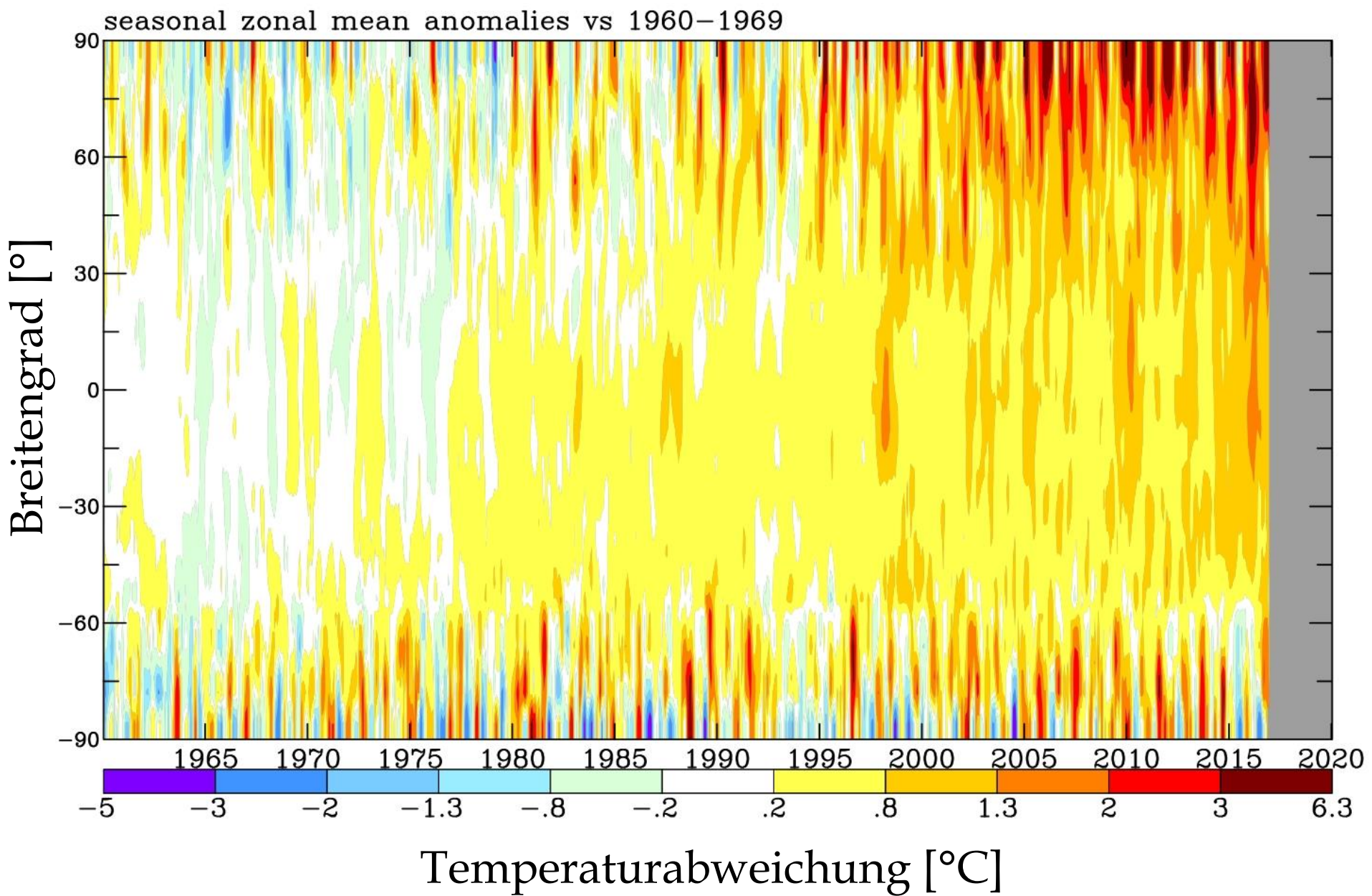
The
Arctic
Ocean

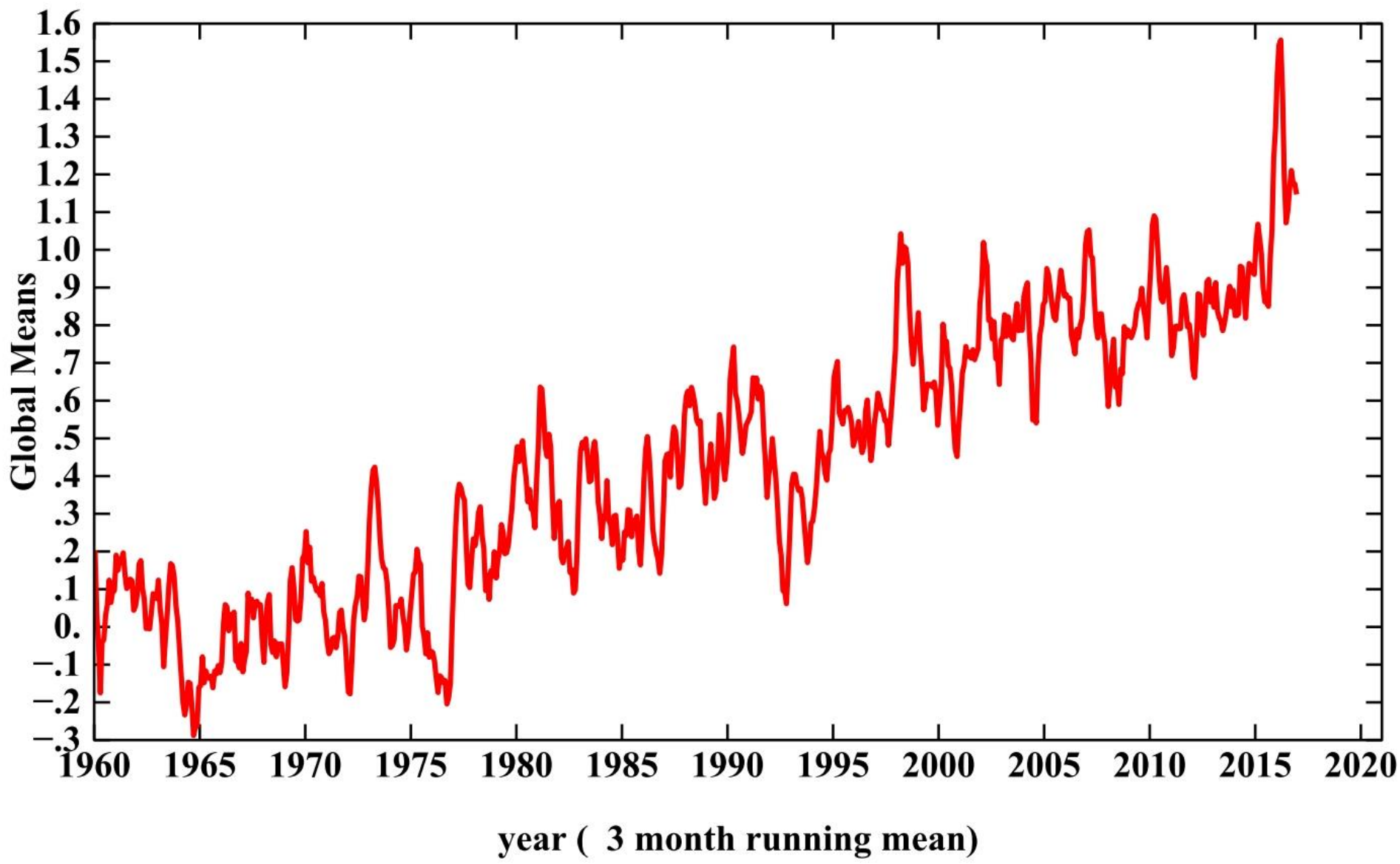
-450000 yr BP; MIS 12





