DMI
Center for Ocean and Ice

The performance of a regional coupled ocean/sea ice model

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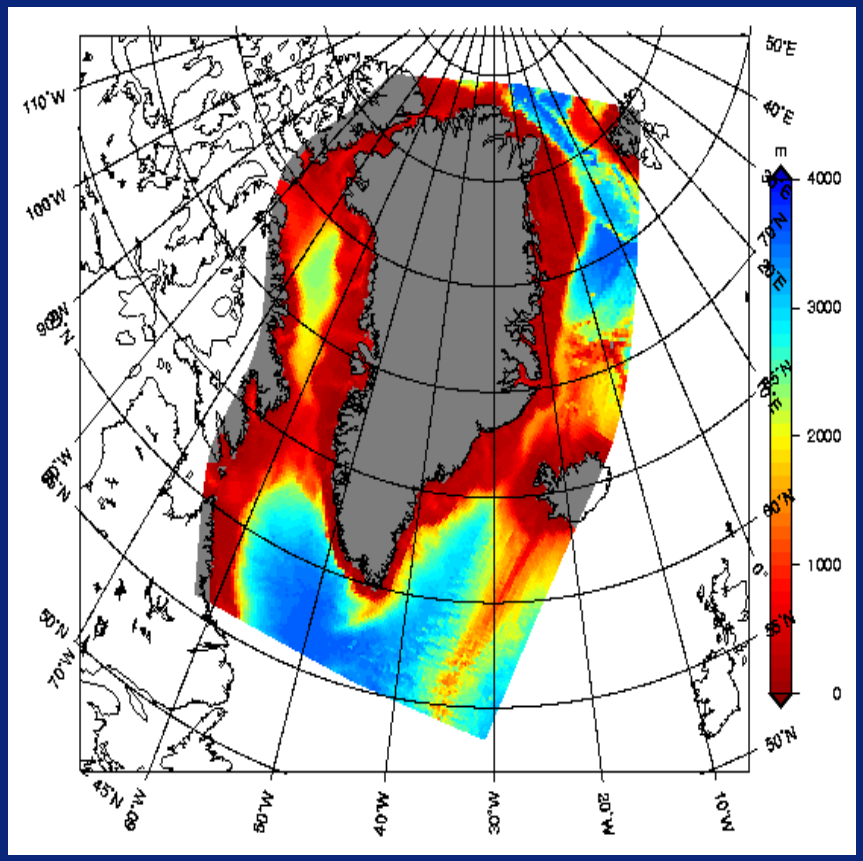
Earlier study



