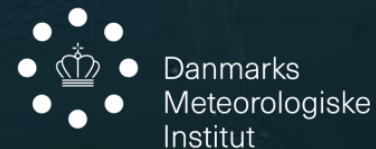


Robustness of high resolution regional climate projections: A new method for uncertainty distillation

Martin Olesen, Jens H. Christensen,
Eigil Kaas & Fredrik Boberg
mol@dmi.dk

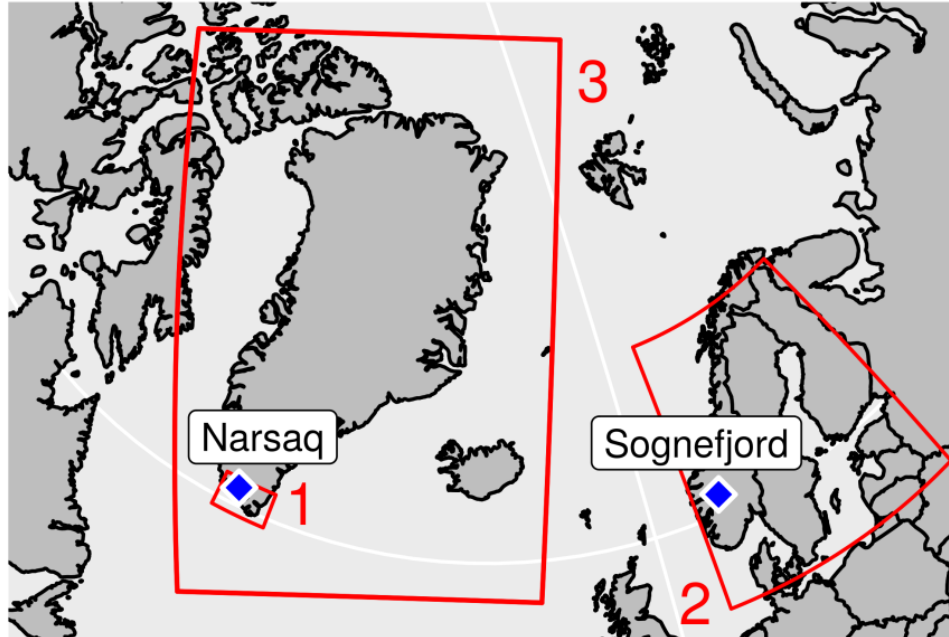


5TH NORDIC CONFERENCE ON CLIMATE CHANGE ADAPTATION
October 23-25 2018 in Norrköping, Sweden

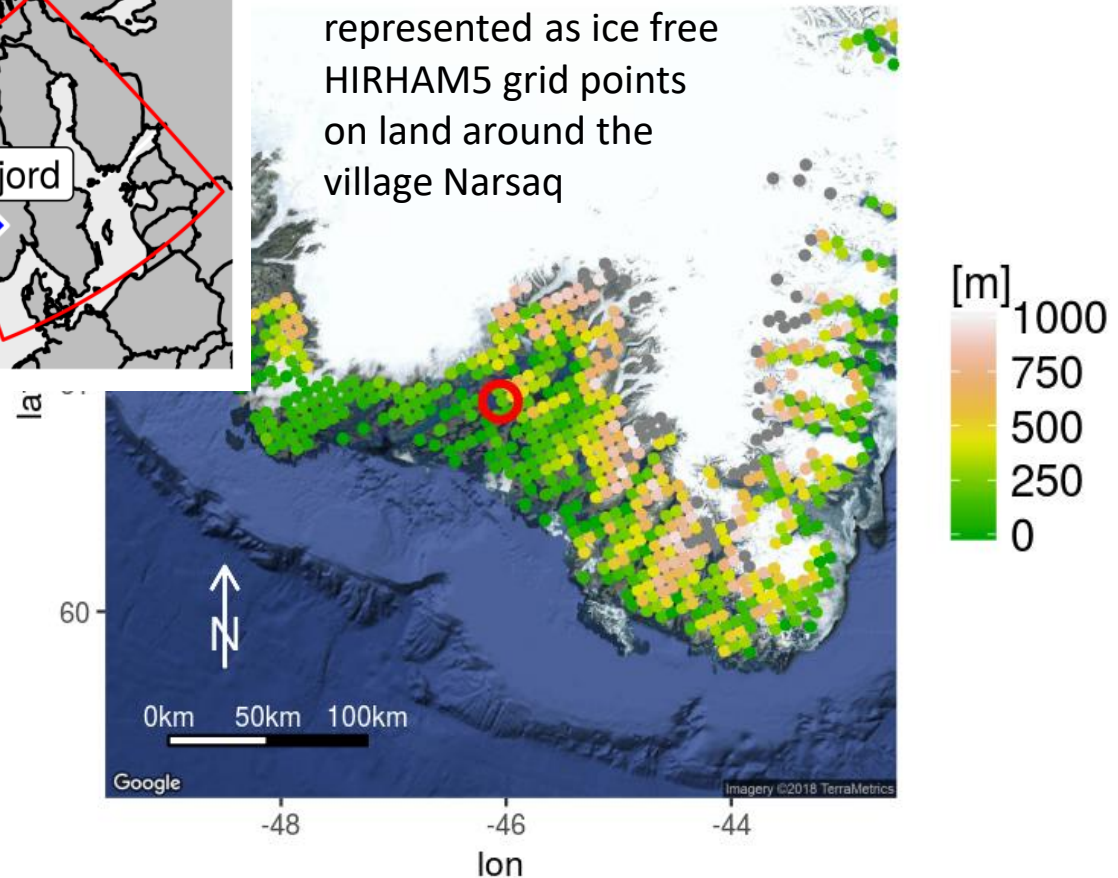
Narsaq from Visit Greenland



HIRHAM5 5km simulation



Model topography in South Greenland represented as ice free HIRHAM5 grid points on land around the village Narsaq

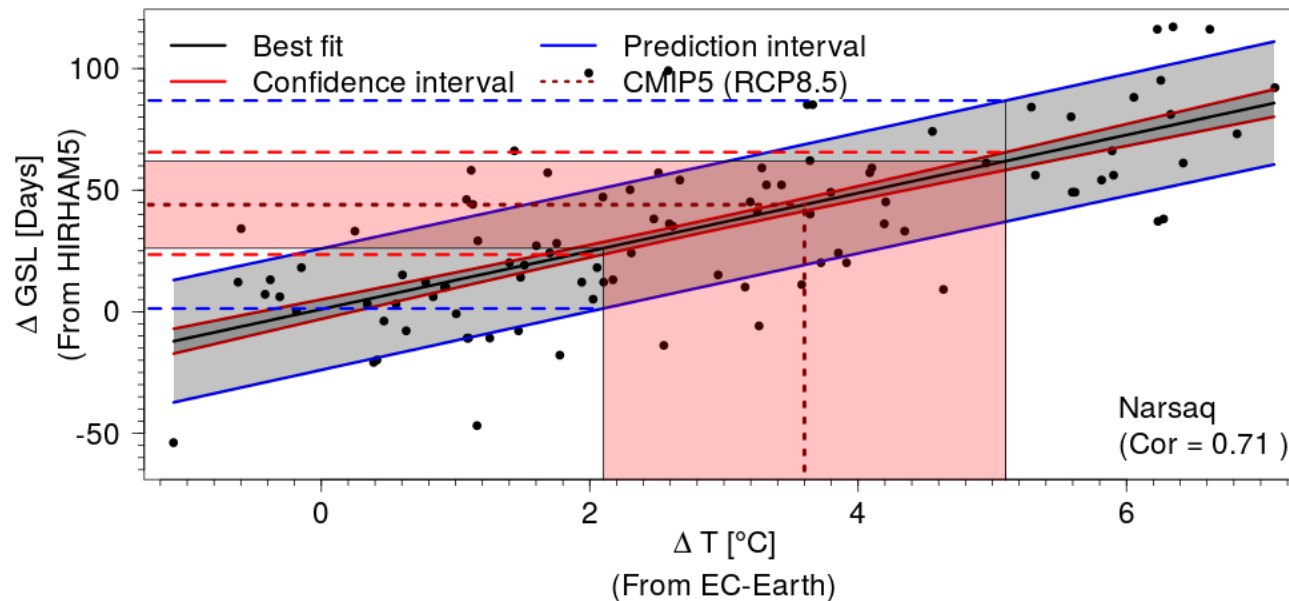
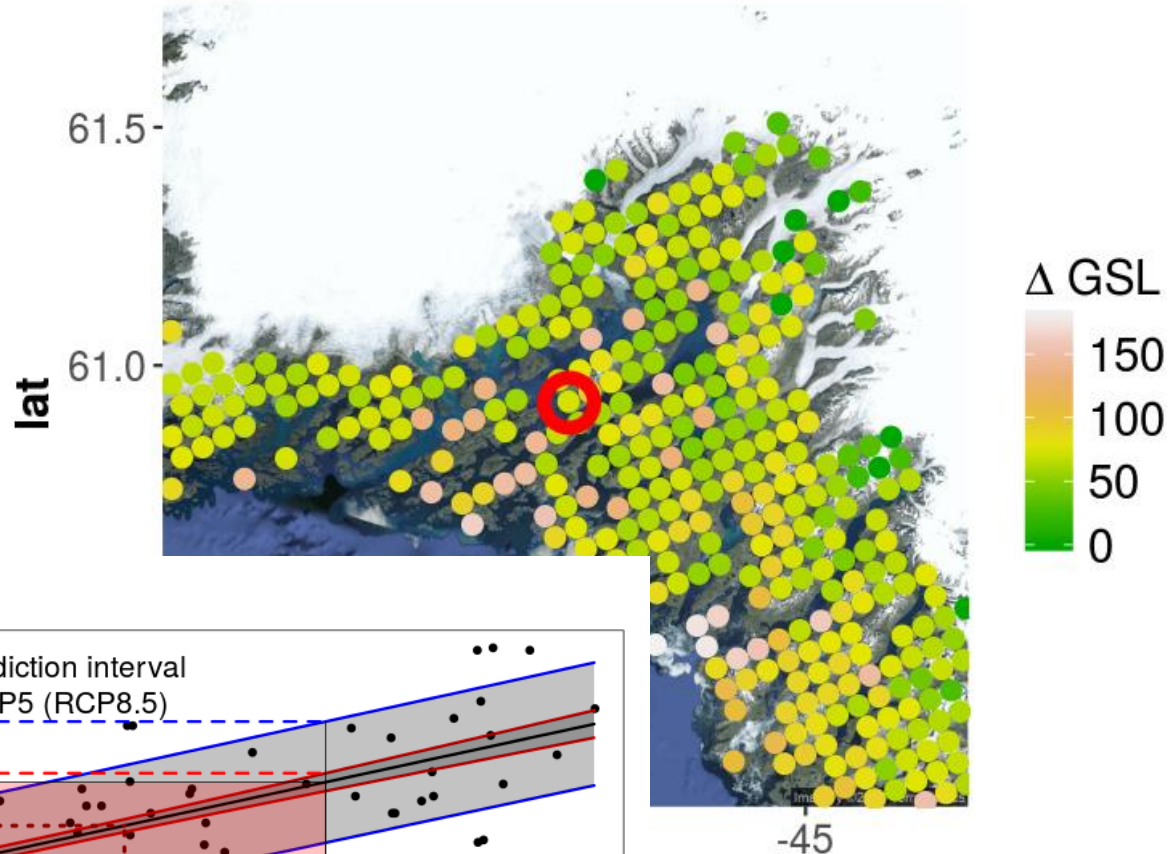


