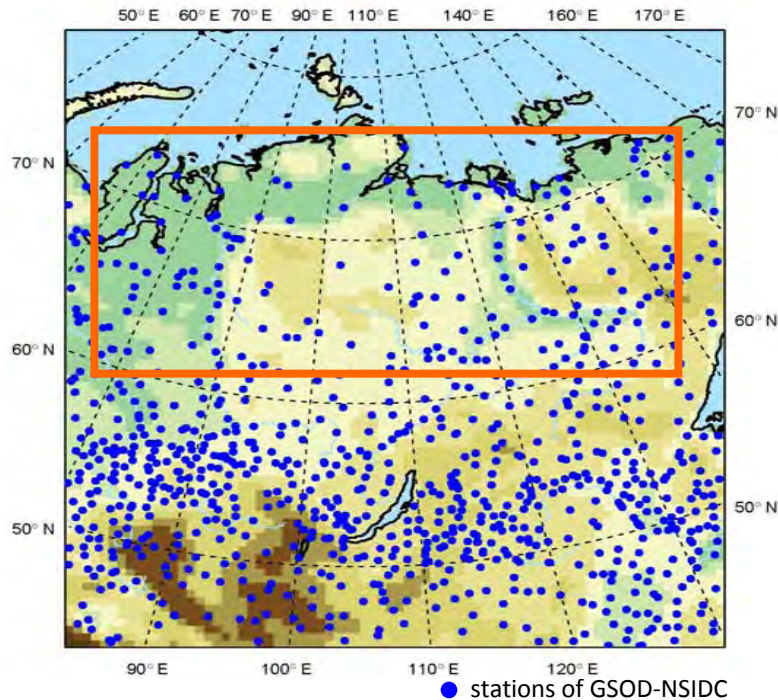


Dynamical Downscaling over Siberia: Is there an added value in representing recent climate conditions?

Katharina Klehmet, Burkhardt Rockel
Institute of Coastal Research
Regional Atmospheric Modelling

24.04.2012

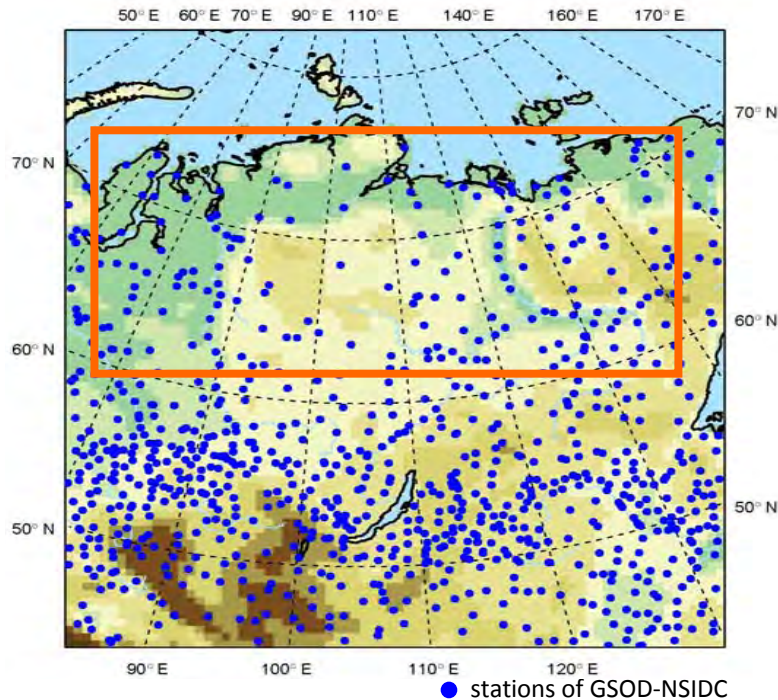
Motivation



Obstacle in assessing climate change in Siberia:

- Lack of long-term homogenous data records
- Sparse station network (*Roshydromet 2008*)
- Long-term global Reanalyses on coarse resolution

