



Part 1.

Increasing climatic and biotic disturbance

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The 2011/12 case study

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Environmental Research Letters

Environ. Res. Lett. 9 (2014) 084006 (14pp)

[doi:10.1088/1748-9326/9/8/084006](https://doi.org/10.1088/1748-9326/9/8/084006)

Record-low primary productivity and high plant damage in the Nordic Arctic Region in 2012 caused by multiple weather events and pest outbreaks

Jarle W Bjerke¹, Stein Rune Karlsen², Kjell Arild Høgda², Eirik Malnes²,
Jane U Jepsen¹, Sarah Lovibond^{1,4}, Dagrún Vikhamar-Schuler³ and
Hans Tømmervik¹

A long-term winter perturbation study: Abisko, northern Sweden

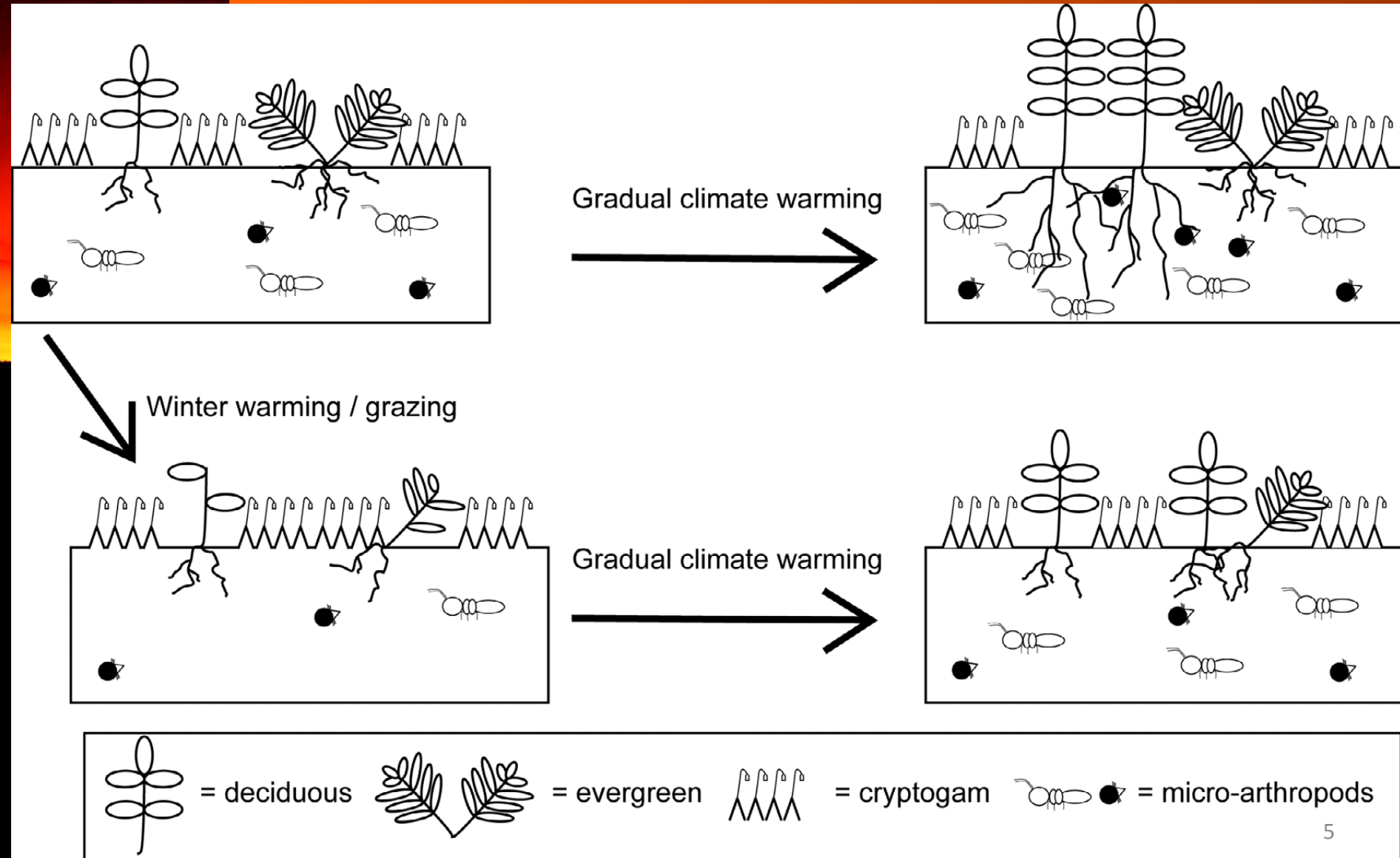
 **Global Change Biology**

Global Change Biology (2015), doi: 10.1111/gcb.13007

Climatic and biotic extreme events moderate long-term responses of above- and belowground sub-Arctic heathland communities to climate change

STEF BOKHORST^{1,2,3}, GARETH K. PHOENIX⁴, MATTY P. BERG^{3,5},
TERRY V. CALLAGHAN^{4,6,7}, CHRISTOPHER KIRBY-LAMBERT¹ and JARLE W. BJERKE¹