**DIE ARKTIS ERWÄRMT SICH
DOPPELT SO SCHNELL
WIE DER REST DER WELT.**





Meereis schmilzt

Ozean erwärmt sich

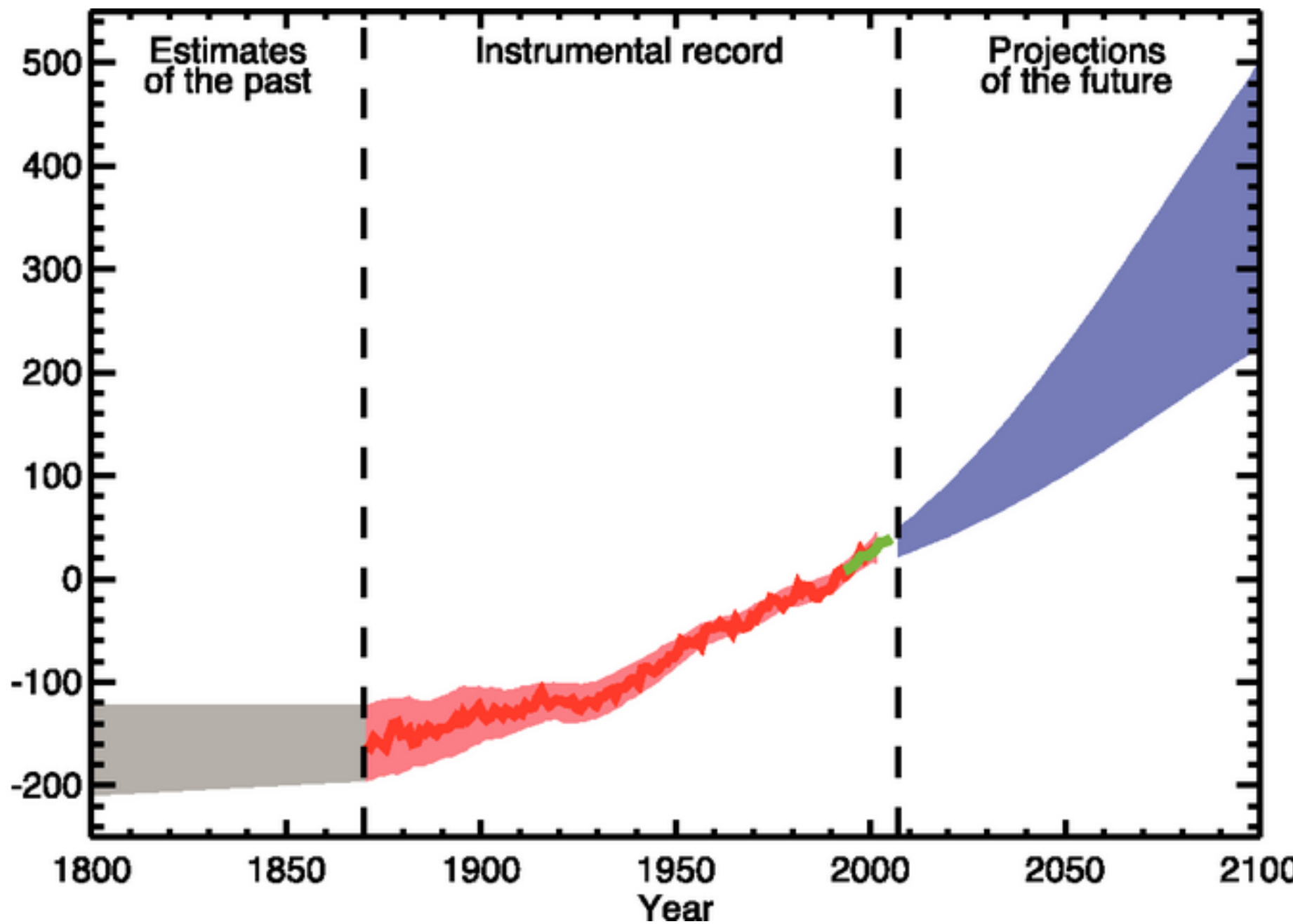
Permafrost taut

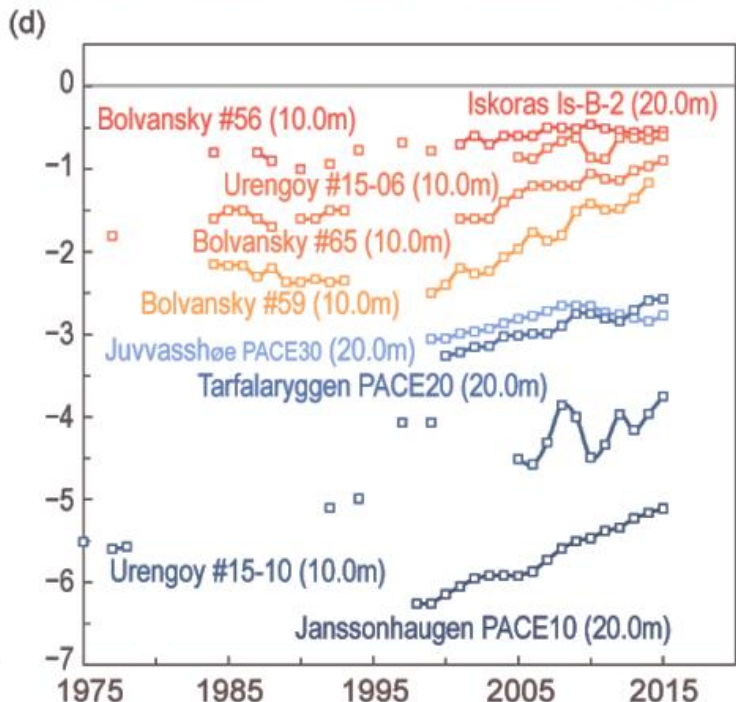
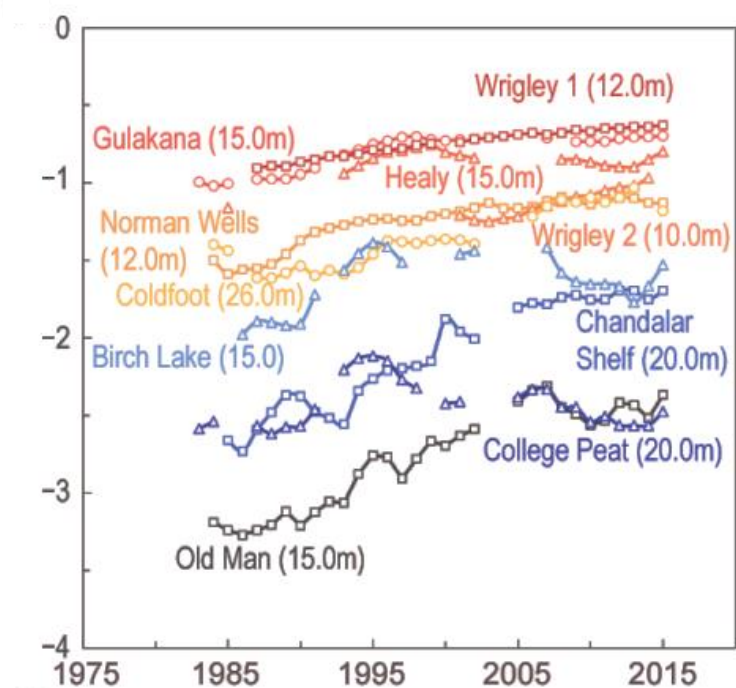
