



Natural soil warming in a Sitka spruce stand in Iceland: A new FSC-Sink related study

Bjarni D. Sigurdsson

Agricultural University of Iceland

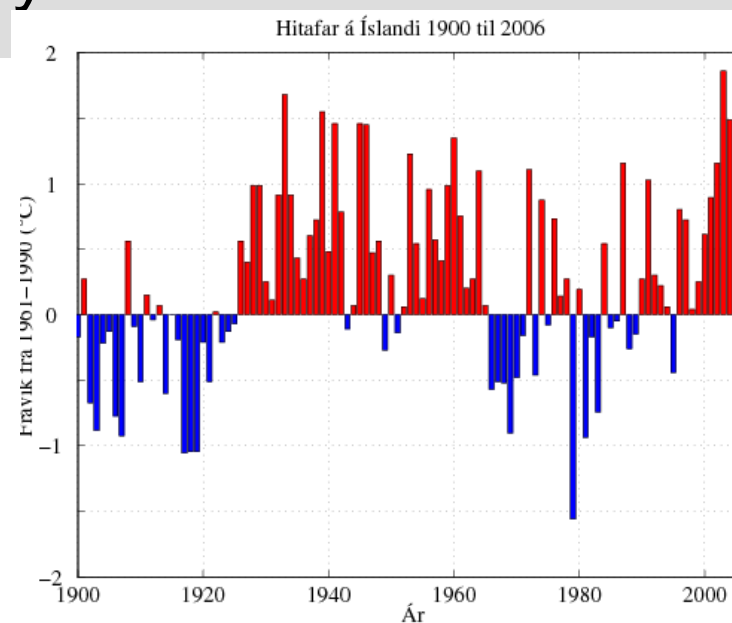
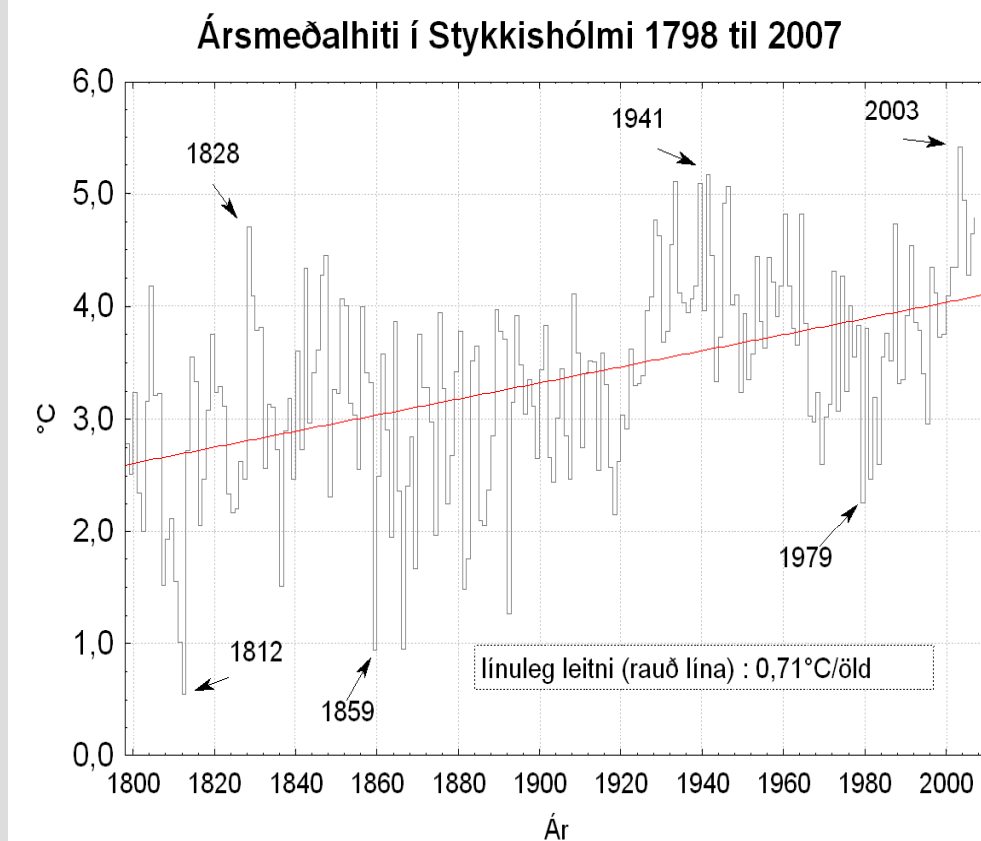
bjarni@lbhi.is



Given at the Nordic FSC-Sink Workshop,
Univ. of Copenhagen, Denmark, 24 Nov.
2011.

