



Seasonal balancing of terrain-near groundwater in the Sunds area

Pilot DK1: Sunds

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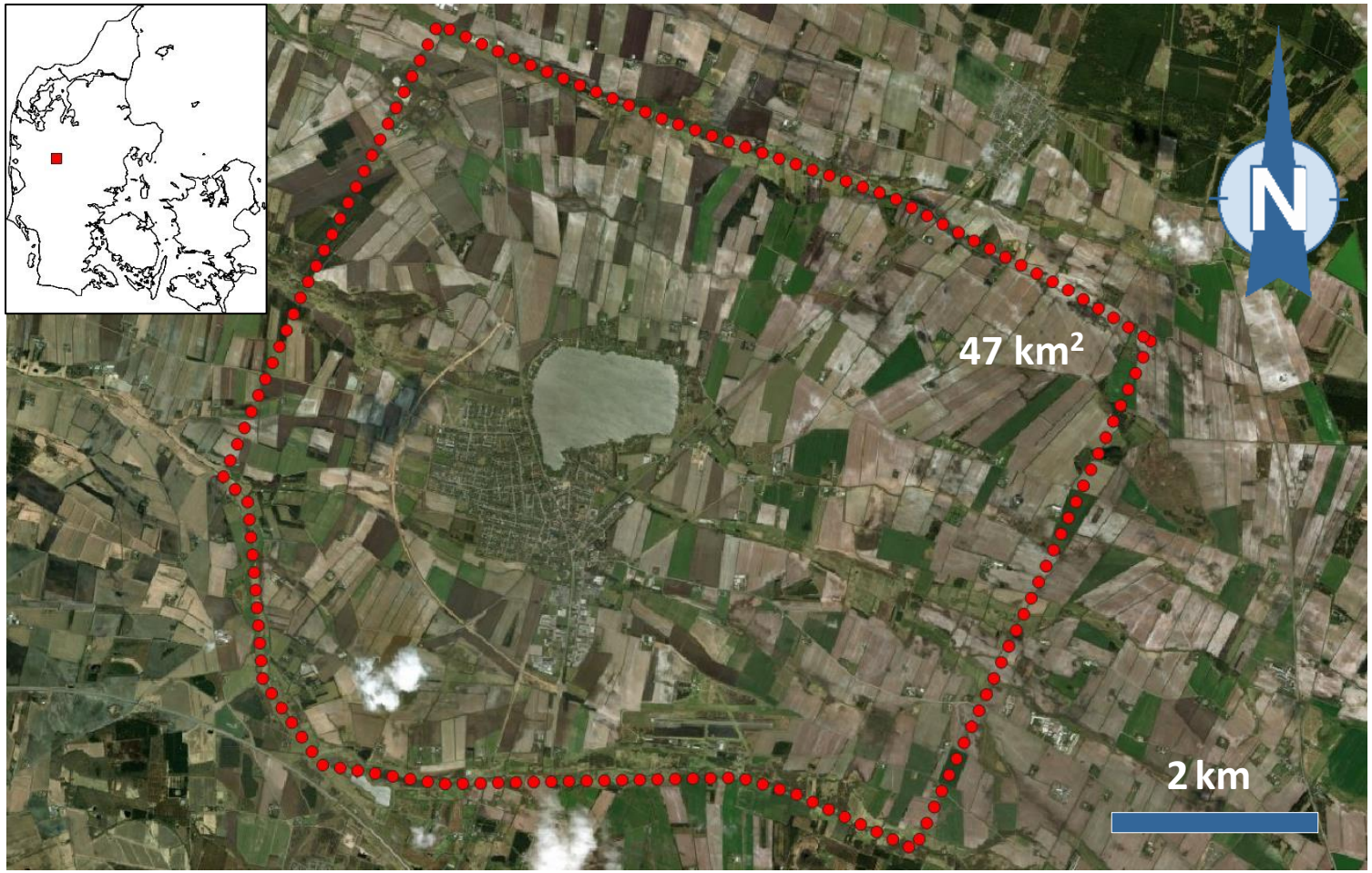
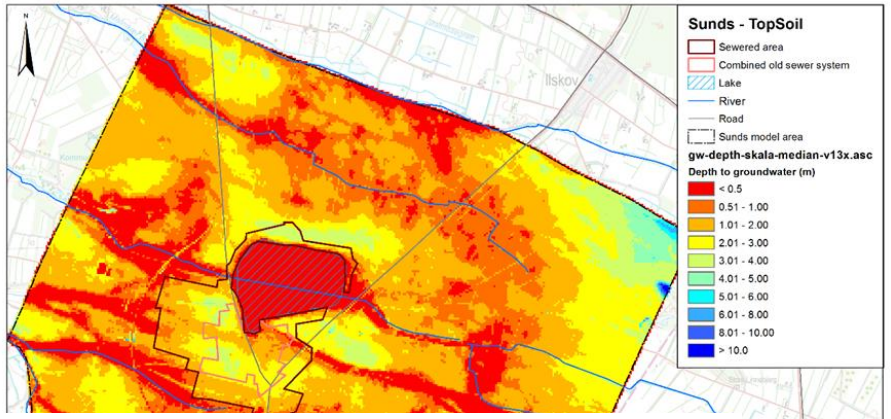
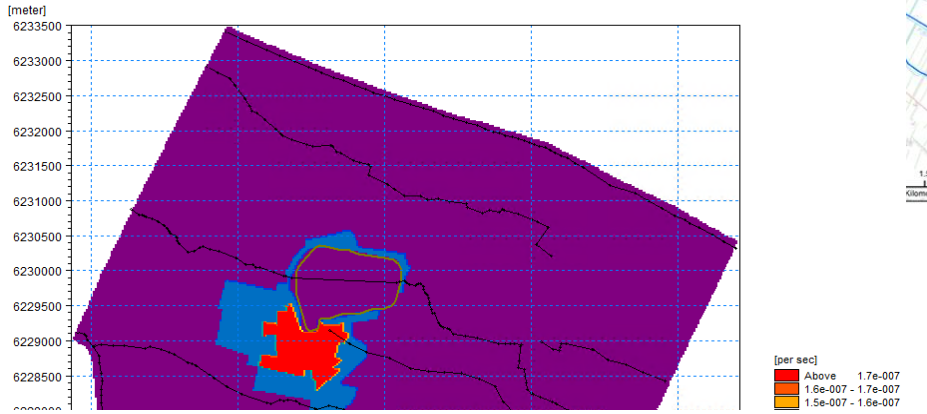
City of Sunds – and the model area

