

# Intercomparison of model runs with three different resolutions in the Arctic Ocean

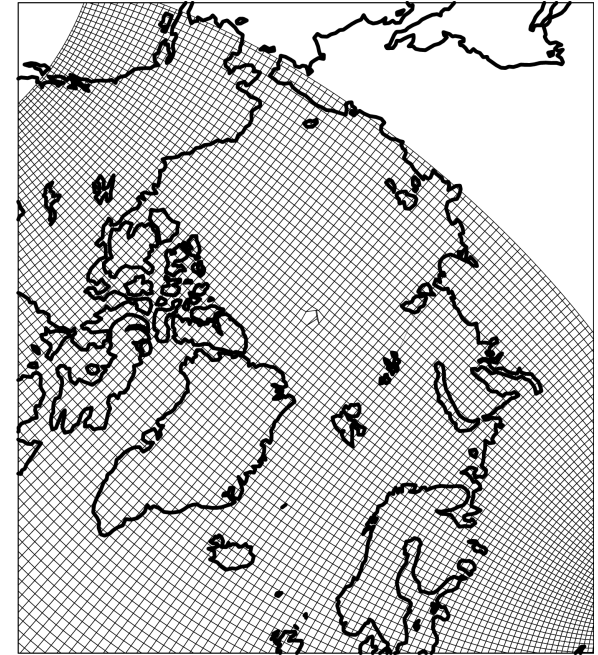
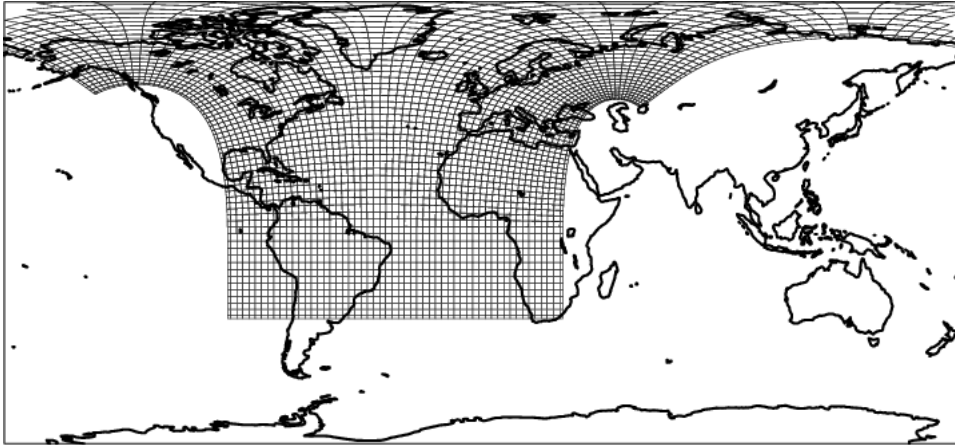
N.V. Koldunov, N. Serra, D. Stammer, A. Köhl

AOMIP Workshop

WHOI 2010

# Model and runs

## ATL03, ATL06, ATL12



Regional setup of MITgcm

Initial conditions: WOA05 (ATL03, ATL12), WOCE Global Hydrographic Climatology (ATL06)

NCEP forcing

SSS (WOA05) and SST (ERSST v3) relaxation. No SST relaxation under the ice.

