GOAPP
at the University of Alberta

Plans and Preliminary Results

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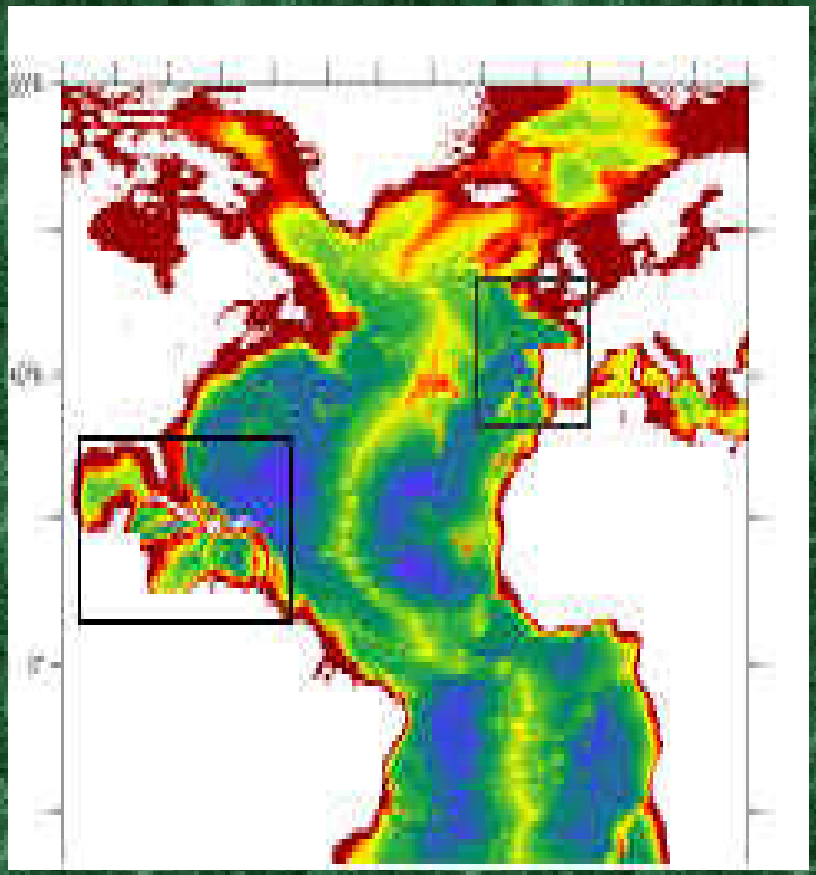
Drakkar NATL4 Grid

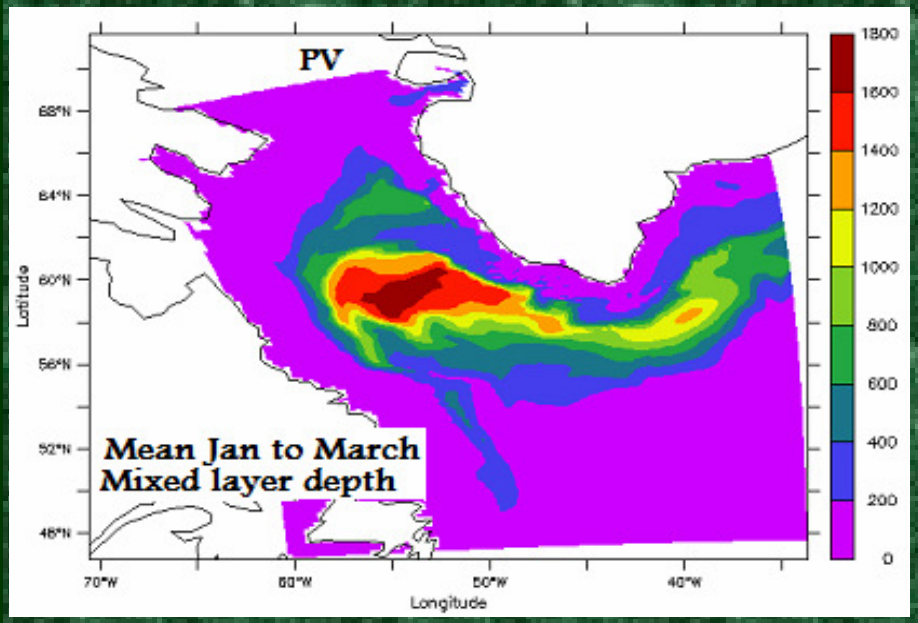
- NATL4 Grid
  - 46 vertical levels
  - ¼ degree resolution
  - 80N to 30S
  - 486x529 grid pts
    - Eddy permitting
  - Closed boundaries
    - Buffer zones
  - CORE forcing set
    - SSS restoring
  - AGRIF zoom package
    - Problems with sea ice
  - 64 Processors on Origen 3900
    - ~12-17 hours for 1 yr simulation