Global Change Biology 2015



World's northernmost agriculture

IO P Publishing

Environ. Res. Lett. 10 (2015) 095007

doi:10.1088/1748-9326/10/9/095007

Environmental Research Letters



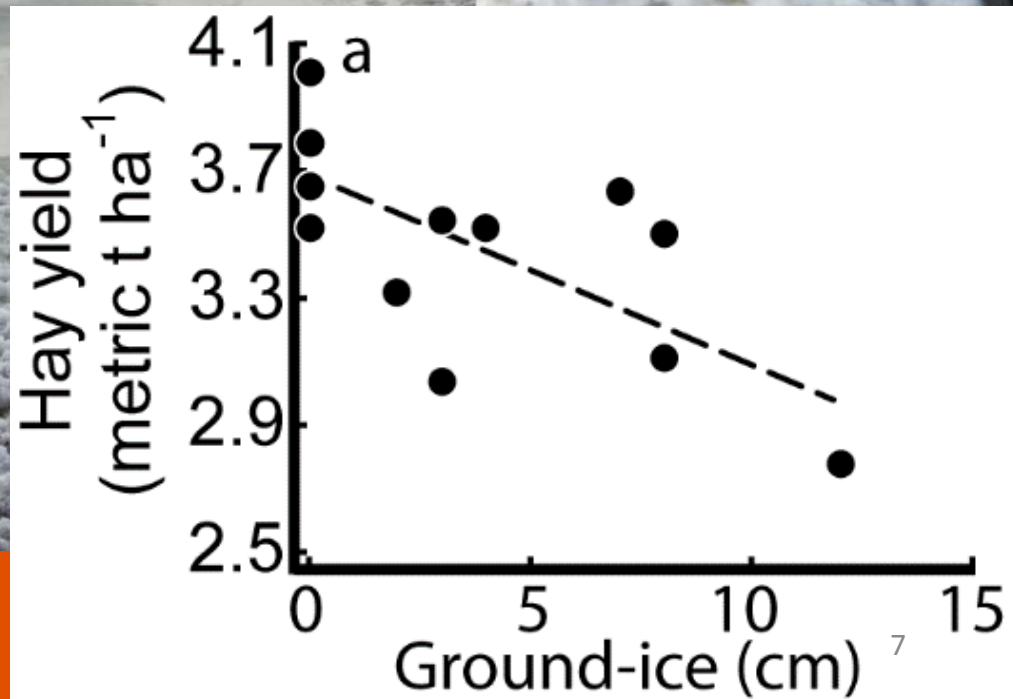
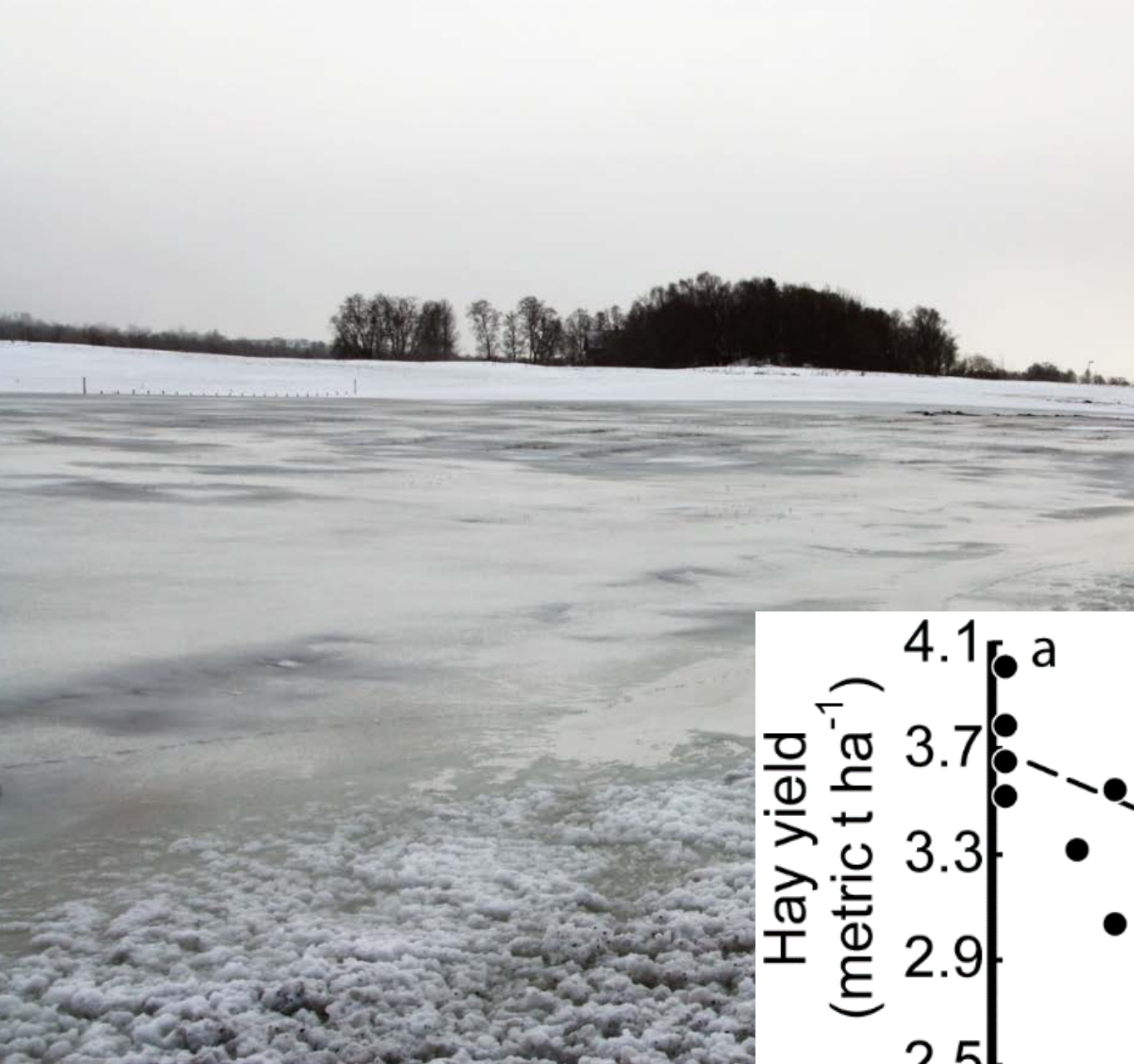
LETTER

Impacts of snow season on ground-ice accumulation, soil frost and primary productivity in a grassland of sub-Arctic Norway