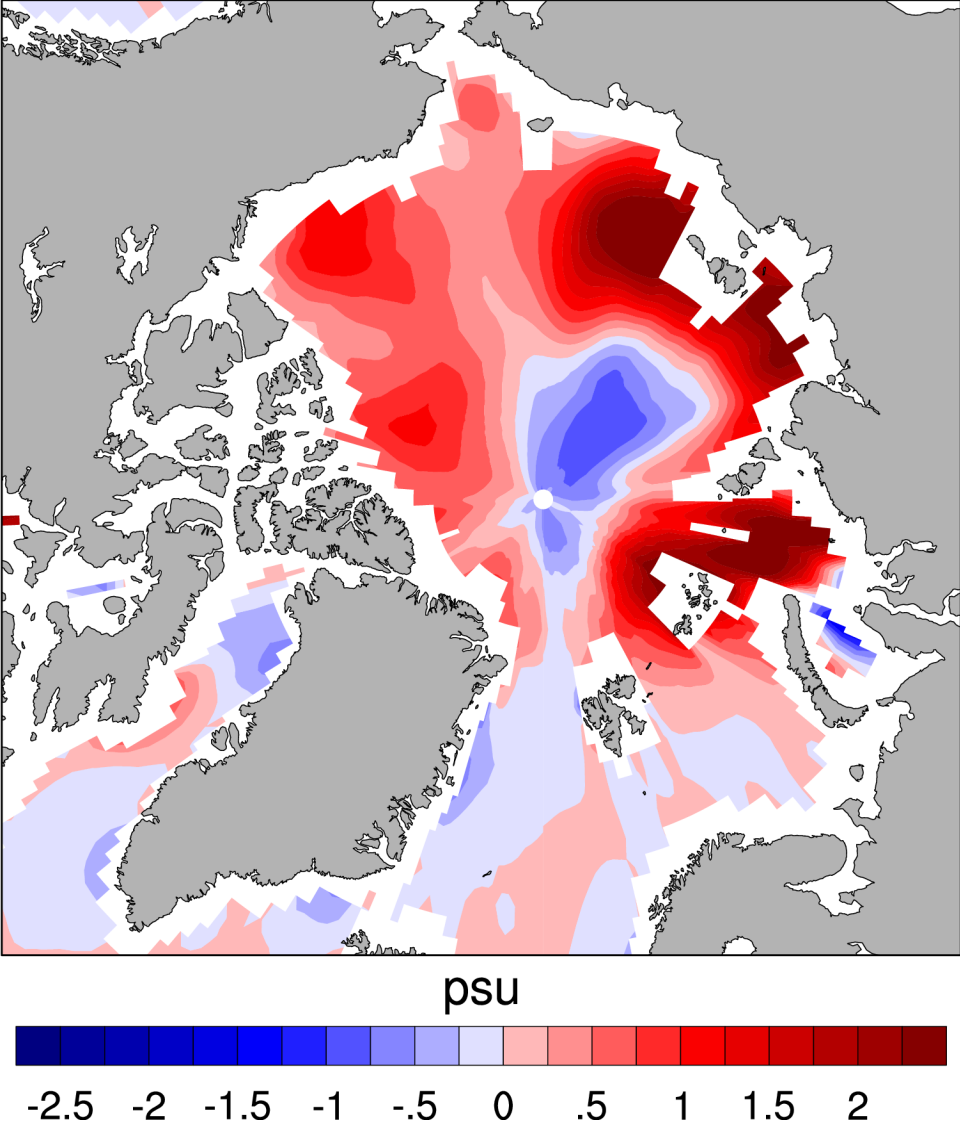
Resolution in the Arctic: ~30km, ~15km, ~8km ; 50 levels; ETOPO2

Time of integration: 1948-2009 (except ATL06 – to 2007)

Boundary conditions: global MITgcm run forced by NCEP.

