



Royal Netherlands
Meteorological Institute
*Ministry of Infrastructure and the
Environment*

EC-Earth: the ocean in the CMIP5 runs

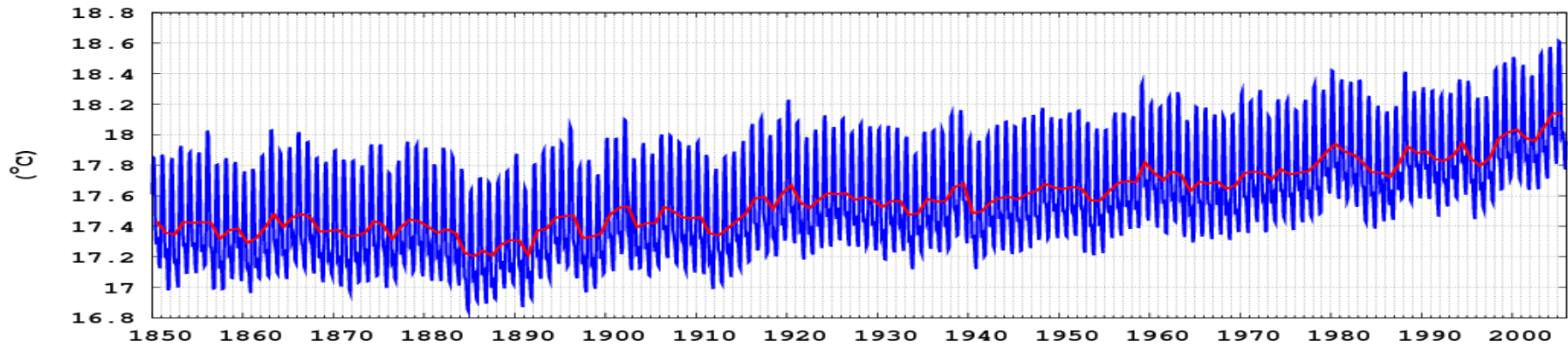
Andreas Sterl (KNMI)