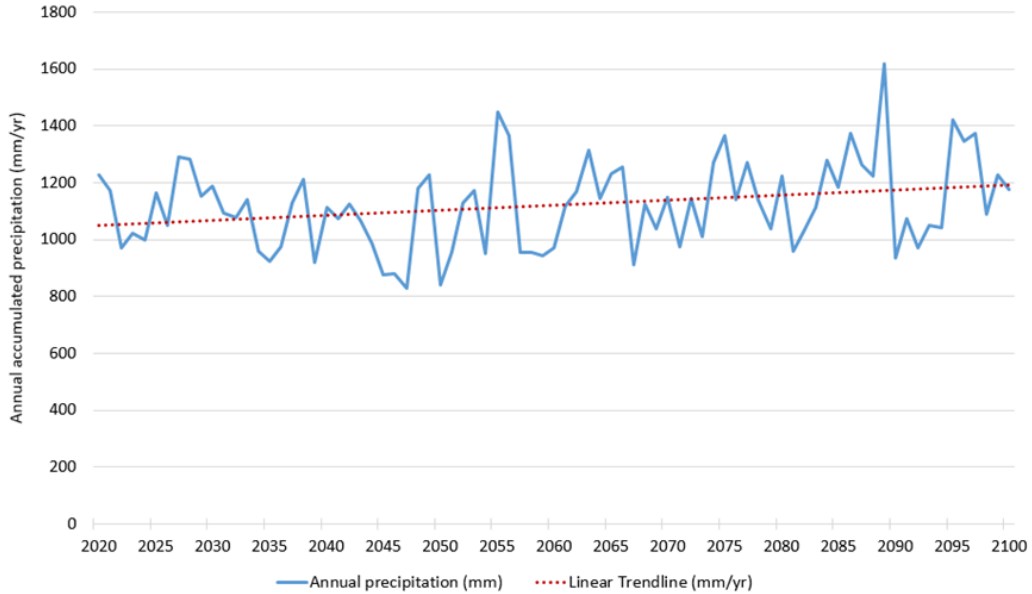


The challenge: Flooding

- Existing high groundwater level => flooding of basements
- Renovation of old leaking sewer pipes
- Predicted more wet future climate
  - Source: AquaClew - http://aquaclew.eu)