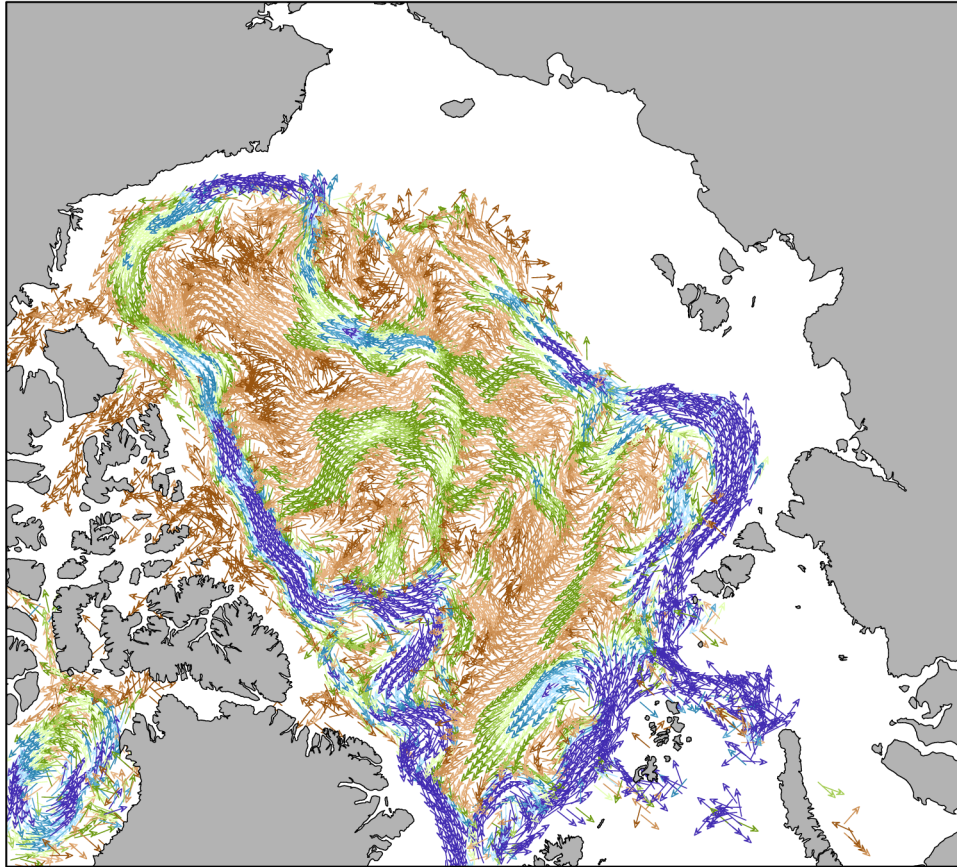
# Additional 1/3 deg run with PHC SSS relaxation (ATL03\_PHC)