- Historical runs
- RCP45

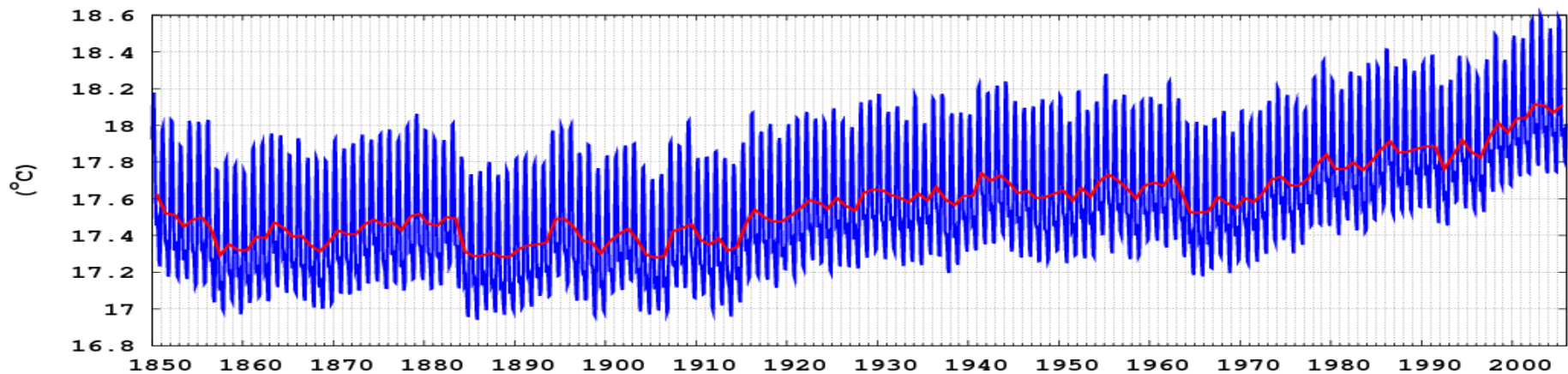


Historical runs

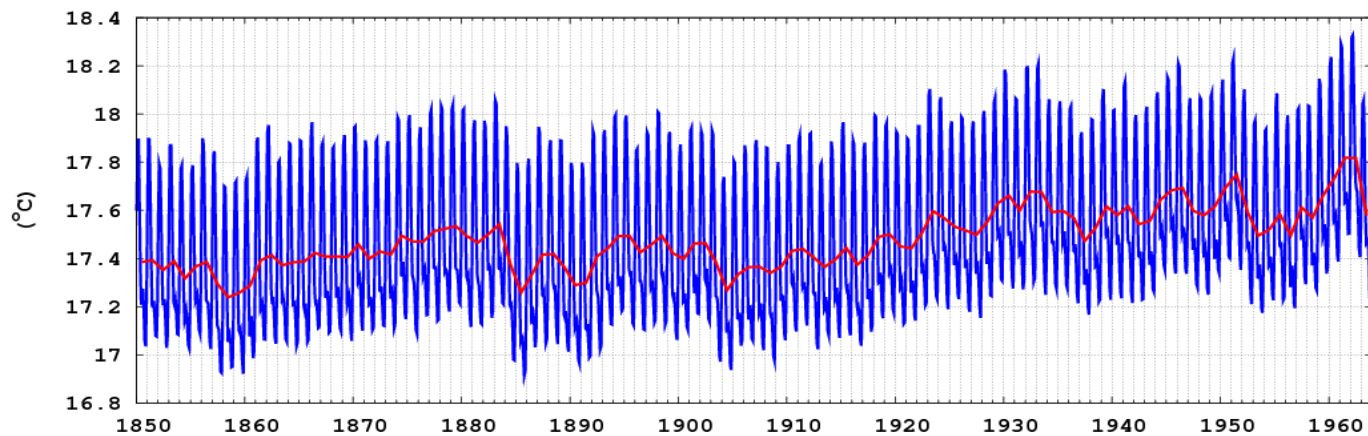
MHC1: monthly globally-averaged Sea Surface Temperature



MHC2: monthly globally-averaged Sea Surface Temperature



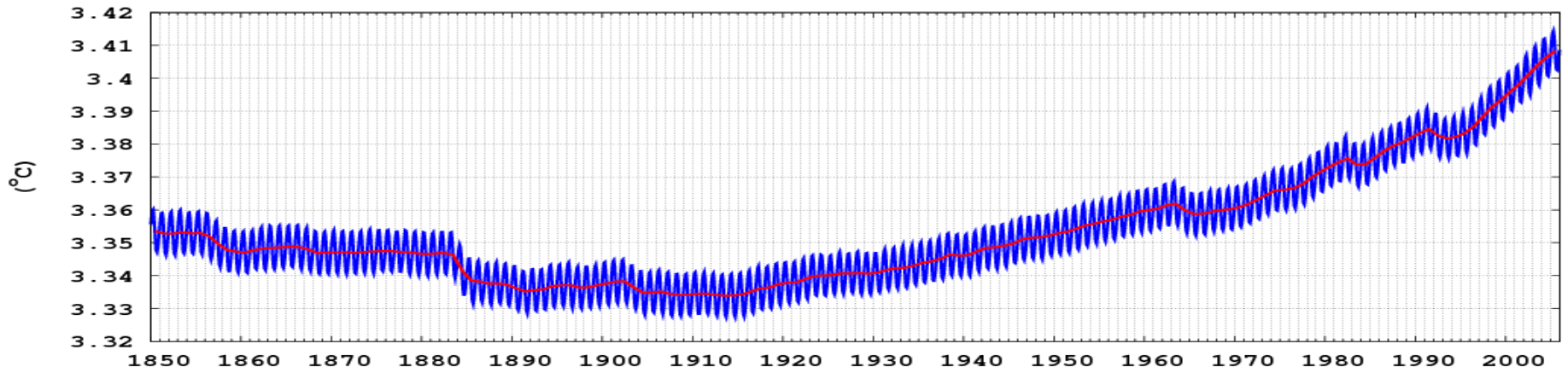
SHC1: monthly globally-averaged Sea Surface Temperature