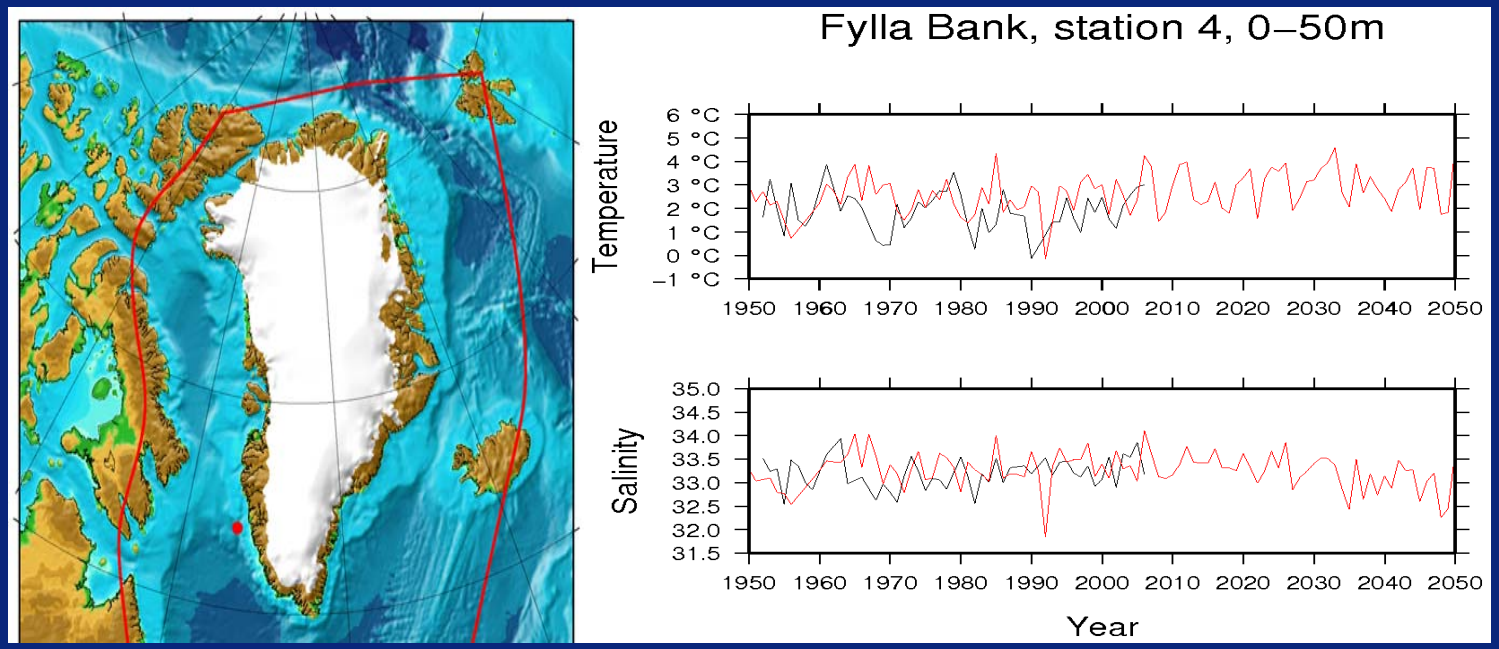
- Ocean model: HYCOM
- Sea ice :
  - Prescribed from a global model.

Model setup

- Atmospheric forcing: HIRHAM
  - The atmospheric forcing that has been used is from a climate research program carried out at the Danish Meteorological Institute.