Sea Surface Salinity, PHC minus WOA05

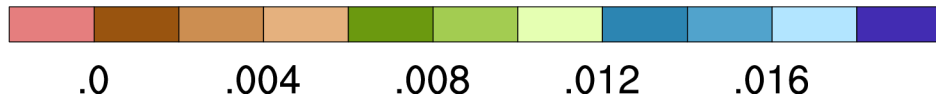


# Circulation at 300m

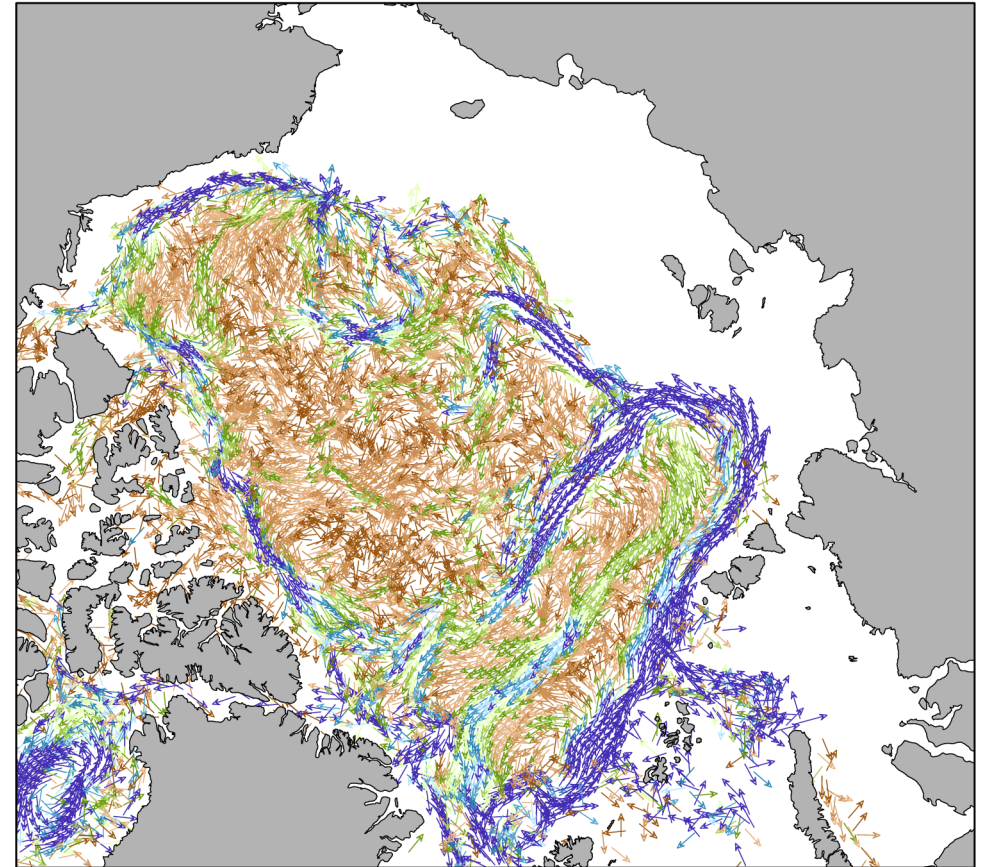