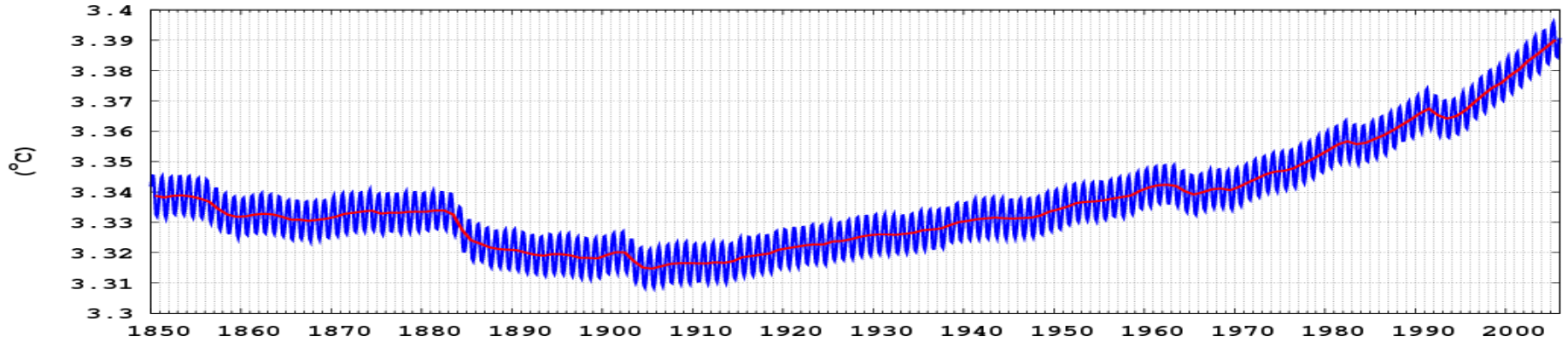
Forcing signal
(volcanoes +
GHG) clearly
visible

large inter-run
variability

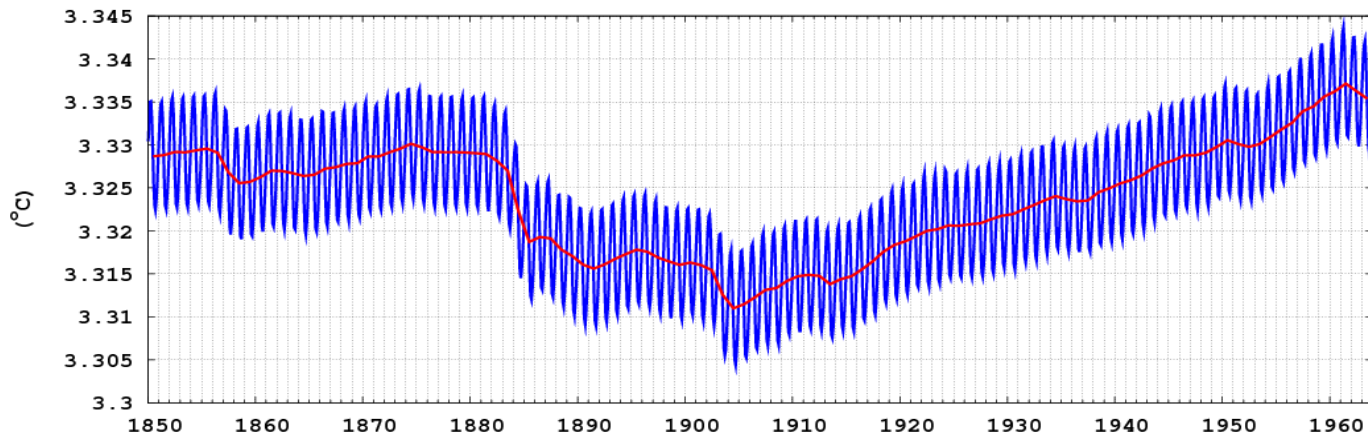
MHC1: monthly globally-averaged ocean temperature