Climate in Iceland is very variable!

The range in mean annual T is $> 4\text{ }^{\circ}\text{C}$
During the past 200 years it has warmed by **0.7°C**
per century



Data: Icel. Met. Buero – Trausti Jónsson

Nordic research project 1994–1997

Effects of elevated T, CO₂, and N on tree growth

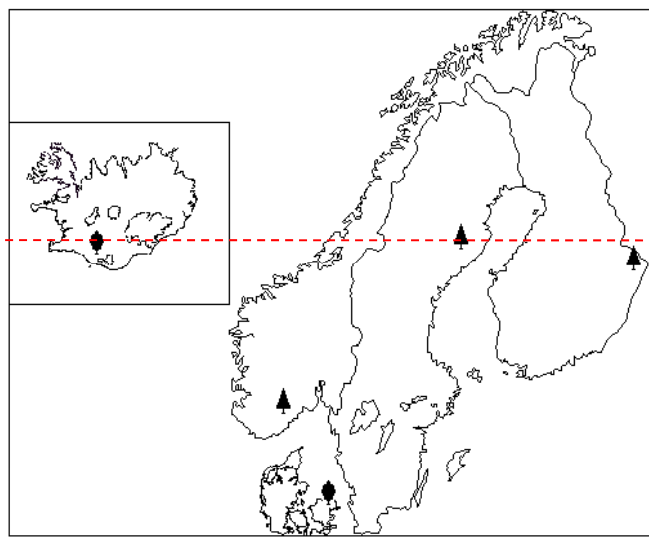
Denmark: beech

Finland: Scots pine

Norway: Scots pine

Sweden: Norway spruce

Iceland: black cottonwood



Increased growing season T in Iceland by 1.1 °C increased 3-year tree growth by 45%.

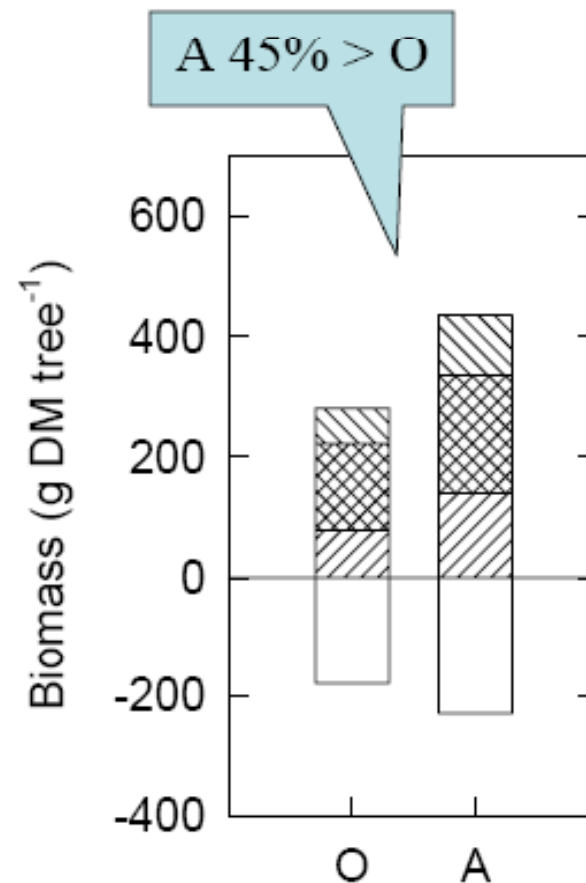
T + **minirialization effects**

The length of the growing season was not affected.