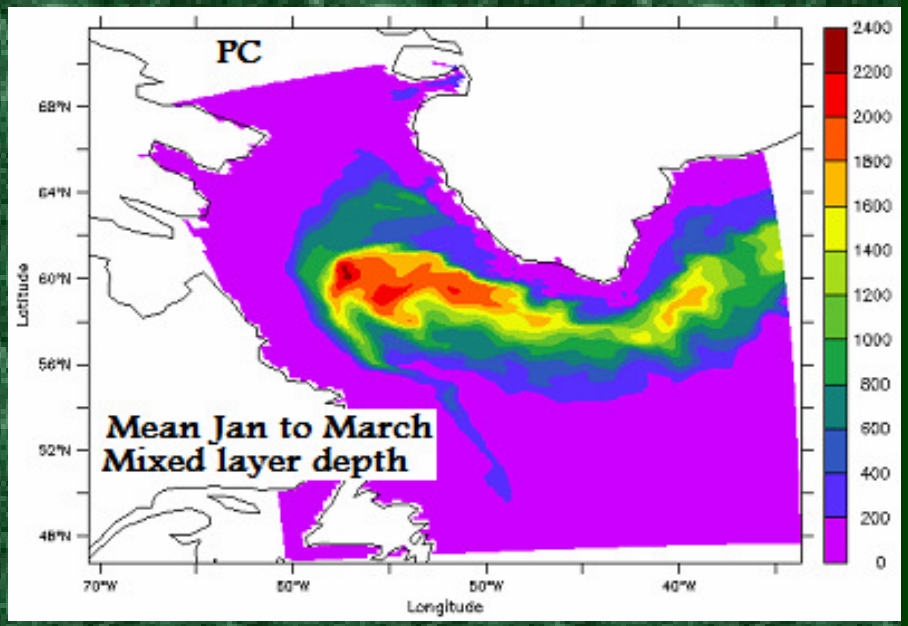


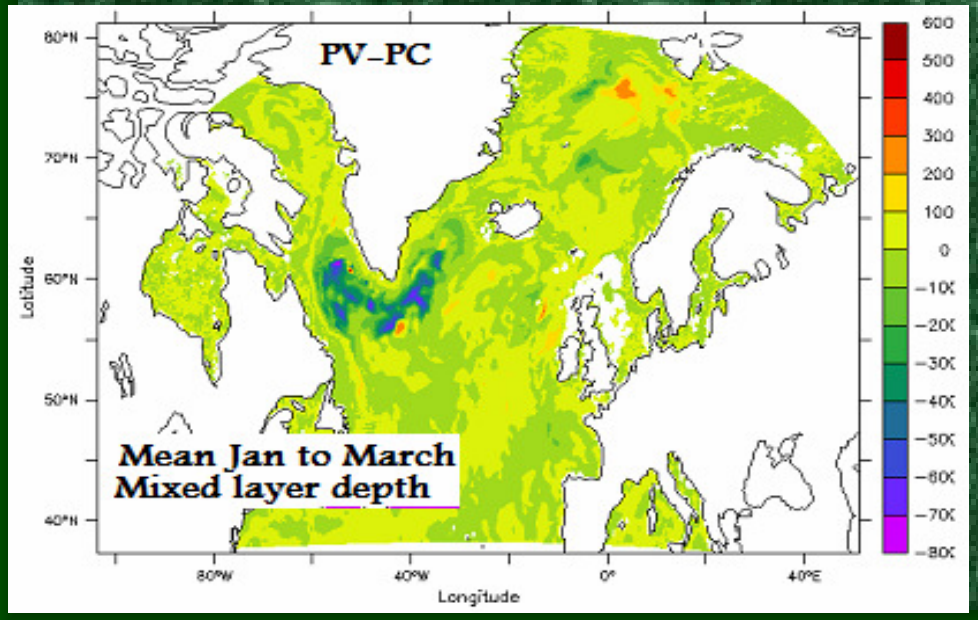
Initial Experiments (Sanjay)

- Sub-grid scale parameterization – GM
  - Constant k = 2.74 x 10^6 cm^2 s^{-1}
  - Spatially variable k
- Simple ocean assimilation
  - Semi-prognostic method
  - Semi-diagnostic method

Mixed Layer Depth (MLD)