## ATL03



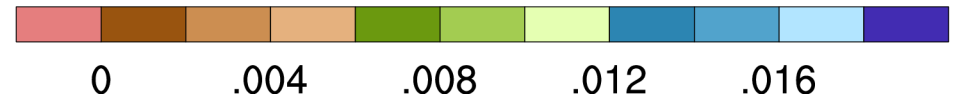
m/s



## ATL12

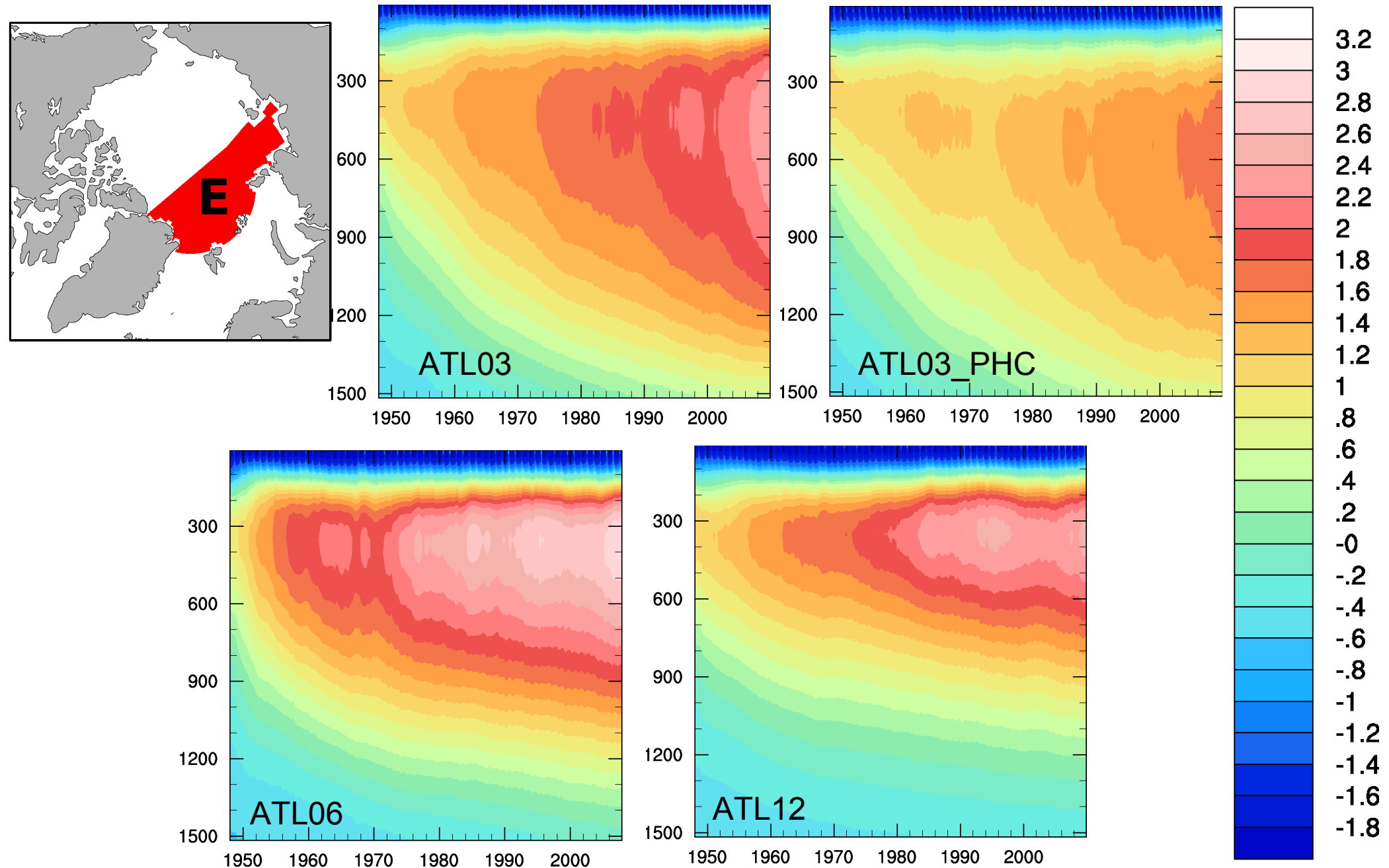


m/s



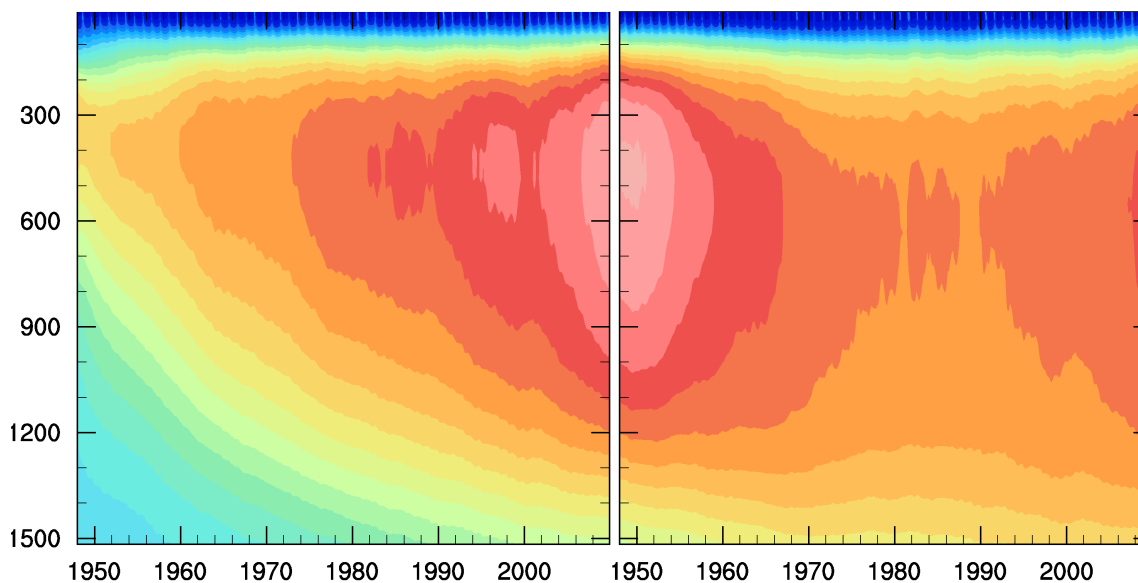