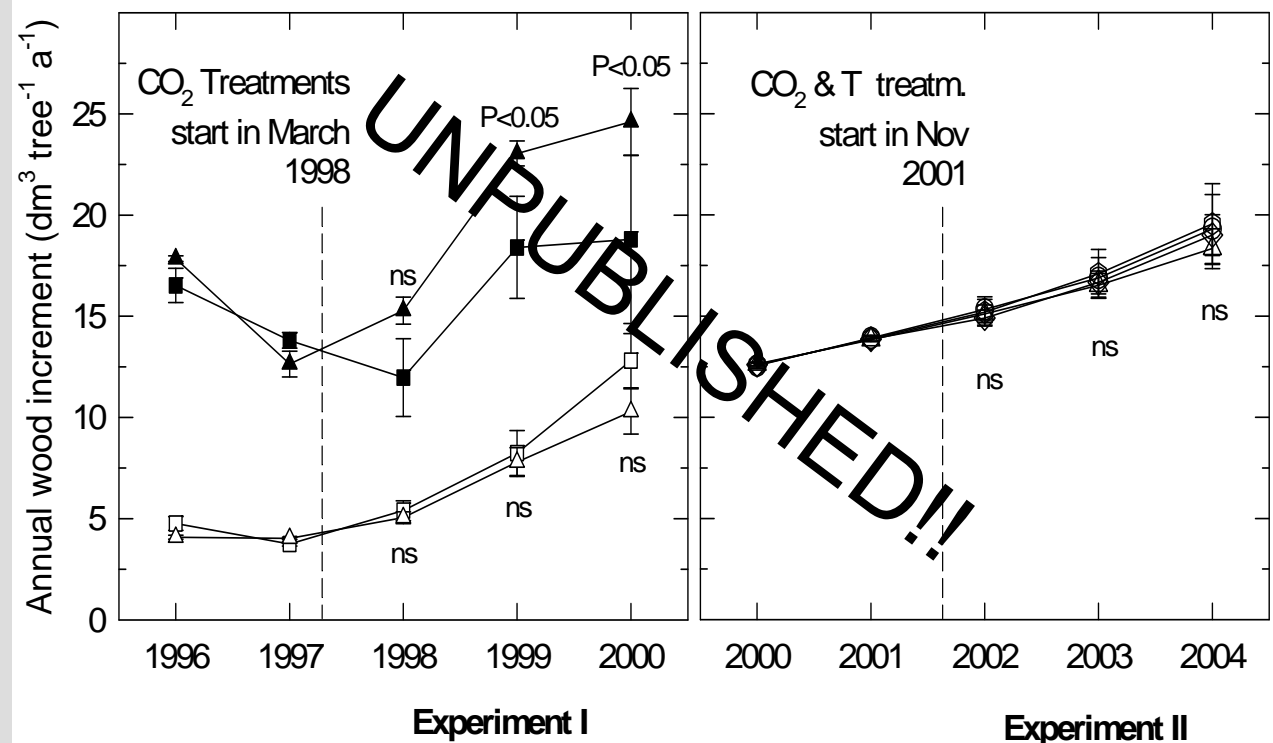
(Sigurdsson 2001. PhD thesis)

Hiti og trjávöxtur

Bjarni D. Sigurðsson



Elevating air temperature $\sim 4^{\circ}\text{C}$ – without increasing soil temperature **did not increase** aboveground growth of Norway spruce at low N-availability



Increasing soil temperature by $\sim 4^\circ\text{C}$ did however increase 3-year growth by +115% (Strömberg & Linder 2002)

Sigurdsson, Linder et al.
(2011). Tree Physiology
(submitted)

FORHOT

(Natural soil warming in a Sitka spruce forest in Iceland)