Application of one stand-alone climate simulation including uncertainty assessments

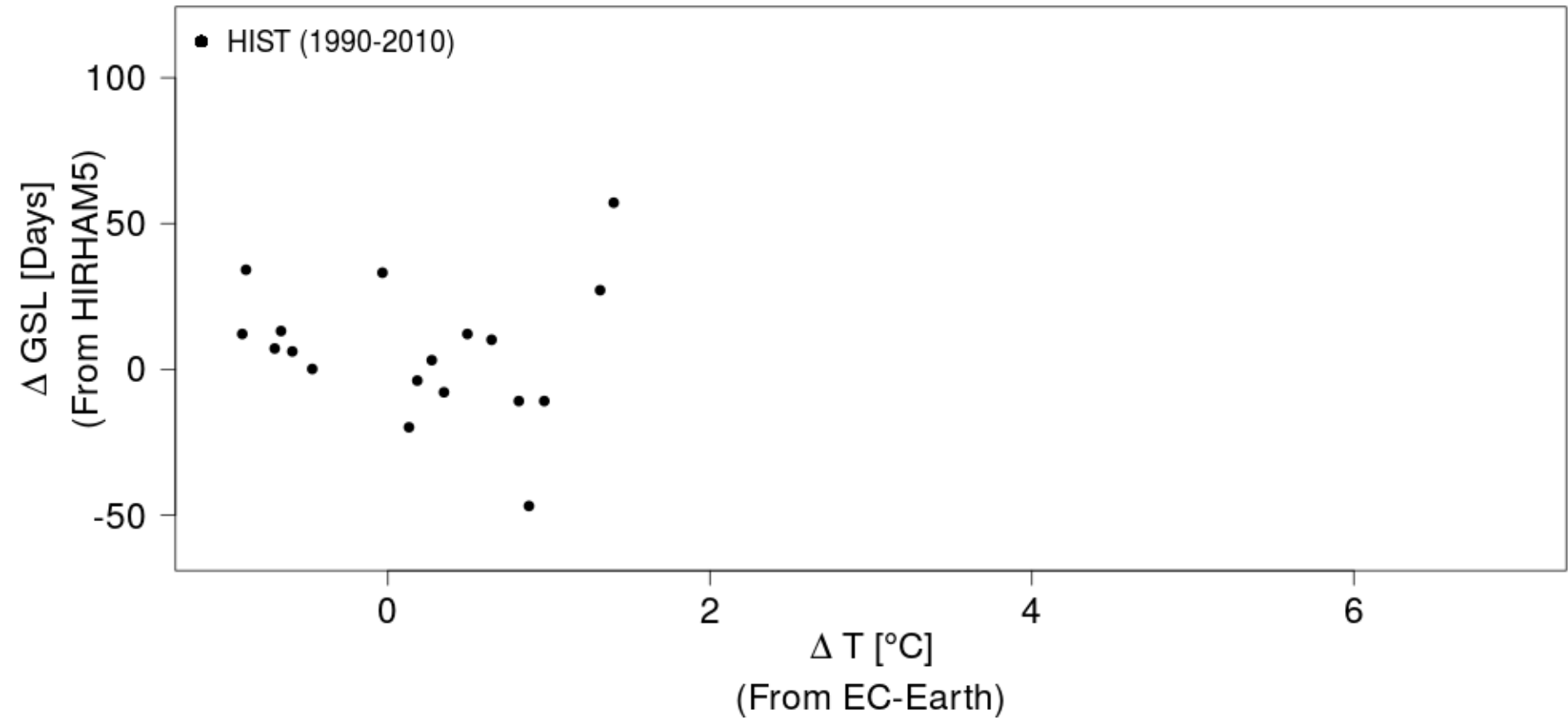
- The method
- Assumptions
- Examples

Growing season length

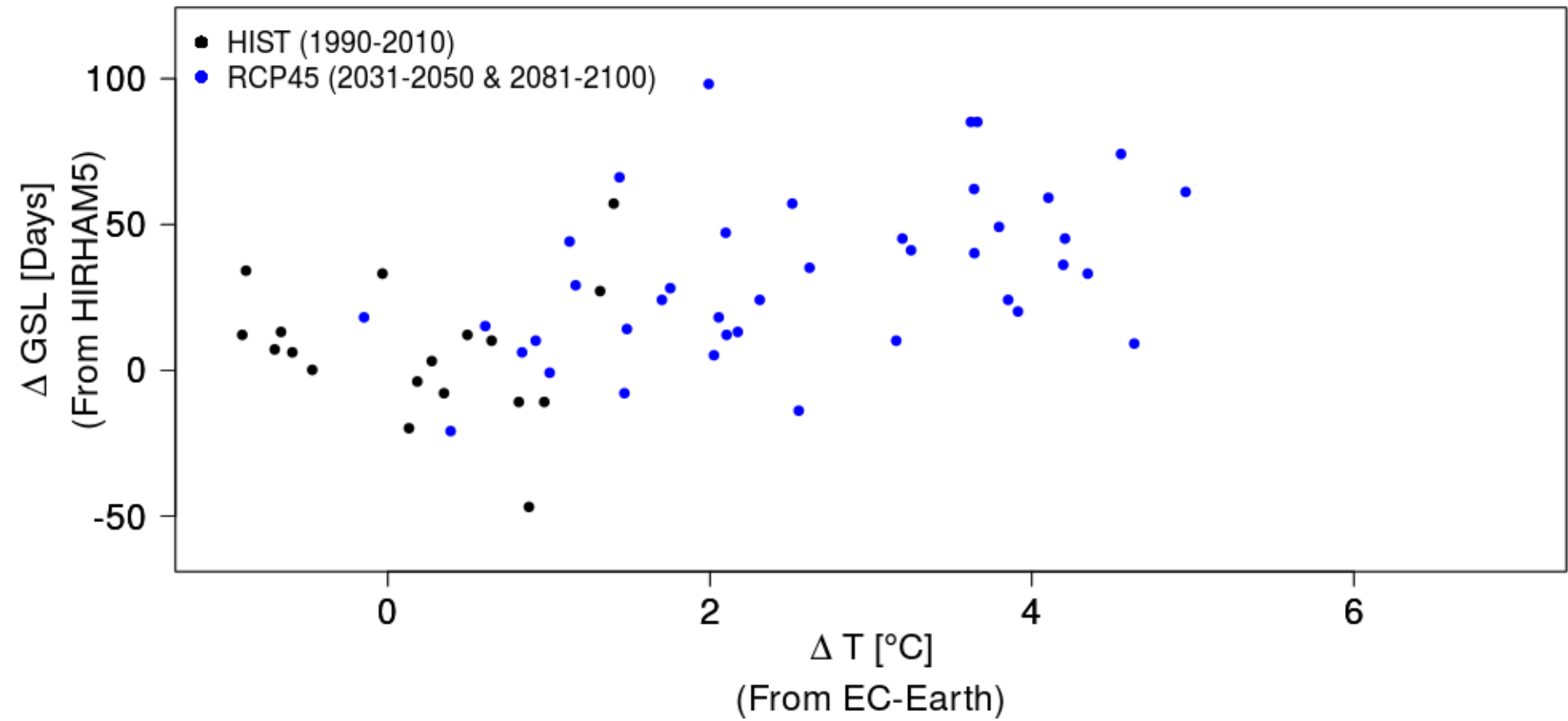
Change in number of days
between the first and the last 4
consecutive days with daily mean
temperature above 5°C.



