

Modellering af interaktion mellem landoverflade atmosfæren

Koblet klima-hydrologisk model

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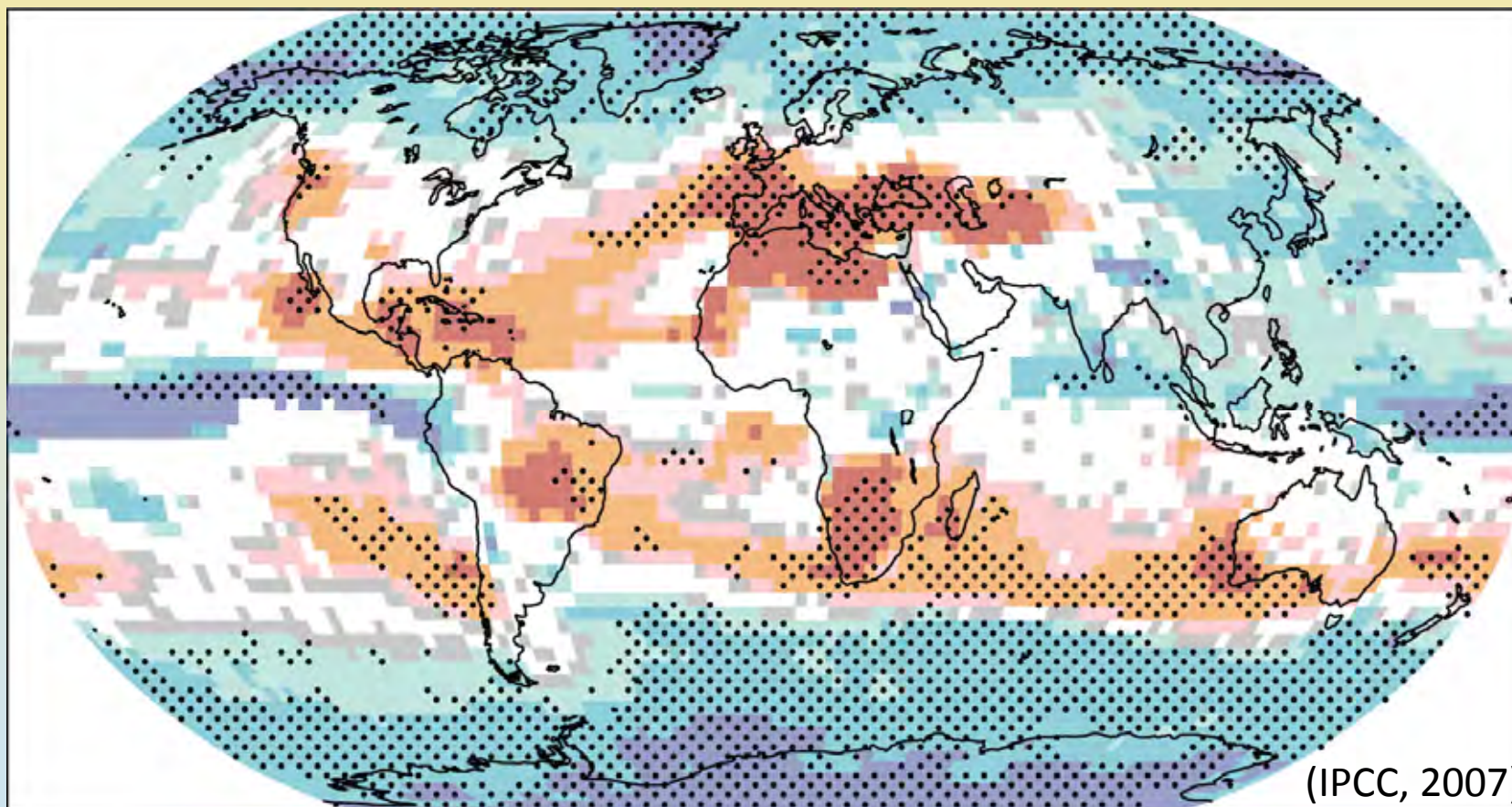
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Karsten Høgh Jensen, KU, IGG