Earthquake in May 2008



© Edda Sigurðis

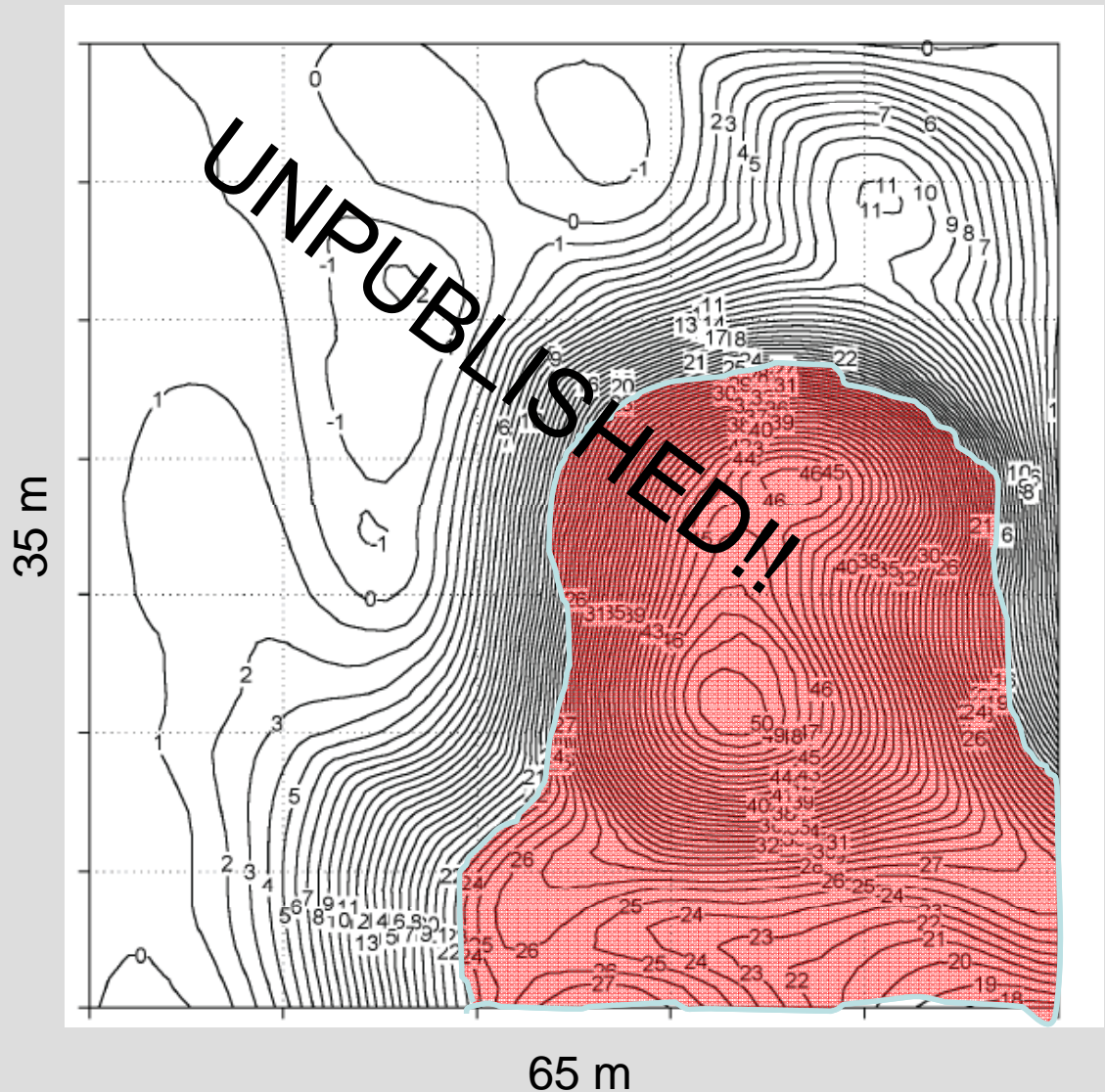
Natural soil warming experiment

Soil T elevation at 10 cm depth (0-50 °C)



2500 m² study area

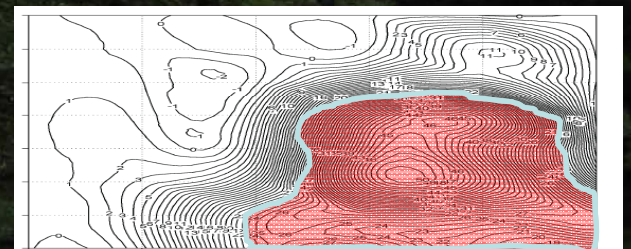
Now 3.5 years of
exposure to higher soil
temperatures