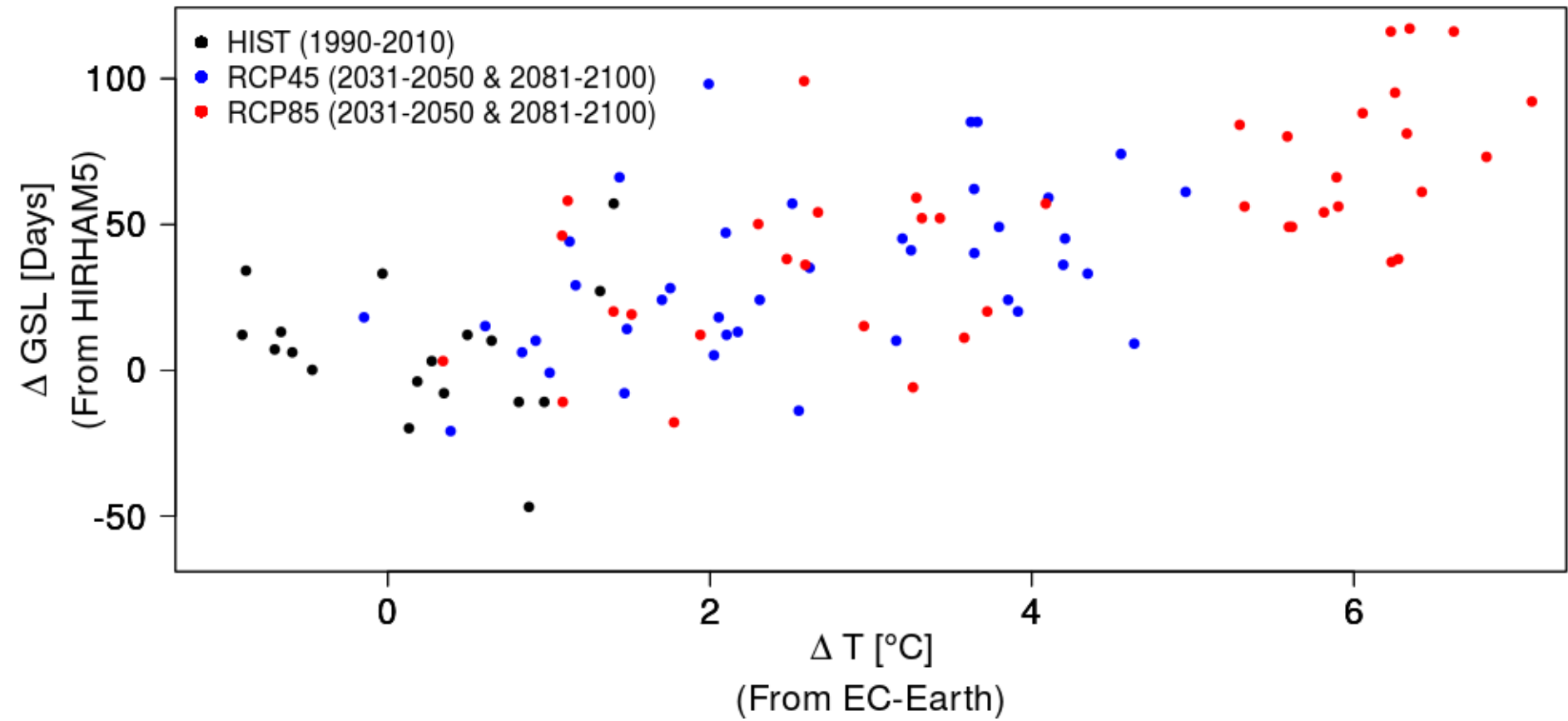
Concept plot – Growing season length



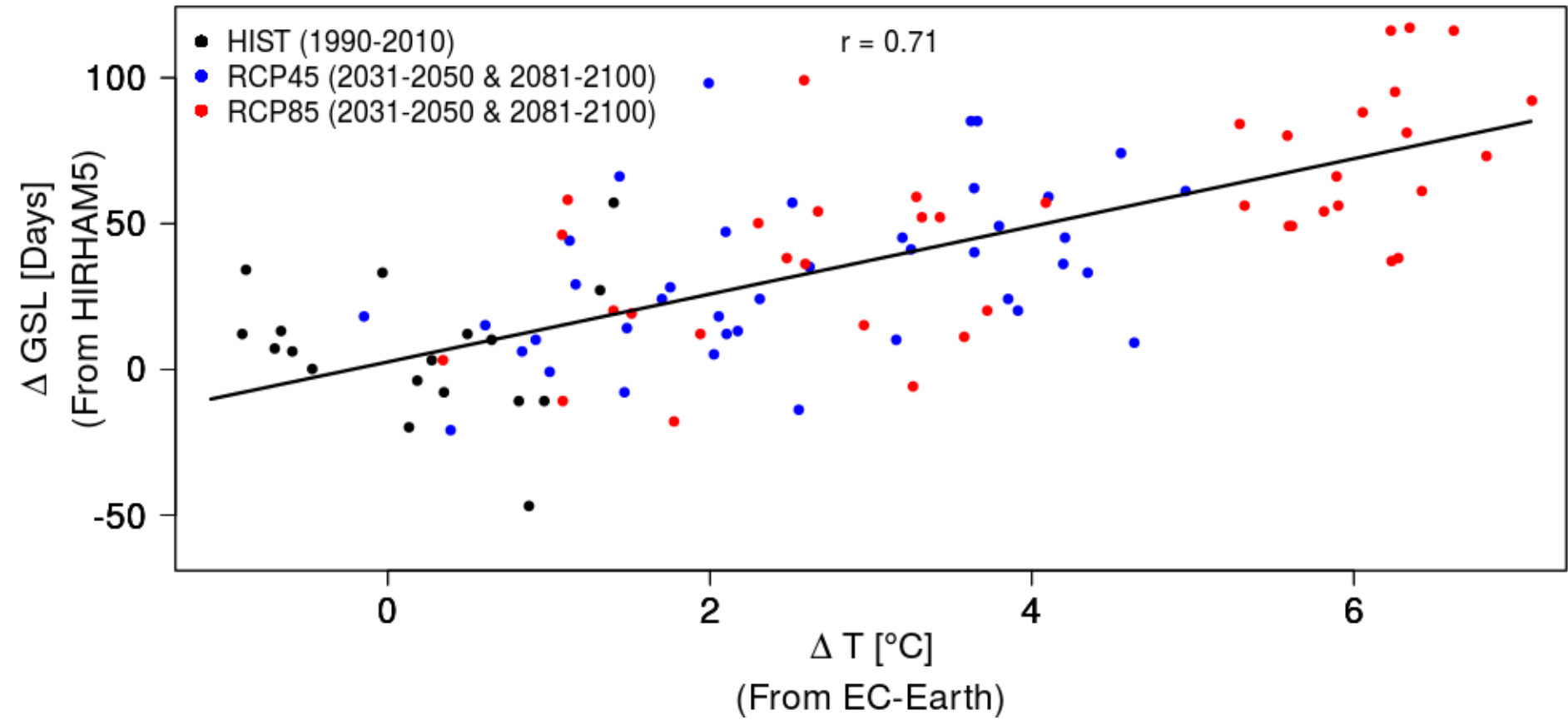
Concept plot – Growing season length



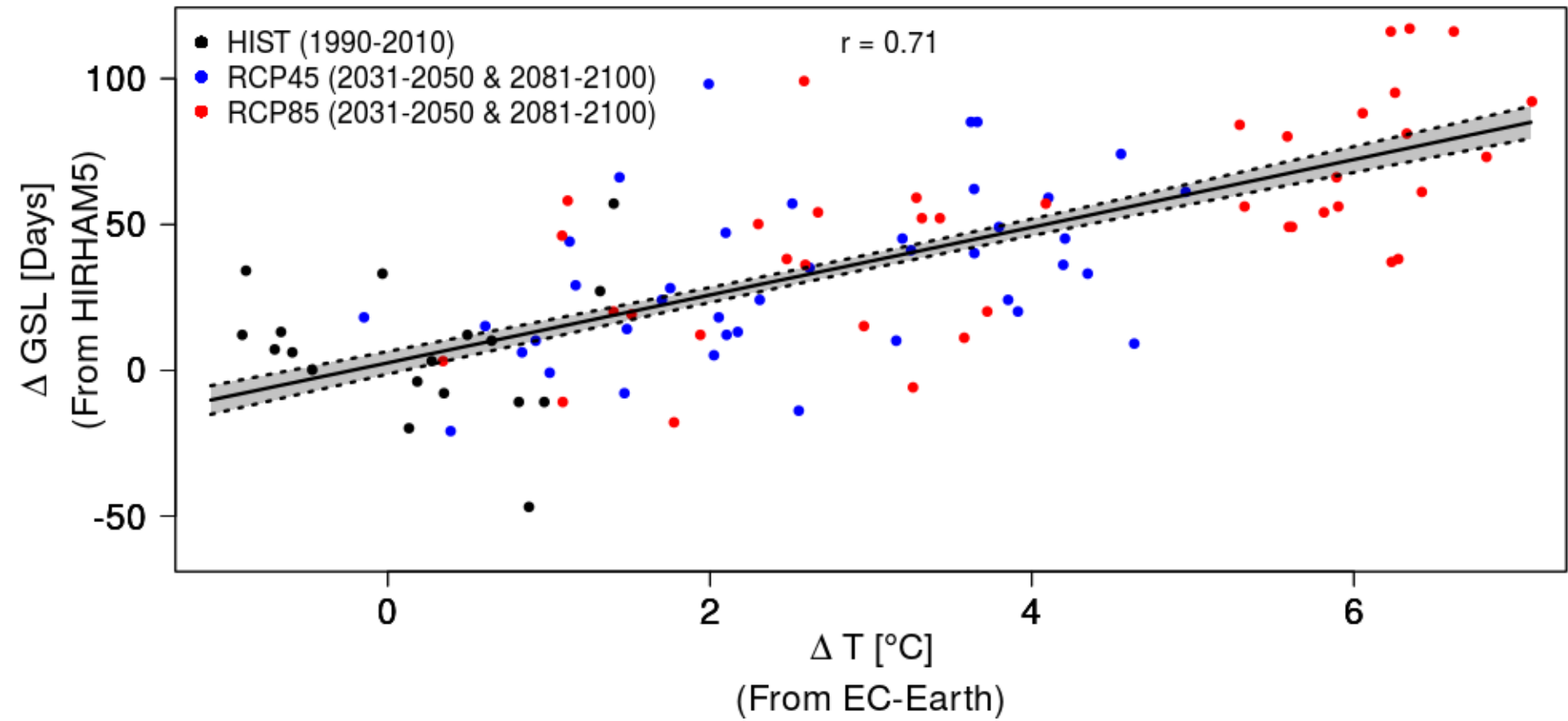
Concept plot – Growing season length



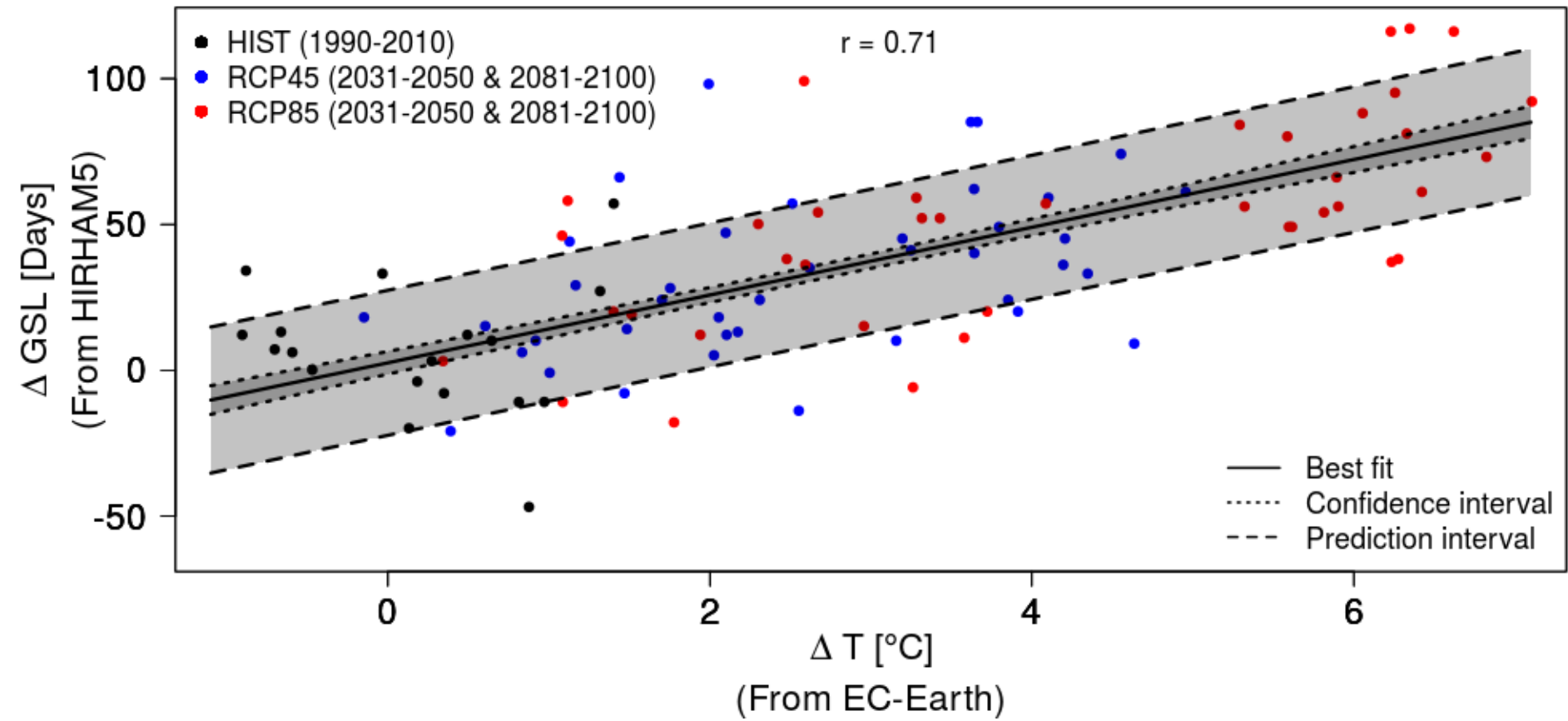
Concept plot – Growing season length



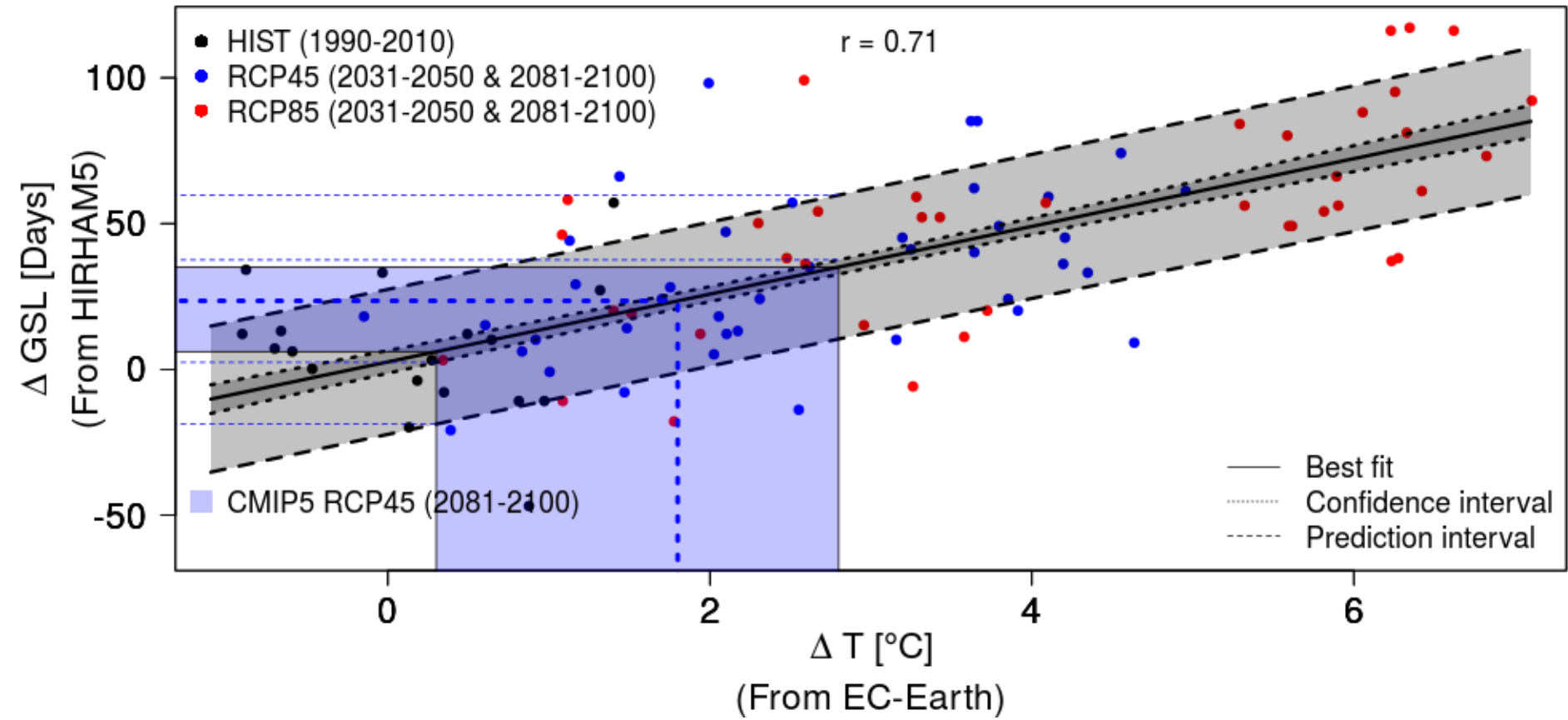