Disposition

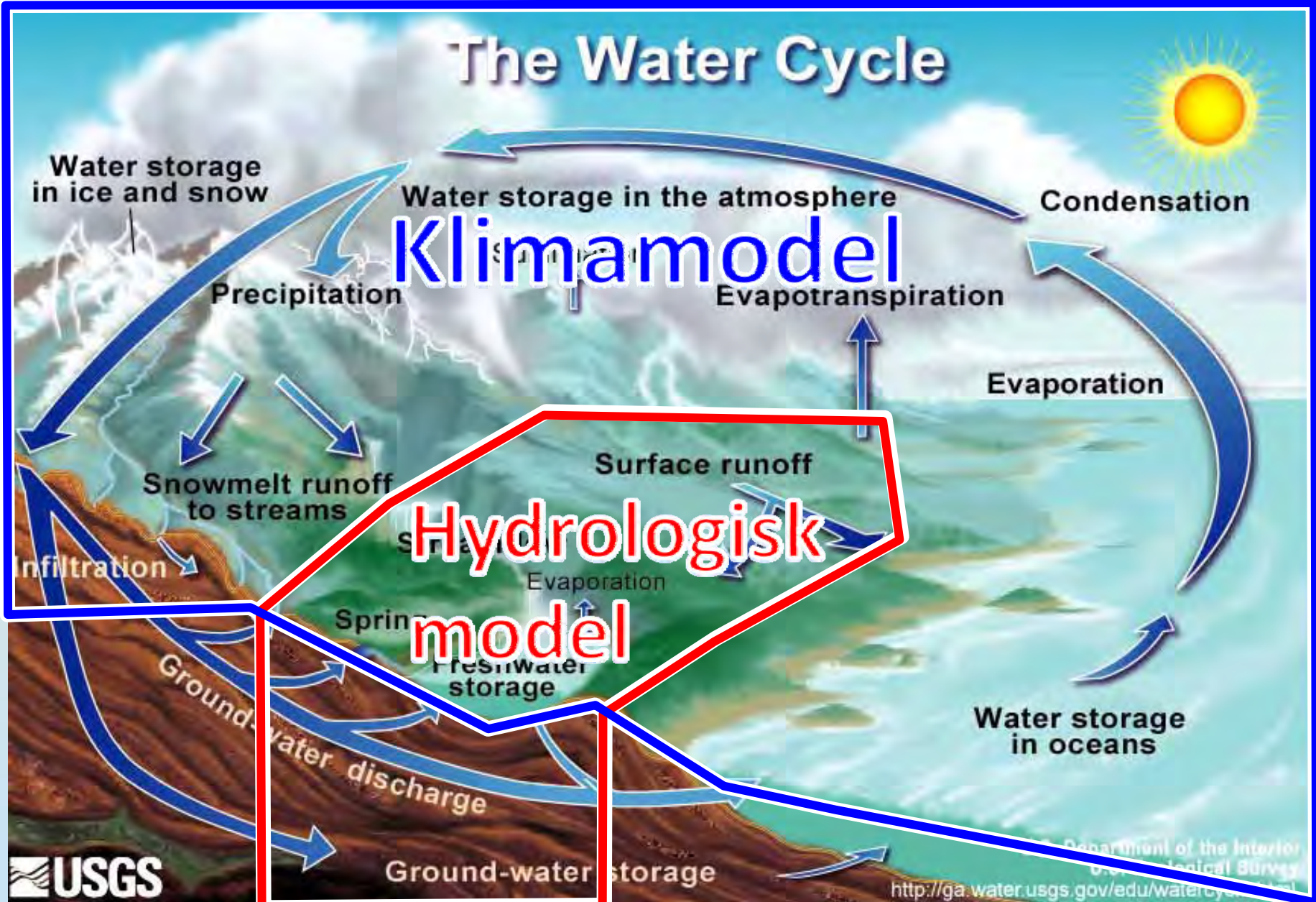
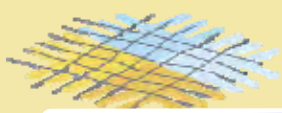
- Introduktion
 - Klimamodellering, vandkredsløbet, kobling
- Resultater
 - Grundvand, kobling, nedbør
- Konklusion

