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FINNISH METEOROLOGICAL INSTITUTE

About future projections of snow cover

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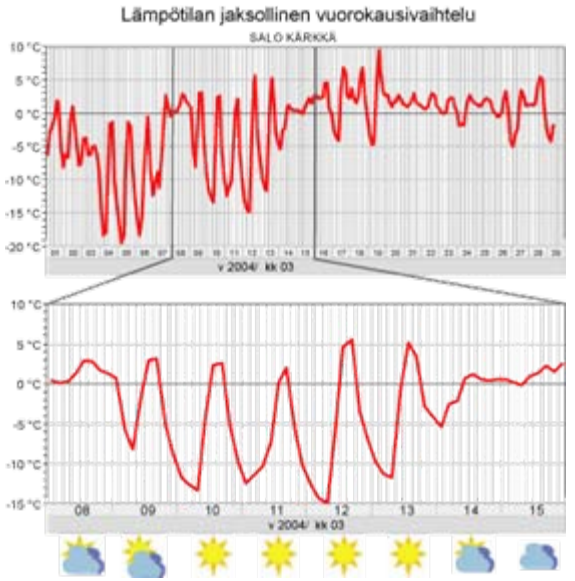
Climate Change
Climate Research and Applications

Ketkä muut tutkivat lunta IL:ssä?
– Kick-off meeting for deeper snow co-operation
26.3.2009

Why is it not possible to construct accurate predictions of the magnitude of climate change?

