



**Effects of climate change on tree seedling  
regeneration and ecosystem properties following fire  
and salvage logging in boreal forests**

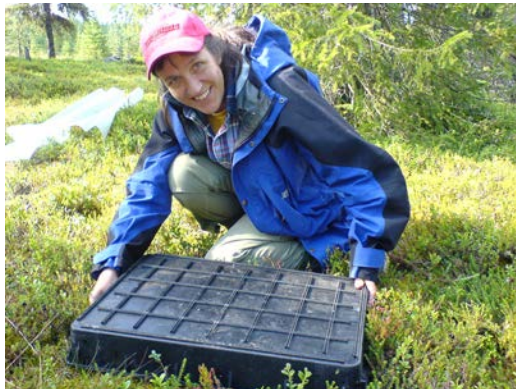
**Theresa Ibáñez**

PhD student  
Theresa Ibáñez



# Supervisors

Prof. Marie-Charlotte  
Nilsson Hegethorn



Assoc. Prof.  
Michael Gundale



Prof. David Wardle

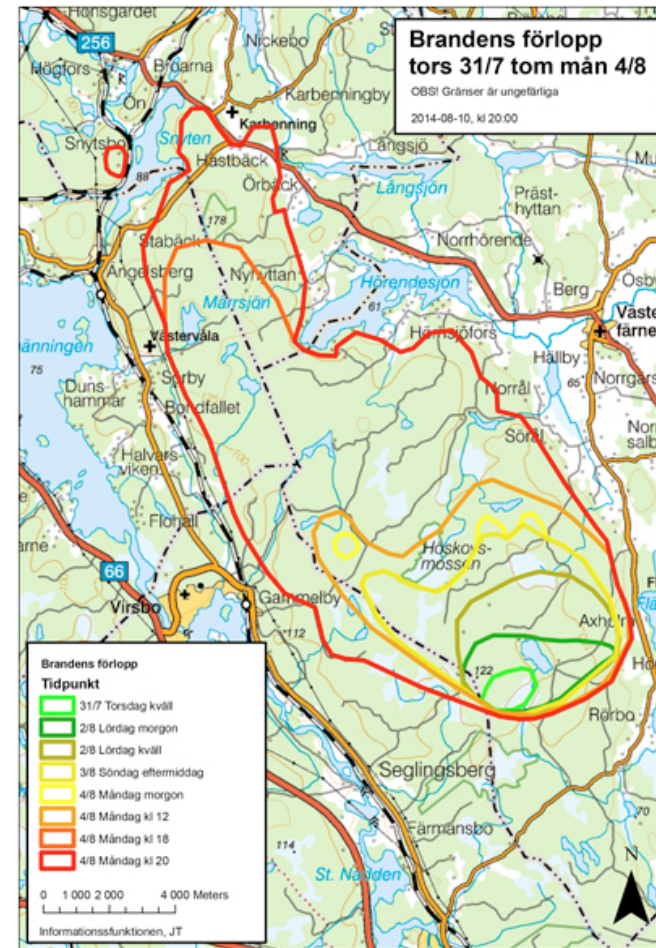


SLU Umeå Dep. Forest Ecology and Management

# Forest fire in Sala 2014



Foto Nasa Observatory



Källa VA-Planeringsguiden

# Background

Climate warming is predicted to impact future fire frequency and severity

Forest management activities impacts diversity, composition and functioning of forest ecosystems

Little is known about how these factors interact to impact forest structure and function

## Overall aim

Enhanced understanding of the **effects of climate warming and forest management** on forest recovery and resilience after fire

## Societal relevance

Will be useful to **establish policy recommendations about the impact of salvage logging** based on empirical evidence

# Experimental design

Logged/ non- logged stands

Burned sites/ control sites

Warming treatment (Open Top Chambers, OTC)