Resent climate “extremes” in Sunds …
… groundwater head elevation

How to do ‘Seasonal balancing’

Extension activities

1. Establish a catalogue of measures
2. Hydrological model studies to assess the effect of measures

Two type of measures

1. Remove surplus water from the area
2. Store and transfer water from winter to summer

Measures to remove surplus water

Use more water in summertime

- Plant more forest
  - Increase evapotranspiration

- Increase irrigation
  - Increase permits
  - Change crops
  - Climate predictions
    - Increasing summer temperature
    - Less precipitation in summertime
    - Change in water demand and crops

- BUT will it affect groundwater levels in wintertime?
- AND how will it affect the surface water in summertime?

Measures to store and transfer water

Remove surplus in wintertime

1. Drainpipes in town – The 3rd pipe

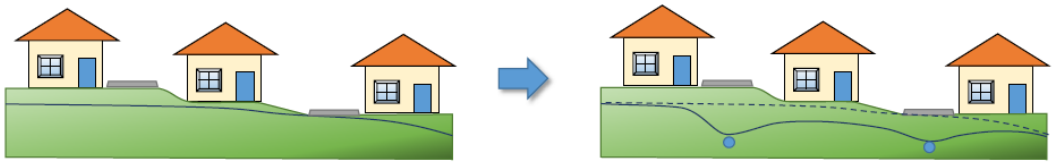


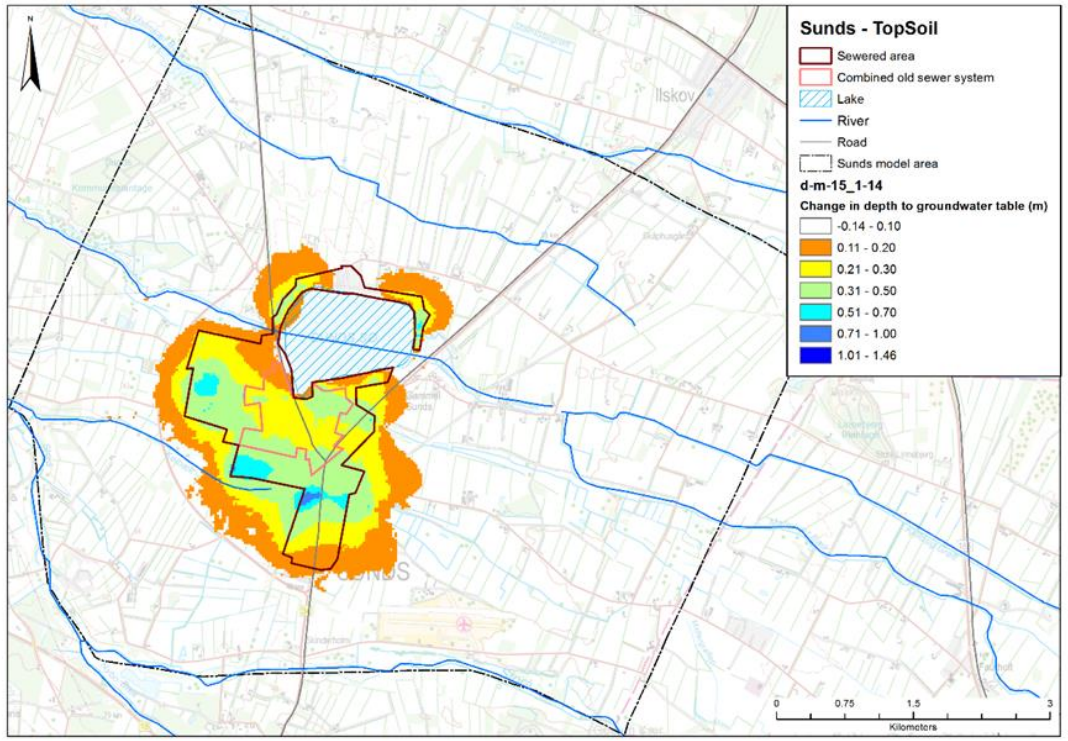
Figure 8: Horizontal subsurface drainage.