Concept plot – Growing season length



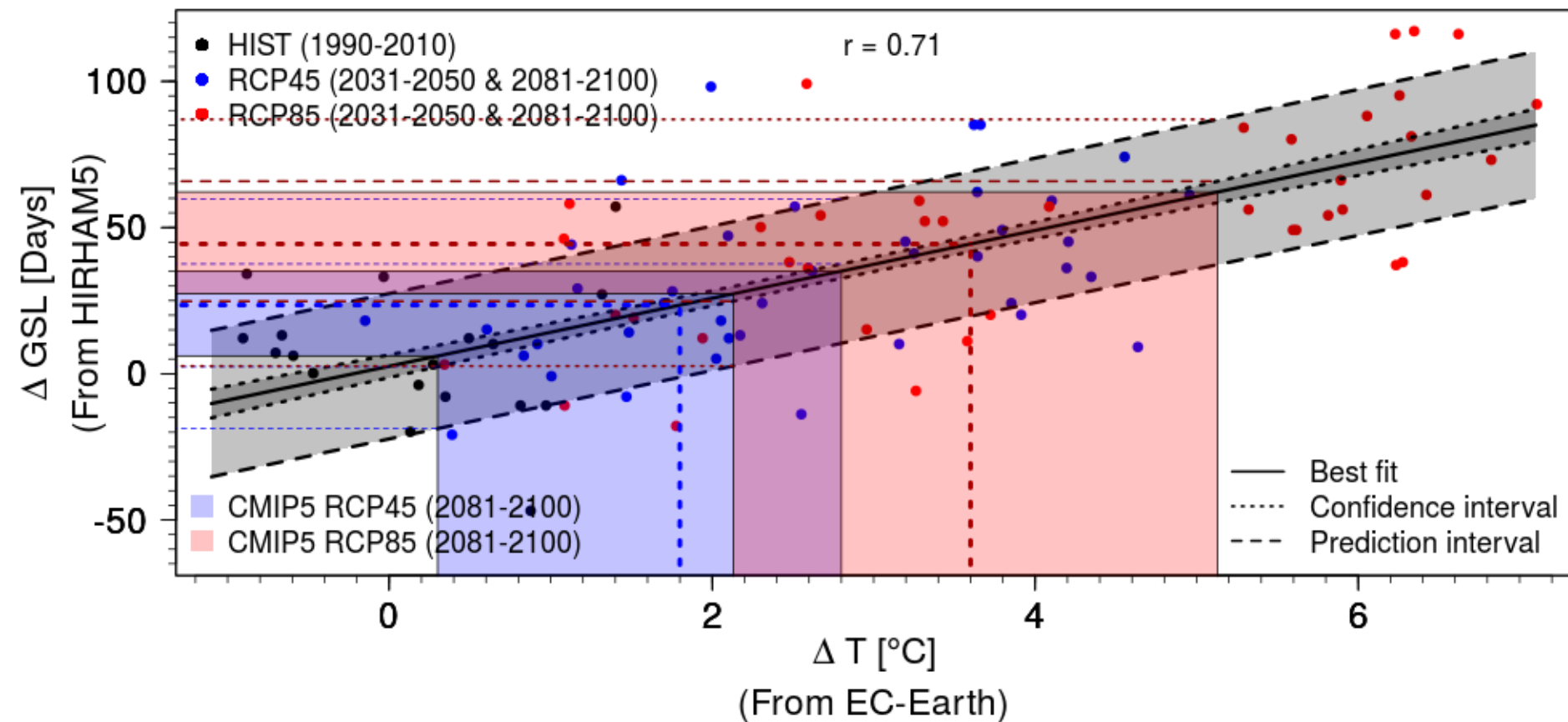
Concept plot – Growing season length



Concept plot – Growing season length



Concept plot – Growing season length

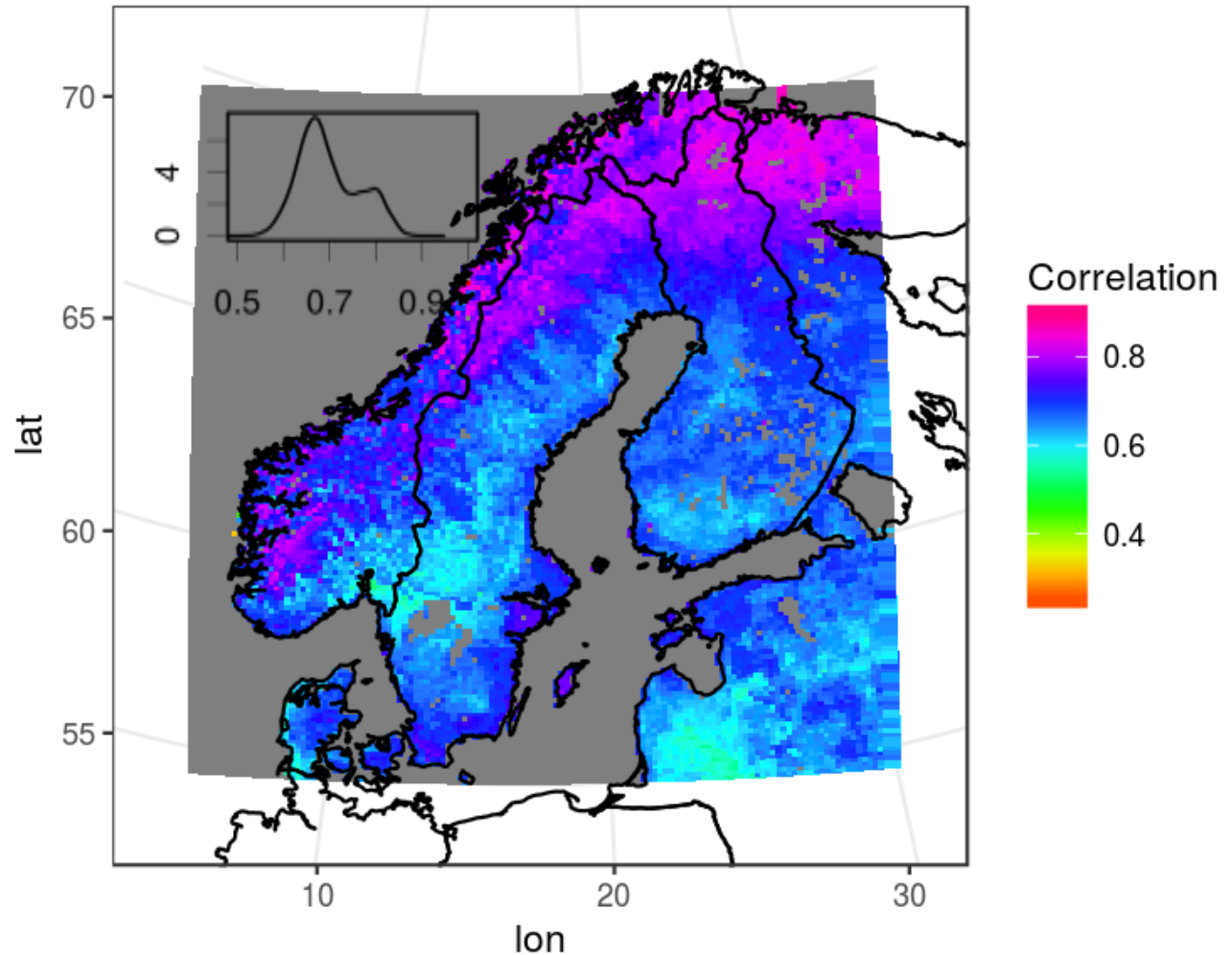


Assumptions (tested for Scandinavia) :

- *HIRHAM5-index and EC-Earth temperature correlation*