MHC2: monthly globally-averaged ocean temperature



SHC1: monthly globally-averaged ocean temperature

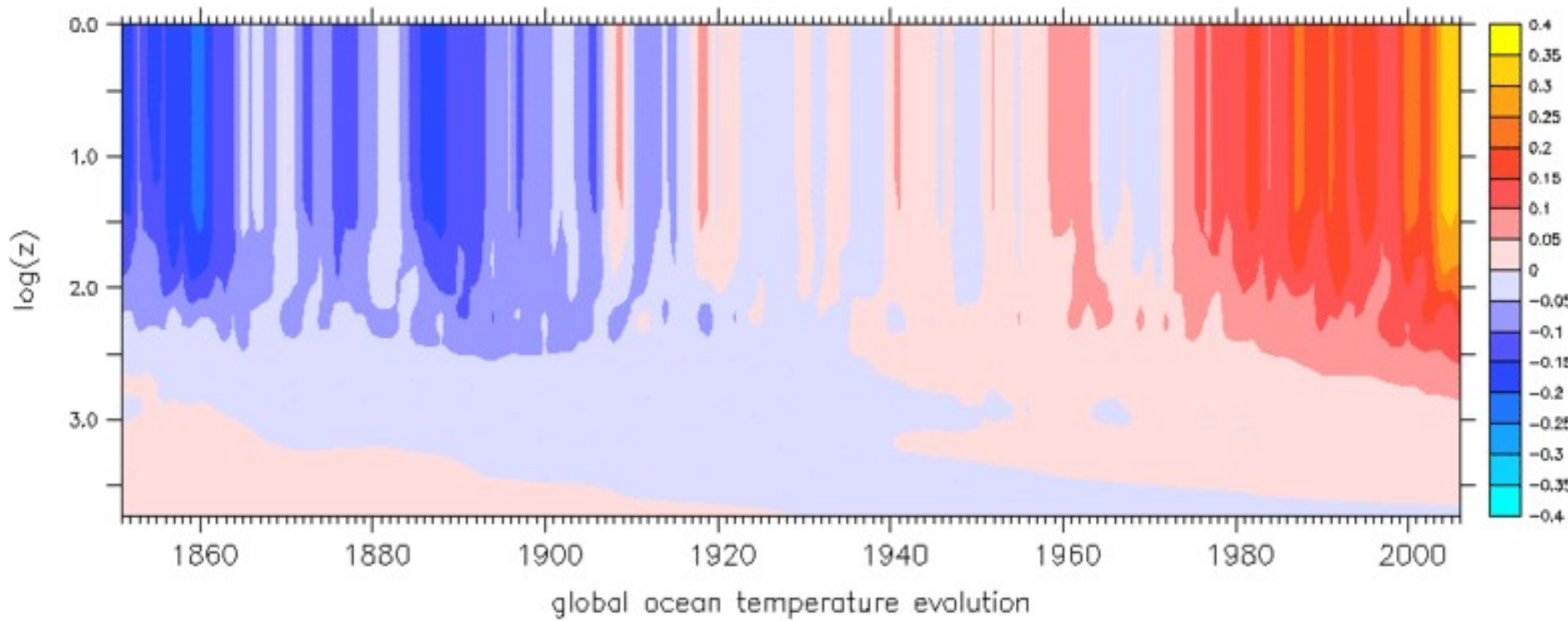


Forcing signal
(volcanoes +
GHG) clearly
visible