Nedbør, A1B 2090-2099

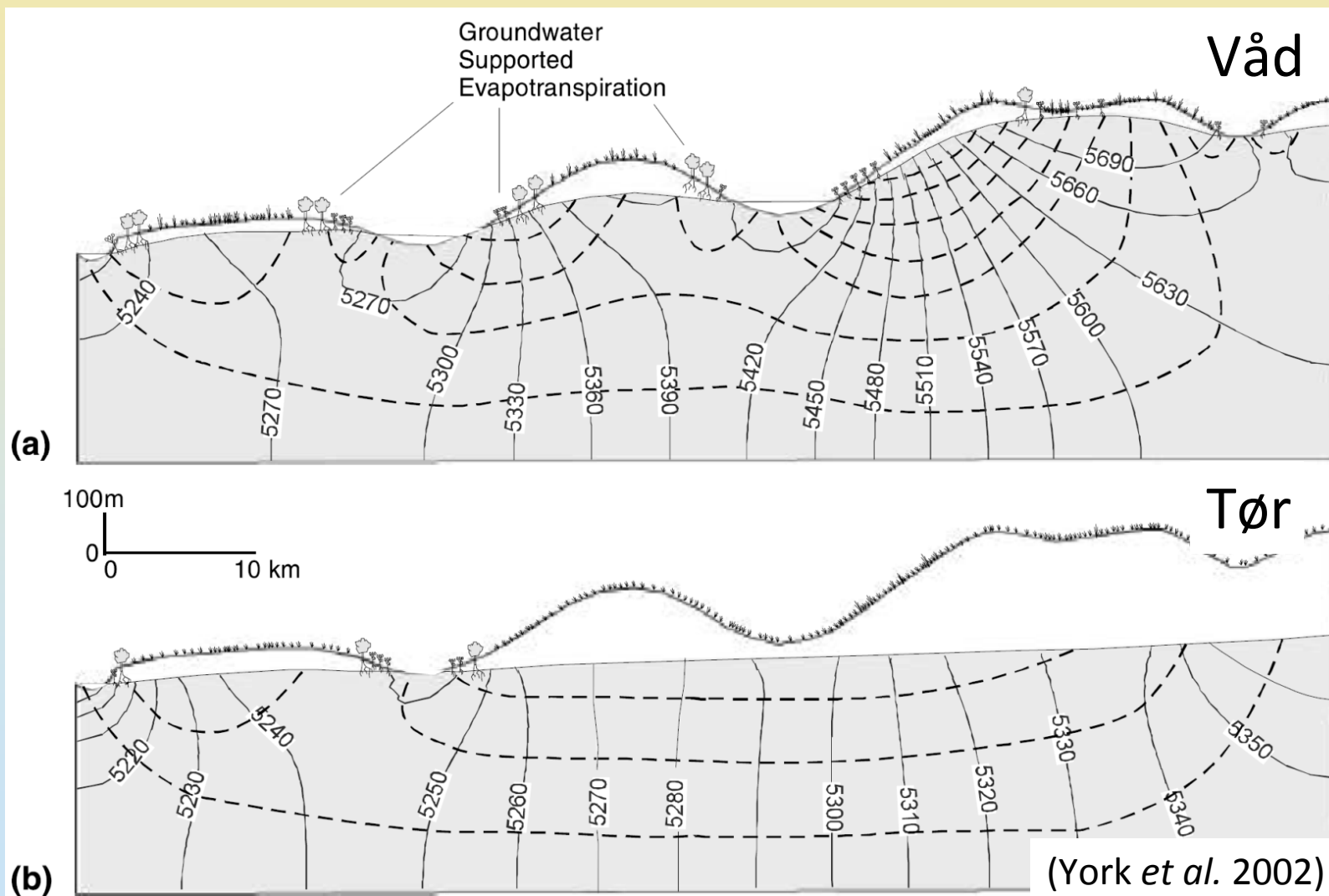


-20 -10 -5 5 10 20

Ændring i sommer, JJA



Grundvands understøttet evapotranspiration



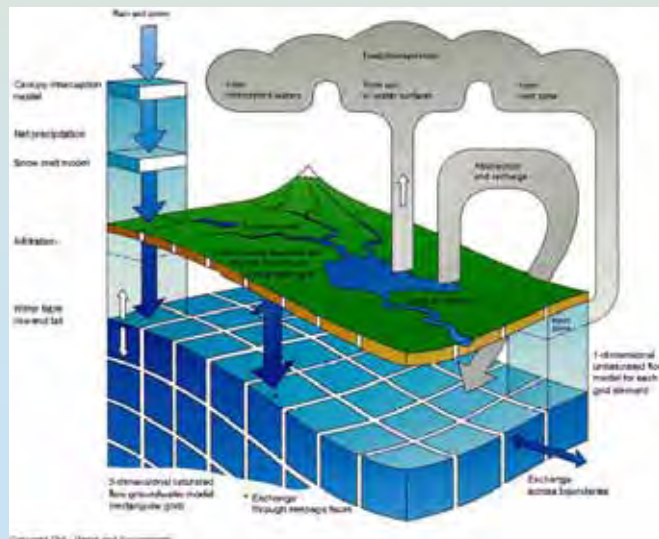
Modellerne

MIKE SHE (DHI)

- Hydrologisk model
- Fysisk, distribueret
- 50 – 1 km
- Opland

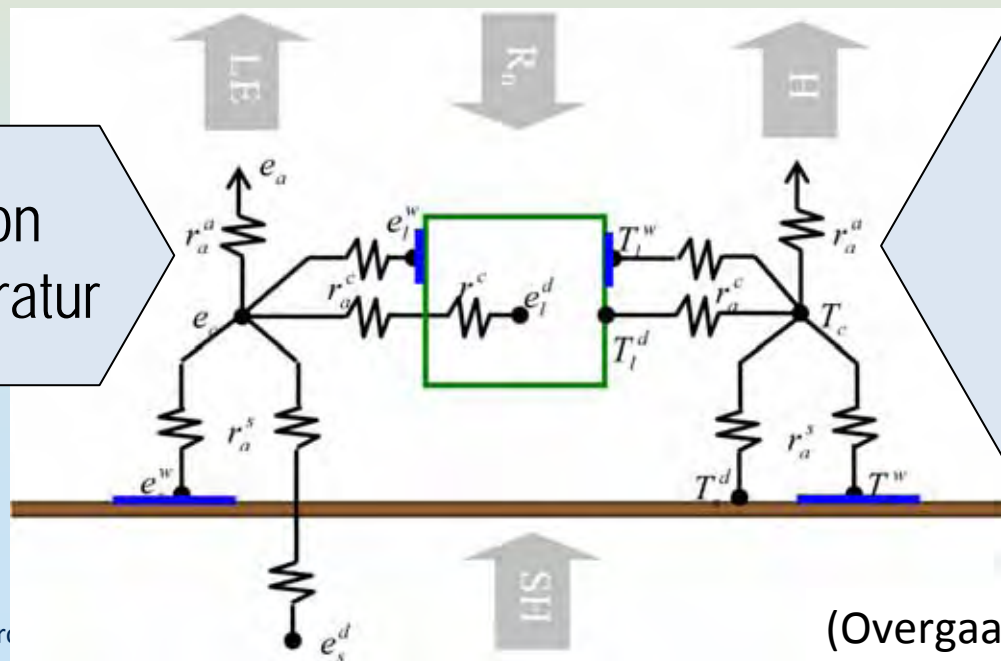
HIRHAM (DMI)

- Regional klimamodel
- Dynamisk fra HIRLAM
- Fysik fra ECHAM
- 5 – 25 km
- Regional, fx EU, USA



- MIKE SHE SWET modul
 - To lag, to kilde model
 - Shuttleworth and Wallace (1985)
 - Overgaard et al. (2007)