- *General RCM-index and GCM-temperature correlation*
- *CMIP5 and CORDEX Variance*
- *Transferability of index relation*

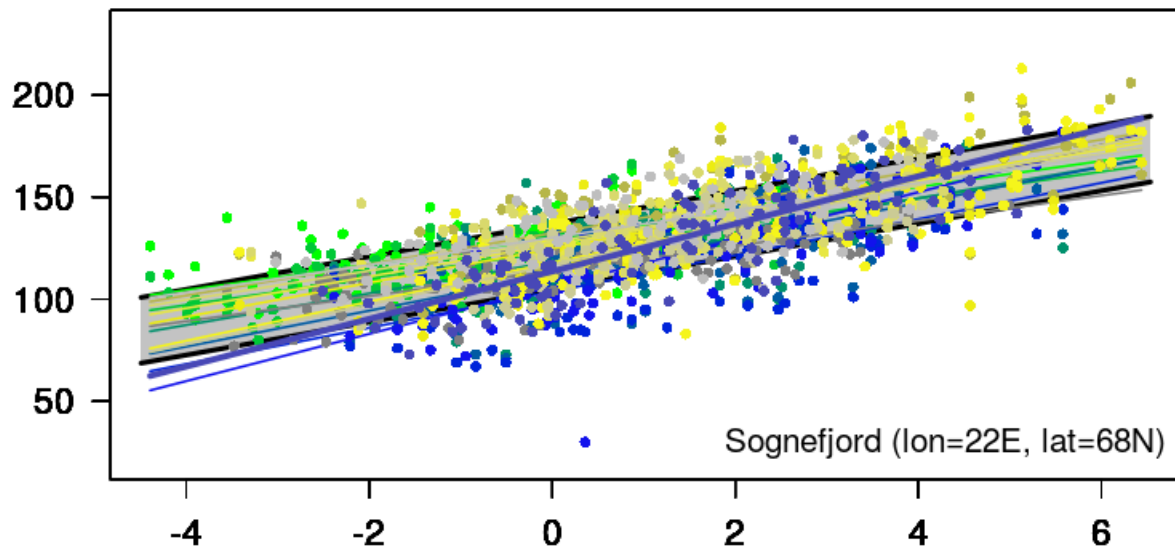
HIRHAM5-index and EC-Earth temperature correlation

Correlation coefficients between growing season length from HIRHAM5 and annual mean temperature from EC-Earth for Scandinavia for the RCP8.5 scenario from 2006 to 2100.