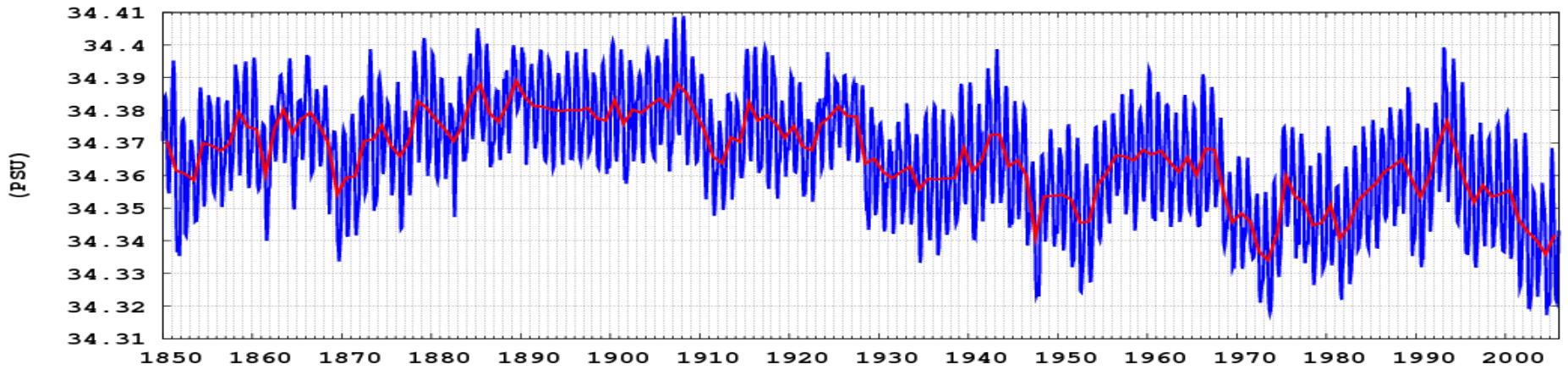
inter-run
variability small



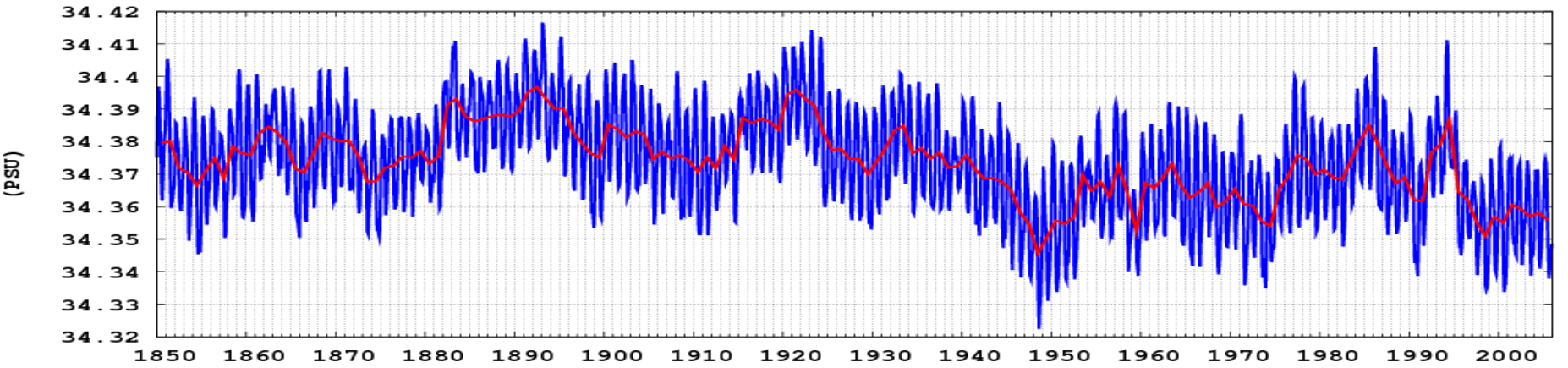
KNMI run



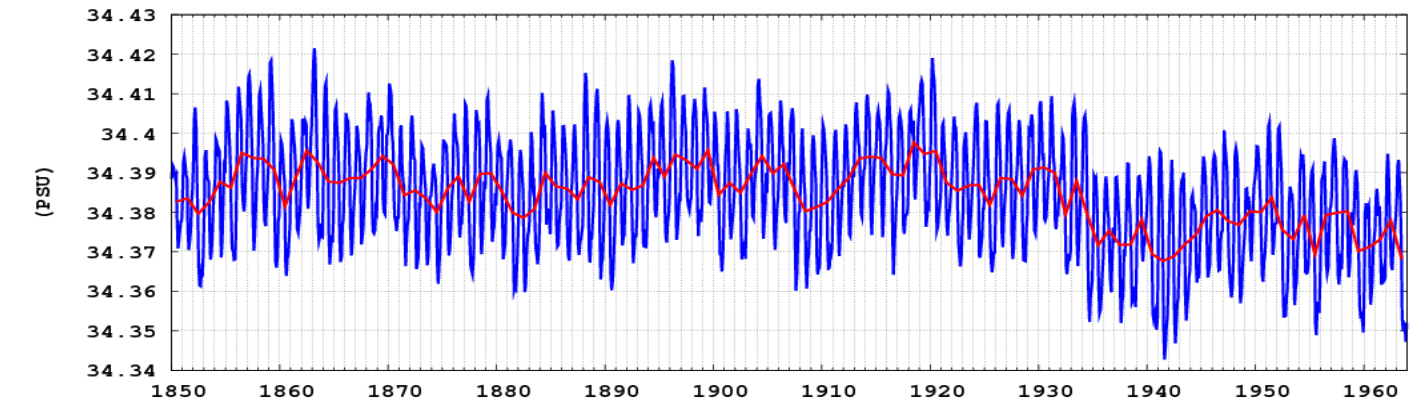
MHC1: monthly globally-averaged Sea Surface Salinity