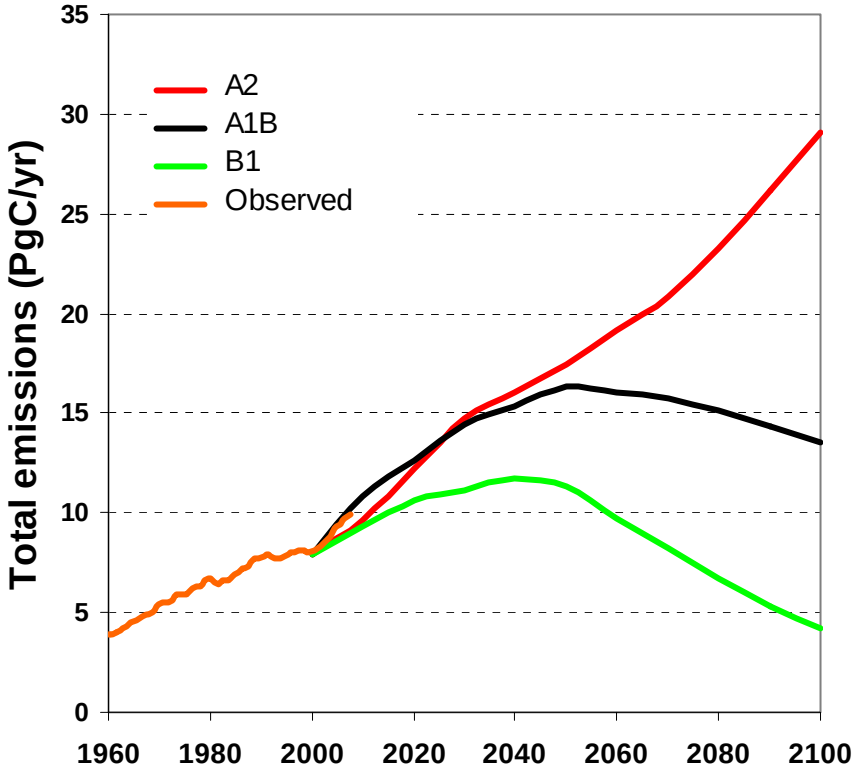
Inherent sources of uncertainty

- future emissions
- model formulation
- natural climate variability

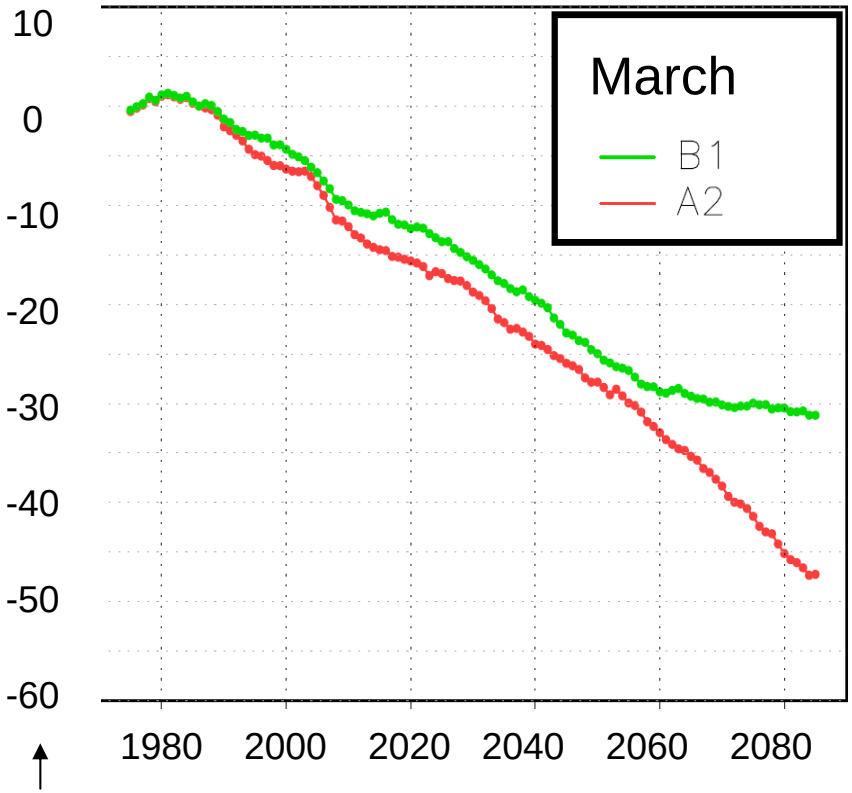


Figures: energyconcepts.tripod.com, www.cccma.bc.ec.gc.ca/images/postdoc_picture.jpg, www.fmi.fi

Scenarios of global CO_2 emissions



Scenarios of snow cover for central Finland



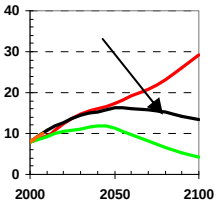
Decrease (in %) of snow water equivalent
from the period 1971-2000
as a multi-model mean based on
17 global climate models

Ref: K. Ruosteenoja (IL)

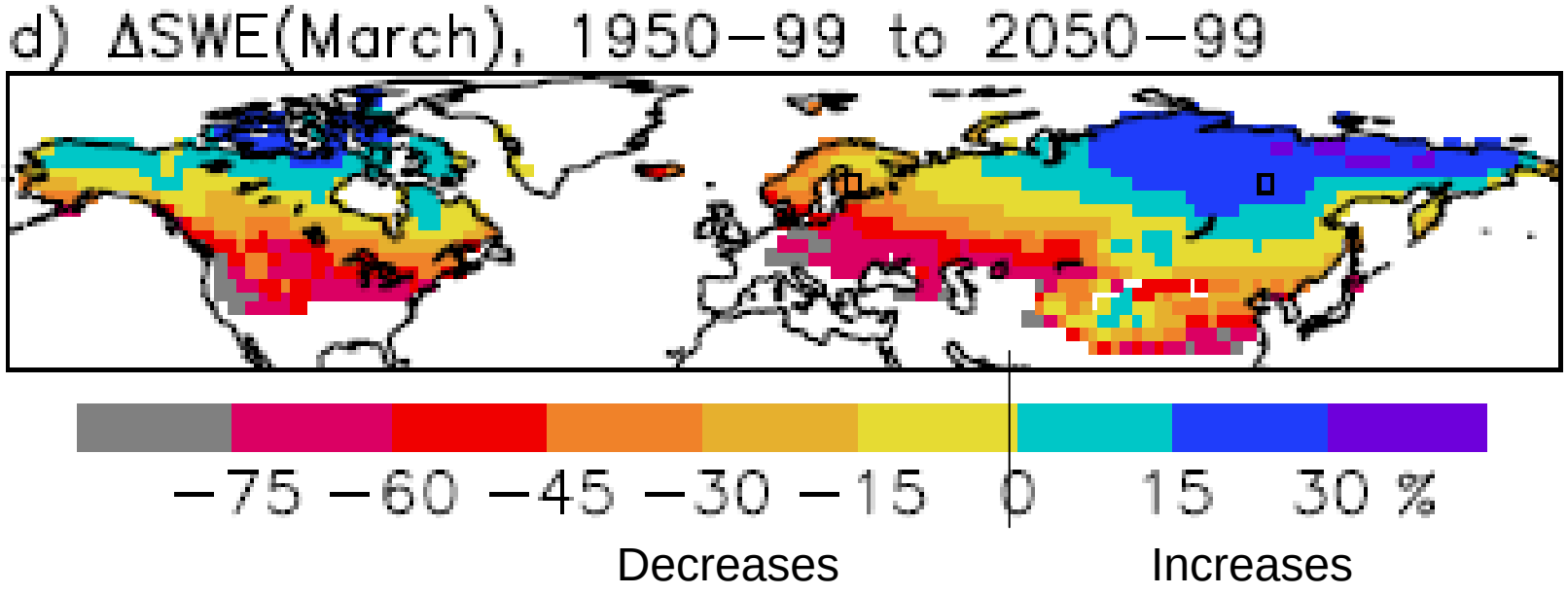
Warmer climate: less or more snow?