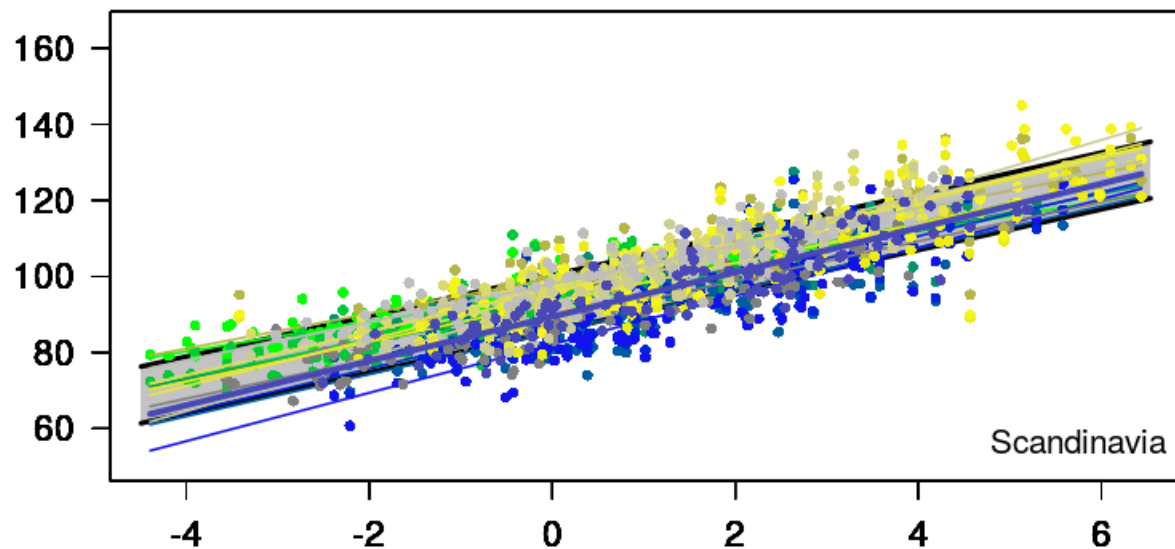


General RCM-index and GCM-temperature correlation

Growing season length [days]
(Regional Climate Model)



Growing season length [days]
(Regional Climate Model)

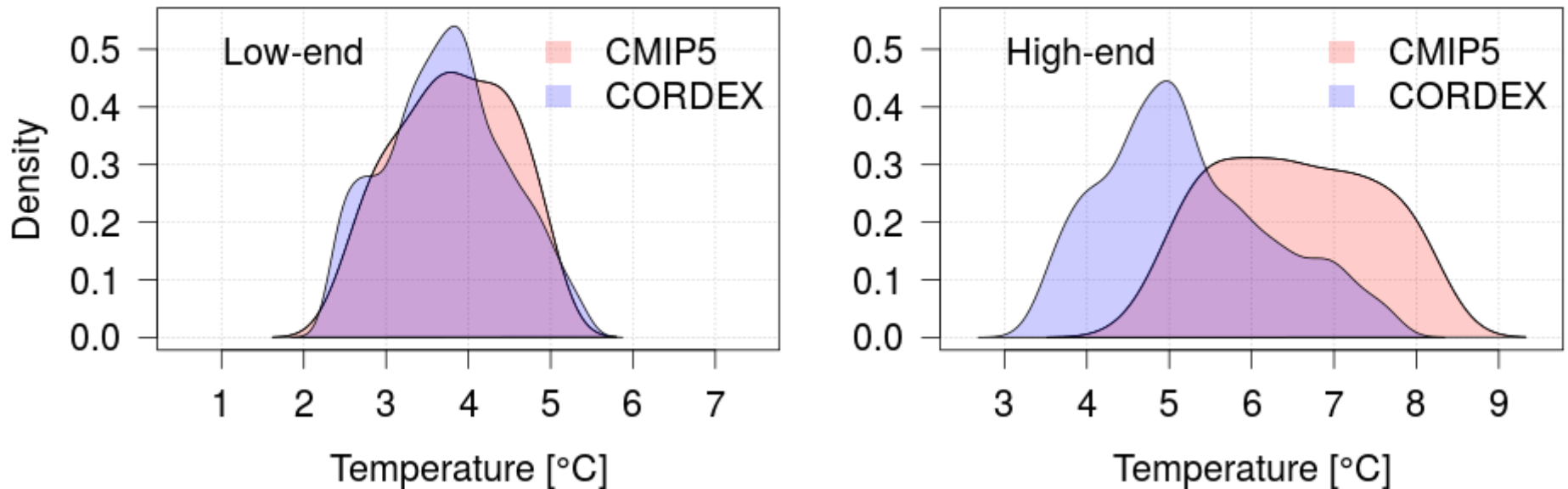


Annual Mean Temperature [°C]
(Global Climate Model)

- EXP 1 (Cor= 0.7)
 - EXP 2 (Cor= 0.72)
 - EXP 3 (Cor= 0.62)
 - EXP 4 (Cor= 0.68)
 - EXP 5 (Cor= 0.68)
 - EXP 6 (Cor= 0.79)
 - EXP 7 (Cor= 0.83)
 - EXP 8 (Cor= 0.75)
 - EXP 9 (Cor= 0.74)
 - EXP 10 (Cor= 0.78)
 - EXP 11 (Cor= 0.77)
 - EXP 12 (Cor= 0.66)
 - EXP 13 (Cor= 0.62)
 - EXP 14 (Cor= 0.76)
 - EXP 15 (Cor= 0.63)
-
- EXP 2 (Cor= 0.87)
 - EXP 3 (Cor= 0.78)
 - EXP 4 (Cor= 0.8)
 - EXP 5 (Cor= 0.79)
 - EXP 6 (Cor= 0.91)
 - EXP 7 (Cor= 0.9)
 - EXP 8 (Cor= 0.88)
 - EXP 9 (Cor= 0.83)
 - EXP 10 (Cor= 0.85)
 - EXP 11 (Cor= 0.86)
 - EXP 12 (Cor= 0.89)
 - EXP 13 (Cor= 0.89)
 - EXP 14 (Cor= 0.89)
 - EXP 15 (Cor= 0.85)

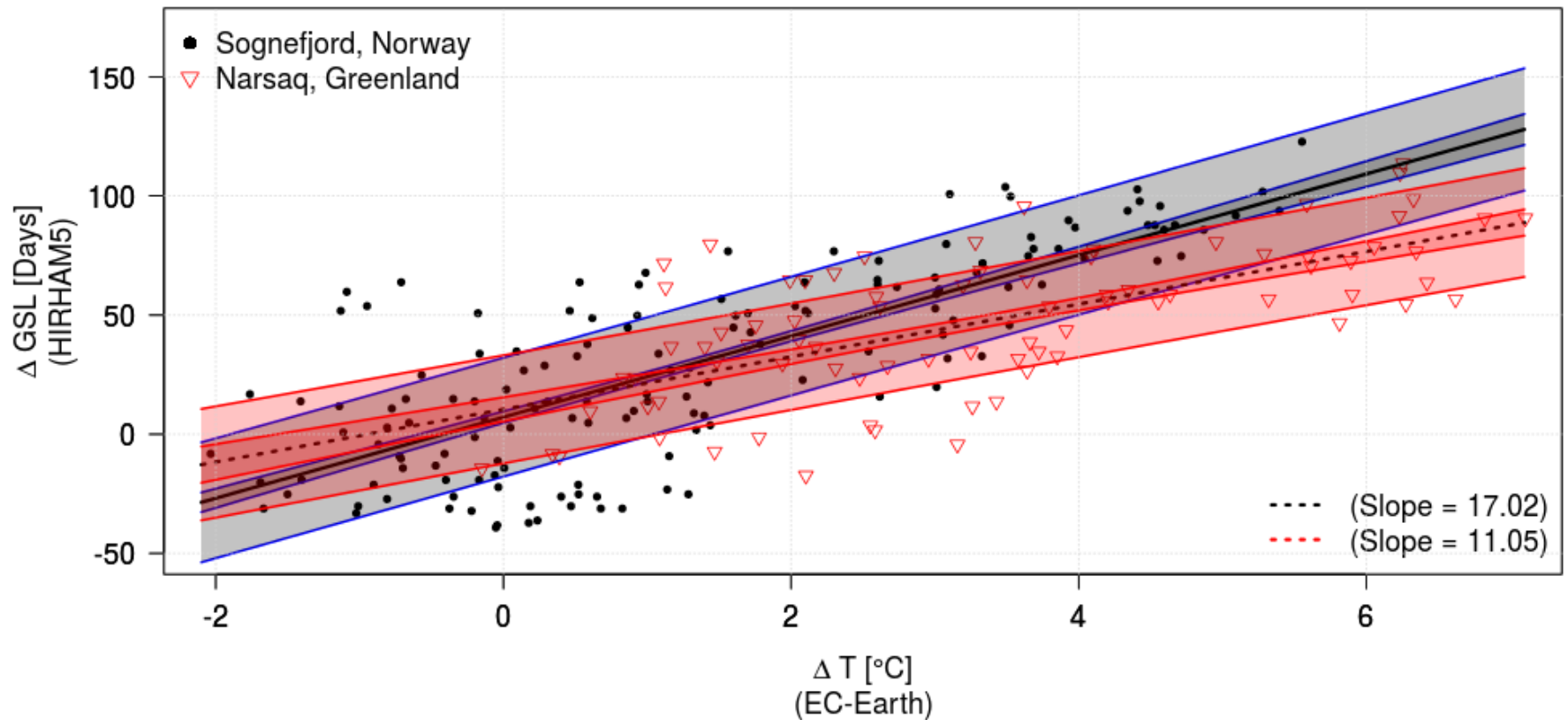
CMIP5 and CORDEX Variance

Density plot of CMIP5 and CORDEX temperature changes from 1986-2005 to 2081-2100 for all Scandinavian grid points.