# Monthly mean T as function of depth and time (subdomain E)

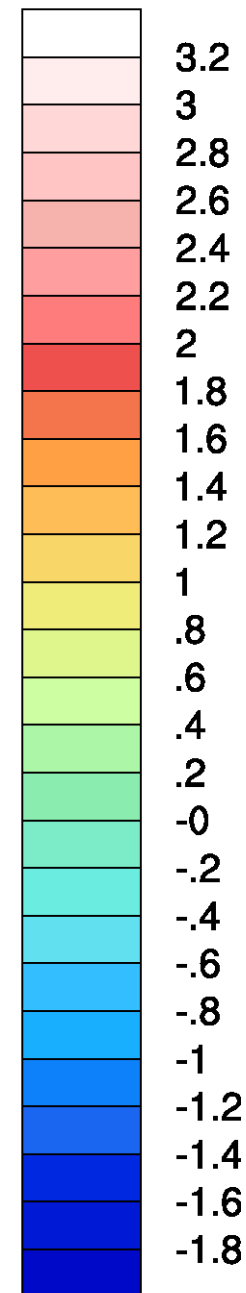
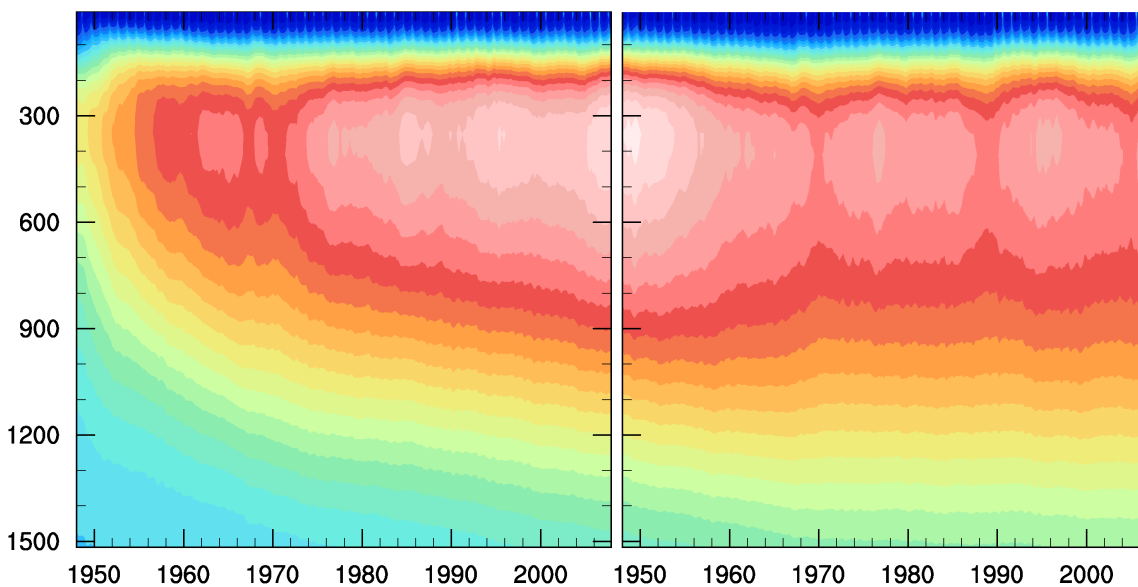