OPEN ACCESS

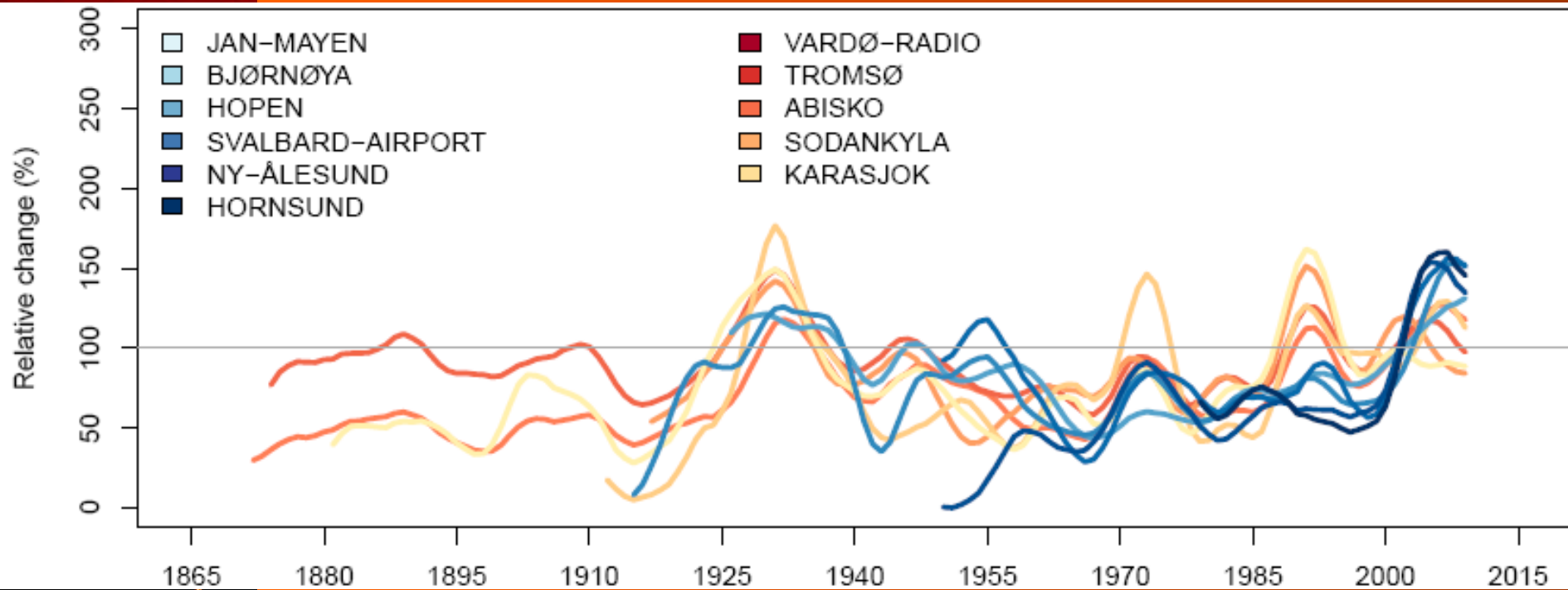
RECEIVED
15 January 2015

Jarle W Bierke¹, Hans Tømmervik¹, Matthias Zielke² and Marit Jørgensen²



World's northernmost agriculture

Changes in winter warming events in the Nordic Arctic Region

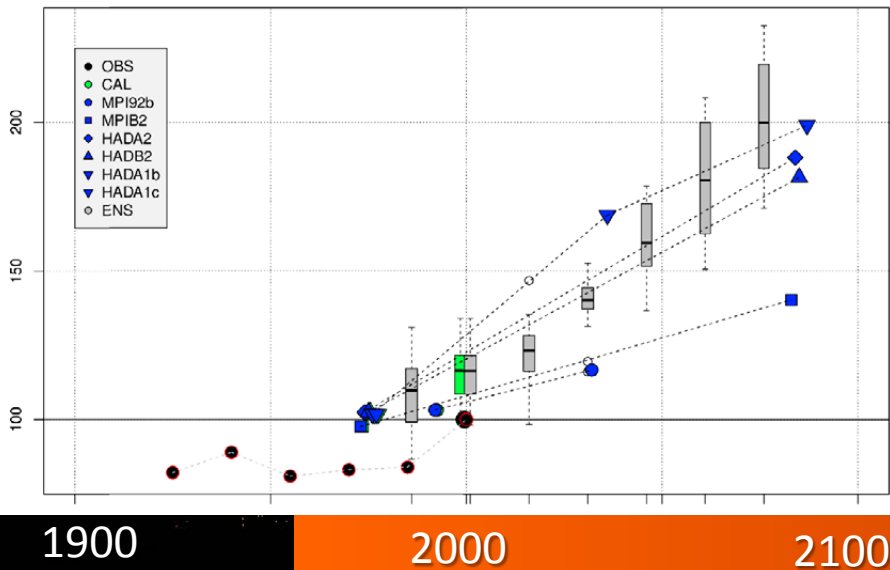


Change in number of melt days in mid-winter.

