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

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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 °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, CO$_2$, 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%.

The length of the growing season was not affected.

(Sigurdsson 2001. PhD thesis)
Elevating air temperature $\sim 4 \, ^\circ C$ – without increasing soil temperature did not increase aboveground growth of Norway spruce at low N-availability.

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

Sigurdsson, Linder et al. (2011). Tree Physiology (submitted)
FORHOT
(Natural soil warming in a Sitka spruce forest in Iceland)

Sitka spruce
Planted in 1966 (45 years)

The Reykir campus of the Agric. Univ. of Iceland
Earthquicke in May 2008
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
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**.


**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)

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**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”!!!