    See http://klimagroenland.dmi.dk/

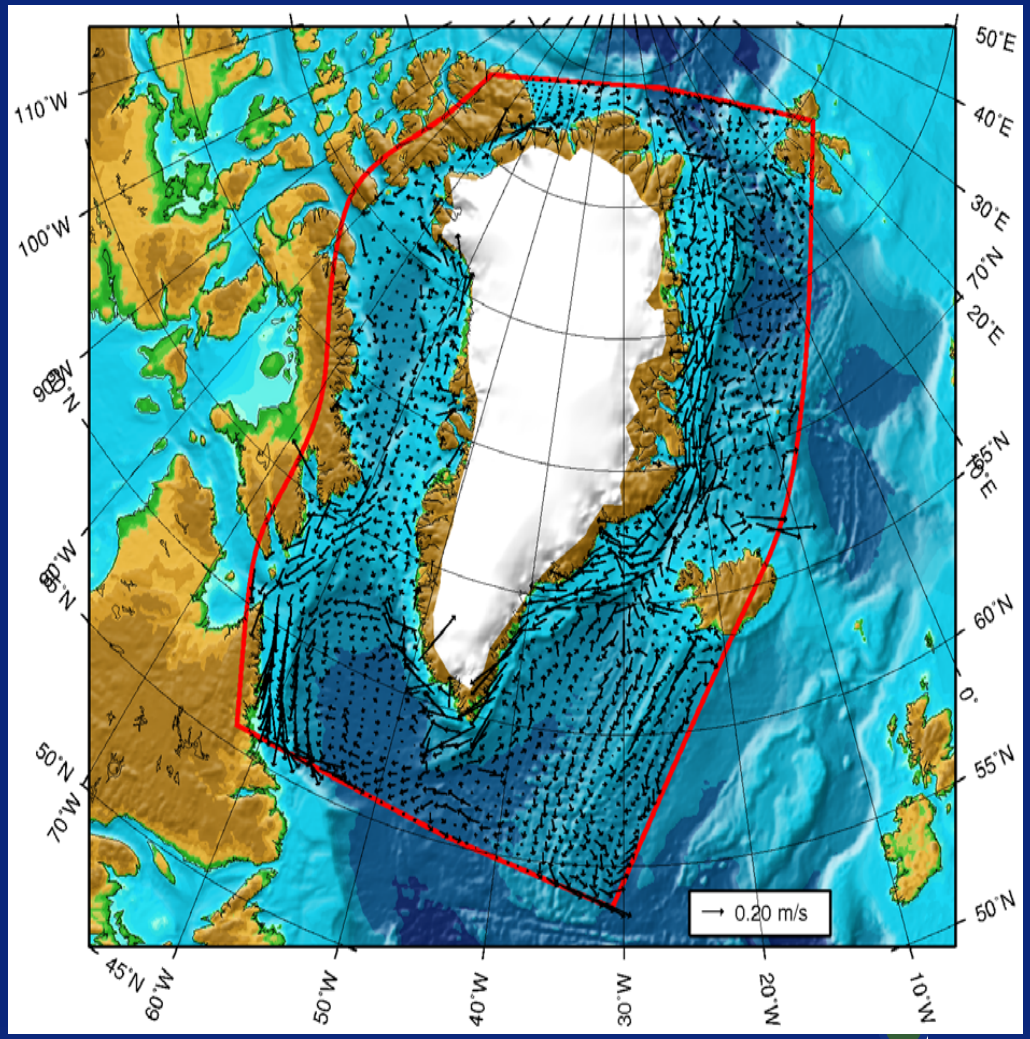
Results – Temperature and salinity



- Black curves observation
- Red model

Surface currents

- 30 years mean current
- Present climate

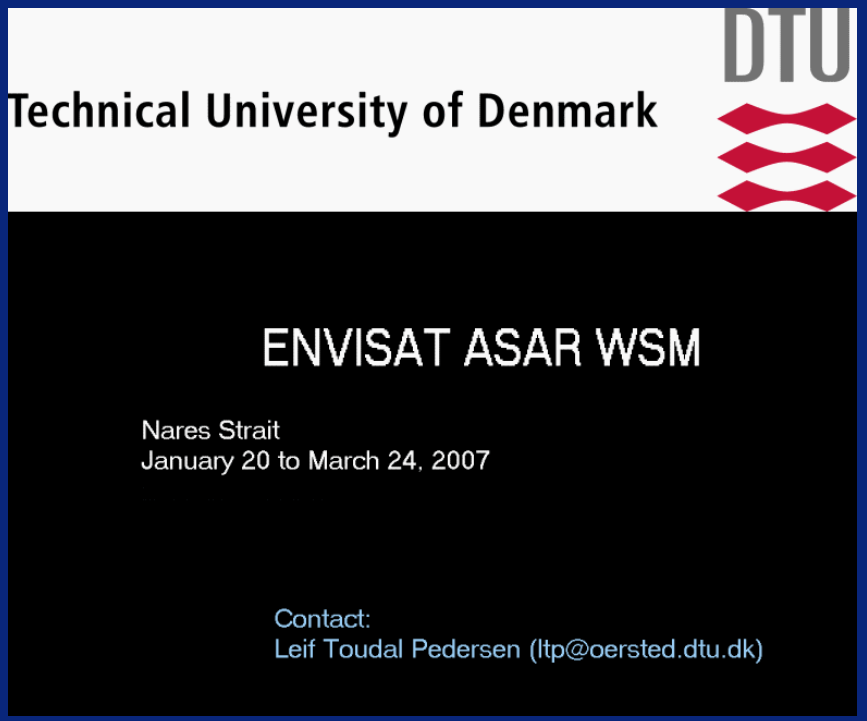


Motivation for including a dynamic ice model

- Satelite images and other measurements shows large drift
- Model runs with stationary ice has proven to be inadequate

Satelite images – Motivatien for ice drift

- Drift towards south
- Area with low concentration in the northern part of the Nares strait