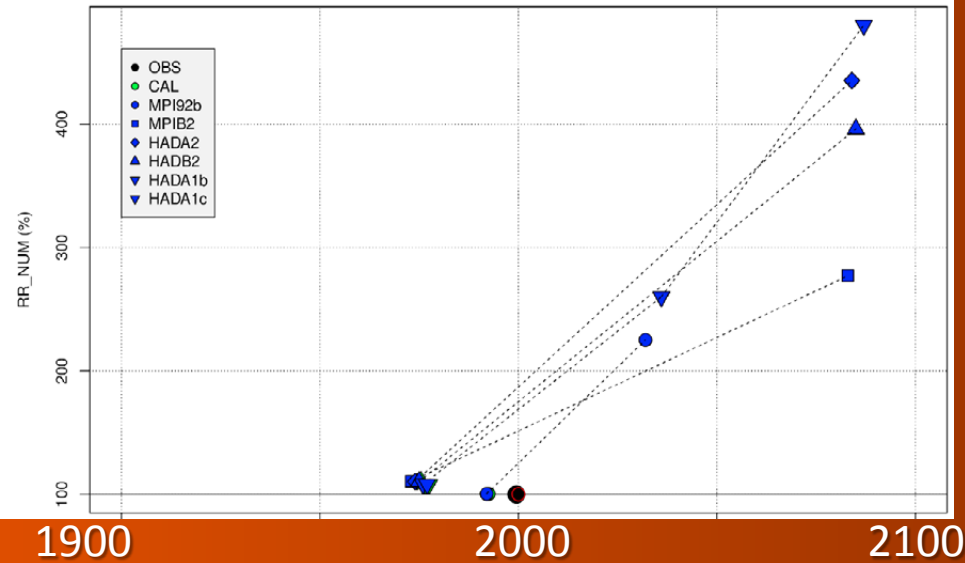
Vikhamar-Schuler et al., submitted

Changes in winter warming events in the Nordic Arctic Region

Number of rainy days (T_{2m}>0) Oct–Apr SODANKYLA



Number of rainy days (T_{2m}>0) Oct–Apr NY–ALESUND




Increasing frequency of warming events.

Vikhamar-Schuler et al., submitted

Arctic Bell Heather – Cassiope tetragona





Part 2. Can we influence the direction of Arctic vegetation change, and if so, which direction should we promote?



Thawing permafrost – collapsing
palsa mire

Regjeringen gir 61 millioner til klimatiltak i skog og myr

Regjeringen bevilger i alt 61 millioner kroner til klimatiltak i skog og myr i sitt forslag til statsbudsjett for 2016.



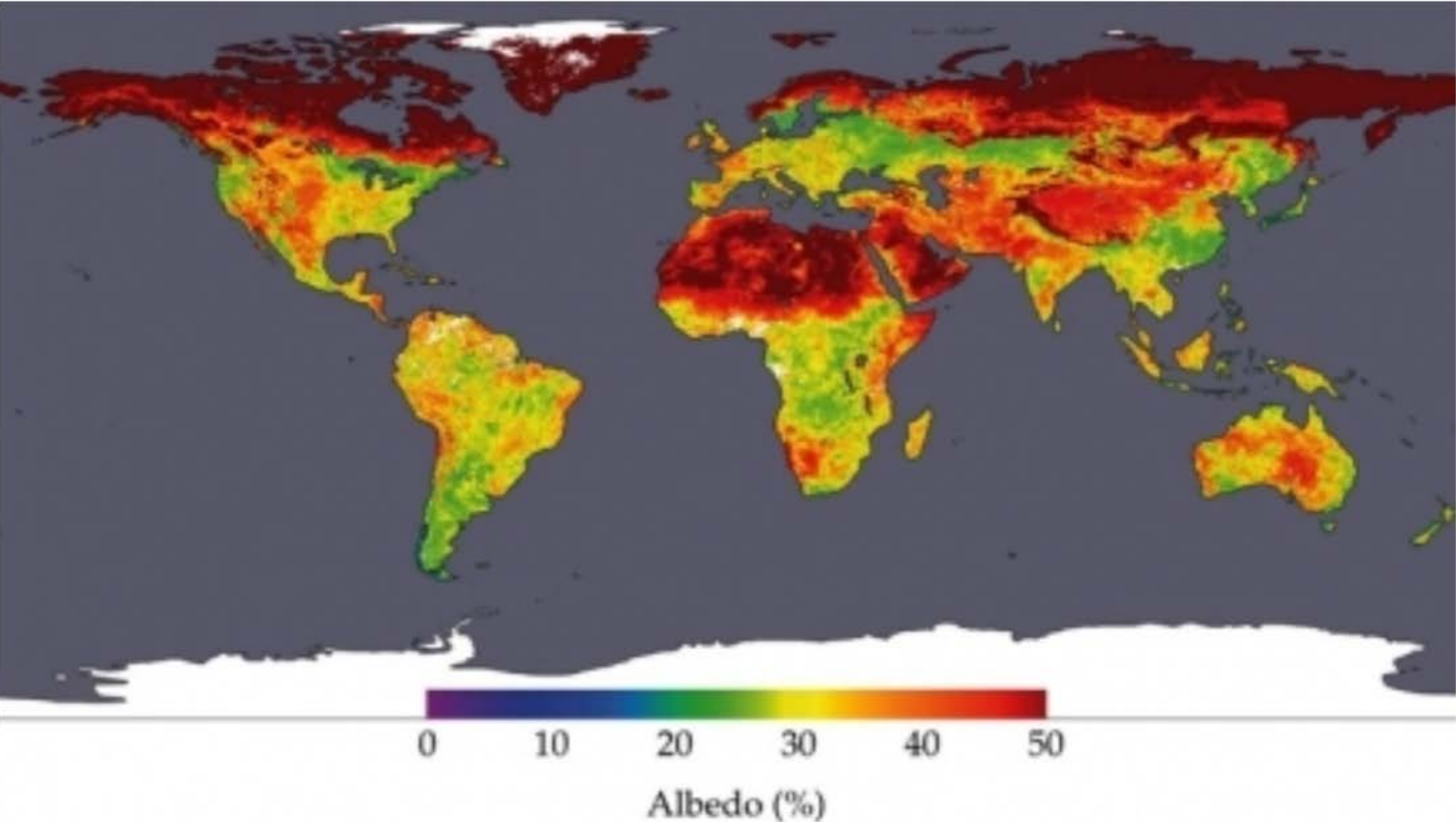
SABIMA fraråder gjødsling av skog



I et felles høringsinnspill fraråder SABIMA og Naturvernforbundet regjeringen å subsidiere skoggjødsling som et klimatiltak.

06.08.2014

regjeringen å subsidiere en gjennomføring av skoggjødsling som et klimatiltak.