HIGH LOW CONTROL  
SOILS

## **Project I: Phenology study**

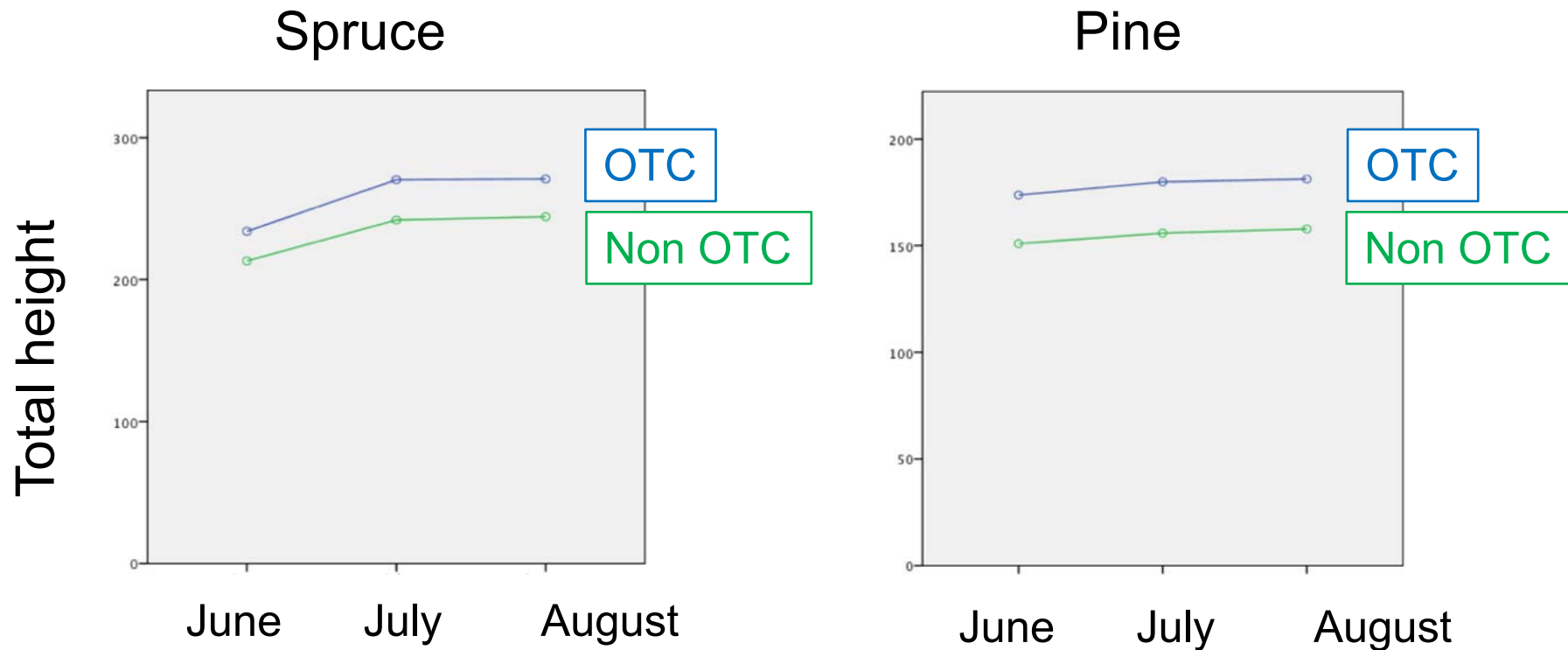
Interactive effects of fire severity, climate warming and salvage logging on the regeneration of boreal tree seedlings

Observations, measurements of growth and biomass estimations of tree seedlings from May- October 2017



Planting of Pine and spruce seedlings 2016

## Overall effects of Open Top Chambers (OTCs)



Increase of 1- 2°C inside OTC



## Project II: Greenhouse experiment

Plant- soil biota interactions in soils of different burn severity

- Distinguish between microbial processes and abiotic factors in soil



HIGH LOW CONTROL

- Plant Pine, Spruce, Birch

## Experiment I

Unsterilized soil

Burn Severity  
*High, Low, Control soil*  
Tree Species

## Experiment II

Sterilized soil

Burn Severity  
*High, Low, Control soil*  
Tree Species

Soil biota inoculation

Effects of burnt soil

Biomass of tree seedlings  
*Pine, Spruce, Birch*

Separated effects of  
soil biota and burn  
severity

Greenhouse Exp. 2: Birch

Sterile soil from:

Low Burn soil (sterile)

High Burn soil (sterile)

Control soil (sterile)



High Burn      Low burn      Control soil

High burn      Low burn      Control soil

High burn      Low burn      Control soil

High burn      Low burn      Control soil

(no inoculation)

(inoculated from)

(inoculated from)

(inoculated from)



## **Project III: lab experiment**

Soil process rates following fire in salvage logged and non-logged stands

*Soil processes*

Net (buried bag method) and gross ( $^{15}\text{N}$  pool dilution method) rates of:

- Mineralization
- Nitrification

Heterotrophic respiration (substrate-induced respiration, SIR)

Carbon and Nitrogen content, ratios



**Thank you**