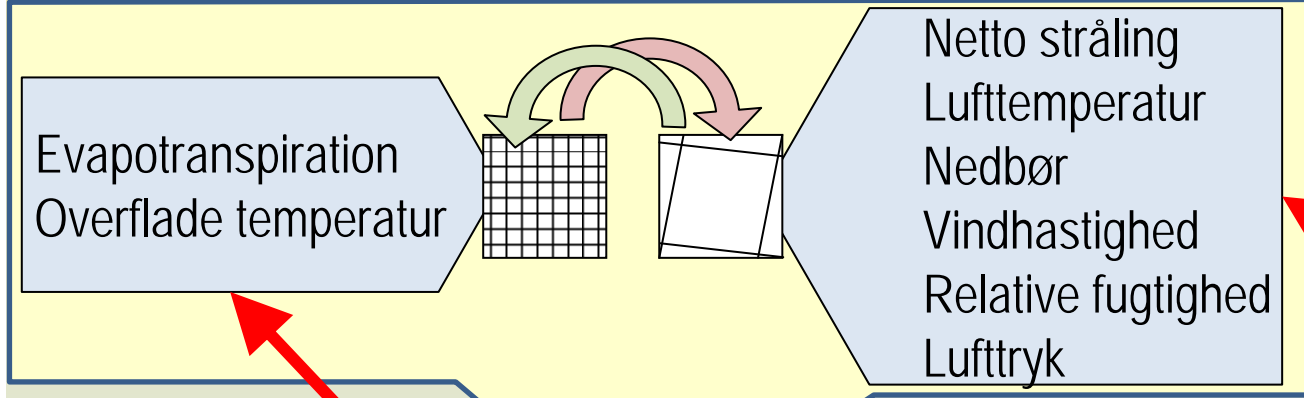
Evapotranspiration
Overflade temperatur



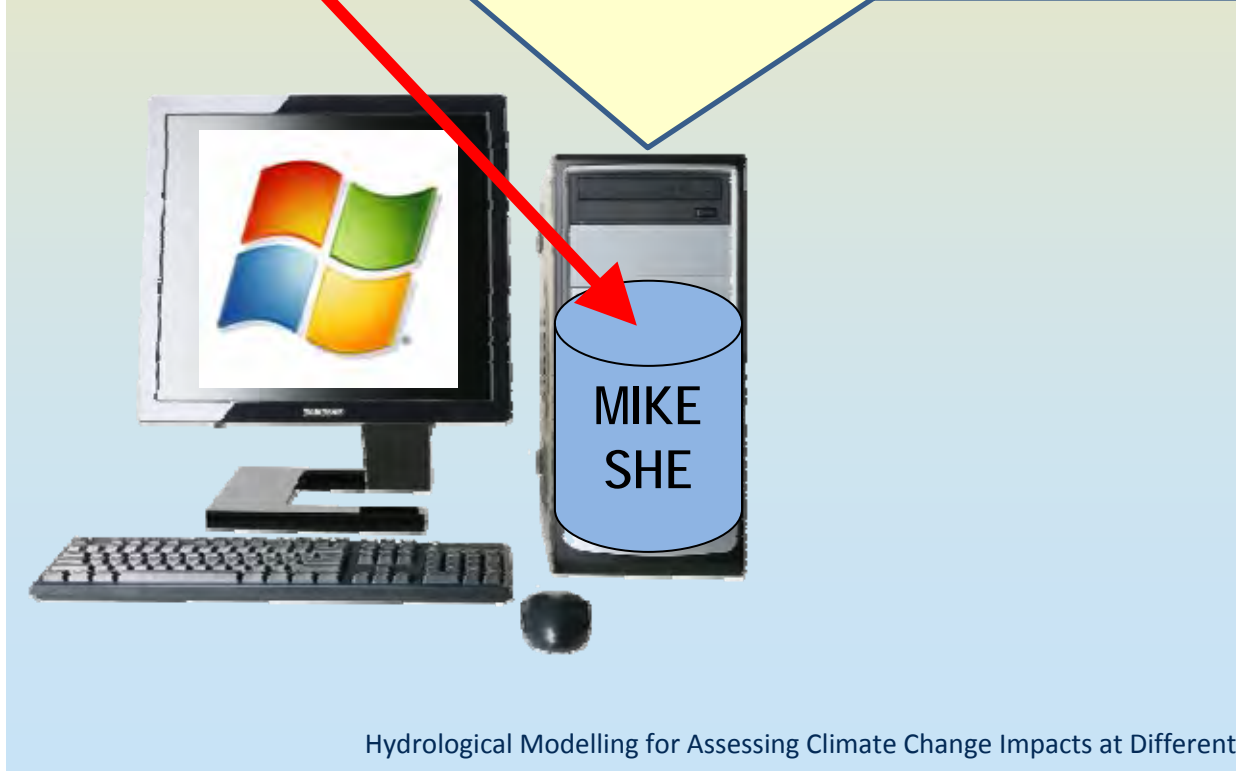
Netto stråling
Lufttemperatur
Nedbør
Vindhastighed
Relative fugtighed
Lufttryk

(Overgaard et al, 2007)

Det koblet system



Kommunikation script



Studie område: FIFE (ISLSCP)

Database, 15 x 15 km² FIFE område

- 10 meteorologisk stationer
- 22 flux stationer
- 32 jordvand stationer
- 26 maj til 16 okt. 1987
Hele vækstsæsonen

(Sellers et al, 1992)