2. Open drainage channels in the town – a blue/green solution

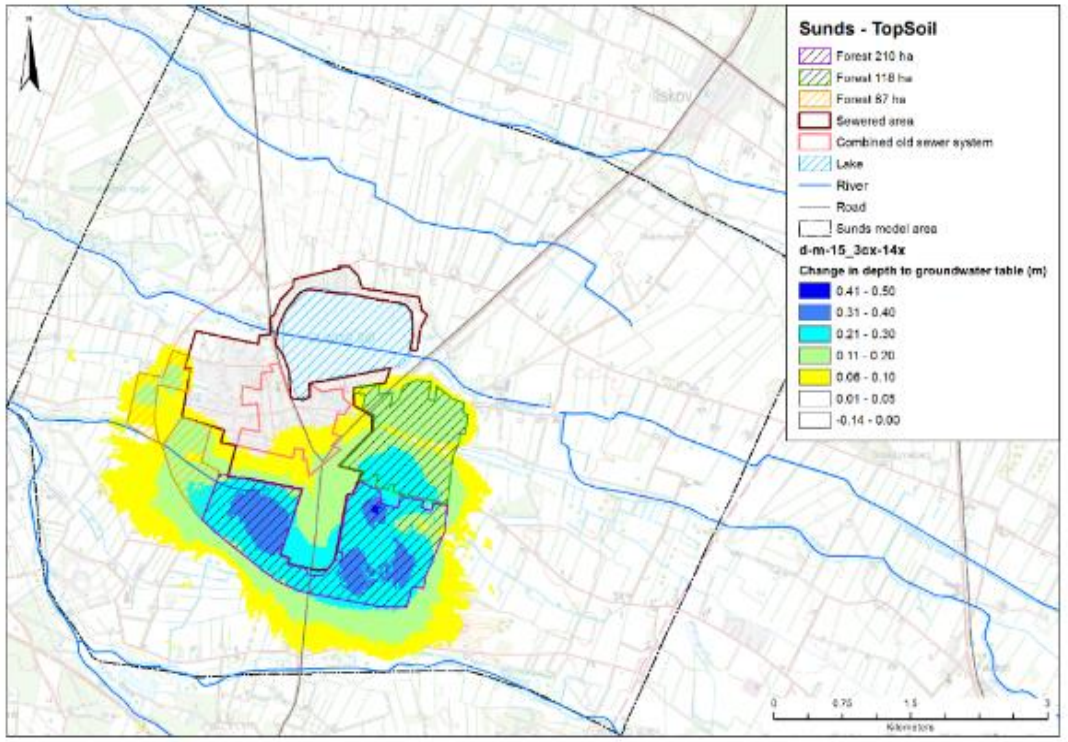
3. Lowering groundwater table by pumping water from the shallow aquifer

Change in depth to groundwater table (1)