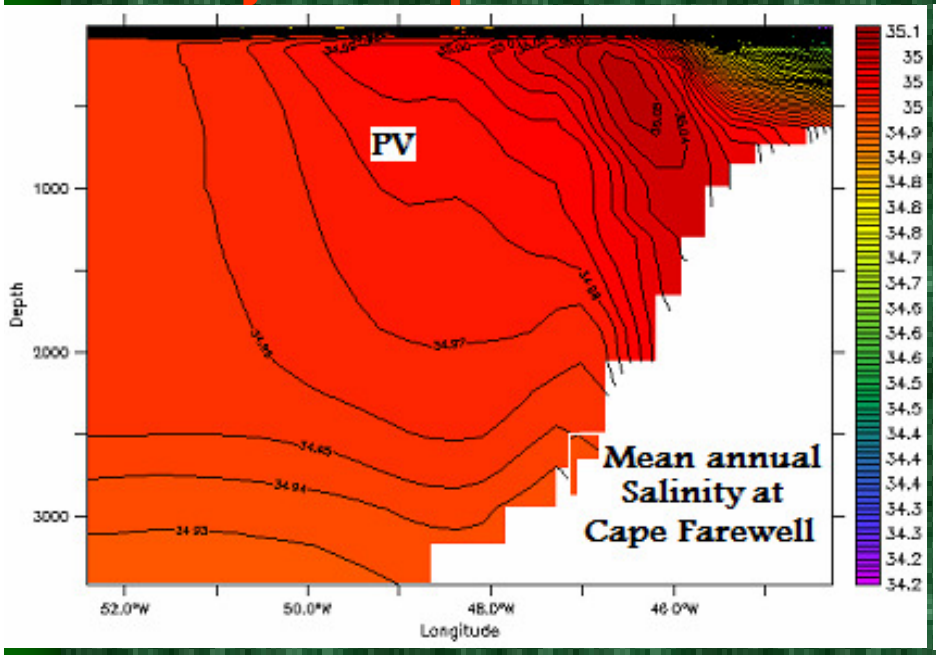


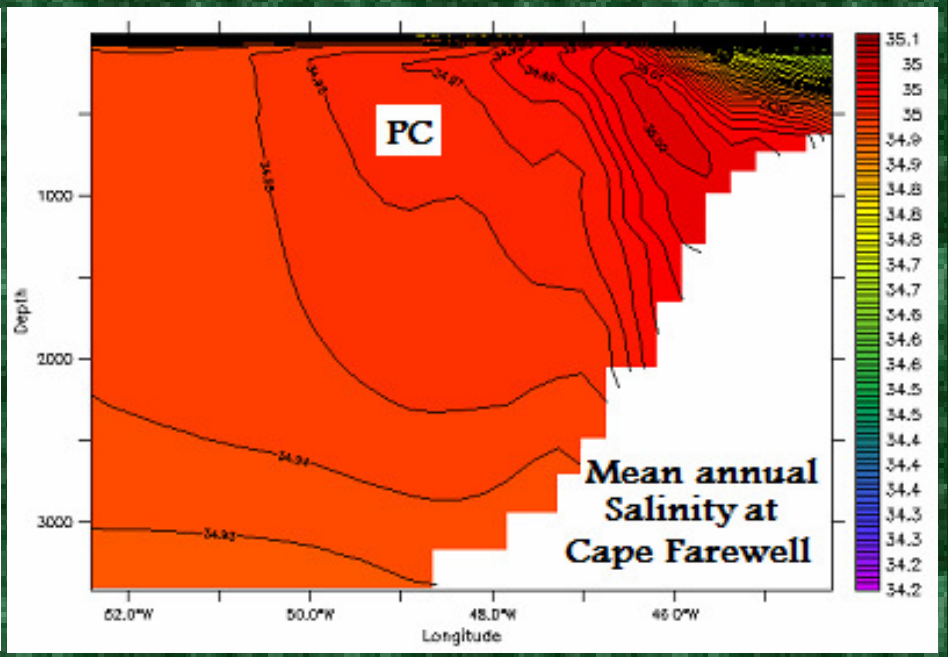


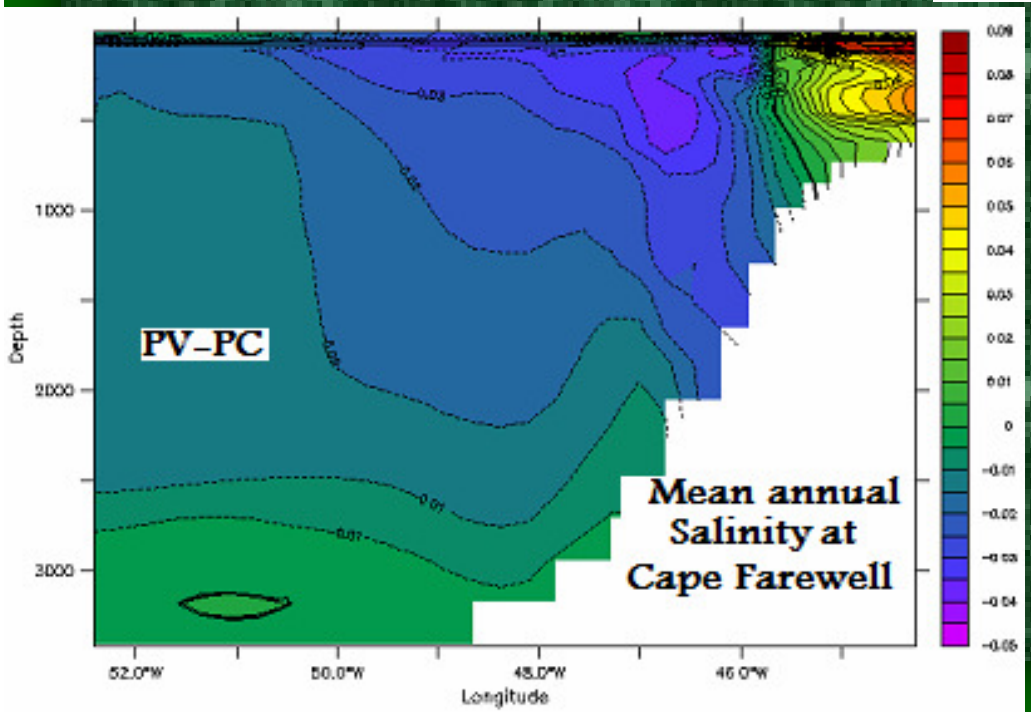


S. Rattan, 2007

Salinity at Cape Farewell

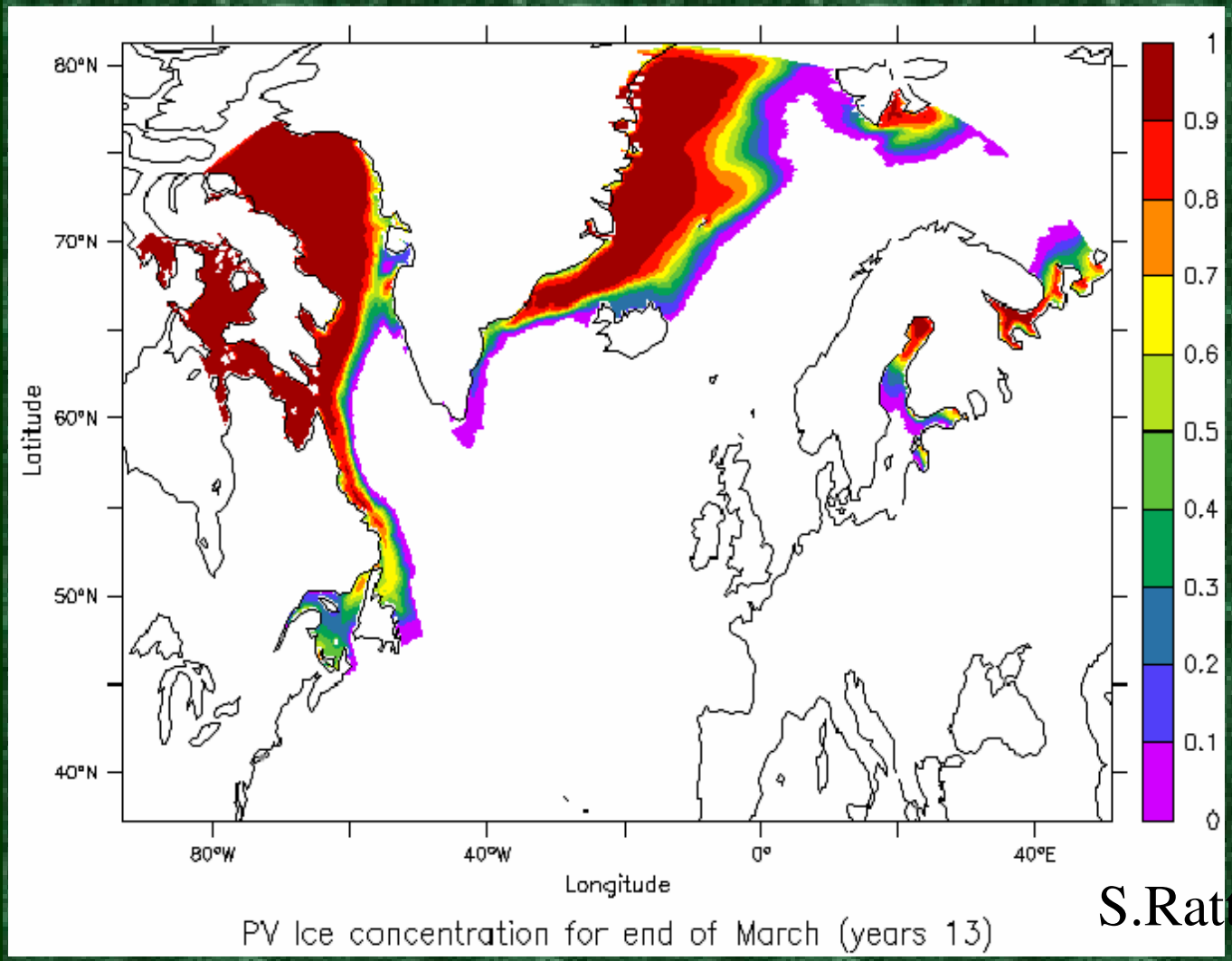