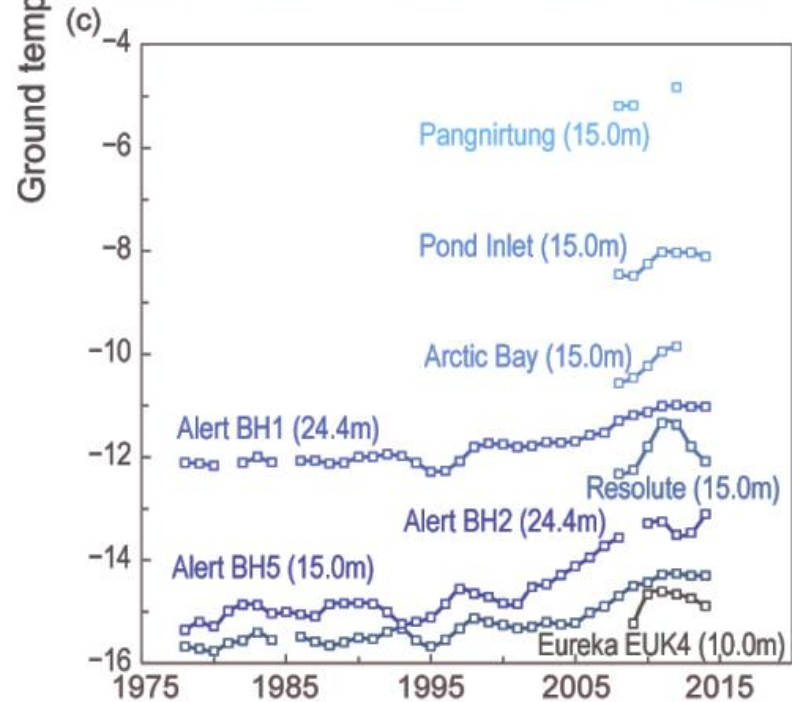
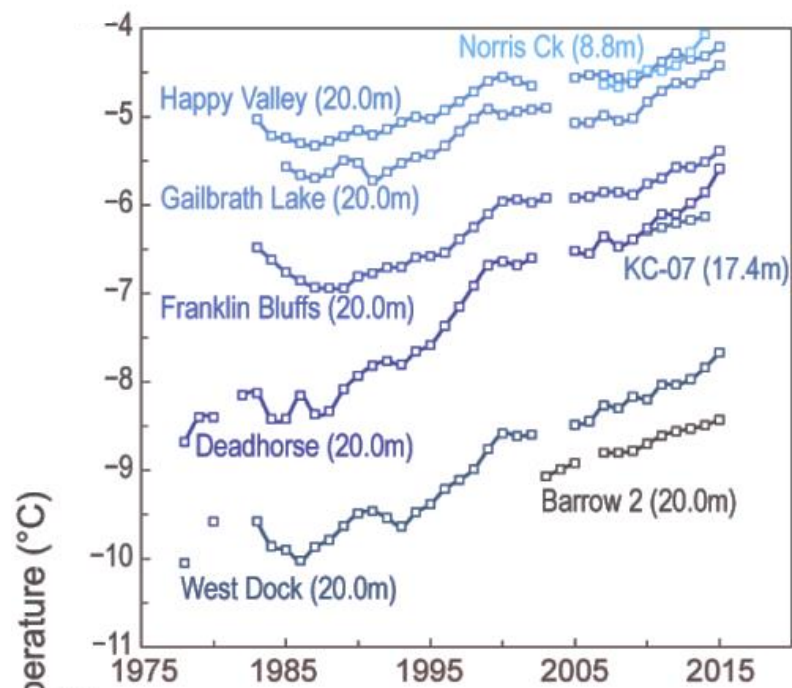
***Gletscher
schmelzen***