New drainage pipes, the 3rd pipe

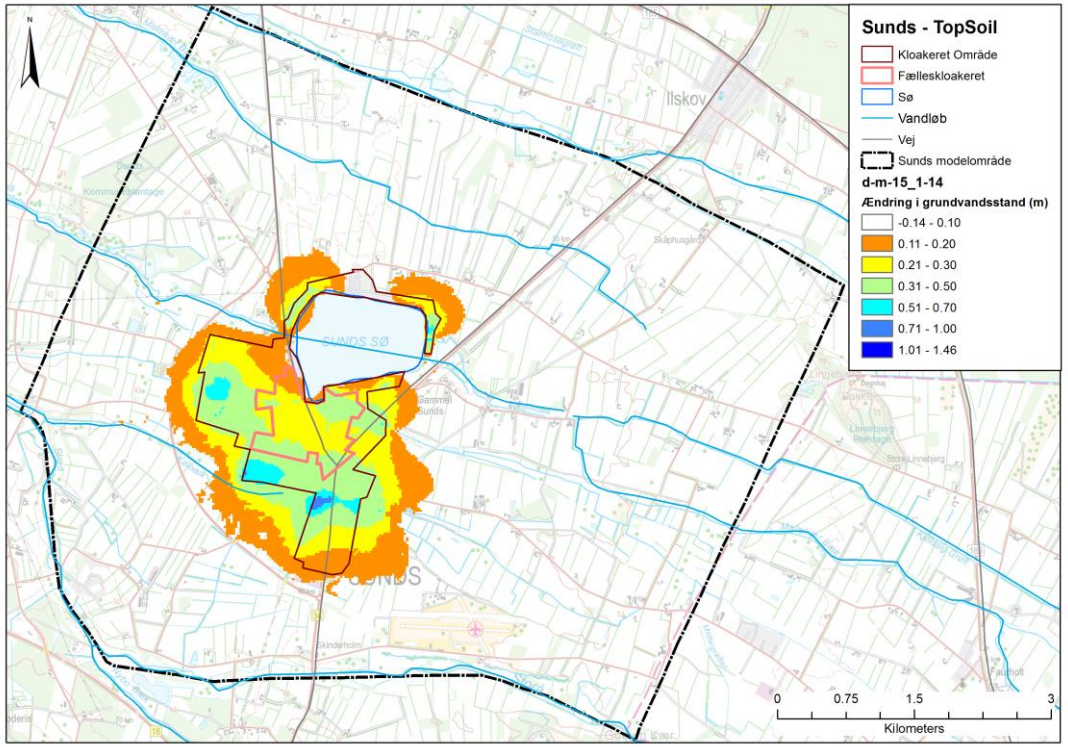


New forest

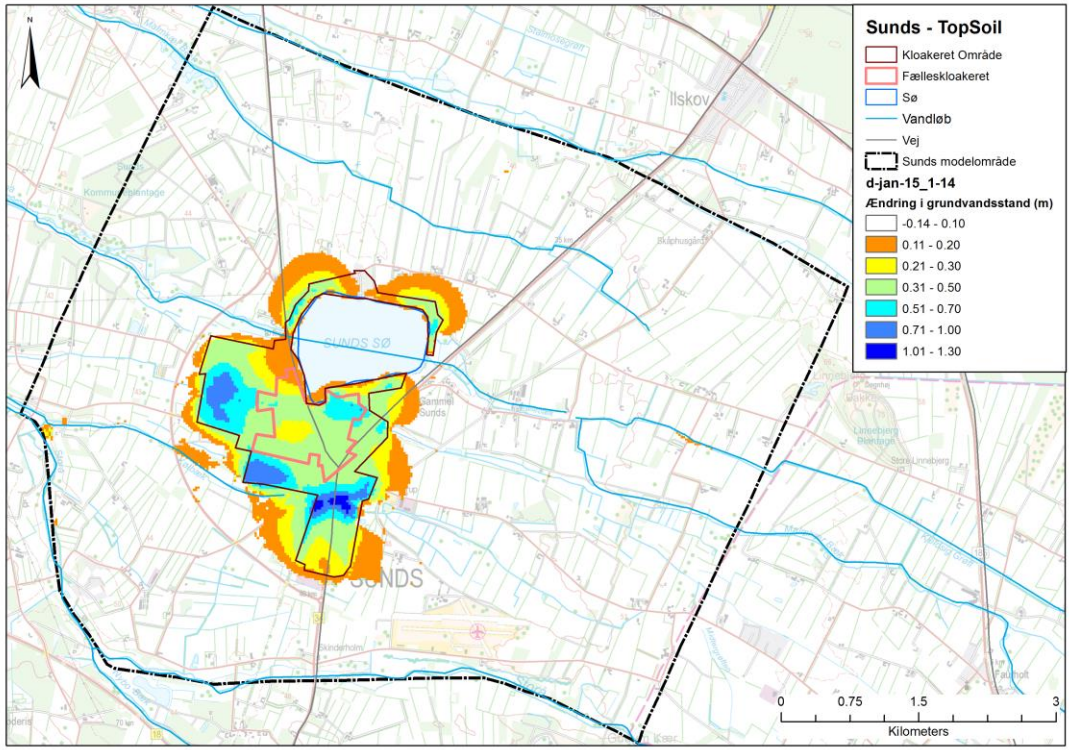


Change in depth to groundwater table (2)

New drainage pipes, average situation



New drainage pipes, winter situation (January)