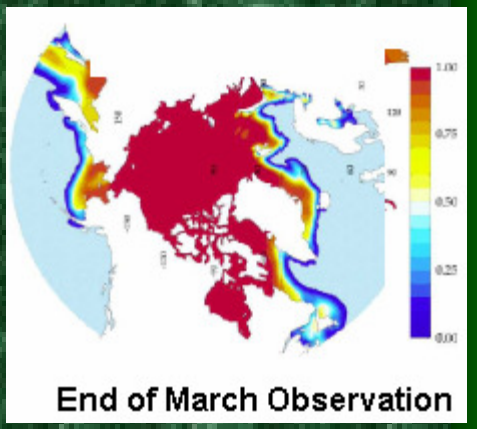




Related to changes in the inflow of high salinity IW

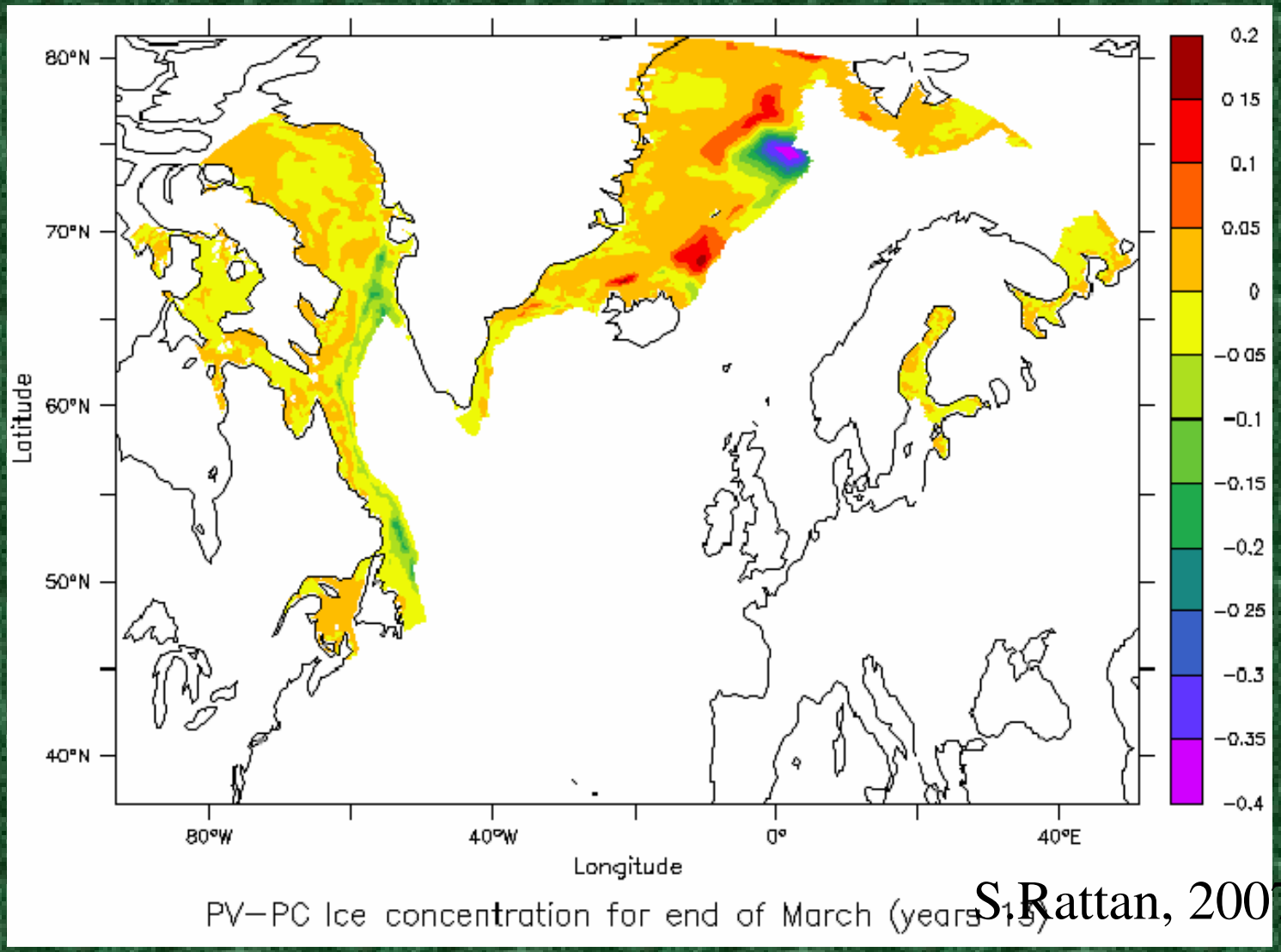
S. Rattan (2007)





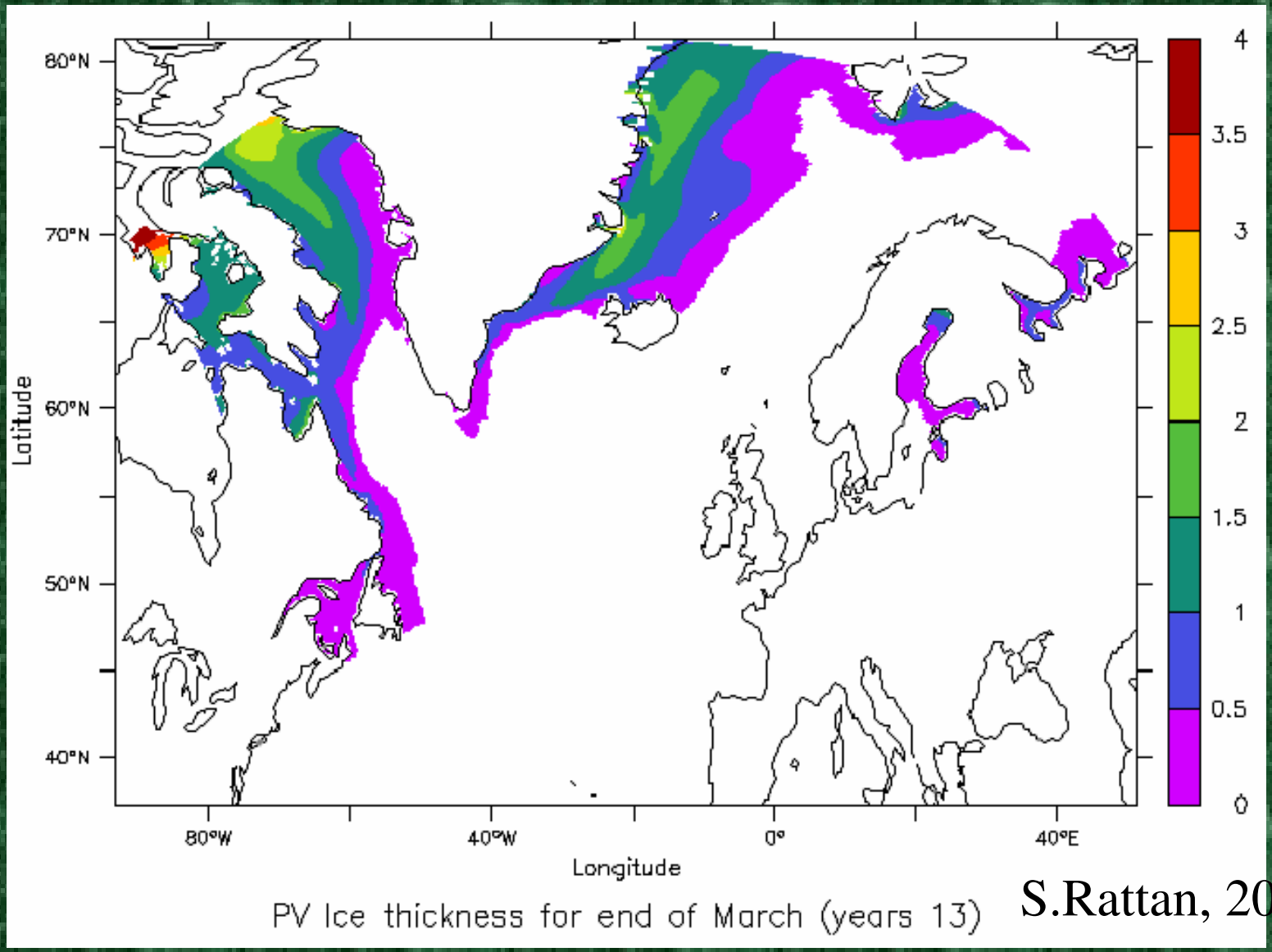
S.Rattan, 2007

Ice concentration at end of March (PV)