Albedo, April 2002

Hillary Clinton Discusses Black Carbon and Arctic Council in Norway

by Mia Bennett | on June 8th, 2012 | 0 Comments

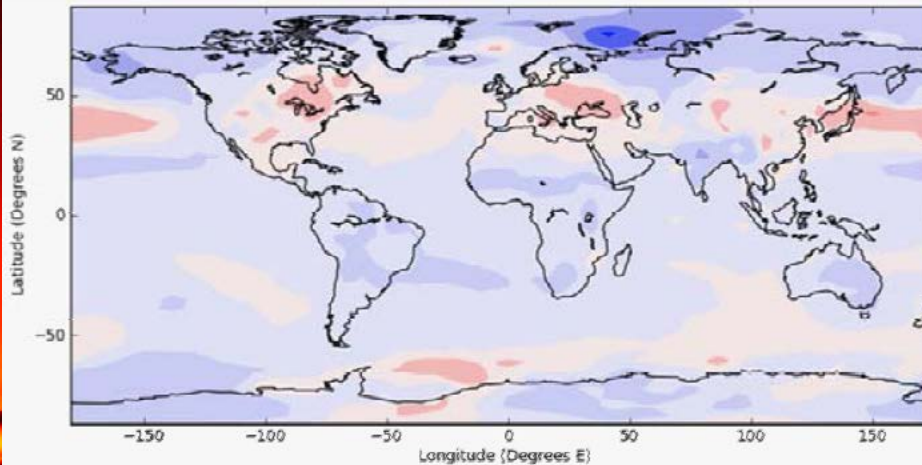
THE ARCTIC



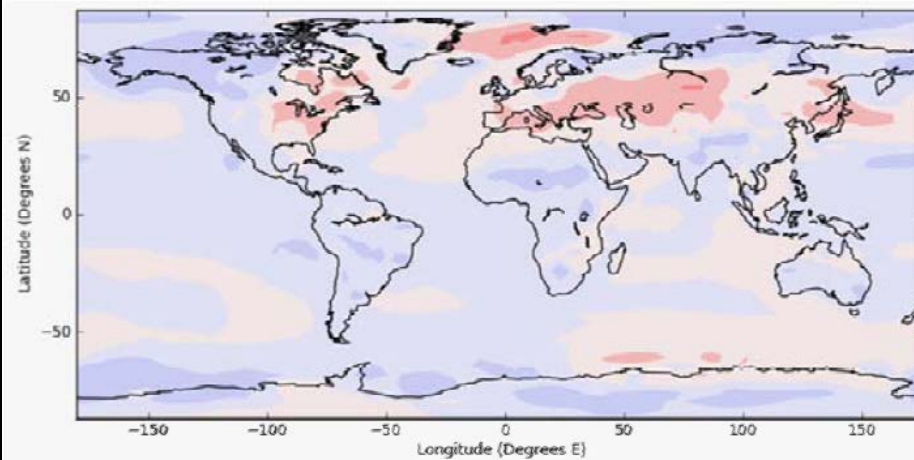
Clinton & Støre onboard the Helmer Hanssen. (c) AP.

Temperature difference ($^{\circ}\text{C}$) over the 2081-2100 period between the latitudinal afforestation and the standard no land cover change simulations