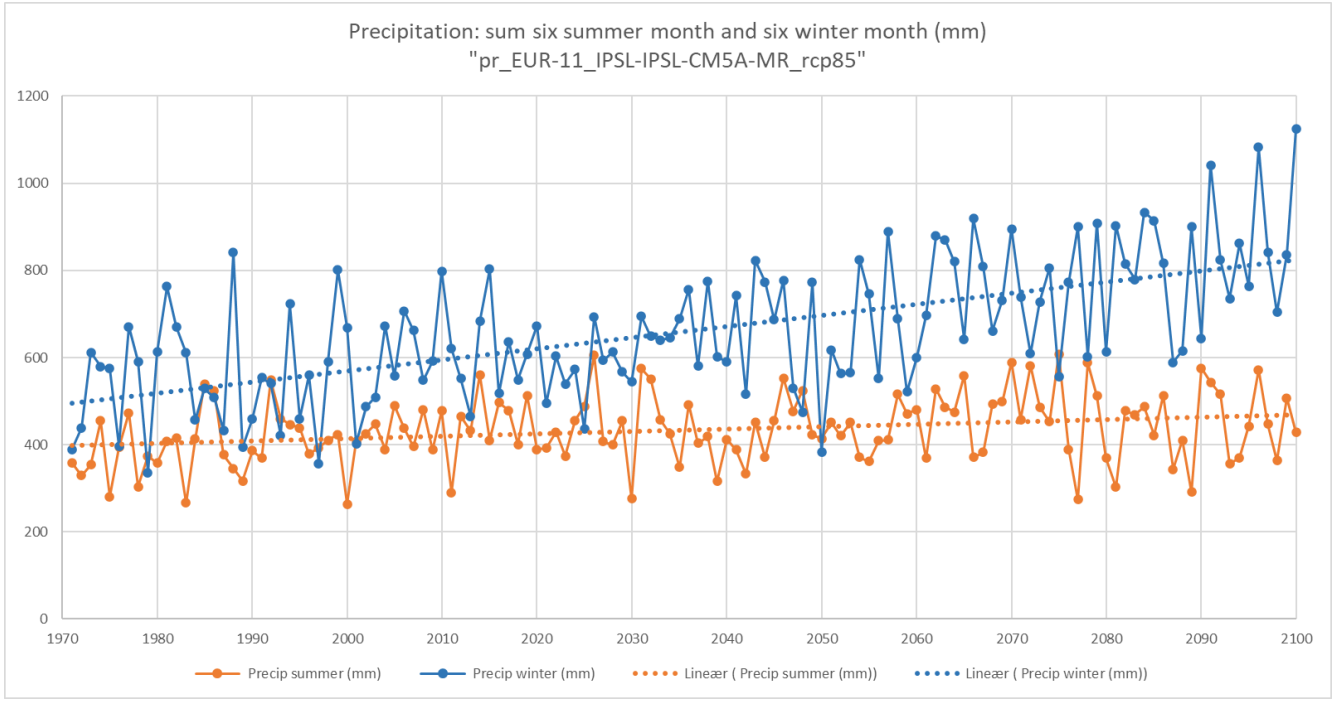
How much excess water?

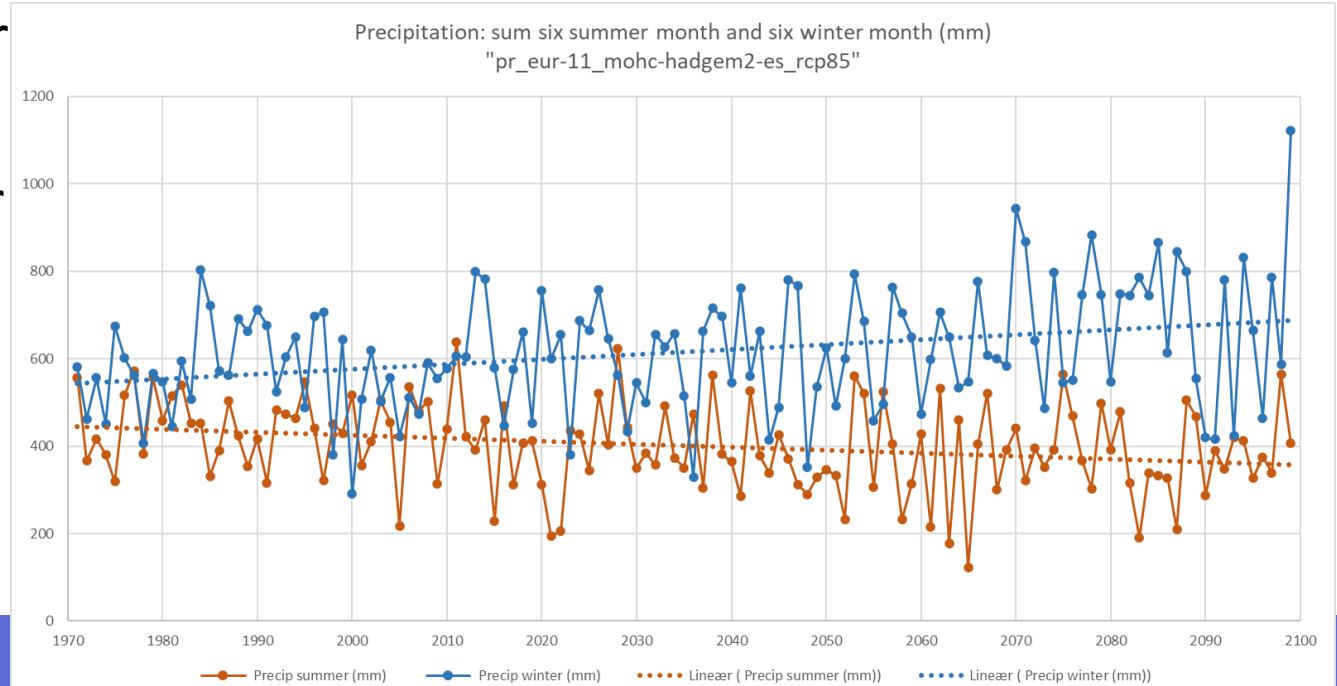
Focus on the water volumes – storing from winter to summer