Left shows low-end of “likely” range (17th percentile) and right shows high-end of “likely” range (83rd percentile).

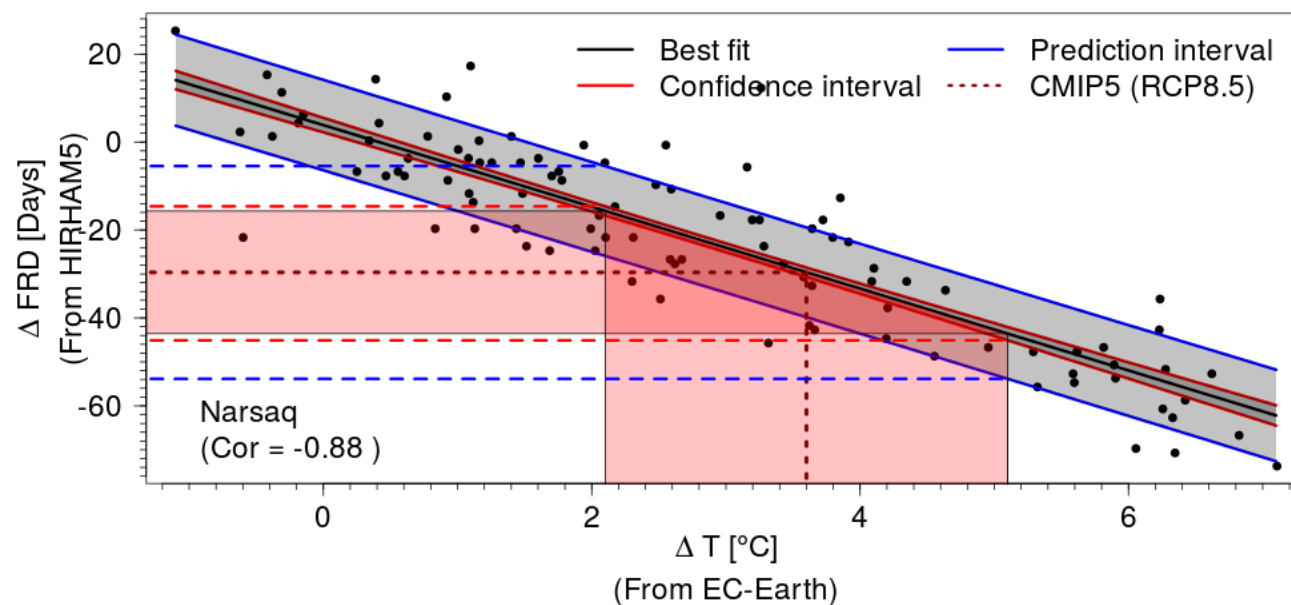
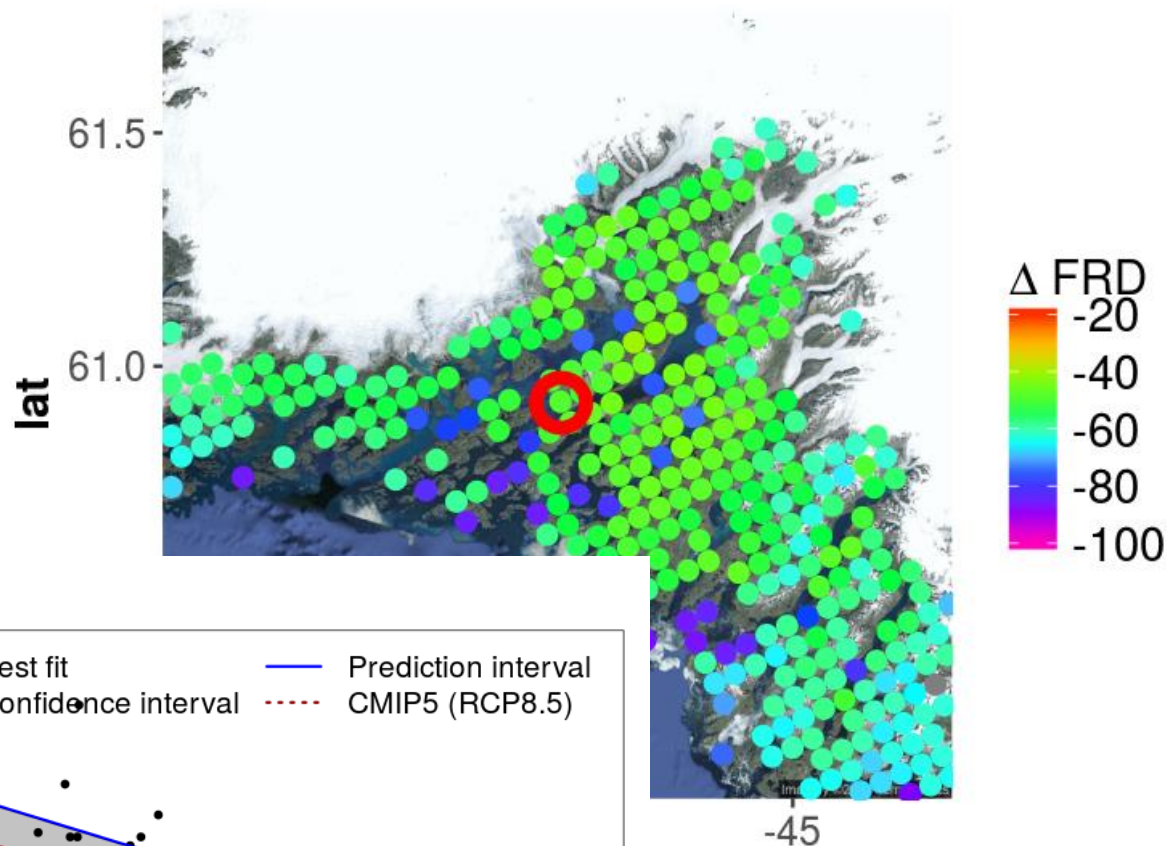
Transferability of index relation



Growing season length from HIRHAM5 as a function of annual mean temperature from EC-Earth for Sognefjord (black) and Narsaq (red)