# Monthly mean T as function of depth and time (subdomain E)

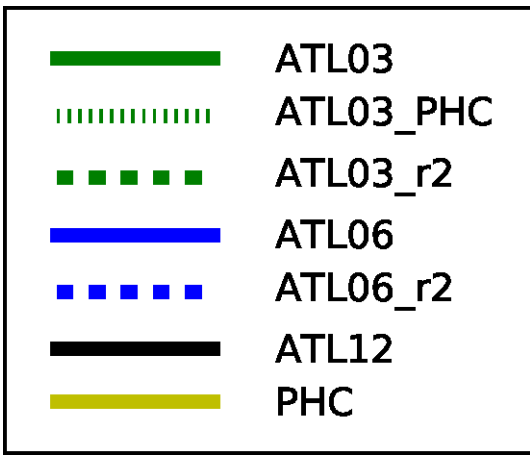
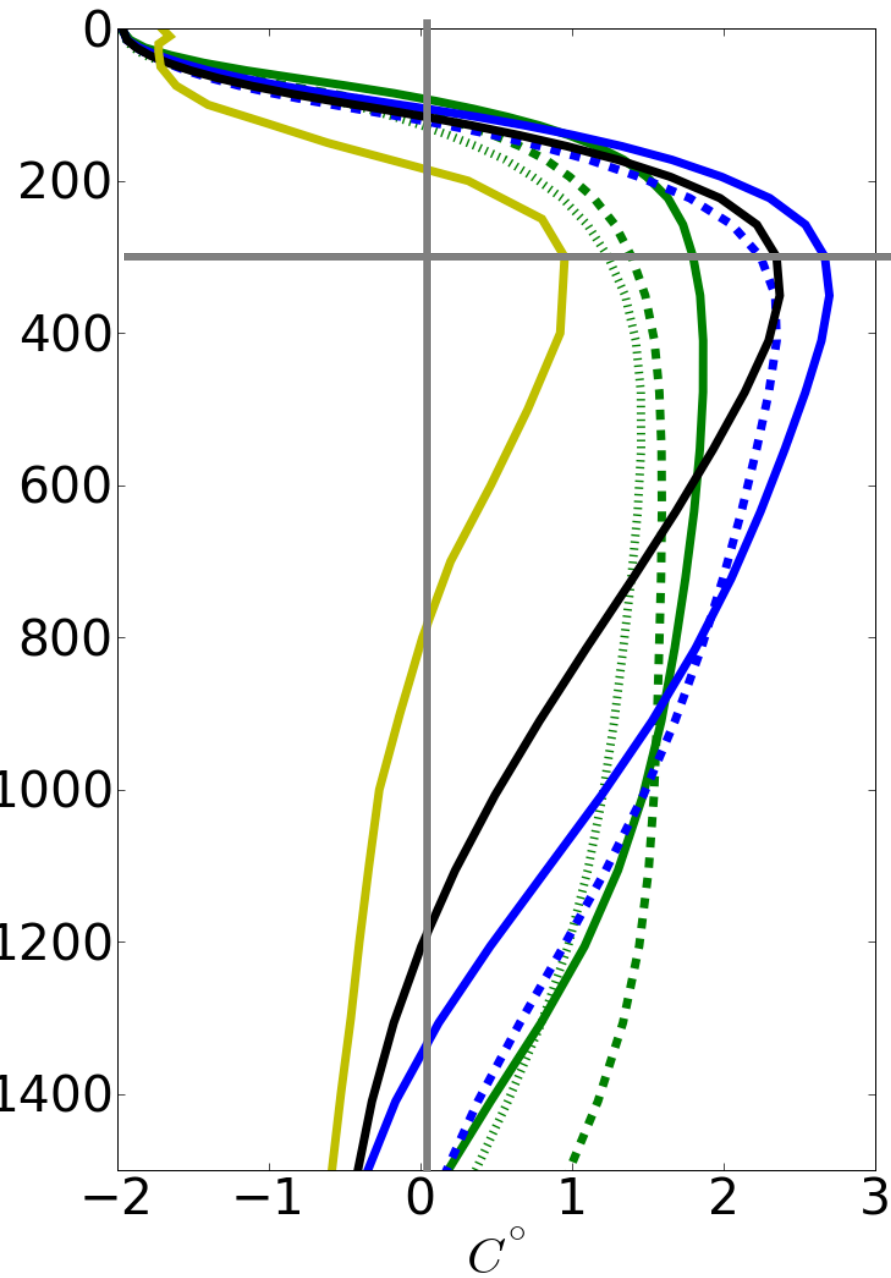
ATL03+ATL03\_r



ATL06+ATL06\_r



# Subdomain E mean vertical T profiles (1980-1989, Winter)



- Models are colder at the surface, no mixed layer
- Ocean interior is warmer than climatology
- Right AW core depth in ATL06 and ATL12
- Temperature decrease in repeated runs for < 900 m
- Temperature increase in repeated runs for > 900 m
- ATL12 closer to climatology > 700 m

- The thickness of the Atlantic Water (AW) layer in the Arctic is overestimated, but it decreases with an increase of resolution.
- The depth of the AW core is in a good agreement with the Polar Hydrographic Climatology in the ~15km and ~8km resolution runs.
- More heat is stored in the interior of the Arctic Ocean in lower resolution runs.
- The lateral heat flux from the Atlantic into the Arctic is similar among runs, but the vertical temperature distribution of the inflow differs considerably.