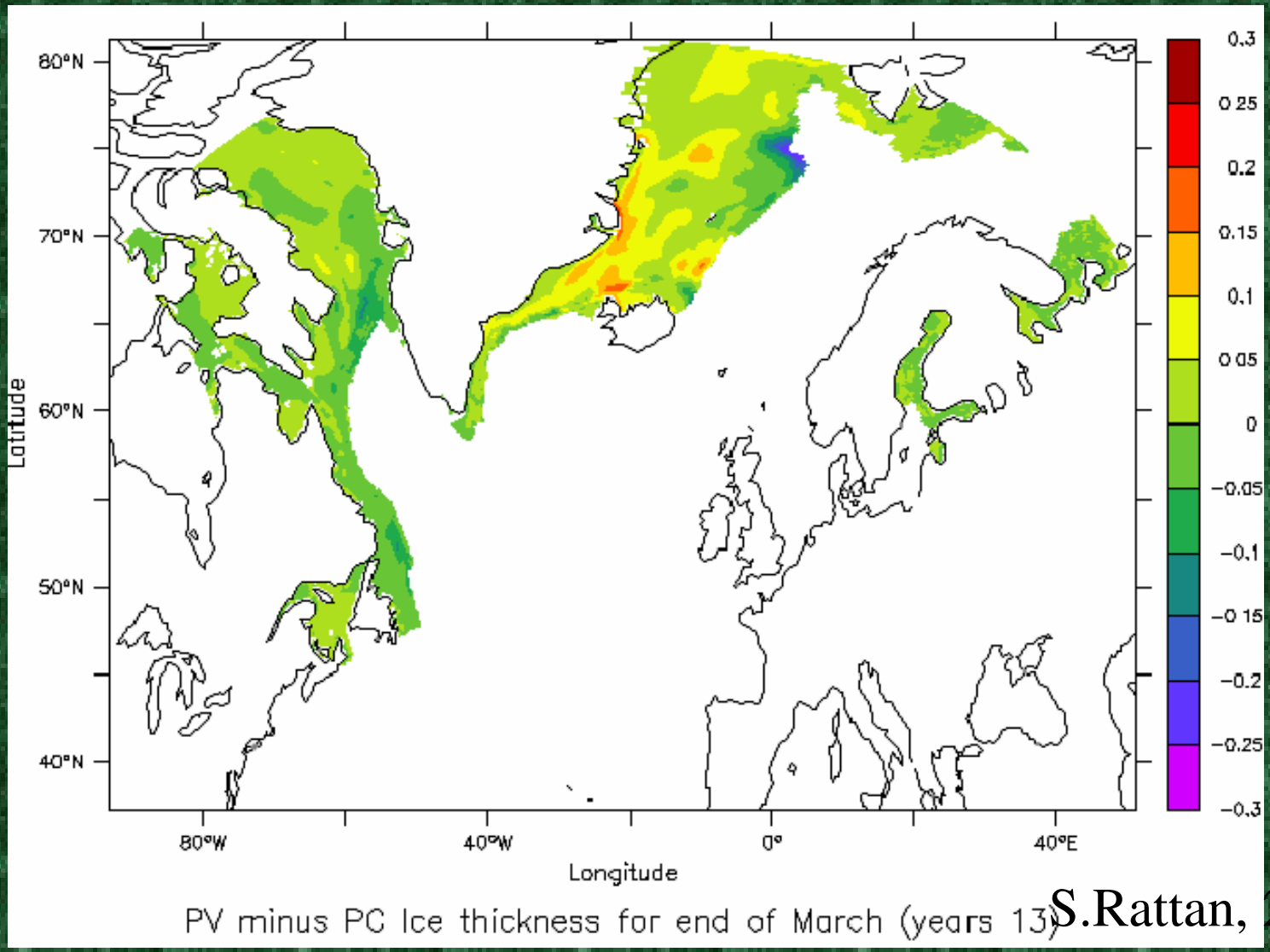
S.Rattan, 2007

Ice concentration at end of March (PV-PC)