- From the different measures
- Todays average climate
- Todays extreme years
- Future climate

How much more water in the future?

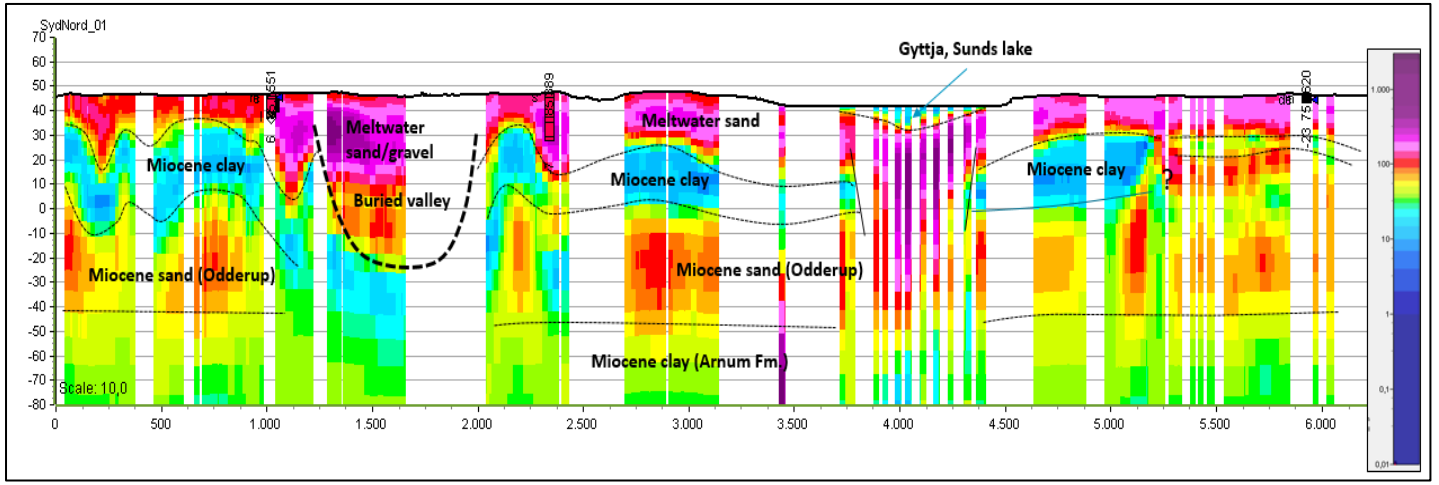
- Selected two RCP8.5 climate models (out of 16)
  - Wet winter / Medium dry summer
  - Dry summer / Medium wet winter





Where to store excess water?

- In deeper aquifers, MAR



- In the unsaturated zone – very thin
- In wetlands – will flood farmland
- In low laying areas – now farmland
- In artificial pond?
- Use the water for energy purposes?

Thank you