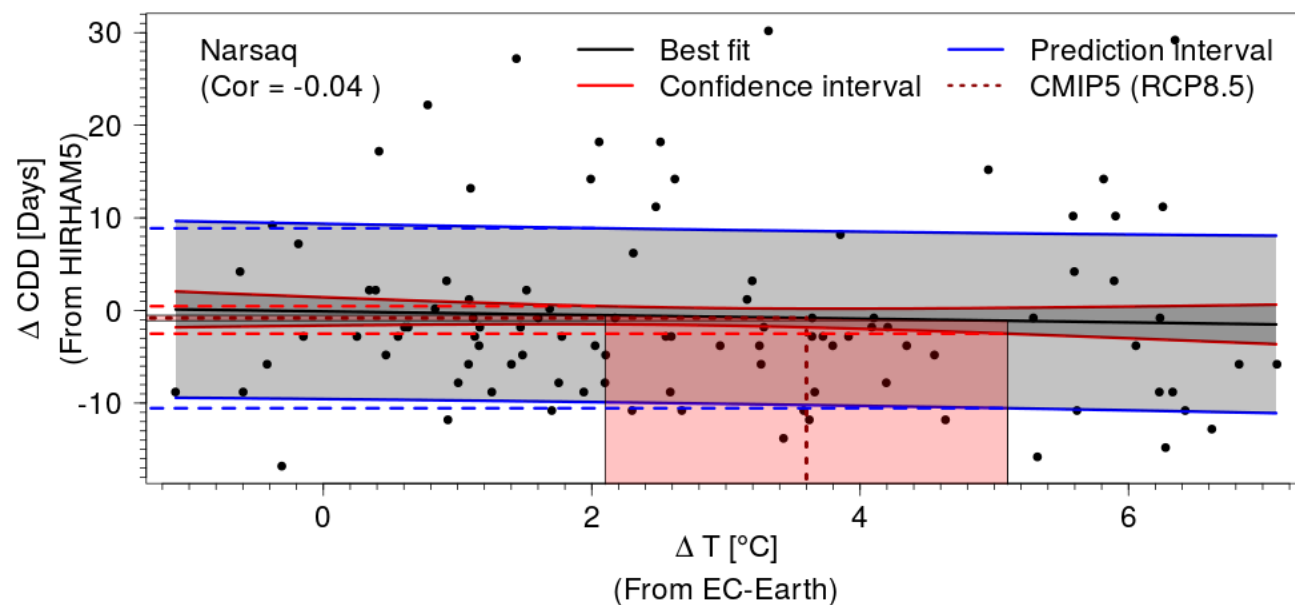
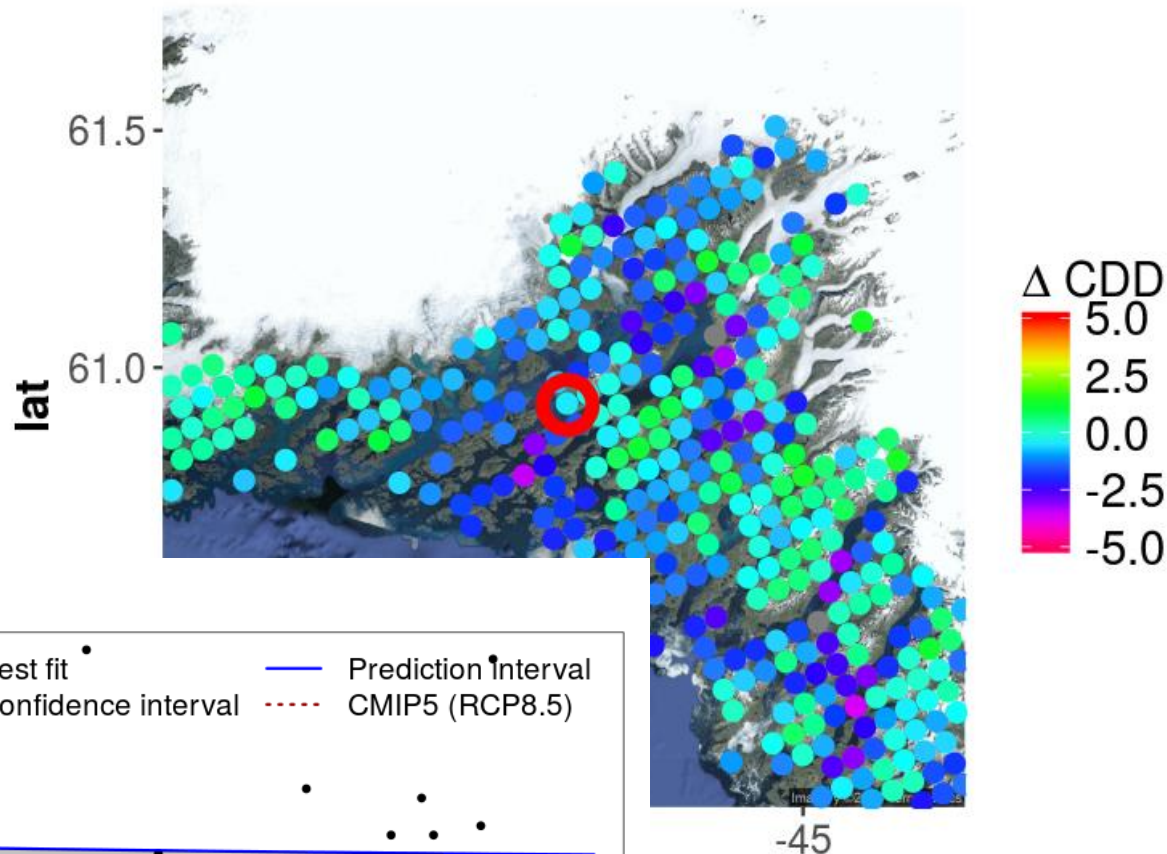
Frost days

Change in number of days per year with minimum temperature below zero



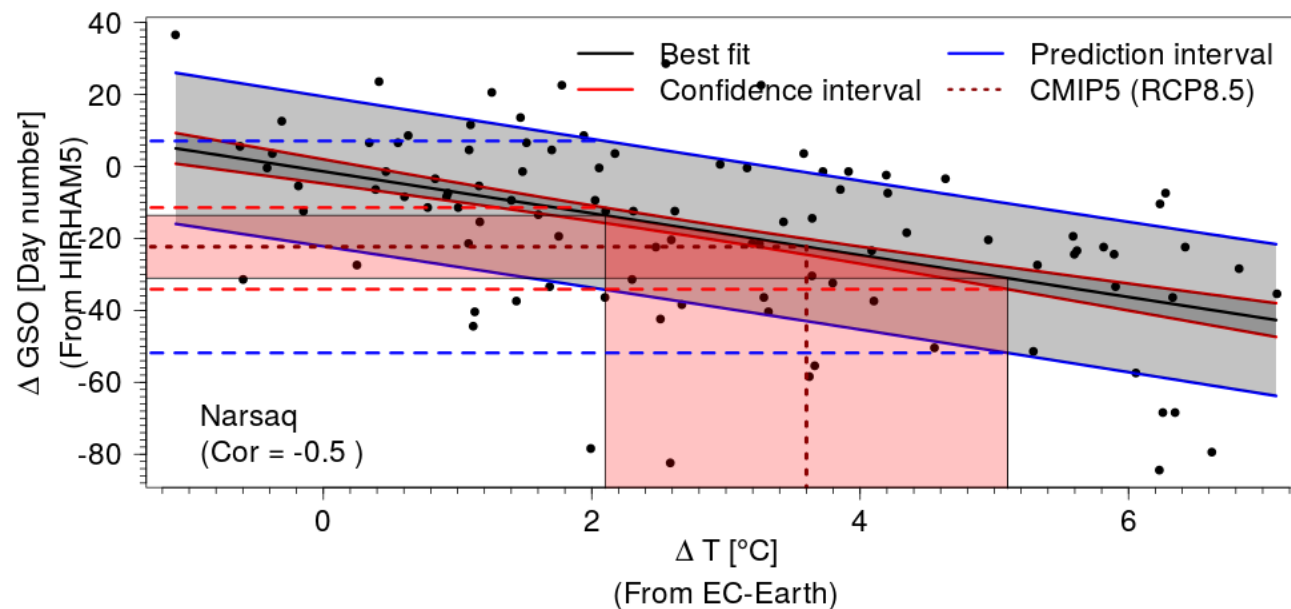
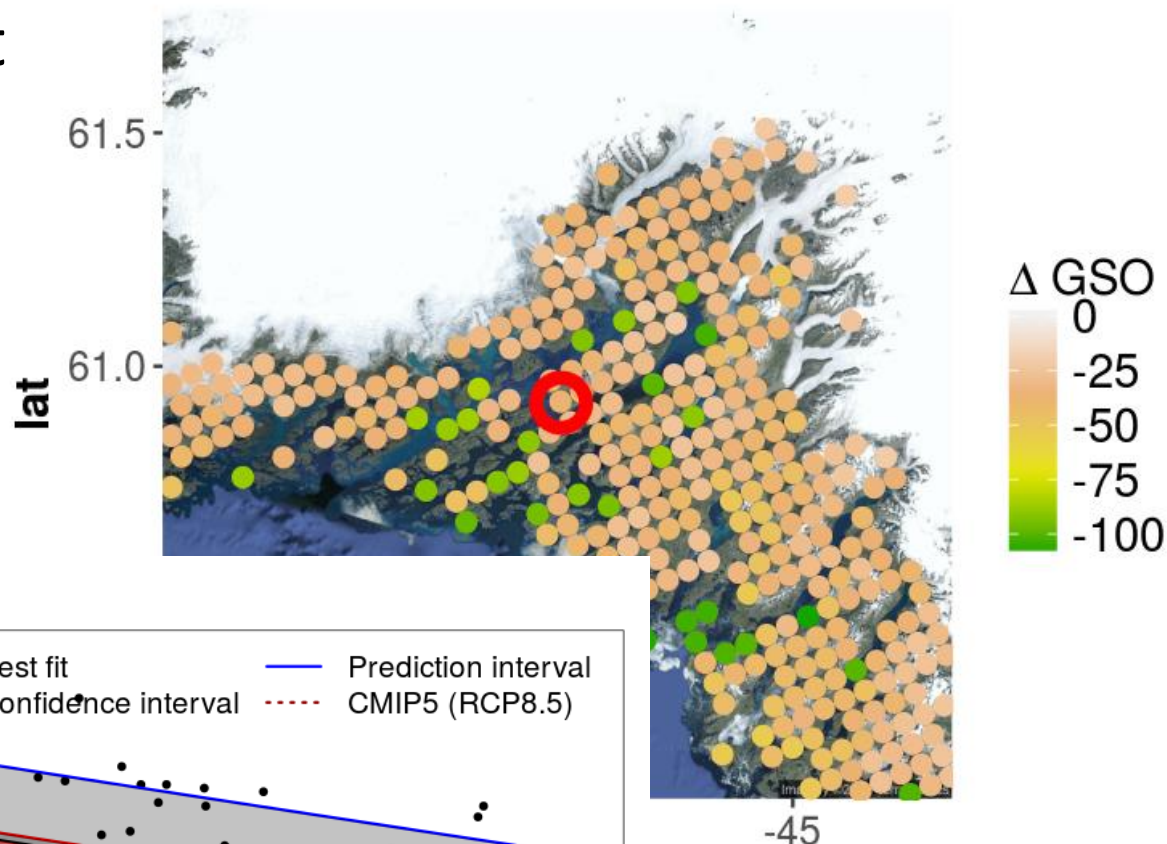
Consecutive dry days

Change in longest period with
precipitation less than 1mm per
day



Growing season onset

Change in day number of the first 4 consecutive days with daily mean temperature above 5°C.



Tack!
mol@dmi.dk