Resultater

Effekten af grundvand

- MIKE SHE
 - Konstant grundvandsdybde -3 m
 - Dynamisk grundvandsmodel

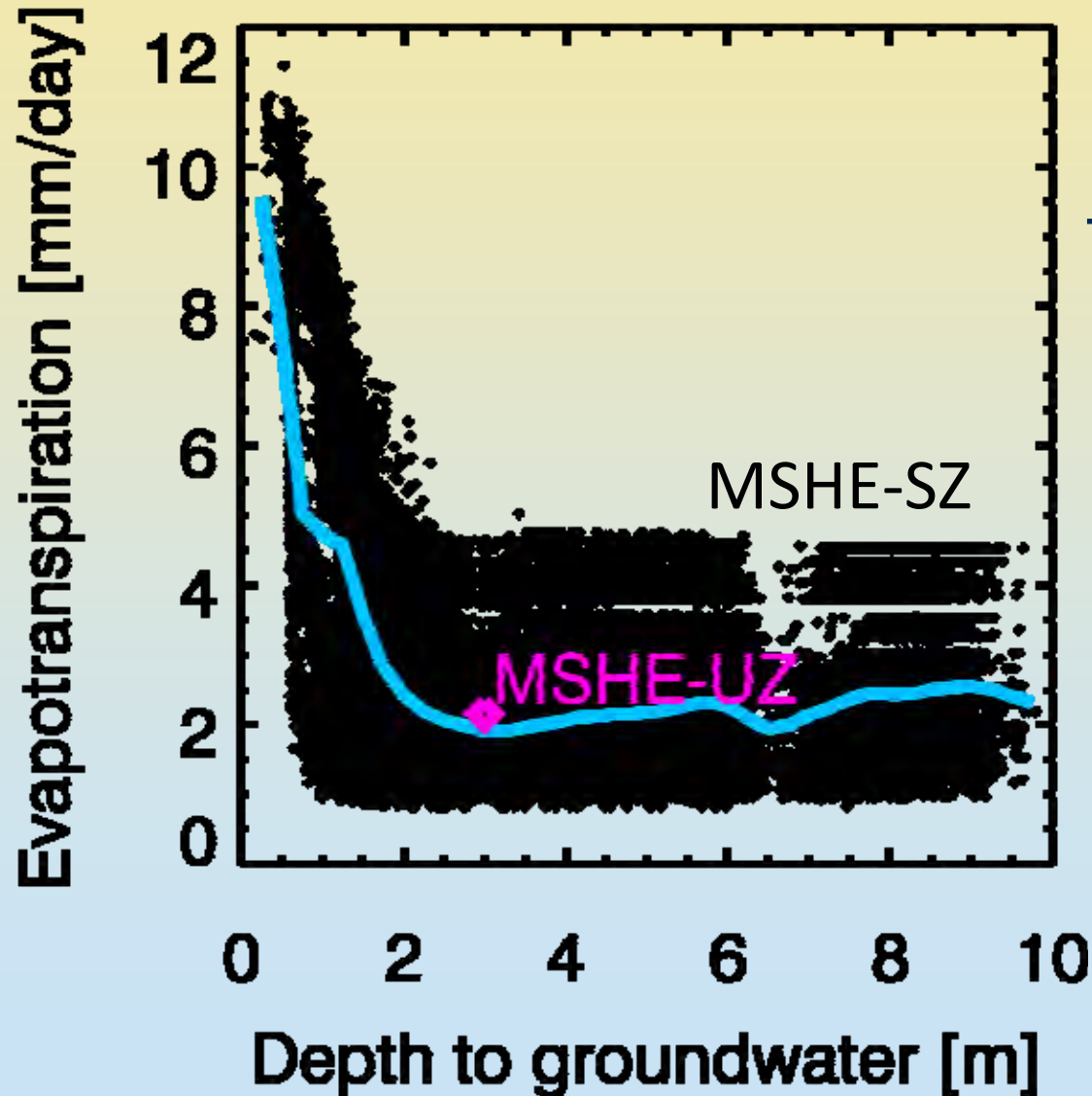
Betydning af kobling

- MIKE SHE – HIRHAM

Rumlig skala af nedbør

- HIRHAM and WRF

Effekten af grundvand

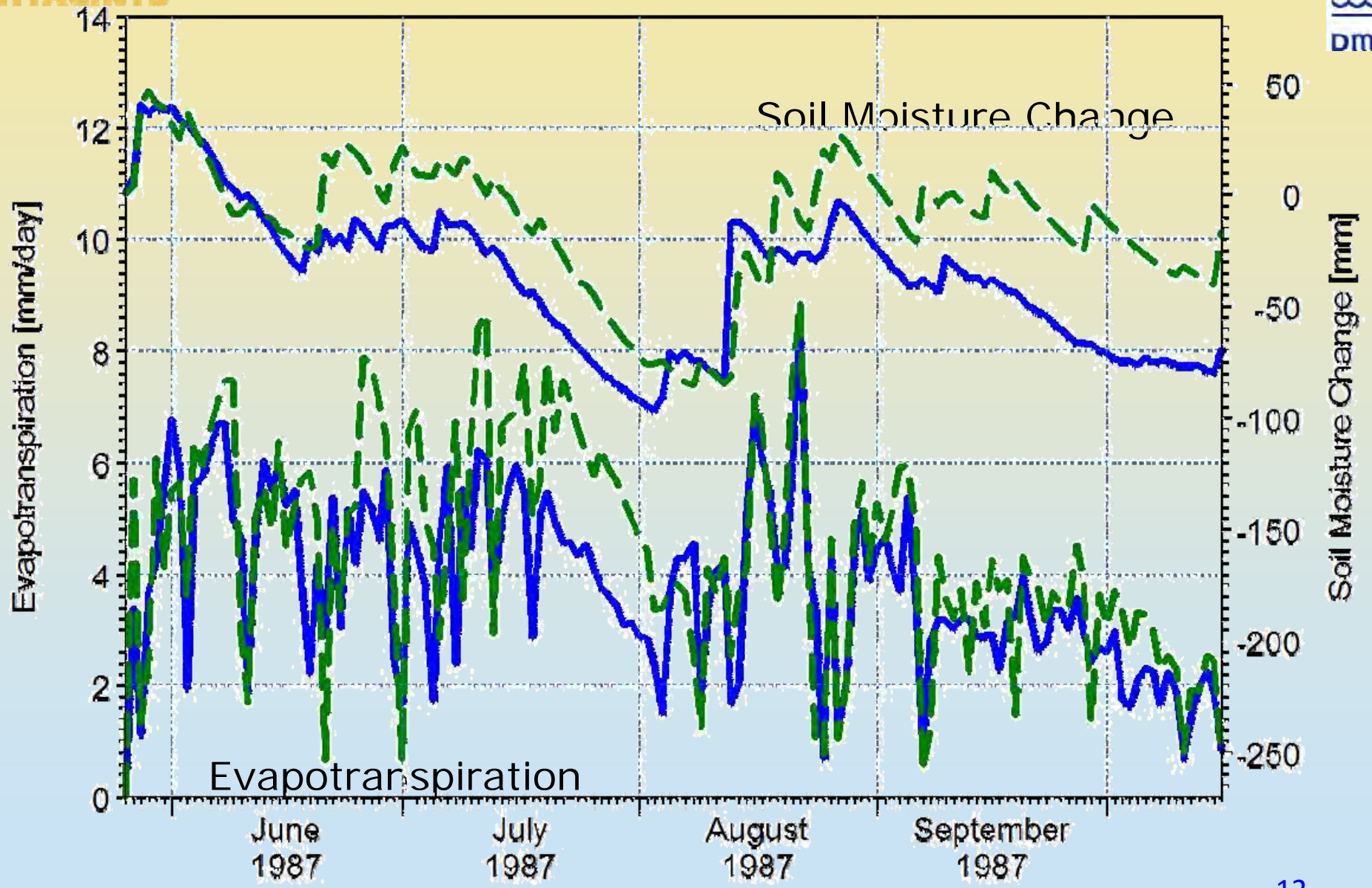


1. August
Tør
periode