Motivation

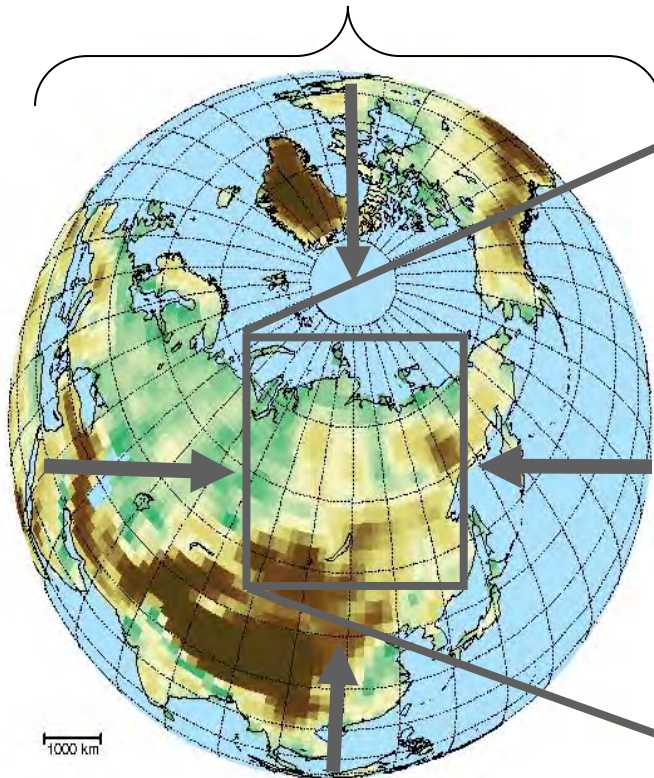


Reconstruction of recent-past climate

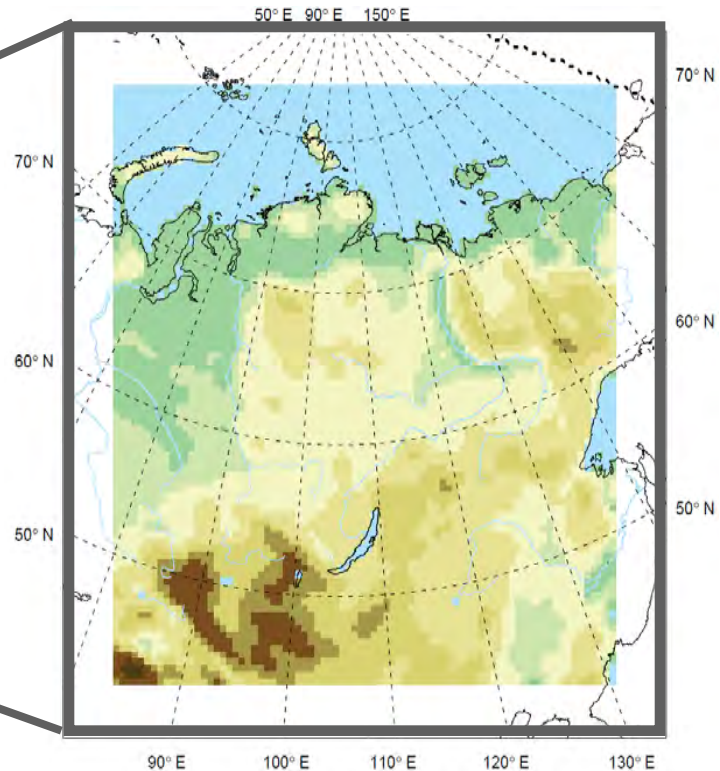
- Using a regional climate model (RCM)
- Long-term homogenous, consistent data set
- Higher temporal & spatial resolution than reanalysis
- Information of various atmospheric & terrestrial parameters

Dynamical Downscaling over Siberia

Large scale forcing: NCEP1 Reanalysis



Limited Area: Siberia



Orography of the regional climate model CCLM
Resolution: ~ 50km

- Expectation: added value gained by RCM
- Key issue in evaluation of RCM: Assessment of added value (*di Luca et al. 2011*)