MHC2: monthly globally-averaged Sea Surface Salinity

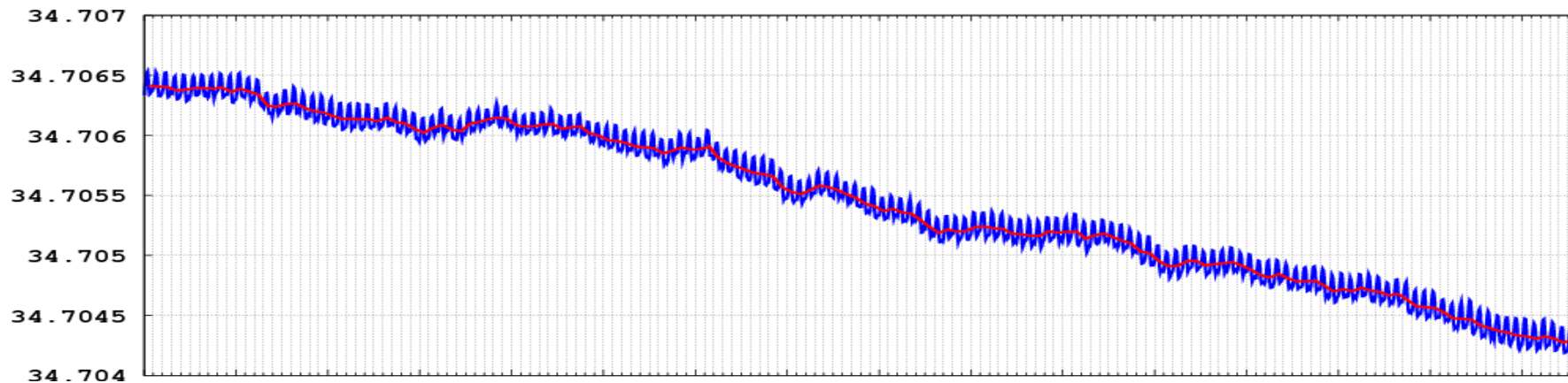


SHC1: monthly