a) 50% temperate afforestation



b) 50% boreal afforestation

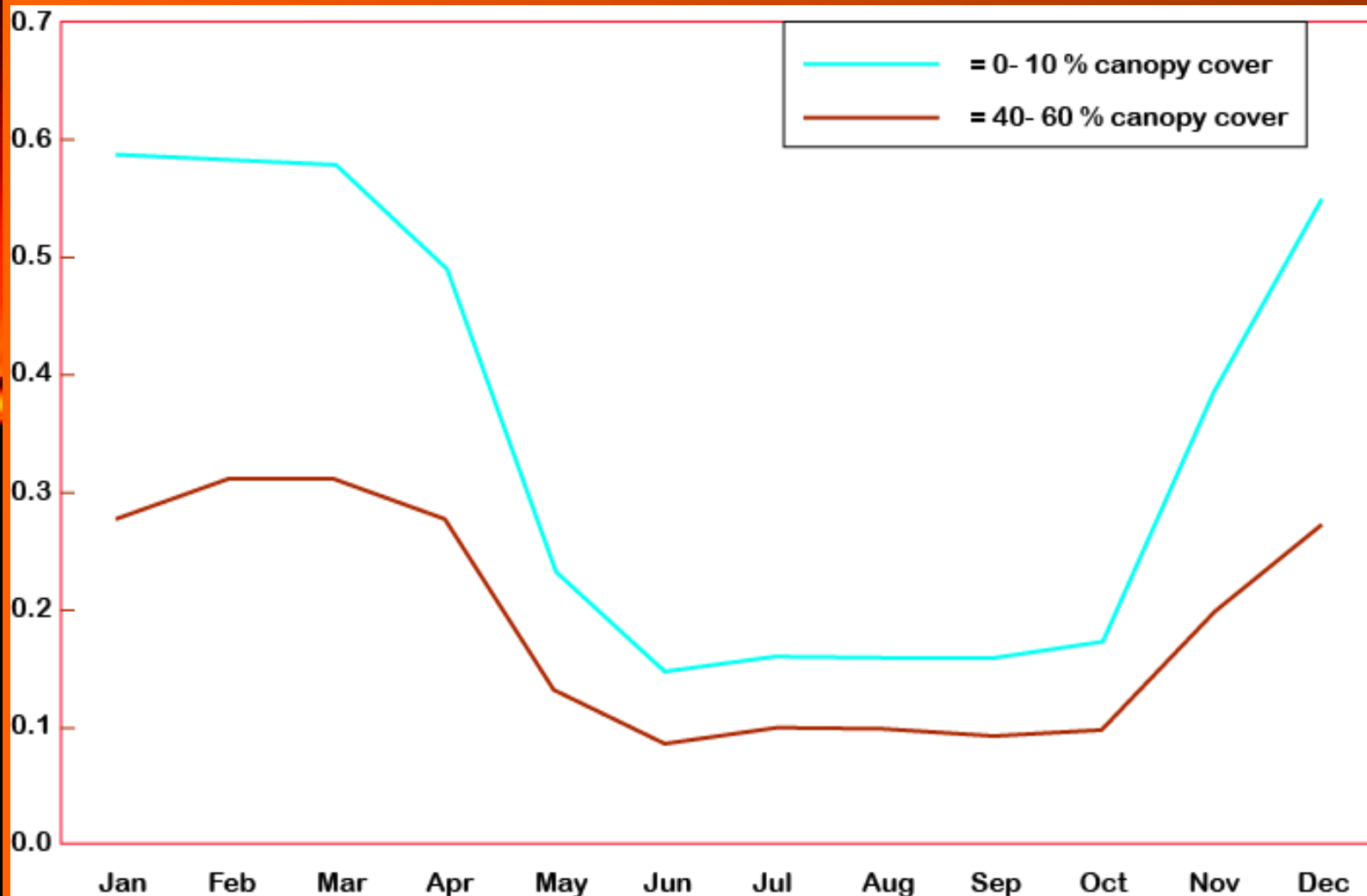


Arora & Montenegro 2011. Small temperature benefits provided by realistic afforestation efforts.
Nature Geoscience

Cladonia stellaris

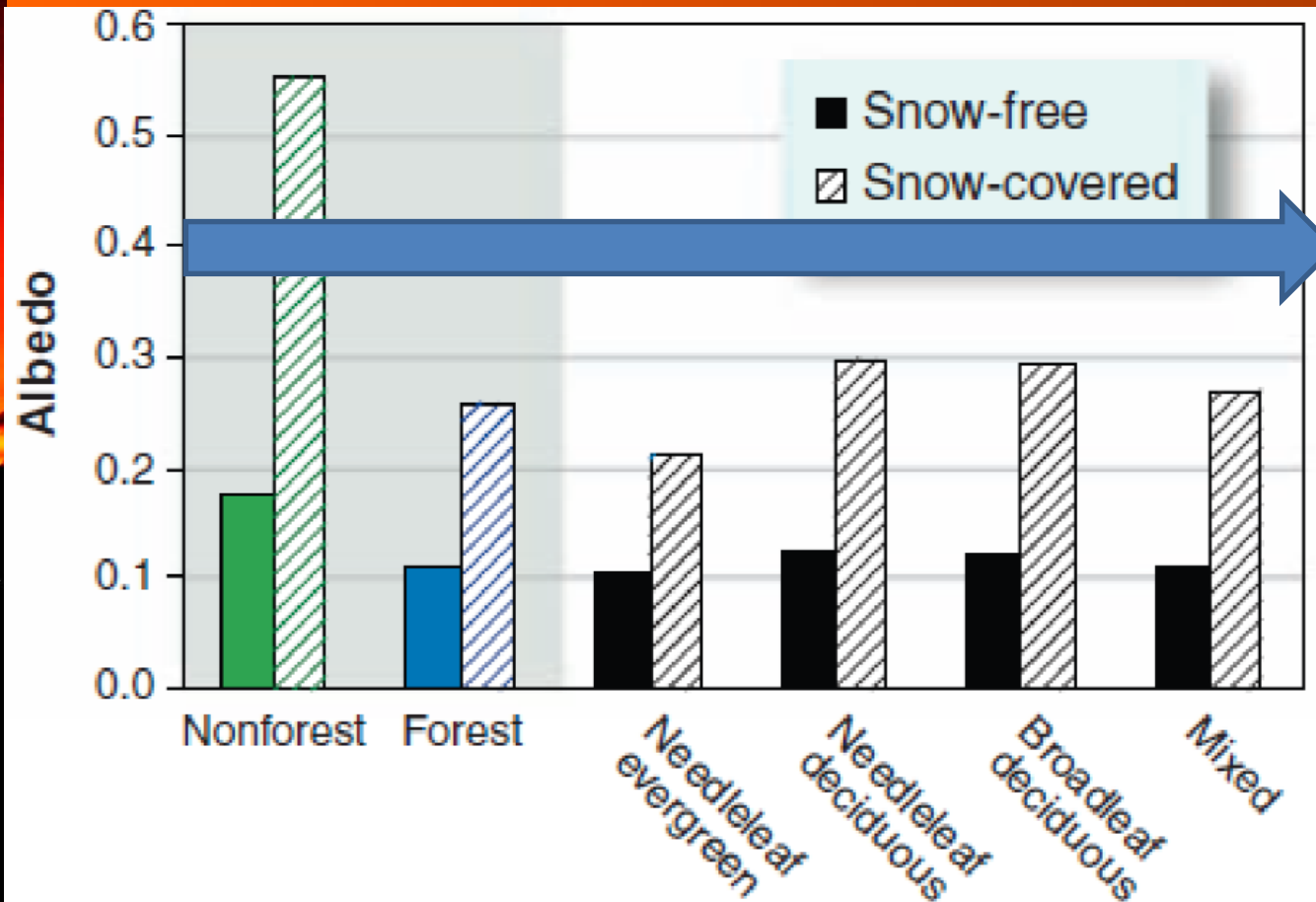


Albedo of boreal lichen woodland



Bernier et al. 2011. Boreal lichen woodlands: a possible negative feedback to climate change in eastern North America. *Agric. Forest Meteorol.*

Estimated albedo of *C. stellaris*



Cladonia stellaris

Threatened lichen tundra



Jarle Bjerke @JarleBjerke · 12. jun.