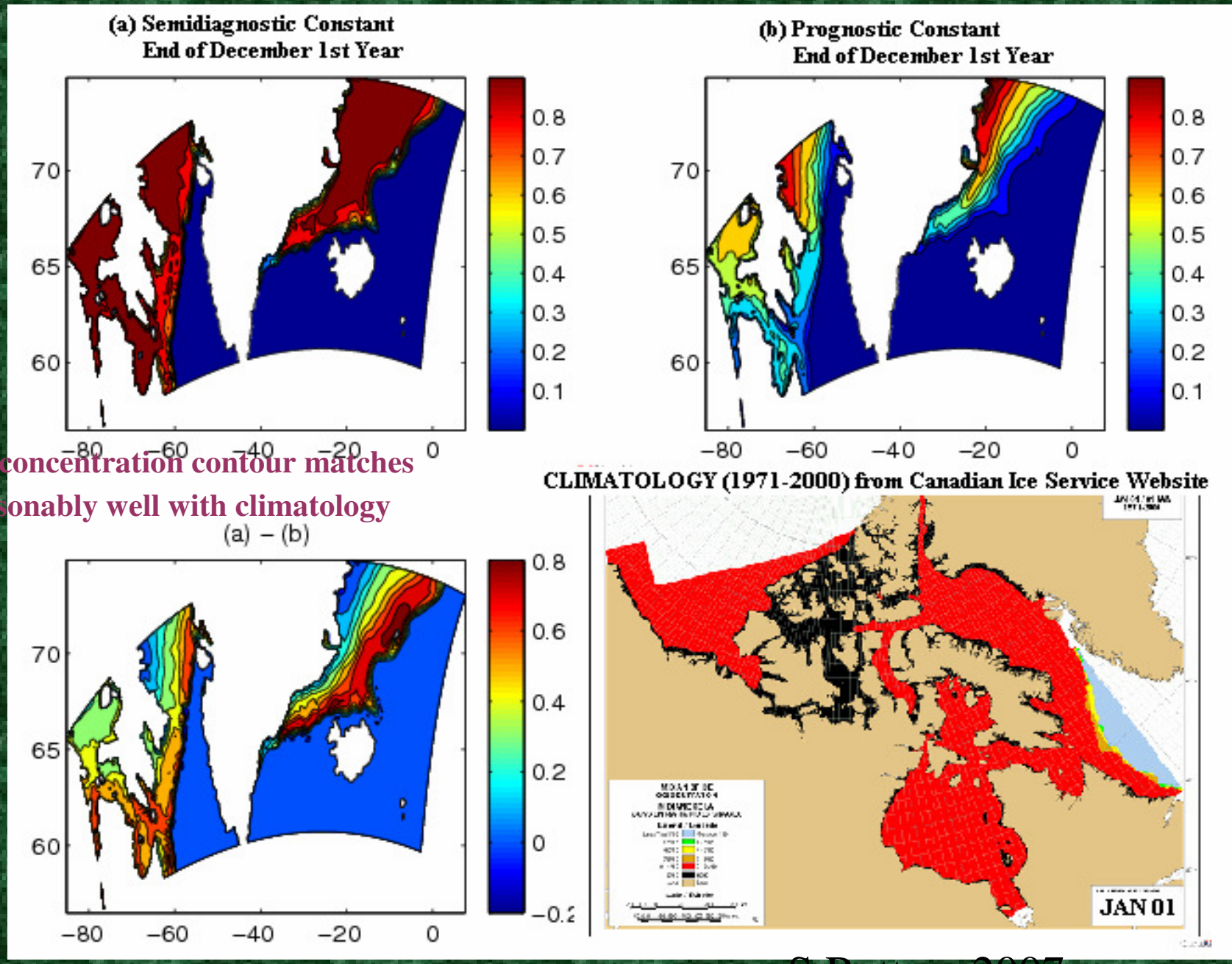
S.Rattan, 2007

Ice thickness at end of March (PV)



S.Rattan, 2007

Ice thickness at end of March (PV-PC)



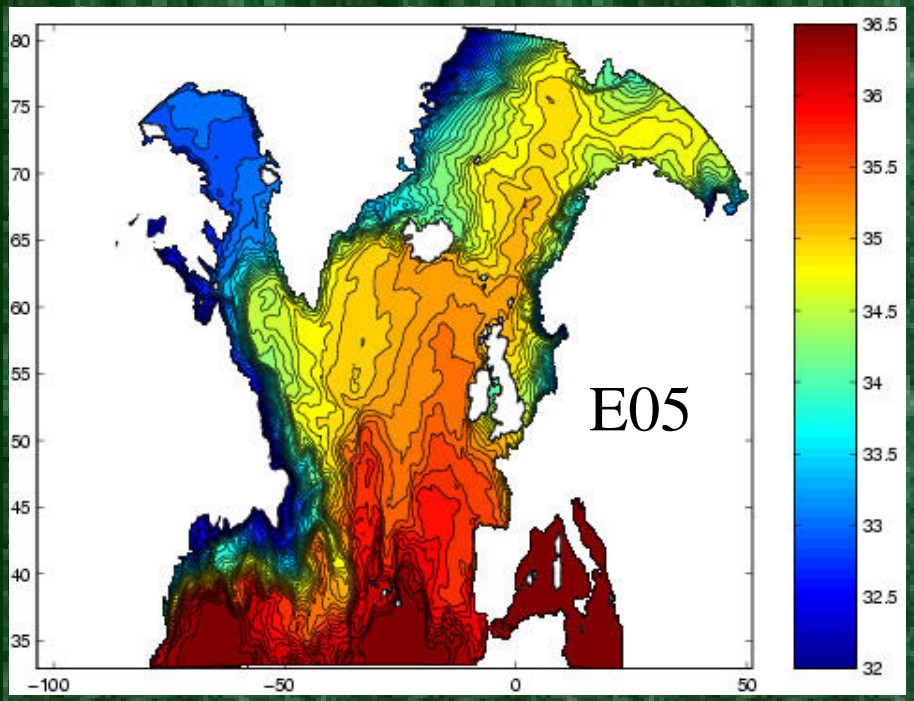
S.Rattan, 2007

Spectral Nudging on SSS

- SSS restoring
  - Controls hydrographic drift
  - maintains convection
  - Damps eddies and EKE
- Apply spectral nudging to SSS
  - Nudge annual mean and seasonal cycle
  - 25 day (0.25 m/day) restoring timescale