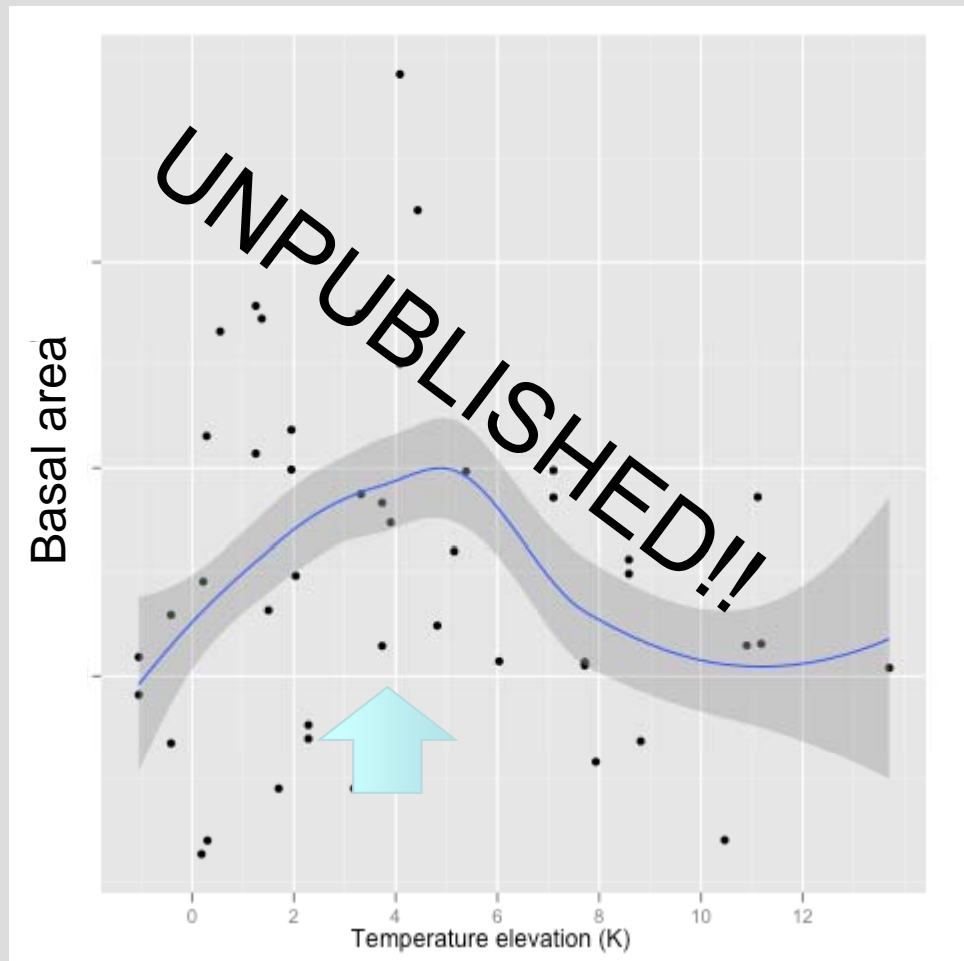


Dominant height 13 m
45 years
Unthinned
3000 trees/ha



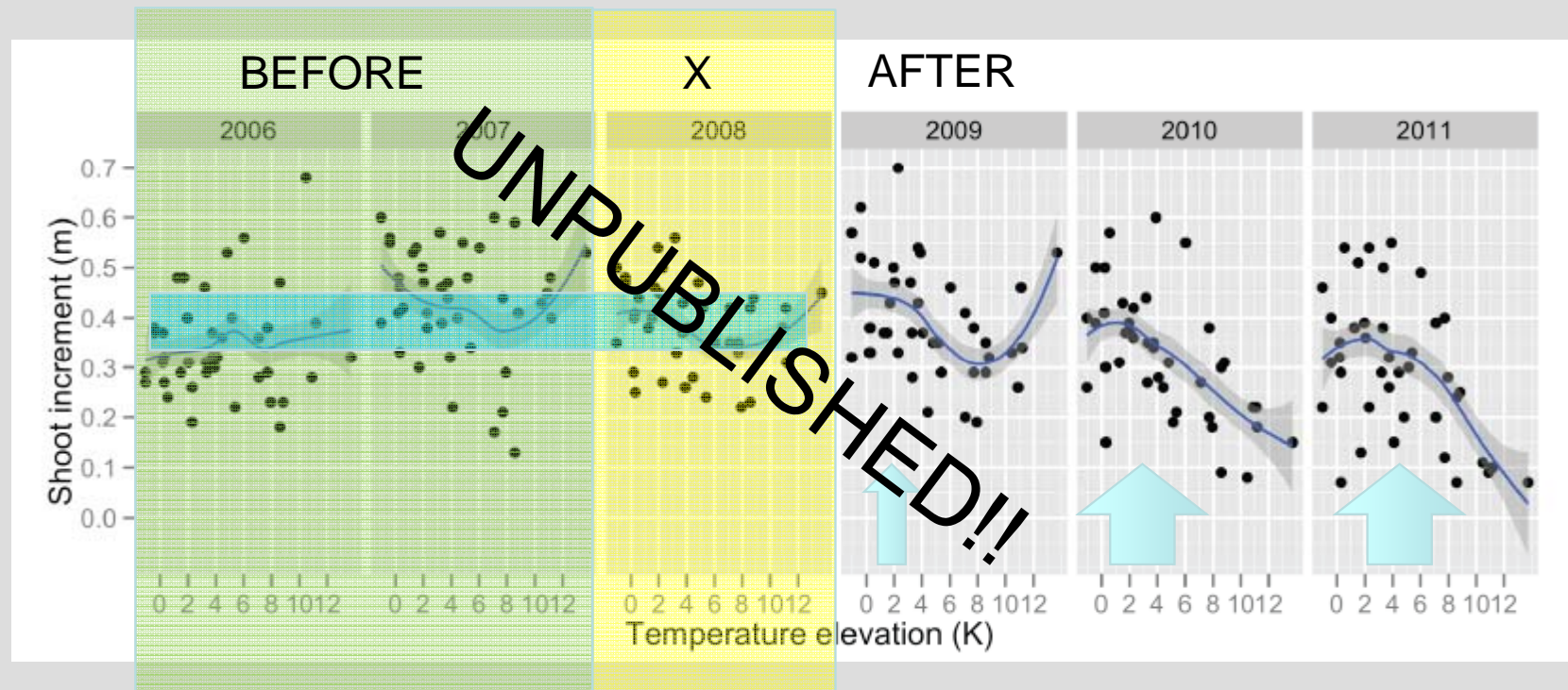
65 m

Basal area after 3,5 years of exposure



Lenz and Sigurdsson (unpubl. prelim. data)

Height increment before and after the exposure started



Lenz and Sigurdsson (unpubl. prelim. data)

Number of (pilot)studies started/starting within ForHot...

Started:

1. Armando Lenz, Bjarni D. Sigurdsson, and Christian Körner – Effects on **annual tree growth and TNC status**.
2. Edda S. Oddsdóttir and Helena M. Stefánsdóttir – **Litter bag study**.
3. Ella Thoen, Edda S. Oddsdottir, Úlfur Óskarsson and Kesara Anamthawat-Jónsson.
Mycorrhiza
4. Elin Gudmundsdottir, Úlfur Óskarsson and Ásrún Elmarsdóttir – Effects on **ground vegetation**

Starting:

- James T. Wedon and Peter van Bogedom – Effects on **soil microbes**
- Bjarni D. Sigurdsson – Automated **soil flux** system.
- Brynhildur Bjarnadottir and Bjarni D. Sigurdsson – **Canopy gas exchange**

The ForHot group

Agric. Univ. of Iceland

- Prof. Bjarni D. Sigurdsson (coord.)
- Dr. Úlfur Óskarsson
- M.Sc. Helena Marta Stefánsdóttir
- Elín Guðmundsdóttir (M.Sc. student)

Univ. of Iceland / Univ. of Oslo

- Prof. Kesara Anamthawat-Jónsson.
- Ella Thoen (M.Sc. student)

Icelandic Forest Research – Mogilsa

- Dr. Edda S. Oddsdóttir
- Dr. Brynhildur Bjarnadóttir

Basel University, Switzerland

- Prof. Kristian Körner
- Armando Lenz (Ph.D. student)

Vrije Univerity, Amsterdam

- Prof. Peter van Bodegom,
- James T. Weedon (Ph.D. student)

Univ. Eastern Finland

- Dr. Marja Maljanen

**APPLICATION WILL BE SENT
TO ICEL. RES. COUNCIL IN
SPRING 2012**

ForHot Scope: Effects of soil warming on
ecosystem processes in trees and soil

We are still missing “modelling”!!!



ÞAKKA YKKUR
FYRIR!