globally-averaged Sea Surface Salinity

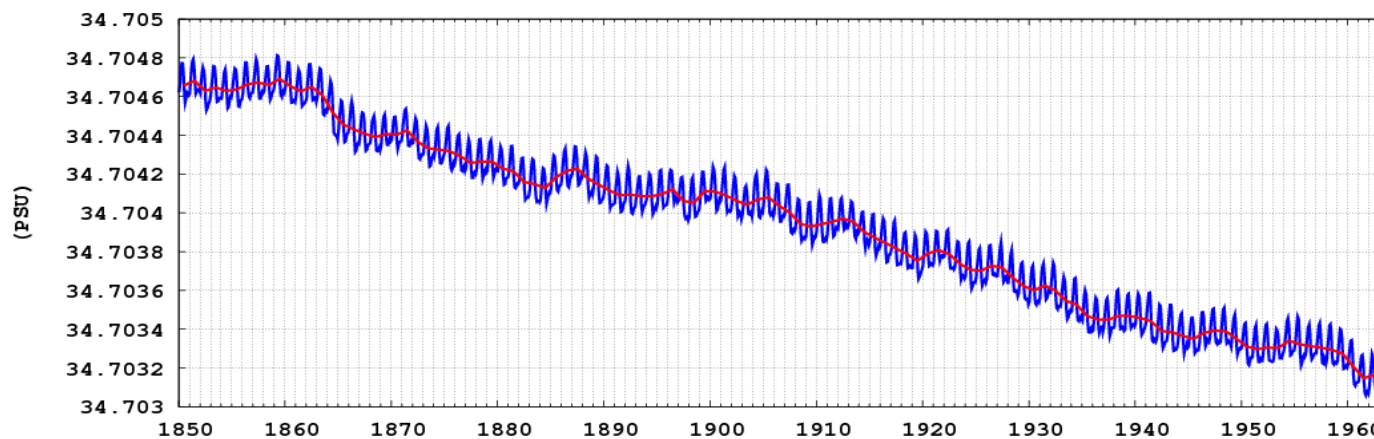
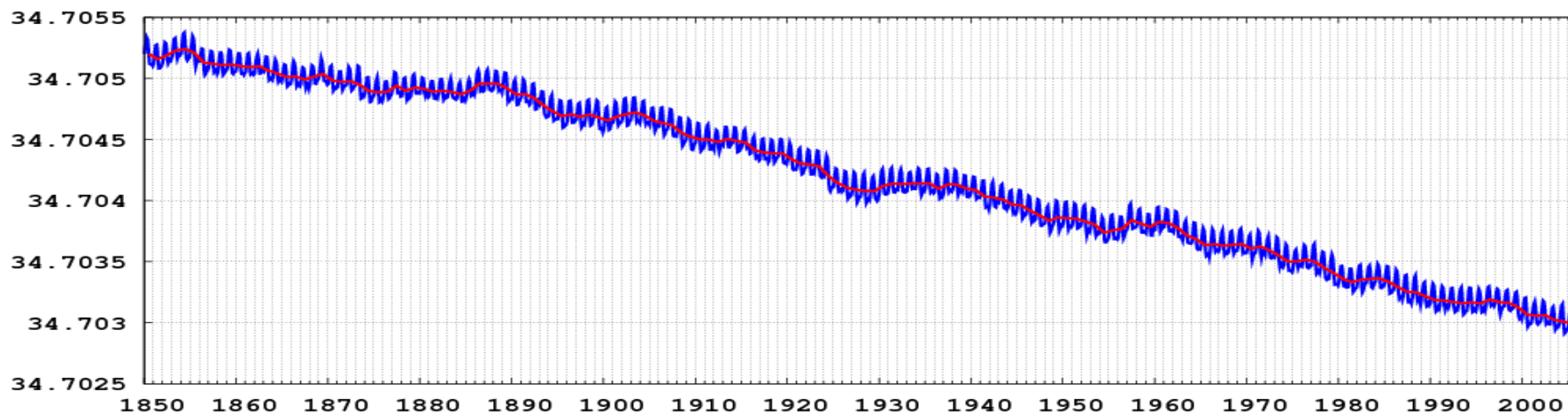