Changes in March mean snow water equivalent (SWE)
relative to 1950–1999

Emissions



The average borderline between **increasing** and **decreasing** midwinter SWE coincides broadly with the **–20°C** isotherm in late 20th century November–March mean temperature



Ref: Jouni Räisänen (2008)

20-model mean changes under the **A1B** scenario

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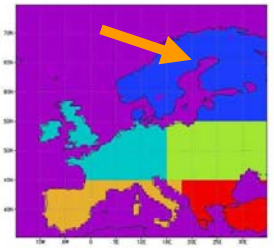
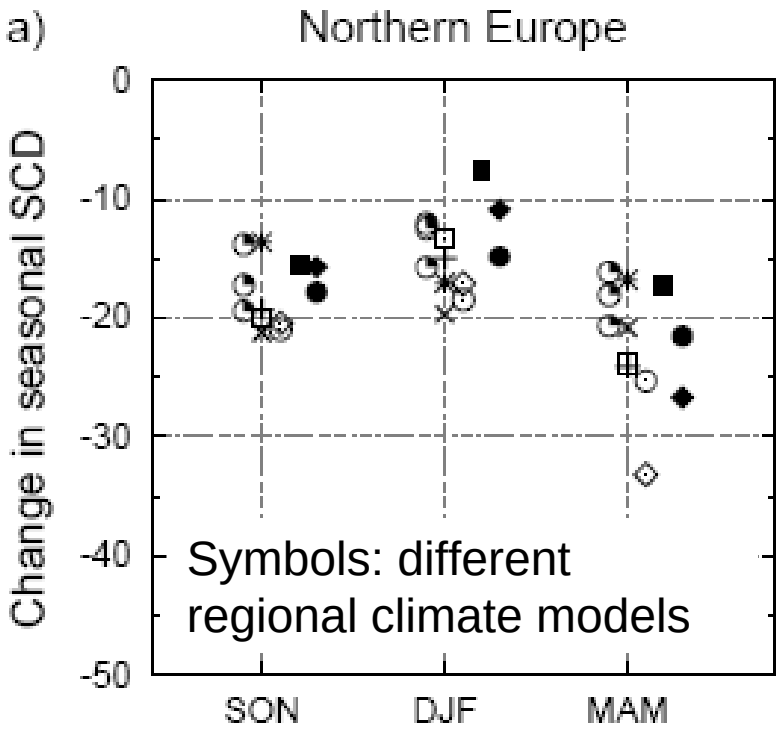
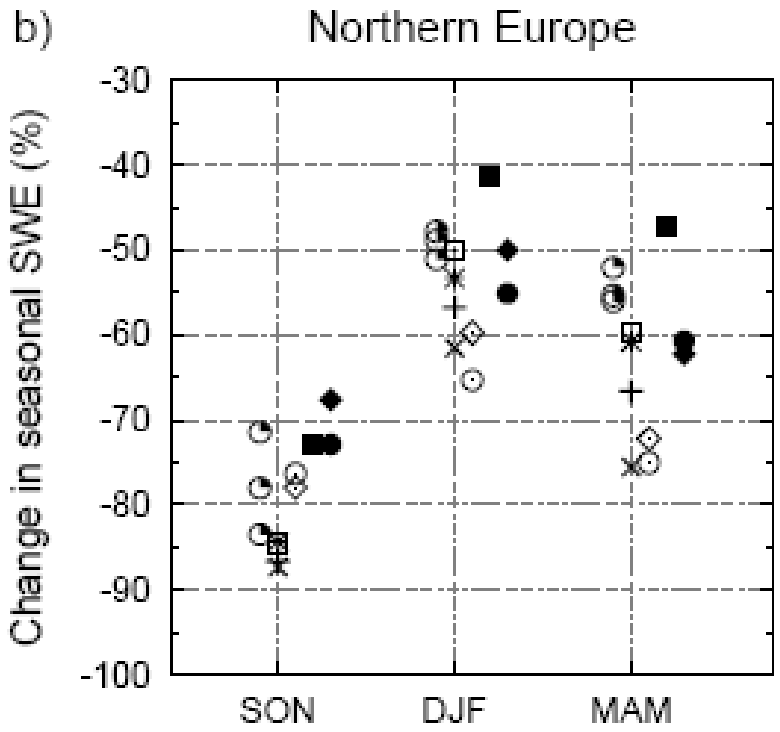