Spectral Nudging on SSS

- 4 5-yr experiments
  - E05 – Spectral nudging on SSS
  - E06 – No restoring at all
  - E07 – Regular SSS restoring
  - E08 – Spectral Nudging on SSS with high resolution Labrador Sea climatology (not yet run)
  - Note: all use spatially variable GM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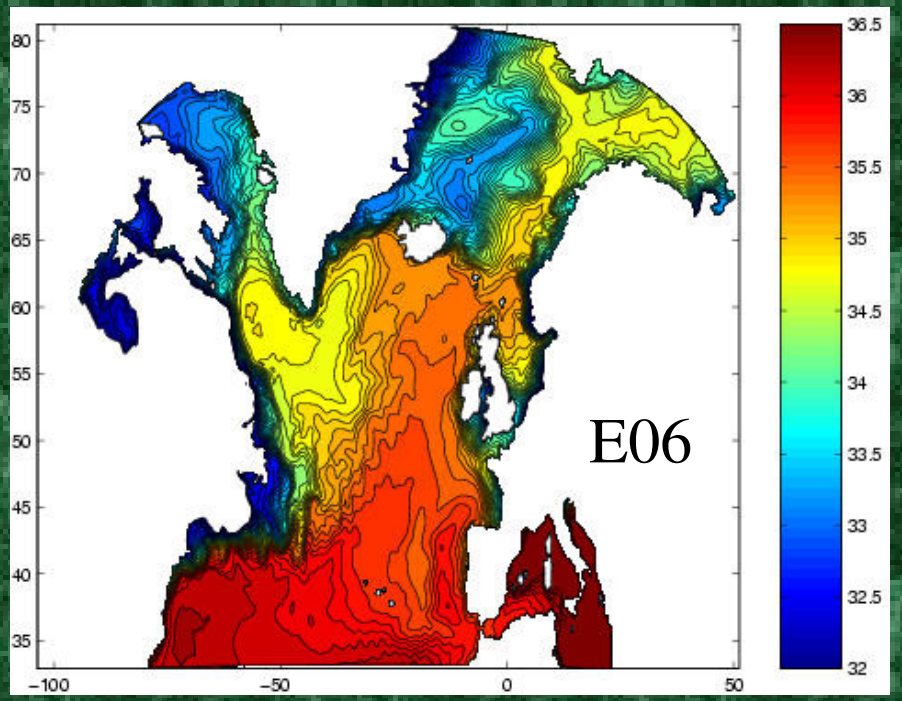
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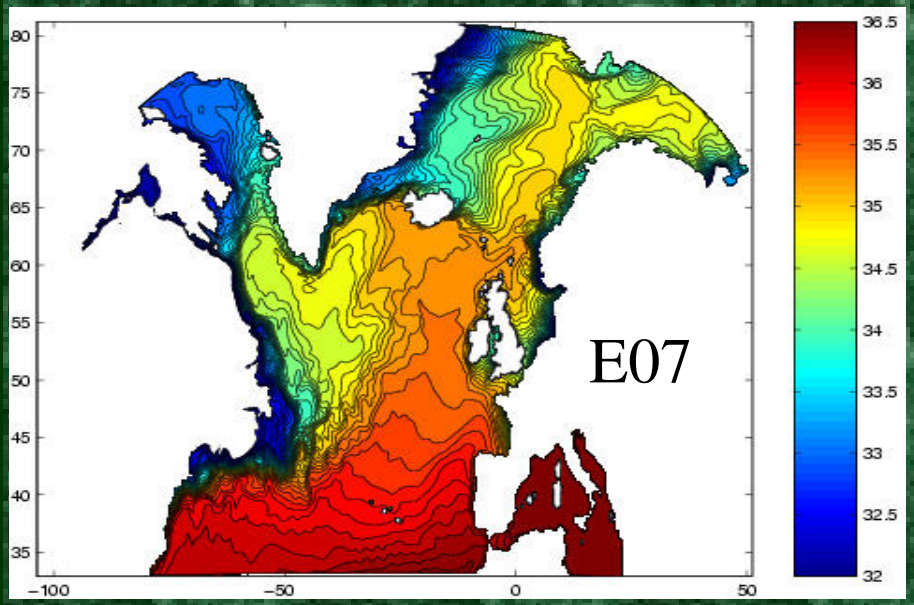
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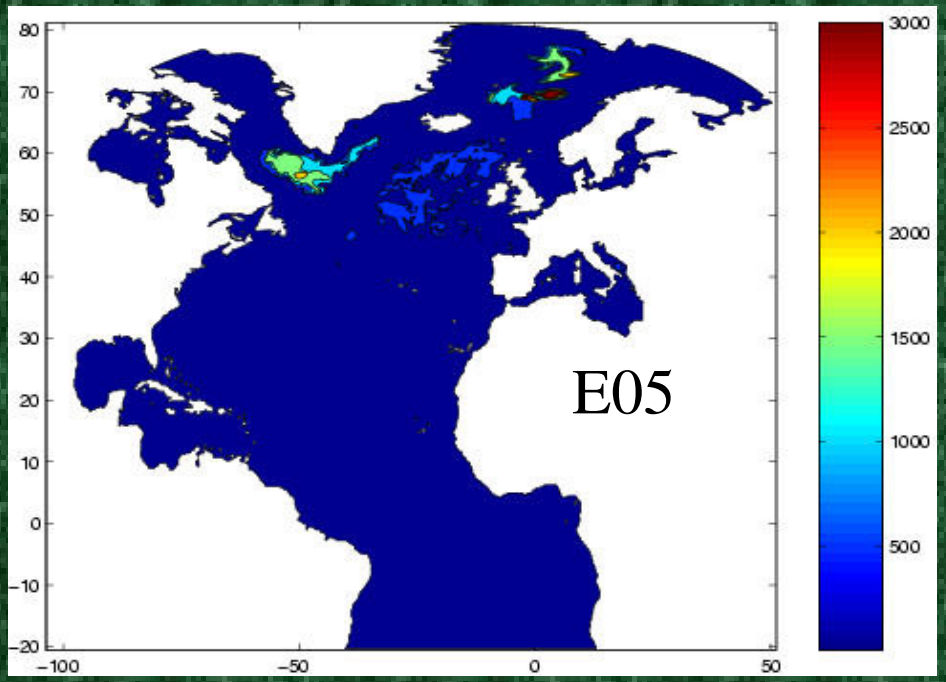
Salinity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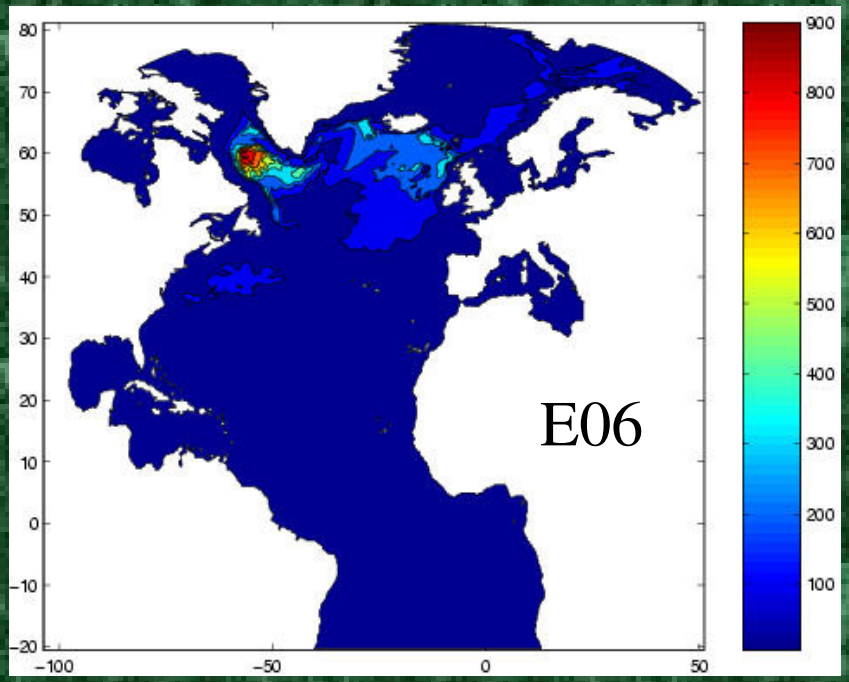
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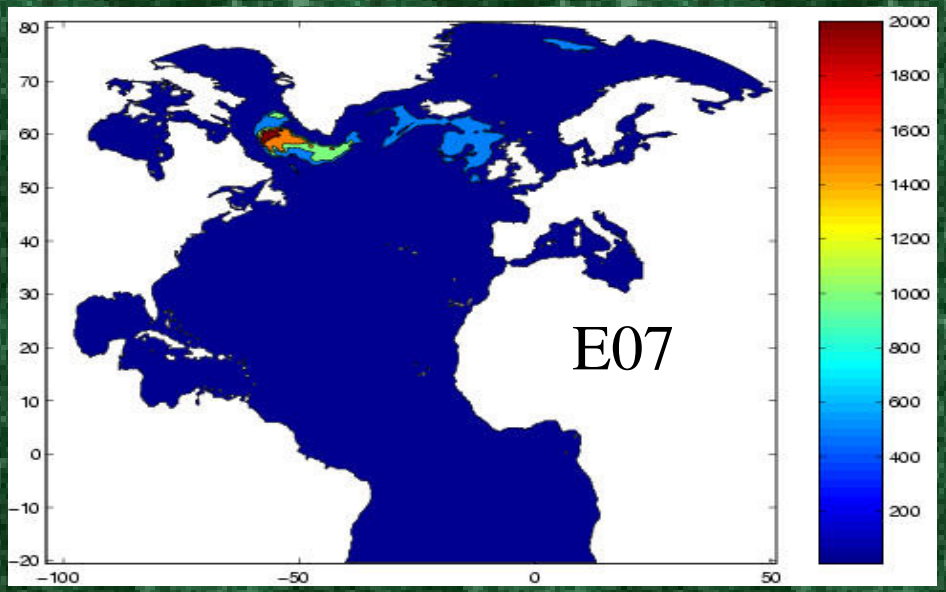