Data availability

- In general sparse
- Moorings
- Satellite images
- Buoy drifters
- Ice charts + experience from ice charting group

Present study - Model setup

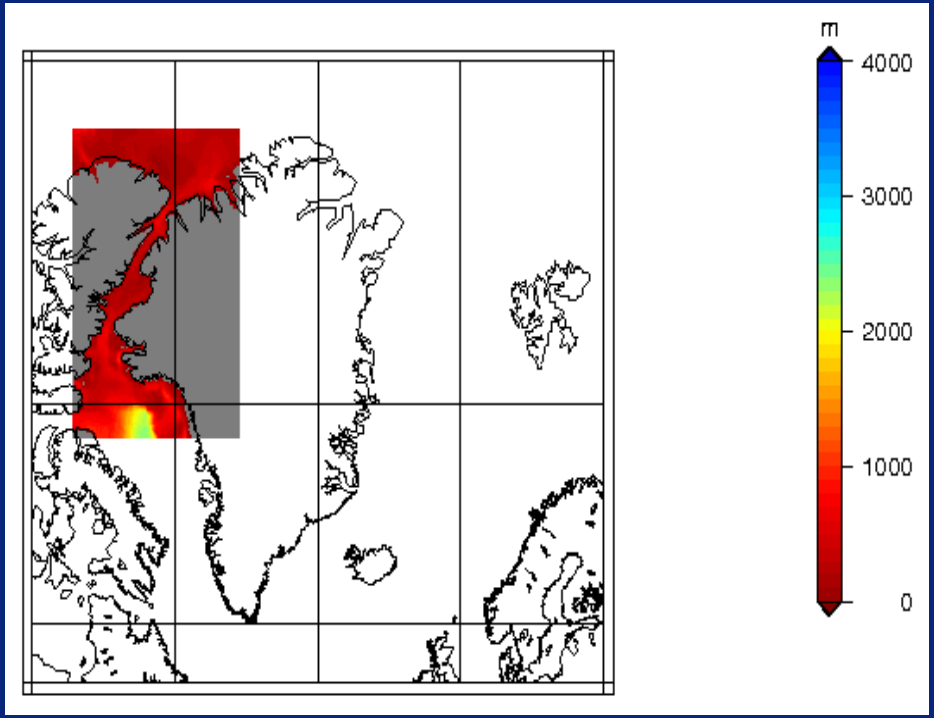
- Ocean model: HYCOM
- Sea ice model:
  - Coupled: CICE (4 ice layers and 1 snow layer)
- Atmospheric forcing. The same as in the previous study

Coupled model setup Boundary condition

- Lateral boundaries are from a global model. The same that was used to prescribe the ice in the first study.
- Implemented in HYCOM
- Not fully implemented in CICE
- Work with boundaries are ongoing