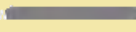



Eva. MSHE-SZ [mm/day] ———
 Eva. MSHE-HIRHAM [mm/day] - - -

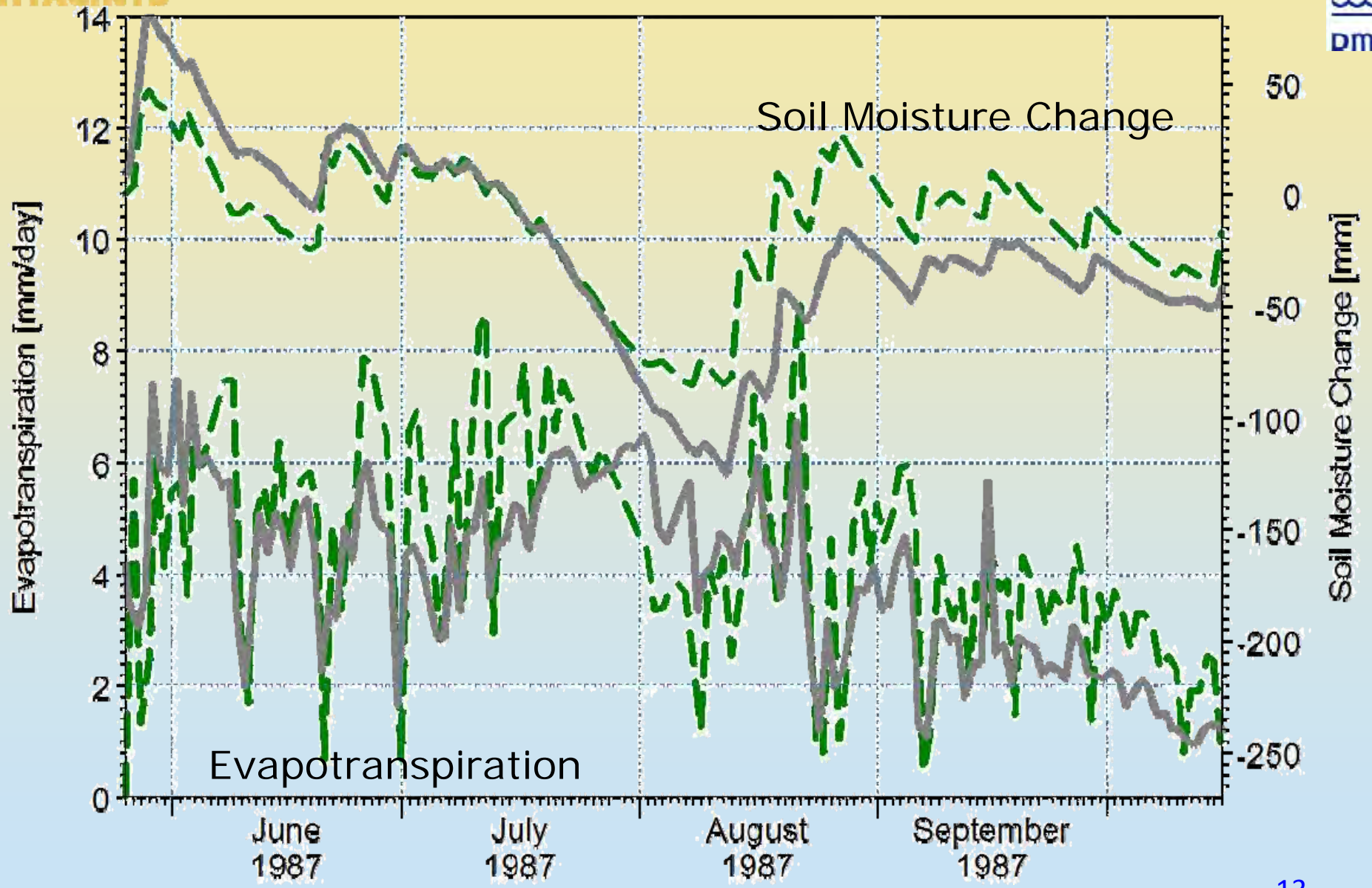
Soil Mst. MSHE-SZ [mm] ———
 Soil Mst. MSHE-HIRHAM [mm] - - -





Eva. MSHE-HIRHAM [mm/day] 
 Eva. HIRHAM [mm/day] 

Soil Mst. MSHE-HIRHAM [mm] 
 Soil Mst. HIRHAM [mm] 