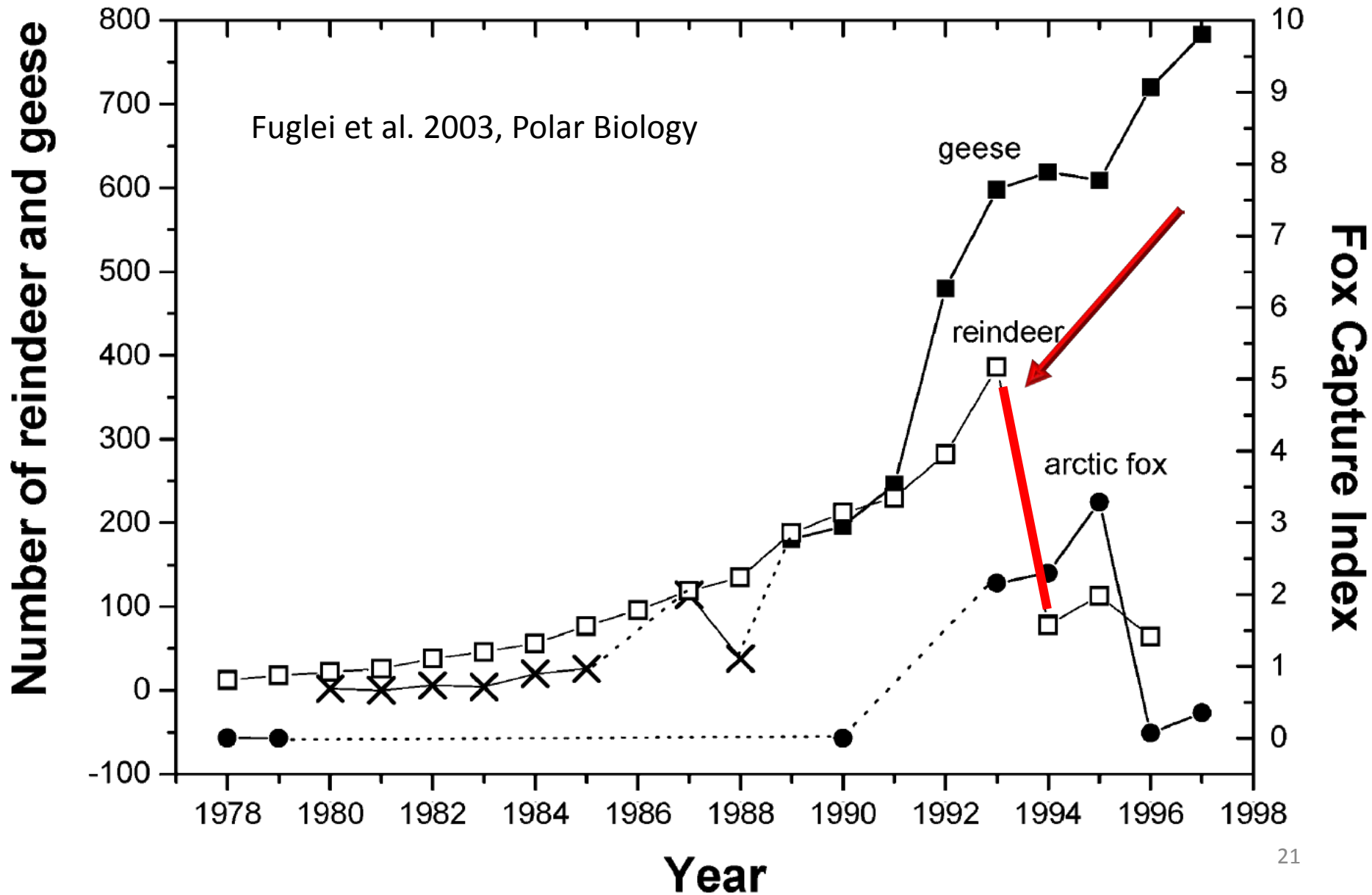
Lichen tundra and lichen forest in Norway are ecosystems severely affected by climate change, our new report explains

nina.no/archive/nina/P...

