

Shrub Data Synthesis Workshop

Davos Laret, Switzerland
13 – 19 September 2011



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The
Shrub
Hub

Dendroecology beyond trees

I. Summary

IASC sponsored a Shrub Synthesis Workshop that was held from September 13 – 19 in Davos, Switzerland. The workshop was an activity of the Shrub Hub Research Network (<http://shrubhub.biology.ualberta.ca/>). During the workshop, 13 participants conducted a data synthesis of growth ring, stem elongation, and other growth data of woody shrubs from Arctic and alpine tundra sites. We discussed research questions, methodologies, data contributions, and analyses and began to outline two manuscripts. We will continue to work on these efforts over 2011-2012.

II. Background

Recent evidence indicates widespread expansion of canopy-forming shrubs in tundra ecosystems. Remote sensing shows a 'greening' of the Arctic which has been partially attributed to increasing shrub cover and growth. This increase in woody shrubs is concurrent with increasing temperatures, but the actual mechanisms, the magnitude of change in cover and feedbacks promoting expansion over time have yet to be quantified at the biome scale.

III. Participants

Name	University/Institute	Country	Field sites
Isla Myers-Smith*	U Sherbrooke/U of Alberta	Canada	Yukon
Daan Blok*	Wageningen U	Netherlands	Siberia
Ken Tape*	U of Alaska Fairbanks	USA	Alaska
Martin Hallinger*	U of Greifswald	Germany	Northern Sweden/Alaska
Martin Wilmking	U of Greifswald	Germany	Northern Sweden/Alaska
Andrew Trant*	Memorial U	Canada	Labrador
Adam Naito*	Texas A&M U	USA	Alaska
Claudia Baittinger	National Museum of Denmark	Denmark	Greenland
Agata Buchwal*	WSL	Switzerland	Svalbard
Wipf Sonja	SLF	Switzerland	Alps
Christian Rixen	SLF	Switzerland	Alps
Melissa Dawes*	SLF	Switzerland	Alps
Julia Wheeler*	SLF	Switzerland	Alps
Marc Macias Fauria*	Oxford U	UK	NW Russian

* early career researcher

IV. Synthesis Manuscript

Working Title: Early summer warming promotes shrub expansion in tundra ecosystems

This manuscript will investigate the following research questions:

- i. Are early summer temperatures the key factor explaining shrub growth at sites around the circumpolar Arctic? Does this vary by site or between species?
- ii. Is variation in growth response to climate greater in sites with higher mean annual temperatures?
- iii. Is there a temperature threshold for shrub growth responsiveness to climate?
- iv. Where have we observed the greatest change in both shrub growth and climate warming?

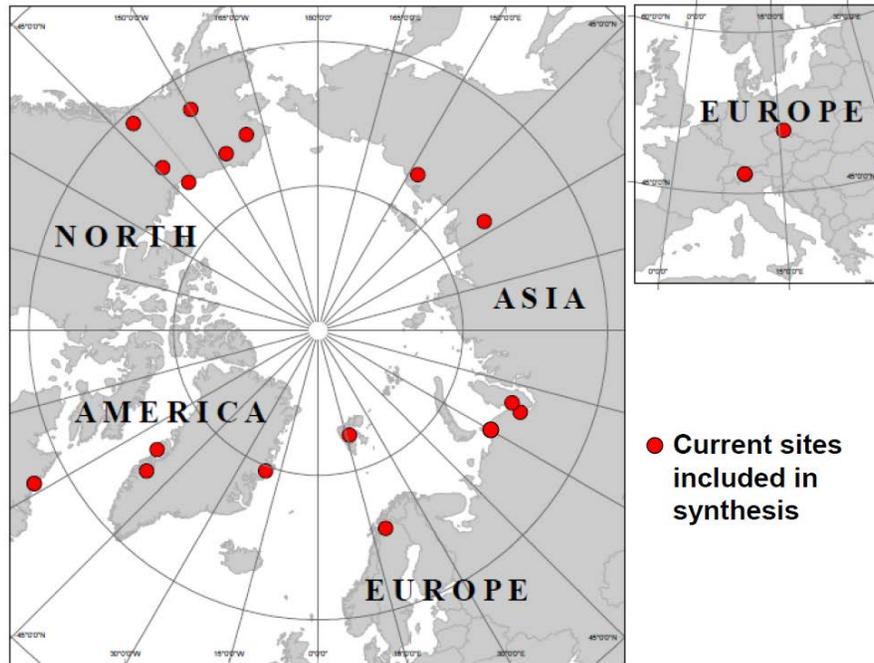


Figure 1. Map of sites with data contributions to synthesis.

V. Methods Manuscript

Working Title: Growth in tundra shrub species: Dendroecological methods beyond forests

Authors: Shrub Synthesis Group and other members of Shrub Hub Research Network

This manuscript is a summary of current methods for sampling, measuring and analysing shrub growth data.

Intro

What shrub growth can tell us about changing arctic ecosystems.

How we can move beyond dendrochronological methods to dendro ecology in shrub species.

Shrubrings

Field Sampling

- On the landscape
- Within a patch
- Within a stem

- Roots vs stems
- Sample Preparation
- Sanding
 - Using a slide table
 - thin sectioning
 - digital image methods

Serial Sectioning
Ring counting methods
Ages and age distributions
Cross dating
Chronology building
Individual approach
Wood Anatomy
Wood density
Isotope analysis

Winter marks septa
Stem increments

Conclusions

- Current limitations to shrub growth methods
- Where we go from here: future potential advances in shrub growth methodologies

VI. Future steps

We will continue to work on this data synthesis effort over 2011-2012. Isla Myers-Smith has post-doctoral funding for the next year to conduct the detailed analyses and work on the manuscript. We aim to compile the methods manuscript over the fall of 2011 and to compile the synthesis manuscript over the spring of 2012. For more information on these efforts please contact Isla Myers-Smith (imyerssmith@ualberta.ca).



The shrub synthesis group at the top of a mountain about to visit some Alpine tundra research sites