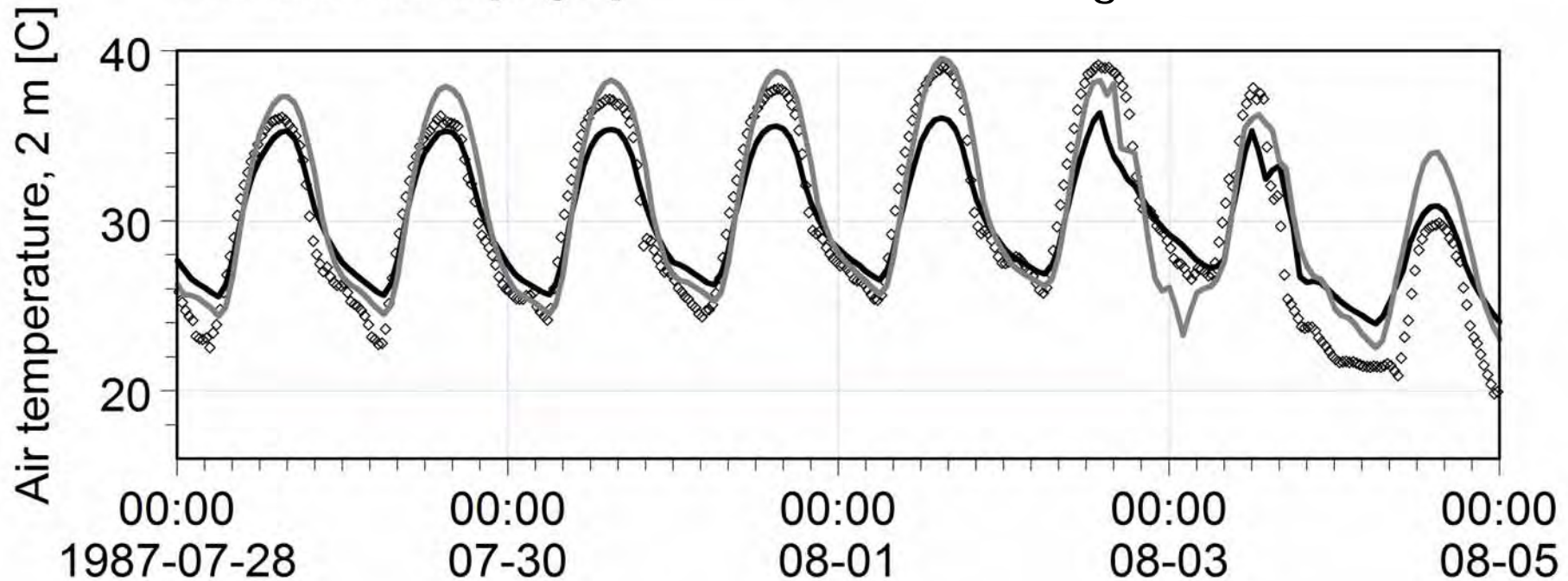
Semi-kobling, temperatur

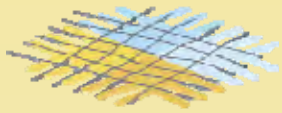
Mean Error (May – Oct)

Obs.	[deg C]	◇ ◇
HIRHAM	[deg C]	—
HIRHAM-MSHE	[deg C]	—

1.2 deg C

0.6 deg C

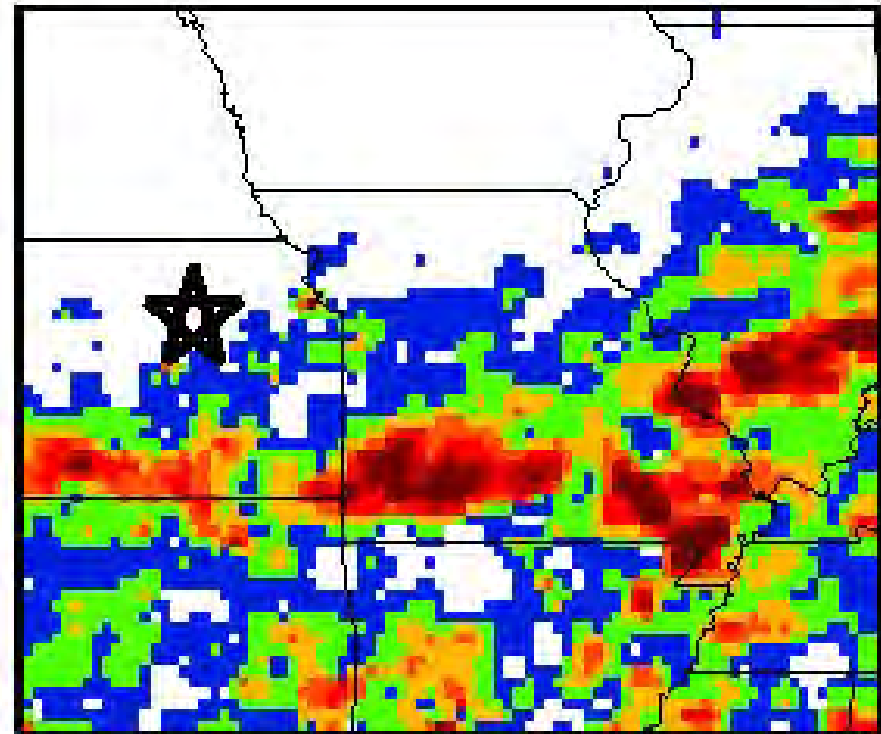
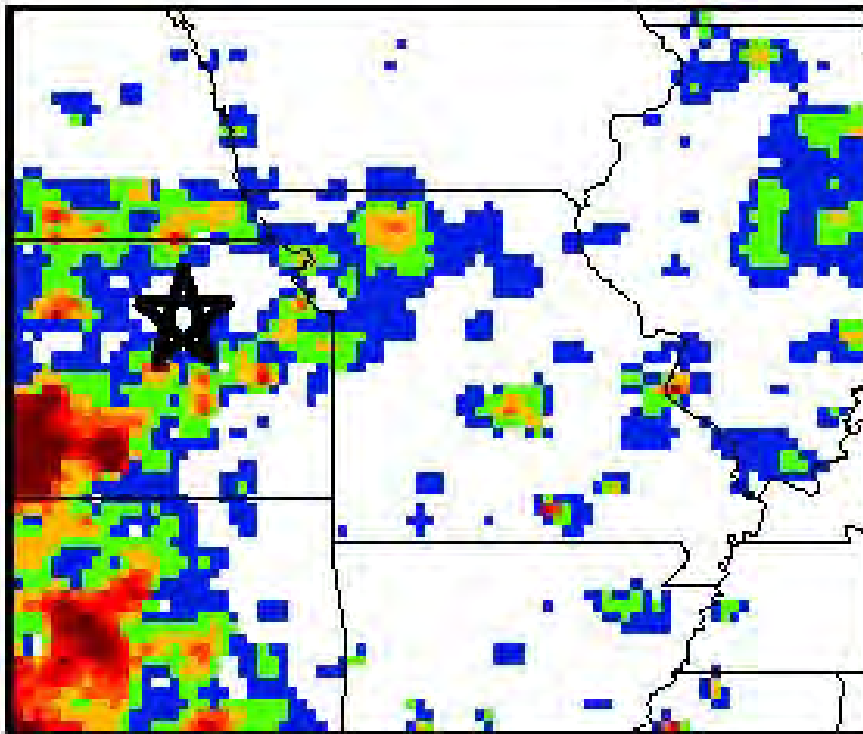