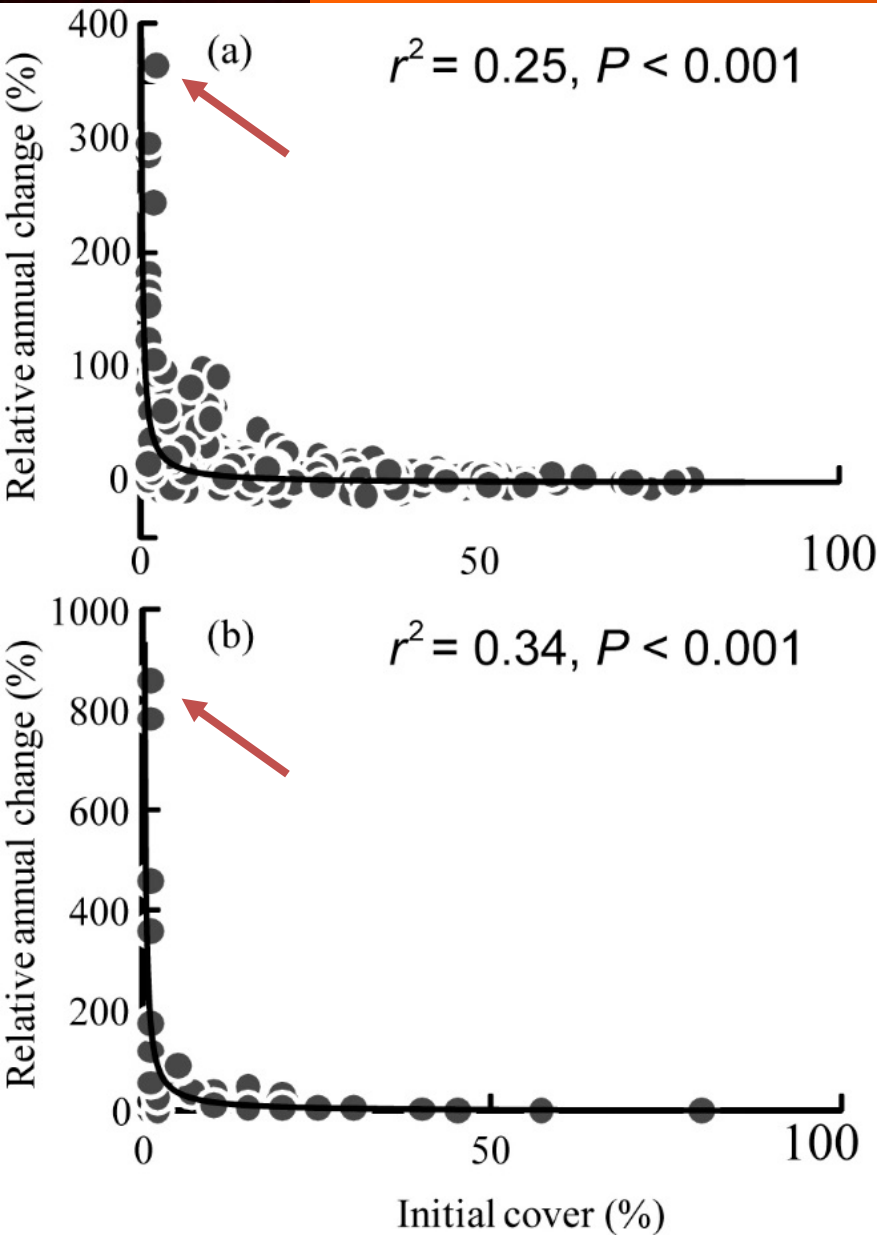


Aarrestad, P.A., Bjerke, J.W., Follestad, A., Jepsen, J.U., Nybø, S., Rusch, G.M., & Schartau, A.K. 2015. Nature habitats for climate adaptation. Effects of climate change and climate adaption interventions on biodiversity and ecosystem services. - NINA Report 1157. 98 pp.]

Reindeer to new areas



Lichen recovery



FUNGAL ECOLOGY 5 (2012) 3–15



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journal homepage: www.elsevier.com/locate/funeco

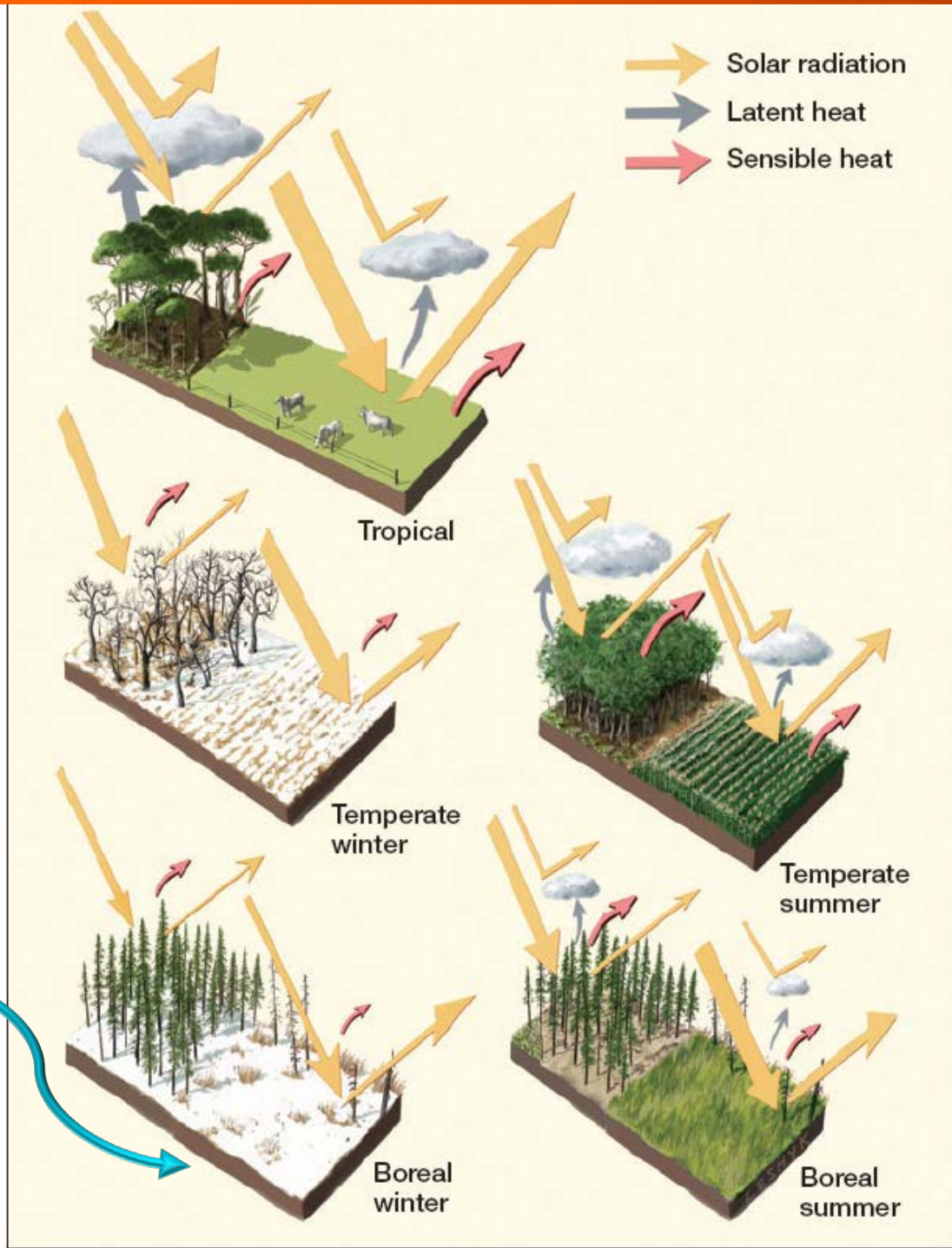


Rapid recovery of recently overexploited winter grazing pastures for reindeer in northern Norway

Hans TØMMERVIK^{a,*}, Jarle W. BJERKE^a, Eldar GAARE^b, Bernt JOHANSEN^c,
Dietbert THANNHEISER^d



Future Arctic summer? (with lichen instead of snow)



Anderson et al.
2011.
Front. Ecol. Environ.