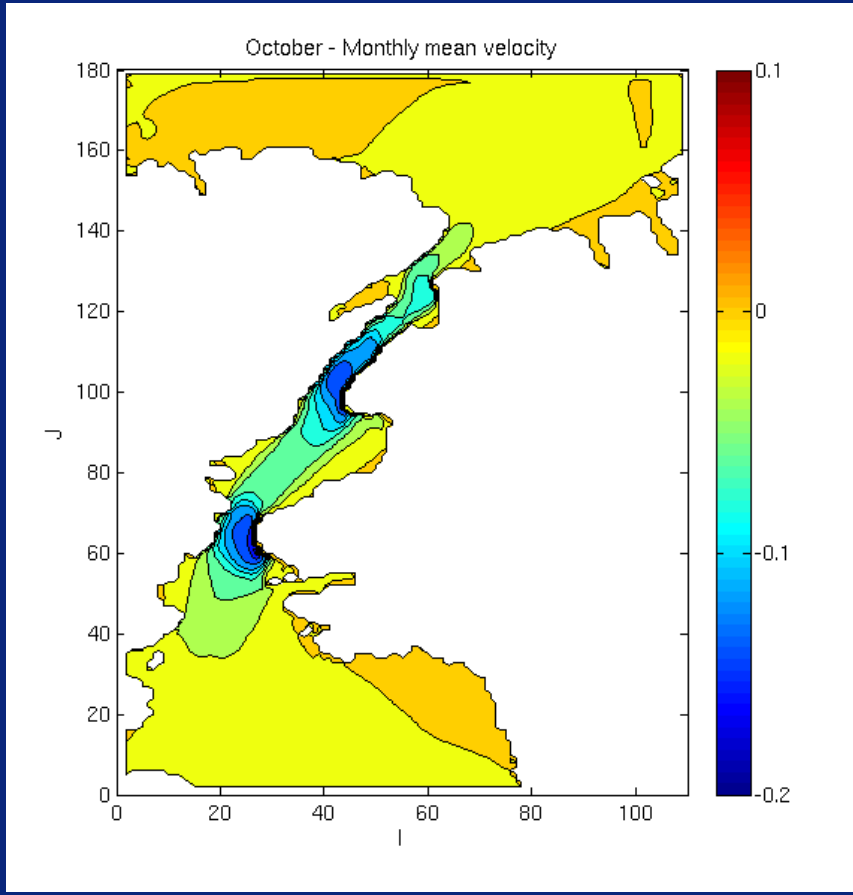
Domain

- Ice bridge is normally build in spring
- Inflow of ice from the arctic
- Inflow of ice along Greenland in winter
- Outflow along Canada

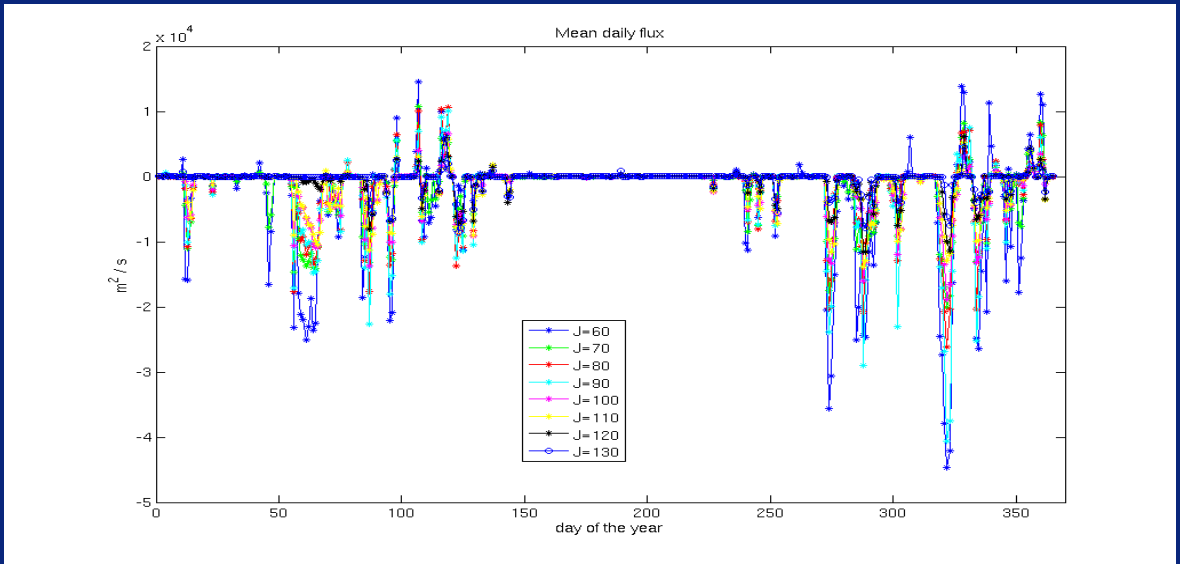


Ice velocity – North/South

- Positive northwards



Mean daily area ice flux



- M^2/S
- 8 sections
- Same direction each day
- Period with very little
- through flow (ice bridge)

Conclusions and future work

- Dynamic ice model is needed to improve results
- Better ice boundary conditions needed
- Direction of mean ice flow is southward
  - Magnitude varies.
- Parameter study is to be made
- Impact of changes in climate will be studied