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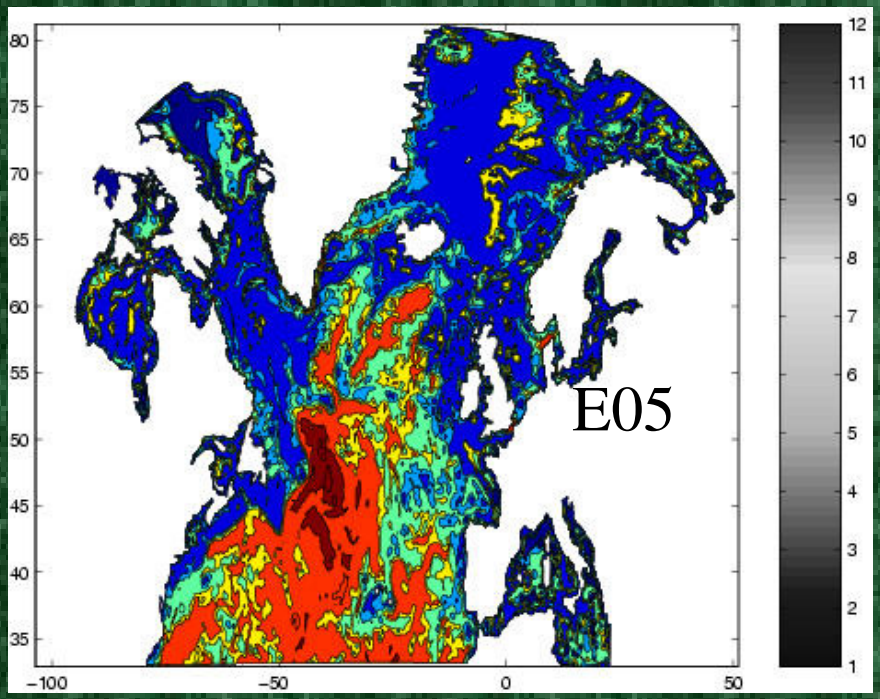
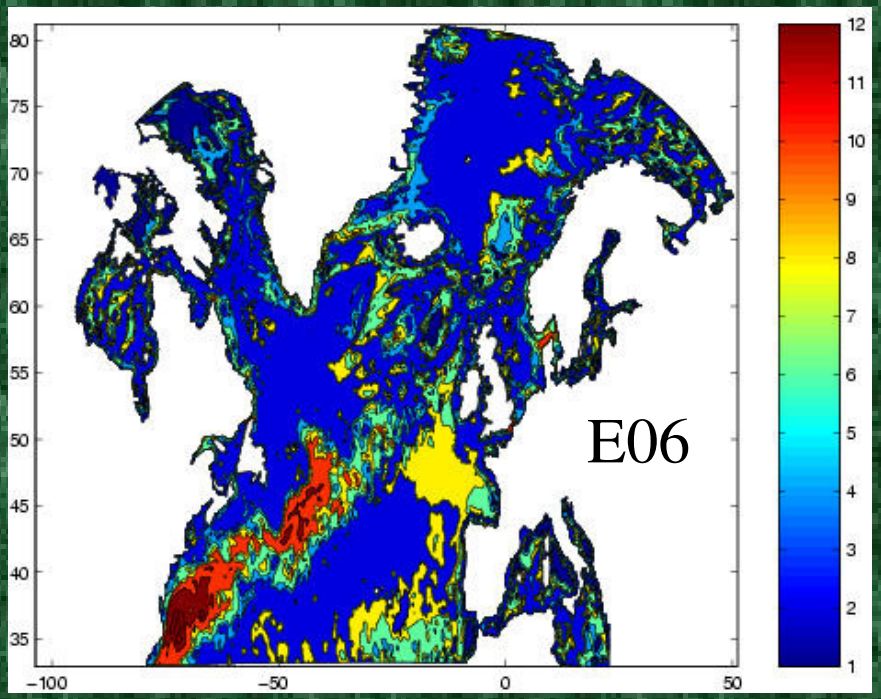
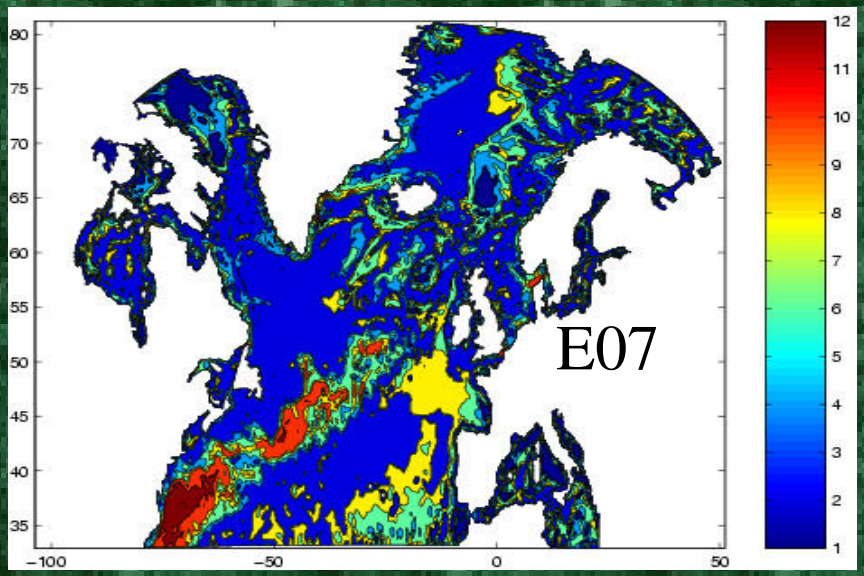
March MLD



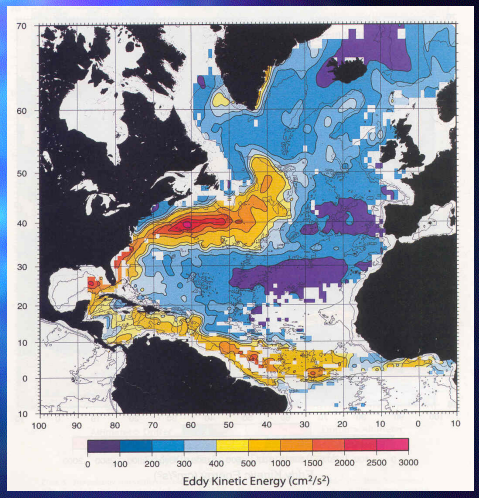




Surface Drifters

Eddy Kinetic Energy

(Fratantoni, JGR 106 (C10), 2001)



Sea Ice Assimilation

- Work will be done by Mattea Turnbull, Ph.d. Student
  - Will start with 1-D assimilation approach developed by Mark Buehner and used by CIS
  - Step 1 will involve computing background error covariances from a Monte Carlo approach
  - Based on ensemble of random, but correlated (spatially and temporally) variations of CORE atmospheric forcing