Decreasing number of snow cover days and snow water equivalent





- **Absolute decreases (in days) largest in spring**
- **Percentage decreases (%) largest in autumn**

- **Percentage decreases (%) largest in autumn**

Ref: Jylhä et al. (2008)

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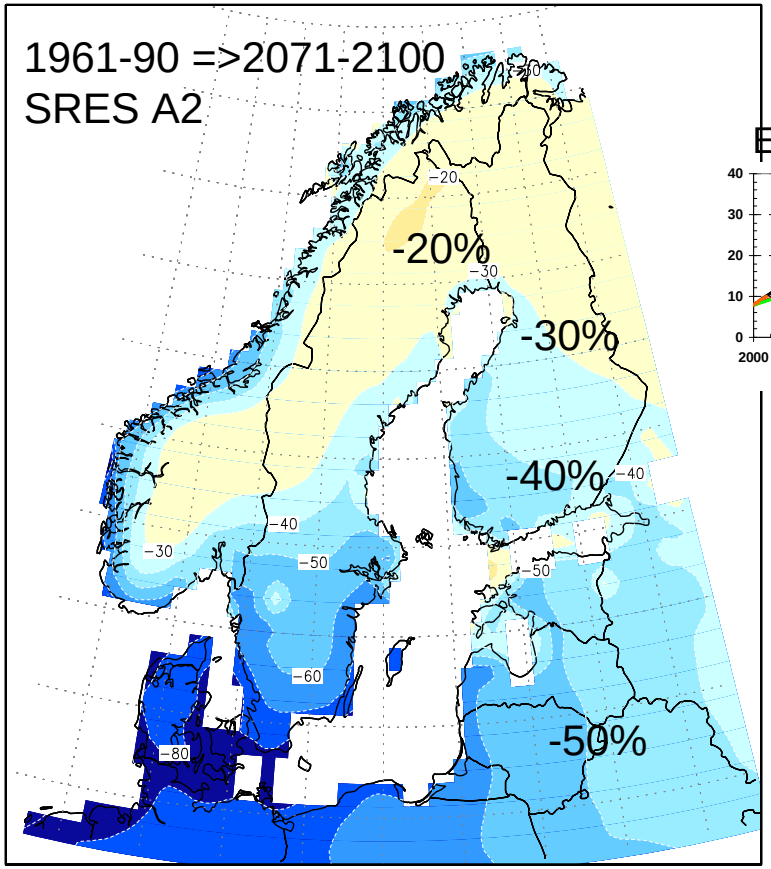
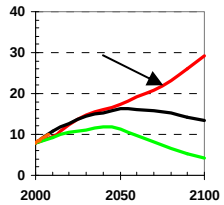
Largest decreases in snow cover in SW Finland