**DER MEERESSPIEGEL STEIGT
WIE SCHNELL? WIE WEIT?**



Sea level change (mm)







Sep 1984

Sea Ice Age



Arctic Ocean Boundary



Jan 1984

Sea Ice Age

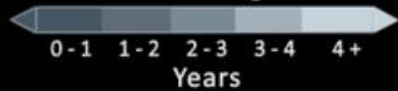


Arctic Ocean Boundary

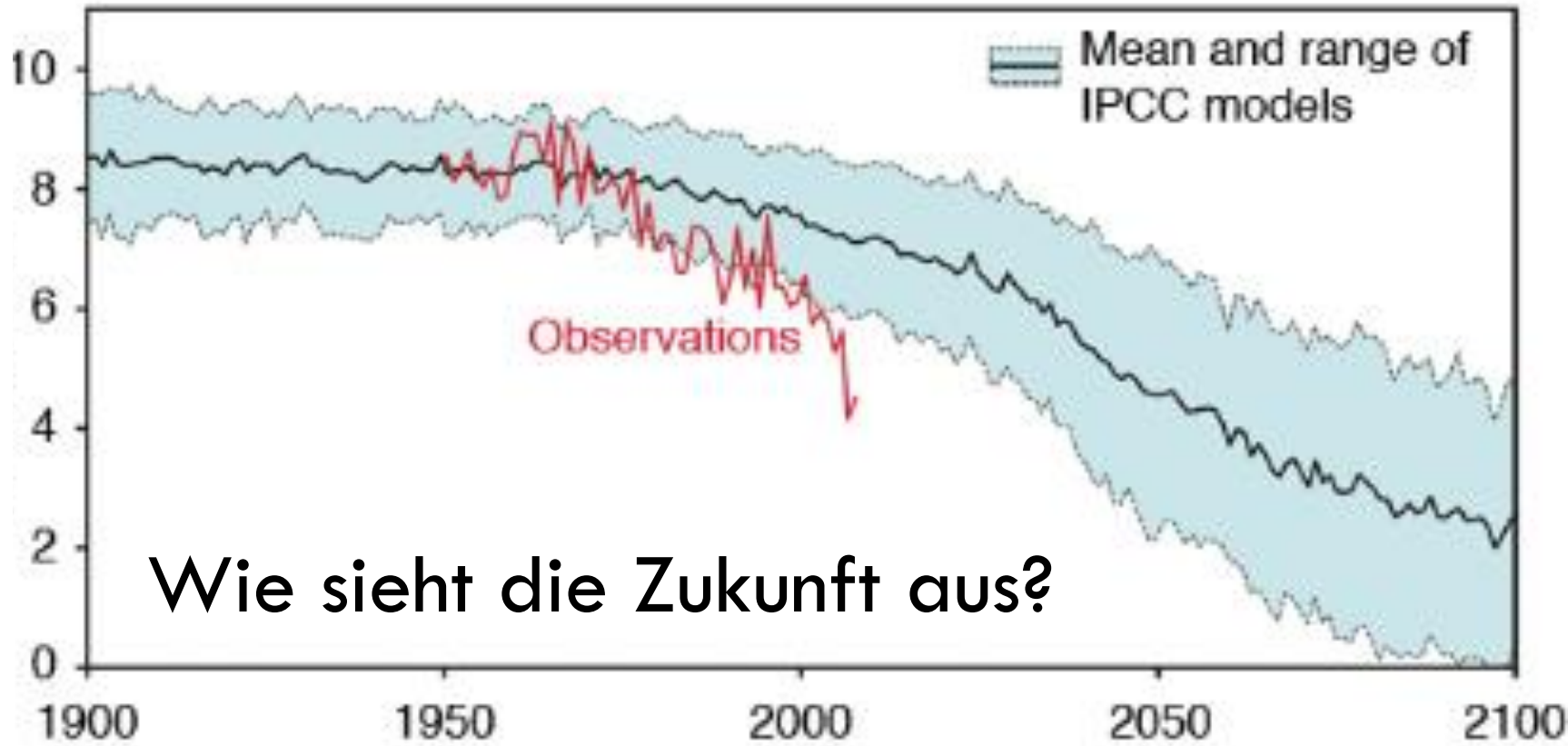


Sep 2016

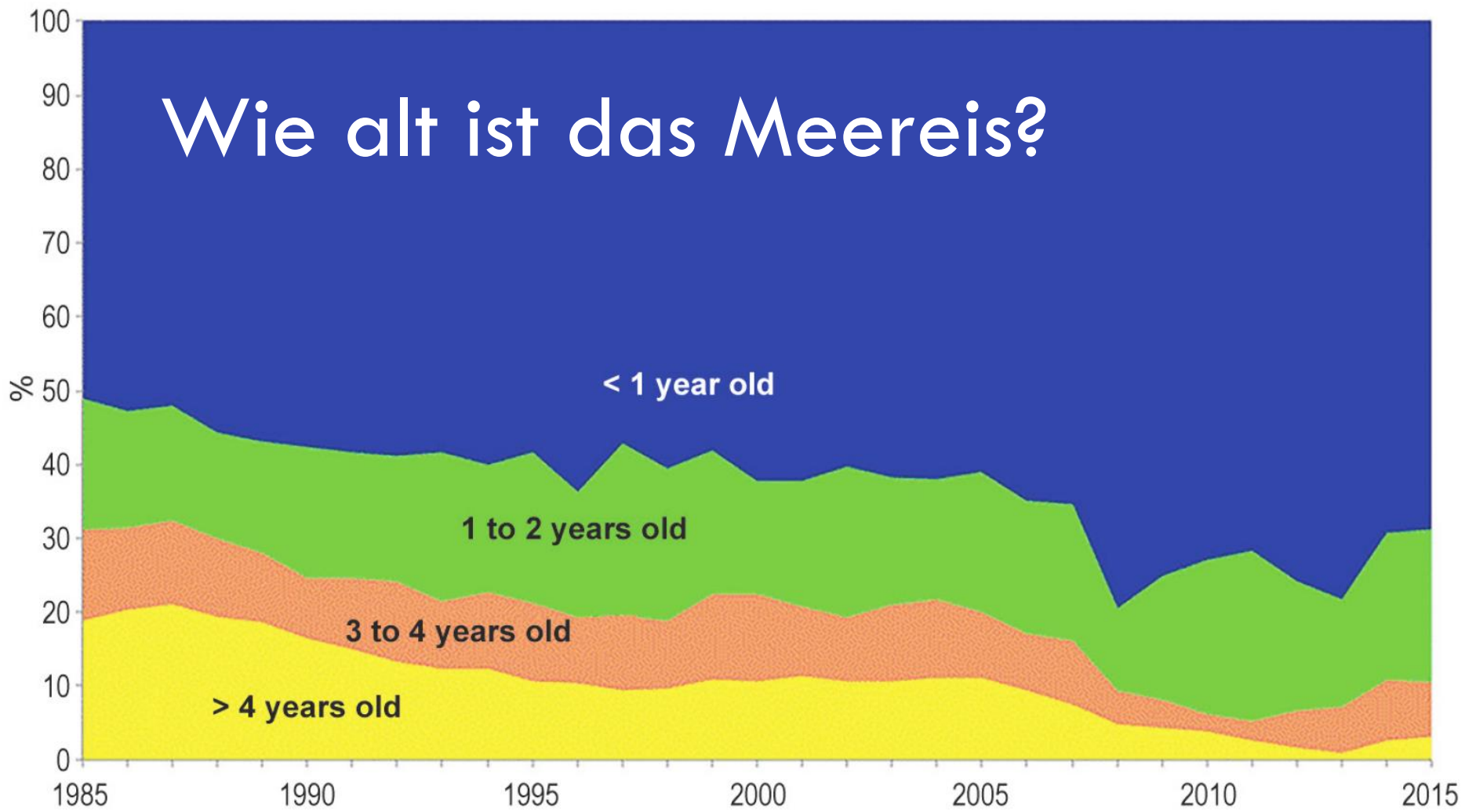
Sea Ice Age



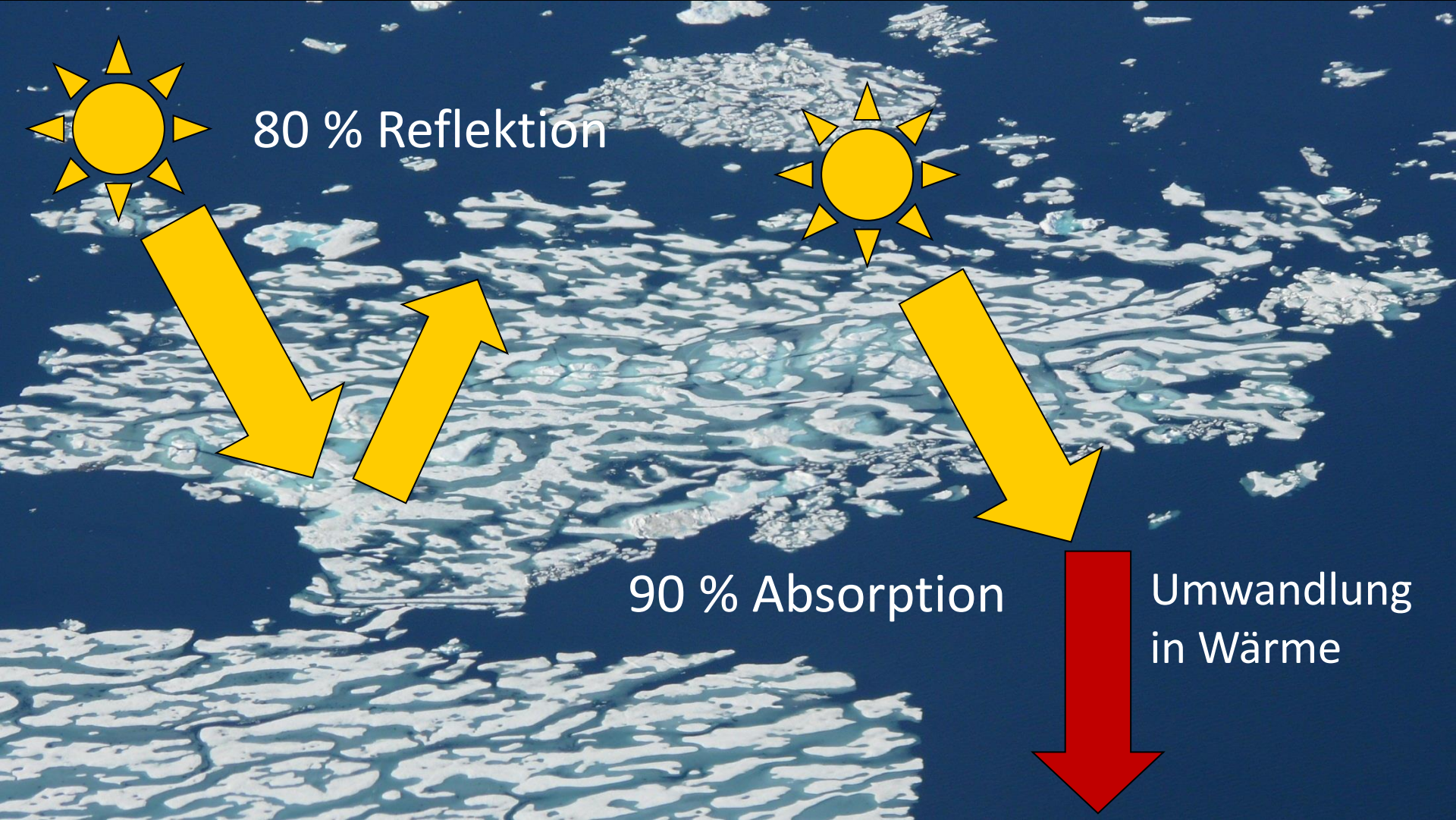
Meereisfläche in September
[Millionen km²]



Wie alt ist das Meereis?