Rumlig karakteristika af nedbør

29 June

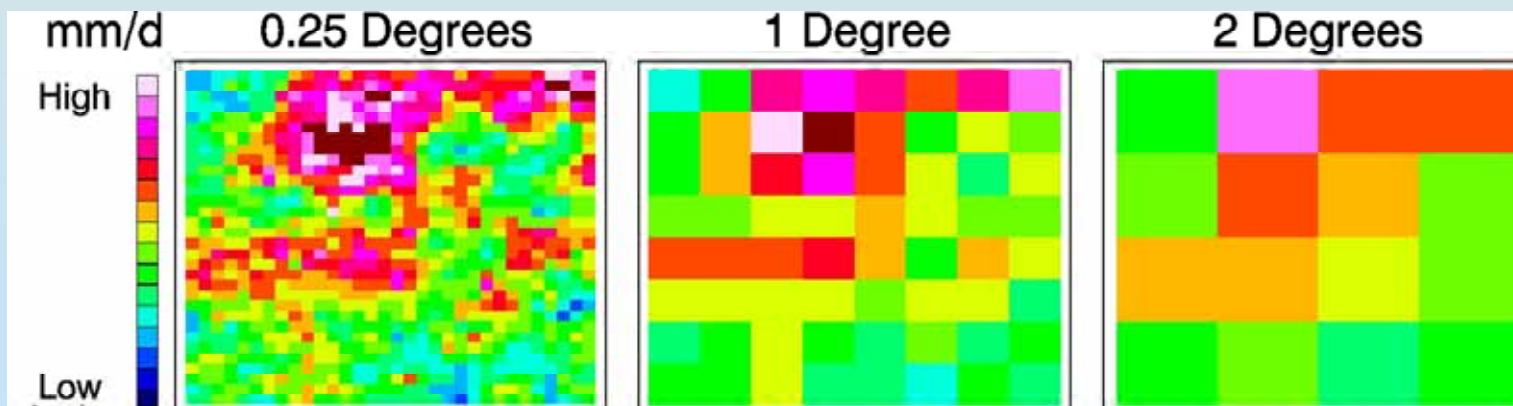
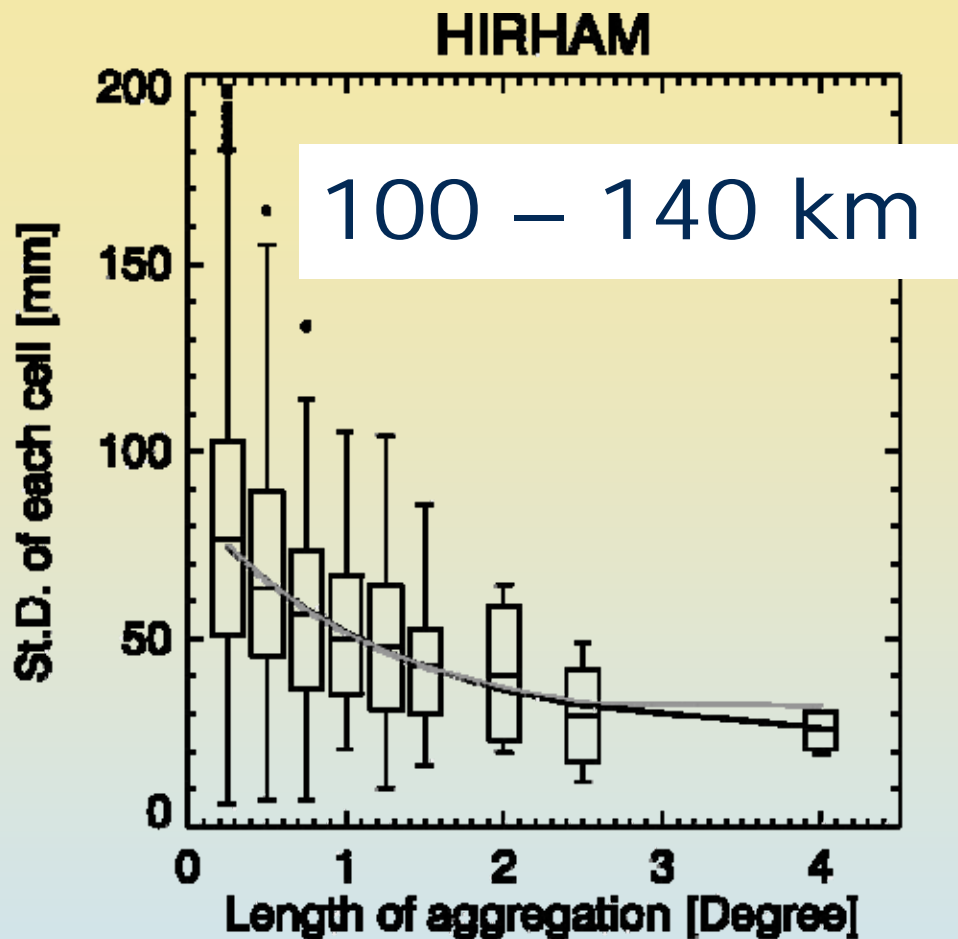
30 June



(Date: Maurer et al., 2002)

Inter-model standard afvigelses længde

Total sommer (JJA) nedbør





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Konklusioner

- Grundvand: Vigtig for evapotranspiration, i tørrer perioder, med lav dybde (<2m)
- Kobling: Indikation af forbedret temperaturer
- Nedbør: Rumlig usikkerhed 100-200 km