RCM Data

CCLM (COSMO Model in CLimate Mode)



(www.clm-community.eu)

Forcing:

NCEP1-Reanalysis (6h) : 1948-2010

For initialization & boundaries, spectral nudging

External Datasets:

Orography: GTOPO30, Land Cover: GLC2000

Soiltype: FAO

Grid:

Rotated coordinate system

Number of grid points: 86 x 76

Resolutions:

Spatial: 0.44° (~50 km)

Temporal: hourly output

Vertical: 40 atmospheric layers, 13 soil layers (92m)

Land-surface Scheme:

Multi-layer soil and vegetation model TERRA-ML

Multi-layer snow model: 2 snow layers

Reference Data

Reanalysis Data:

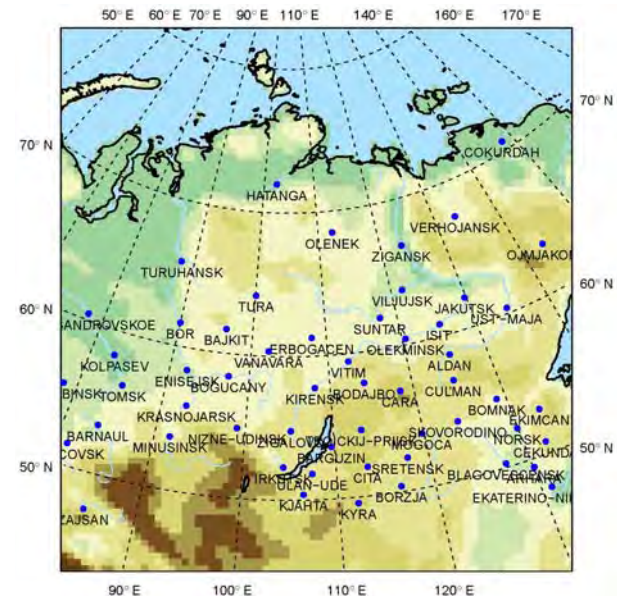
ERA40

ERA-Interim

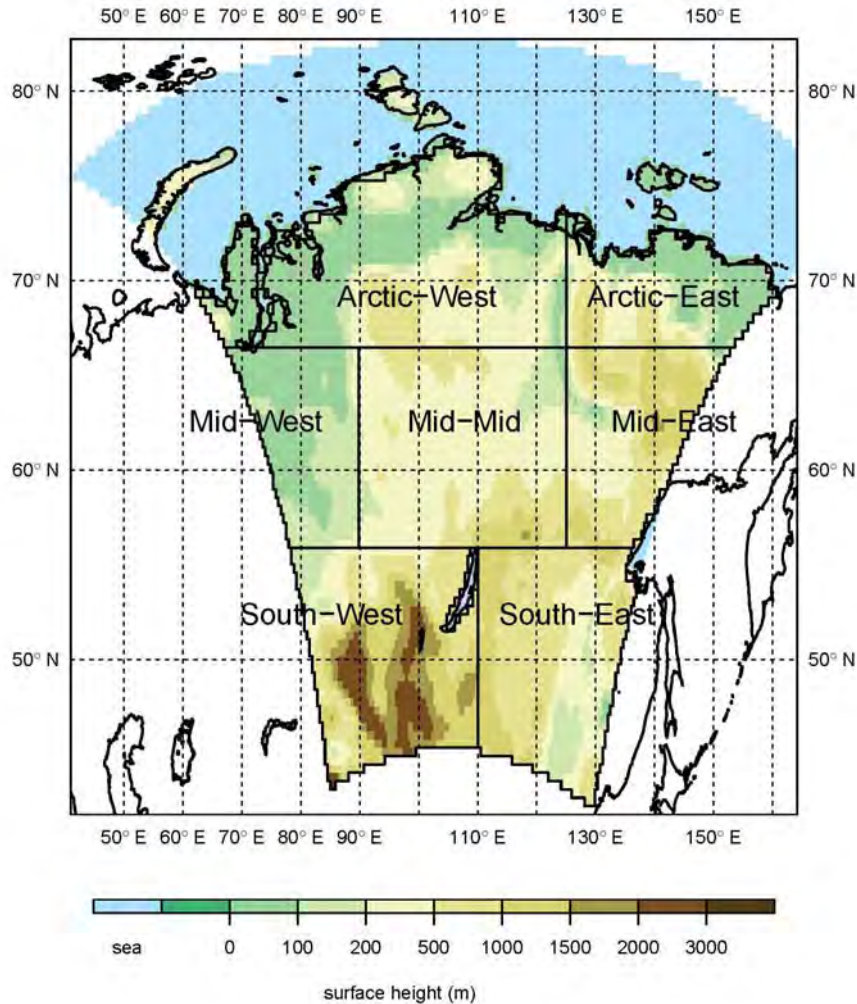
Observation Data:

global land-based climate extremes dataset (ETCCDI)

(The joint CCI/CLIVAR/JCOMM Expert Team on Climate Change Detection and Indices)

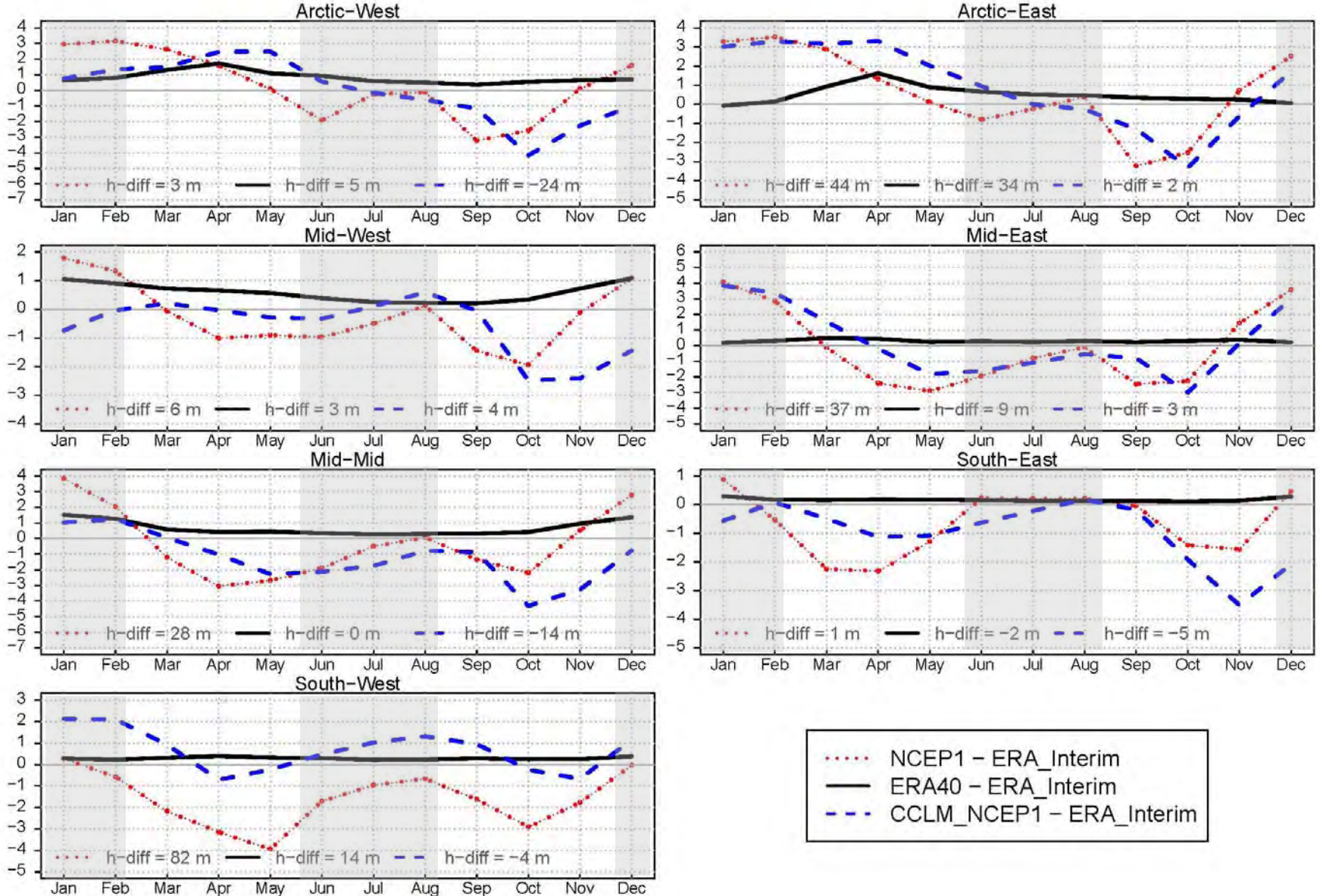


Considered Subregions