80 % Reflektion

90 % Absorption

Umwandlung
in Wärme



GARDENWATCHCAM 2012/08/07 21:30:43

THERMO-KARST





BATAGAI KRATER
TOR DER UNTERWELT



31.22 inHg ↑

8°C



07/11/09 06:00 PM

5555555555

Vermessung & Validierung Fernerkundungsdaten



An der Küste entlang



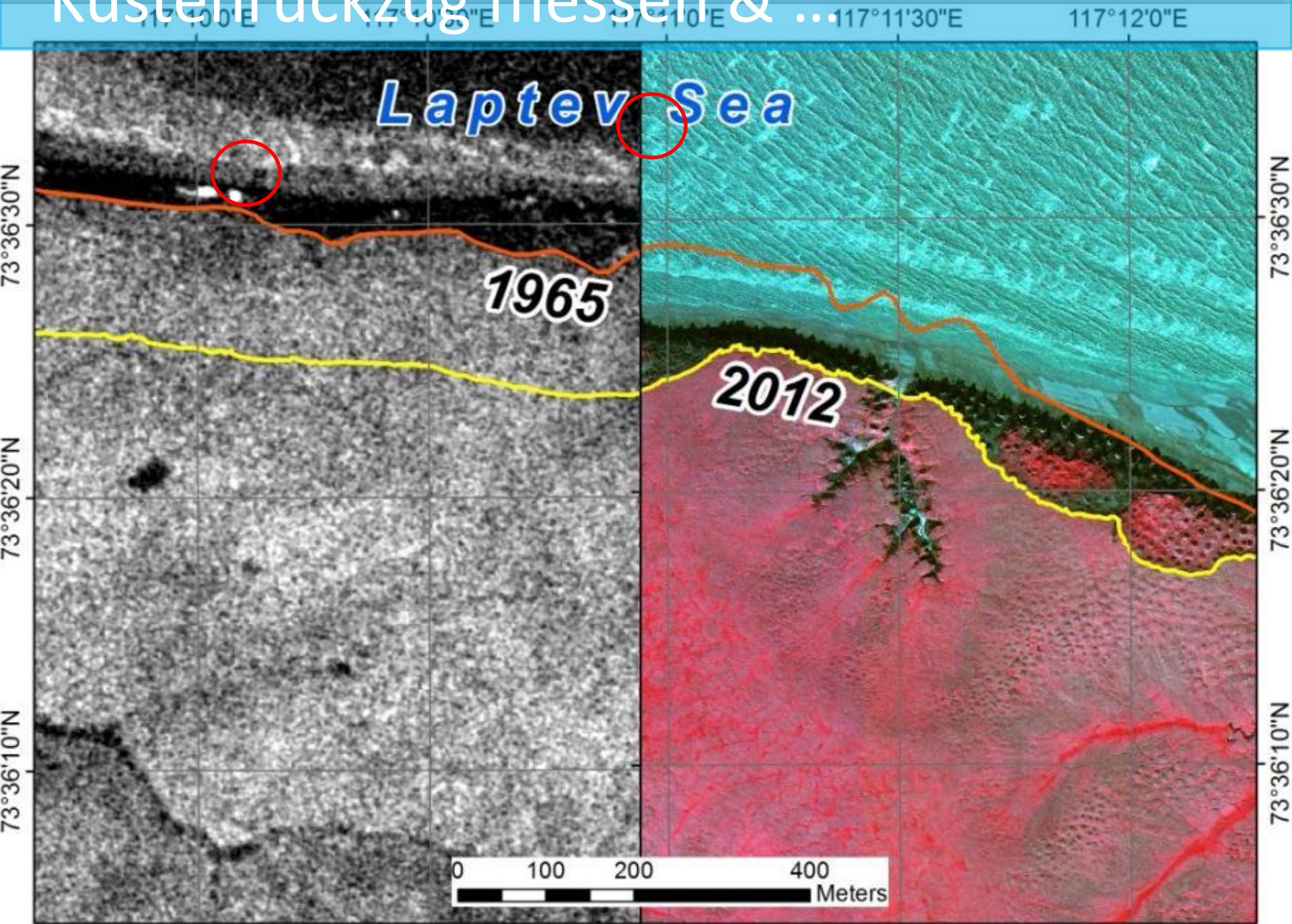
Küstenrückzug



Küstenrückzug



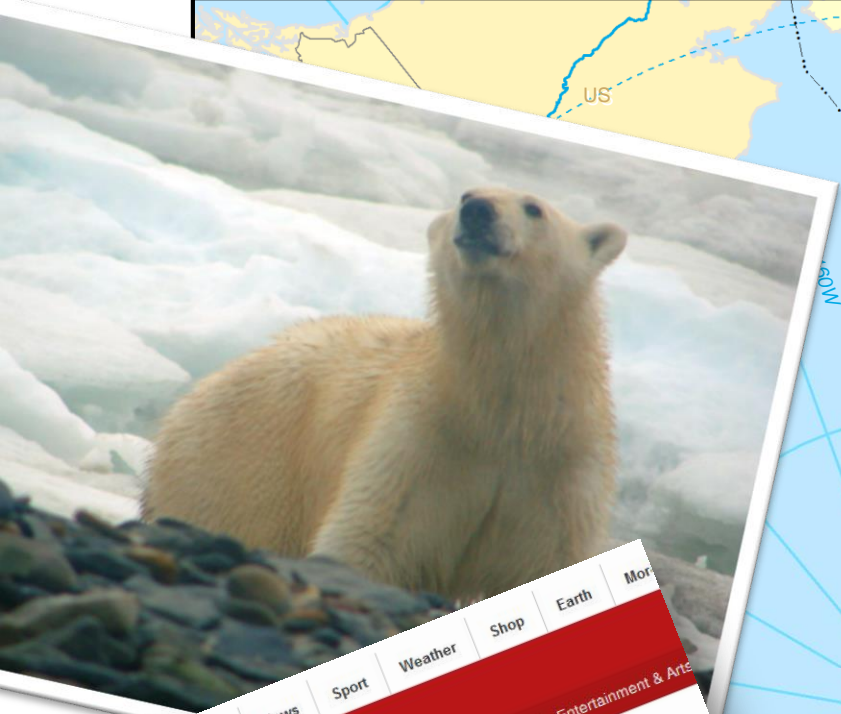
Küstenrückzug messen & ...