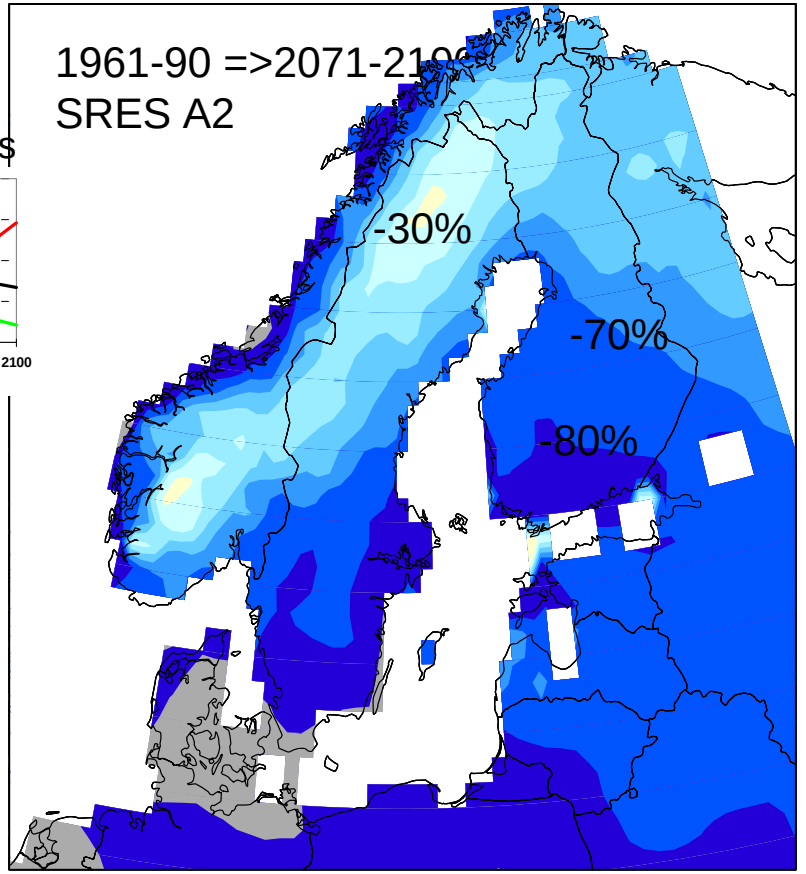
Annual number of snow cover days



Emissions

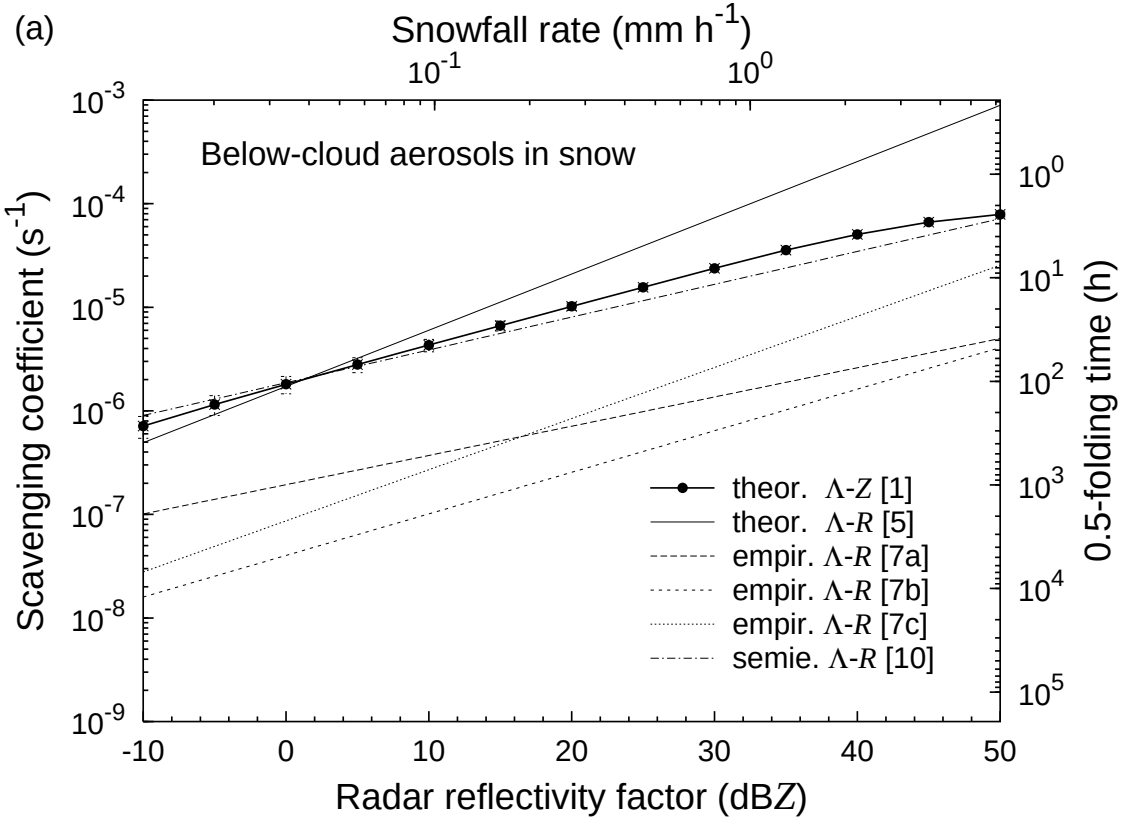


Annual mean snow water equivalent



Multi-model average change (%) based on regional climate models

Removal of air pollutants by snowfall



- Jylhä, 1999: Relationship between the Scavenging Coefficient for Pollutants in Precipitation and the Radar Reflectivity Factor. Part I: Derivation. (*J. Appl.Meteor.*)
- Jylhä, 2000: Removal by Snowfall of Emissions from a Coal-Fired Power Station: Observations and Modelling (*Water, Air, & Soil Pollution*)