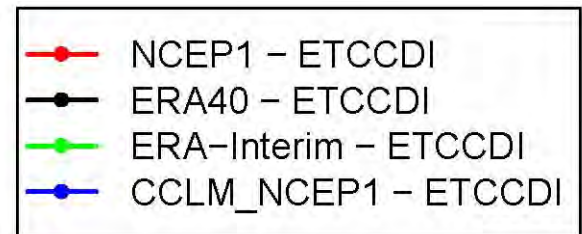
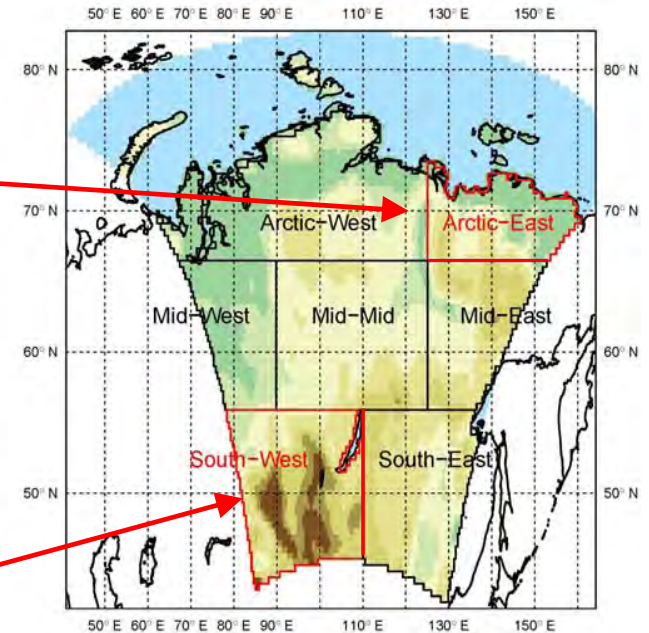
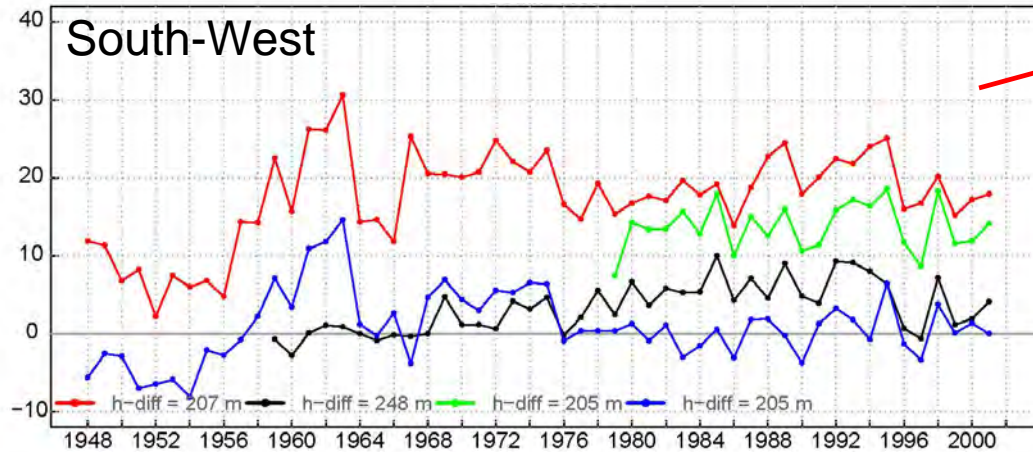
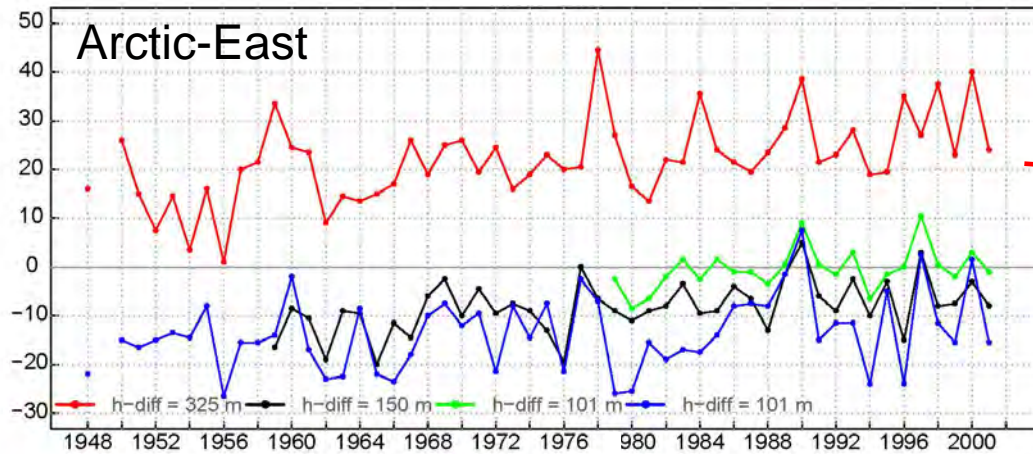
Focus: 2m air temperature
(mean, min., max.)