Überraschungsgast am Frühstückstisch





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Polar bear kills British boy in Arctic

© 5 August 2011 | UK

it was shot dead by a team member



№ 4, август 2011

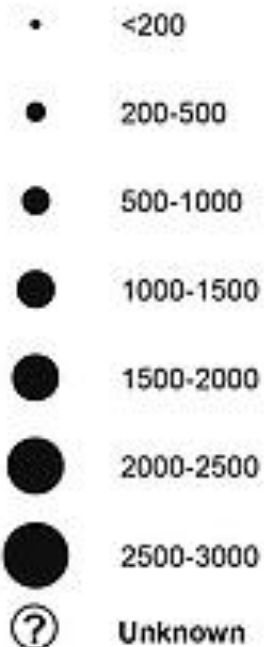
Неприятной новостью стало появление второго медведя на подступах к лагерю. Дожурный при провале движения медведя в сторону лагеря убит. По команде весь лагерь... Двое строили клином «ослабей», как теутоисские рыцари пытались бороться на сомкнутой стене. Нерничья суба в конце июля была забита льдом, и люди бросились в прибрежные воды. Благодаря оленю и слаженному действию, была вырвана борозба с инстинктами, похищая истому оксфорское выживание. Не за прослед лагеря расстояние. Неприятность годовых зверей подтверждает факт нахождения на лагерь в день работы экспедиции и уничтожение запасов халвы, пралинов и конфет.

Оружие 21-го века в лагере медведя. Фото И.А. Ни...

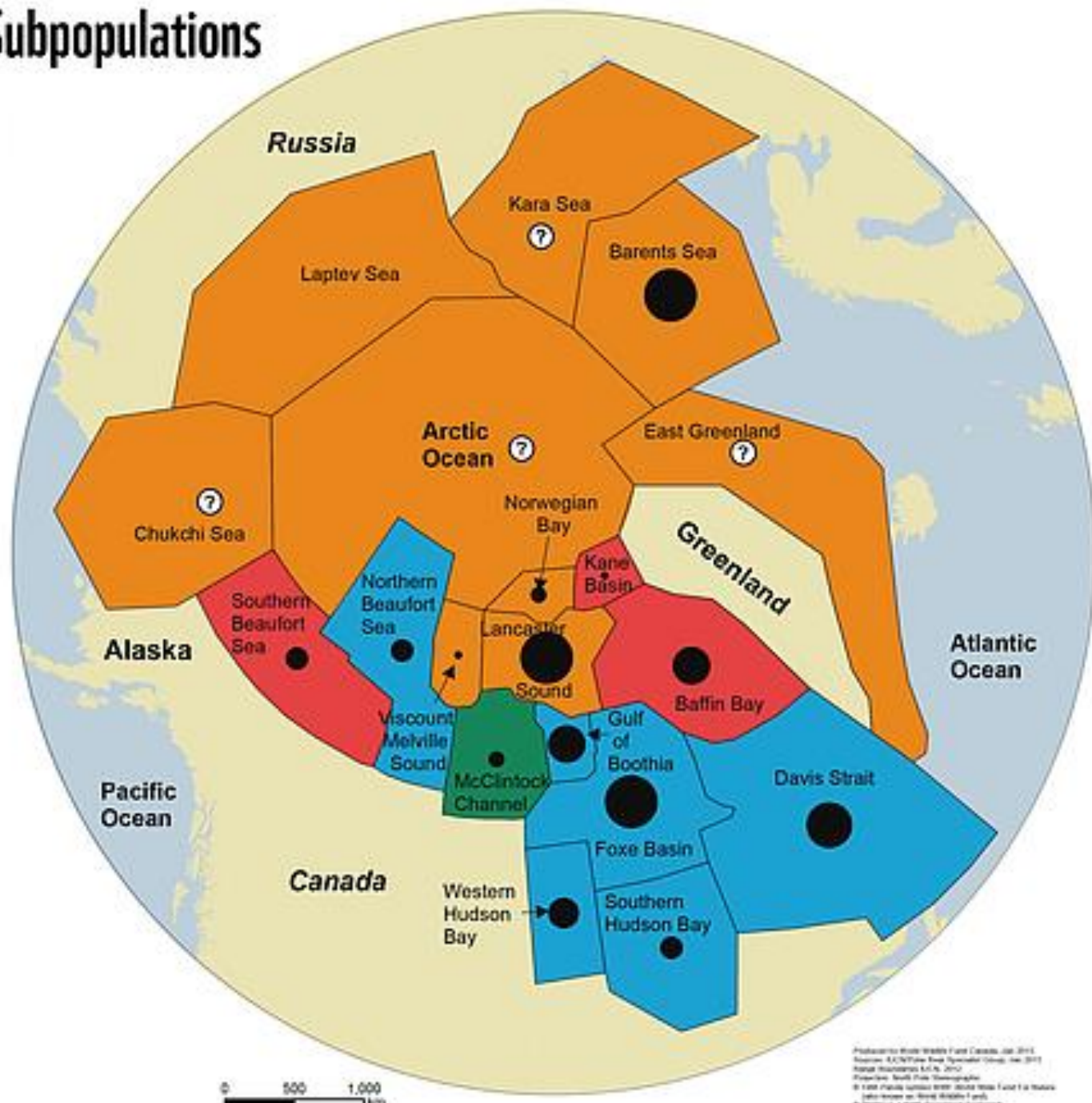
2

Trends in Polar Bear Subpopulations

SUBPOPULATION SIZE (Number of bears)



POPULATION TREND (2014)



0 500 1,000 km

Produced by WWF Canada, Jan 2015.
Source: IUCN Polar Bear Specialist Group, Jan 2015.
Map: WWF Canada, Jan 2015.
Illustration: Scott Cook, WWF Canada.
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M B A R I











Elfenbein Goldrausch