Bias Yearly Cycle (1979-2001) of 2m Temperature



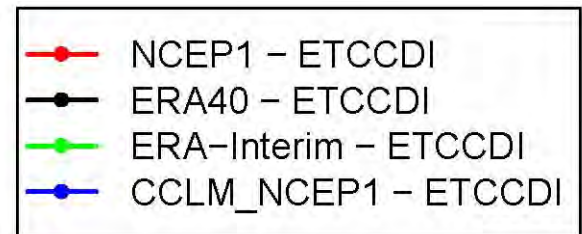
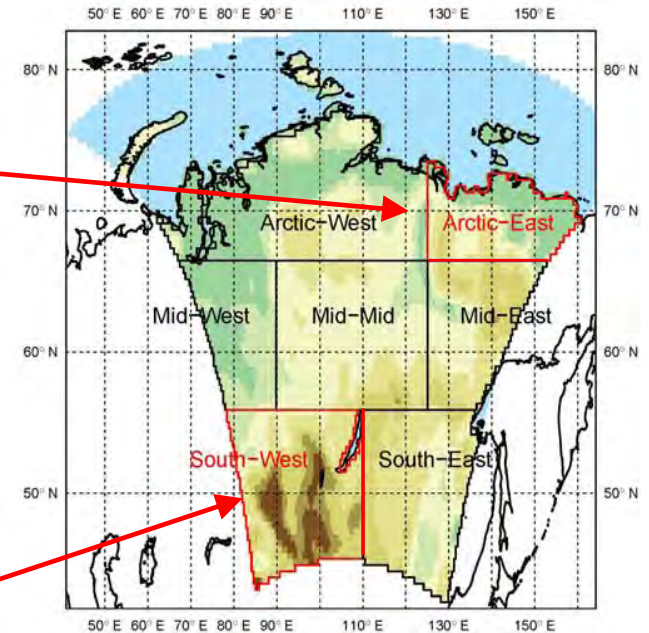
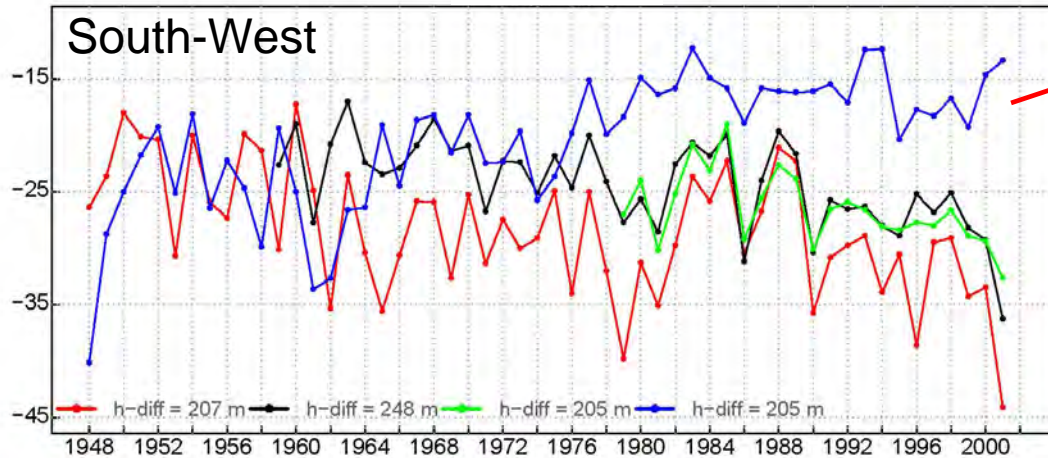
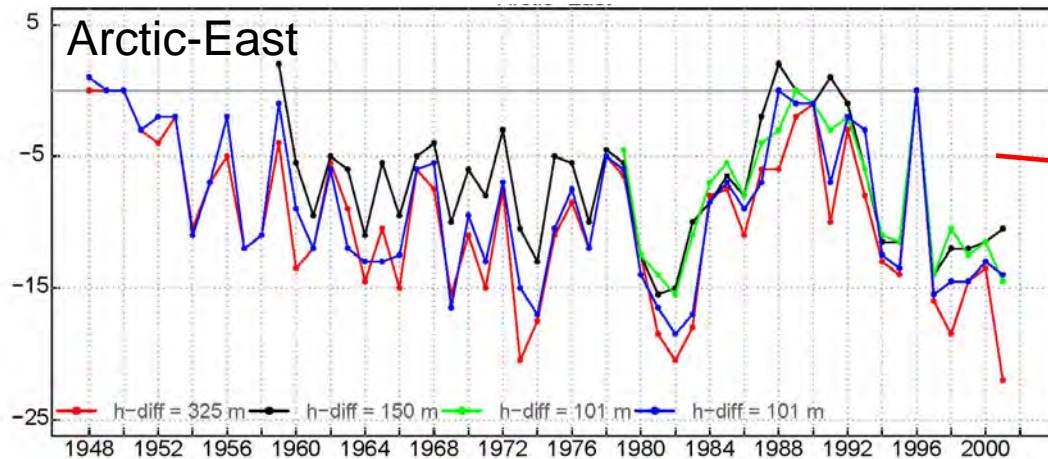
Bias Frost days

Frostdays: Annual count of days when daily minimum temperature $< 0^{\circ}\text{C}$



Bias Summer days

Summer days : Annual count of days when daily maximum temperature > 25 °C



Thank you for your attention

Summary

- Set up the RCM CCLM for Siberia
- Provide reconstruction of recent past climate (1948-2010)
- Assessment dependant on quality of observation data
- Assessment of added value: frost days, summer days
- Added value for frost days especially in regions with strong orography
- No added value in terms of summer days, only after 1980

Outlook

- Measures of skill (e.g. Brier skill score)
- More extreme indices and percentile based extreme values
- Consider added value in terms of variability, trends