large variability

MHC1: monthly globally-averaged ocean salinity

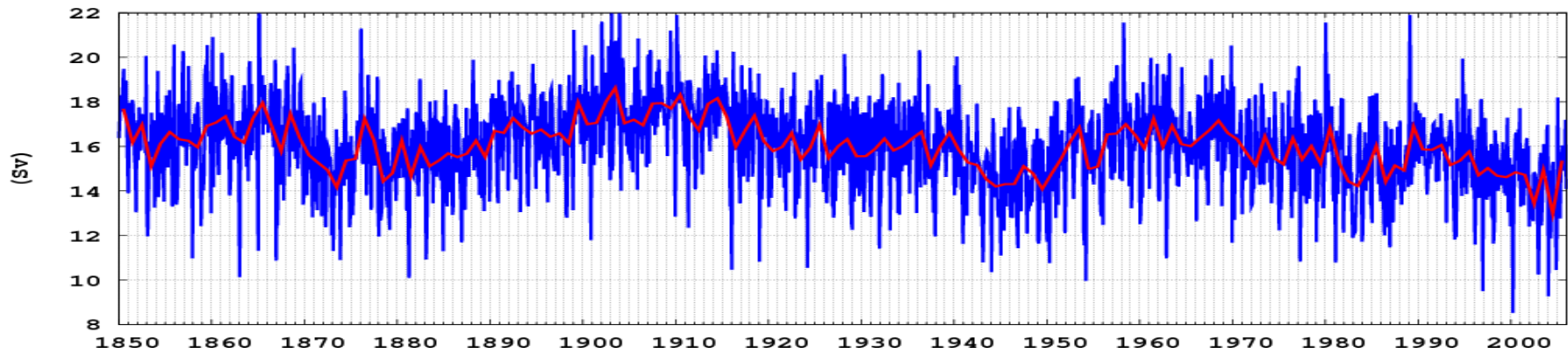


MHC2: monthly globally-averaged ocean salinity

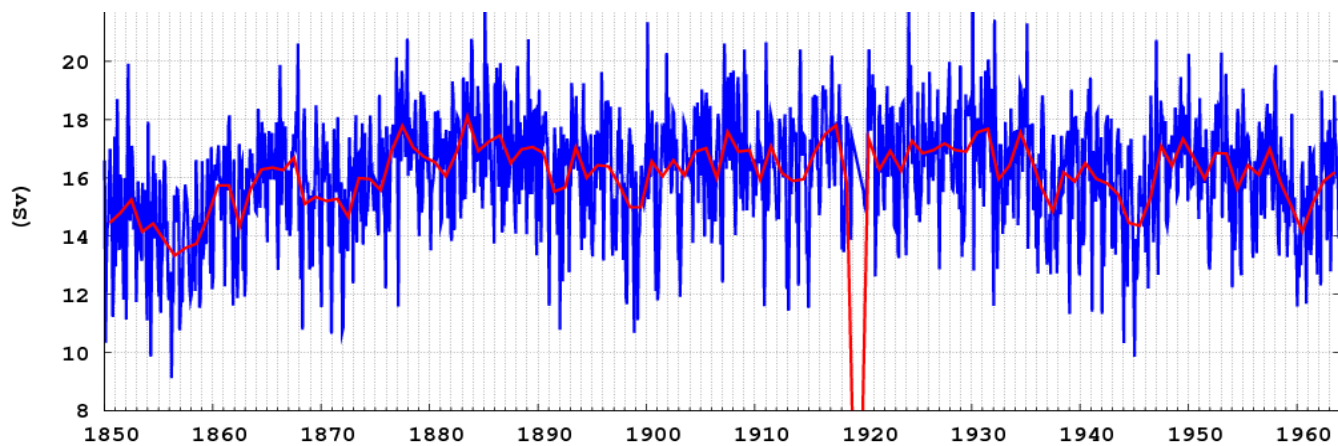
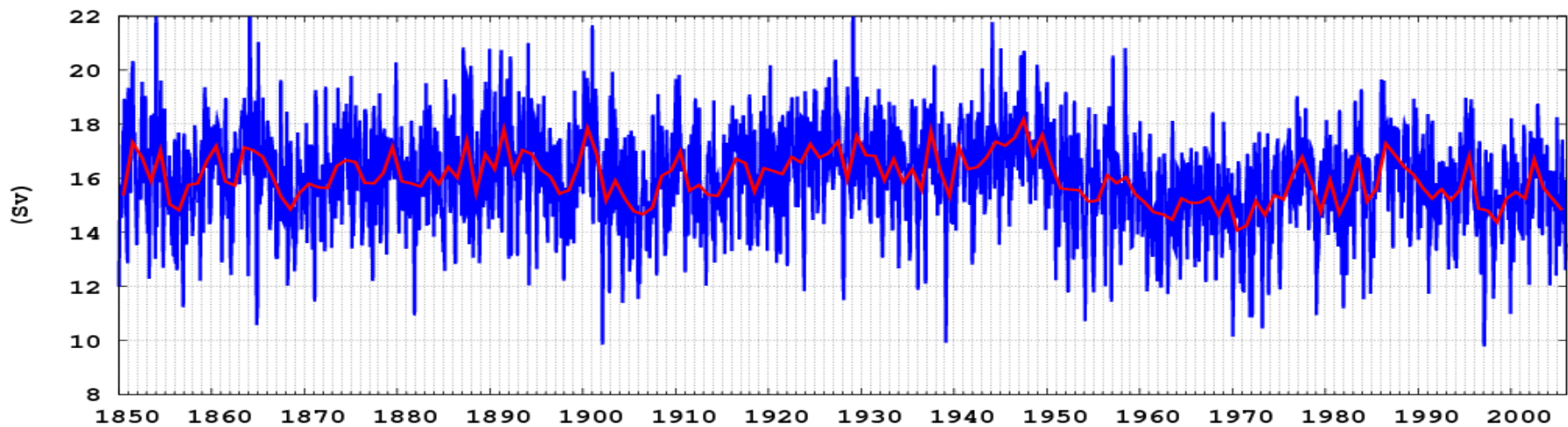


Relatively large
inter-run
variability

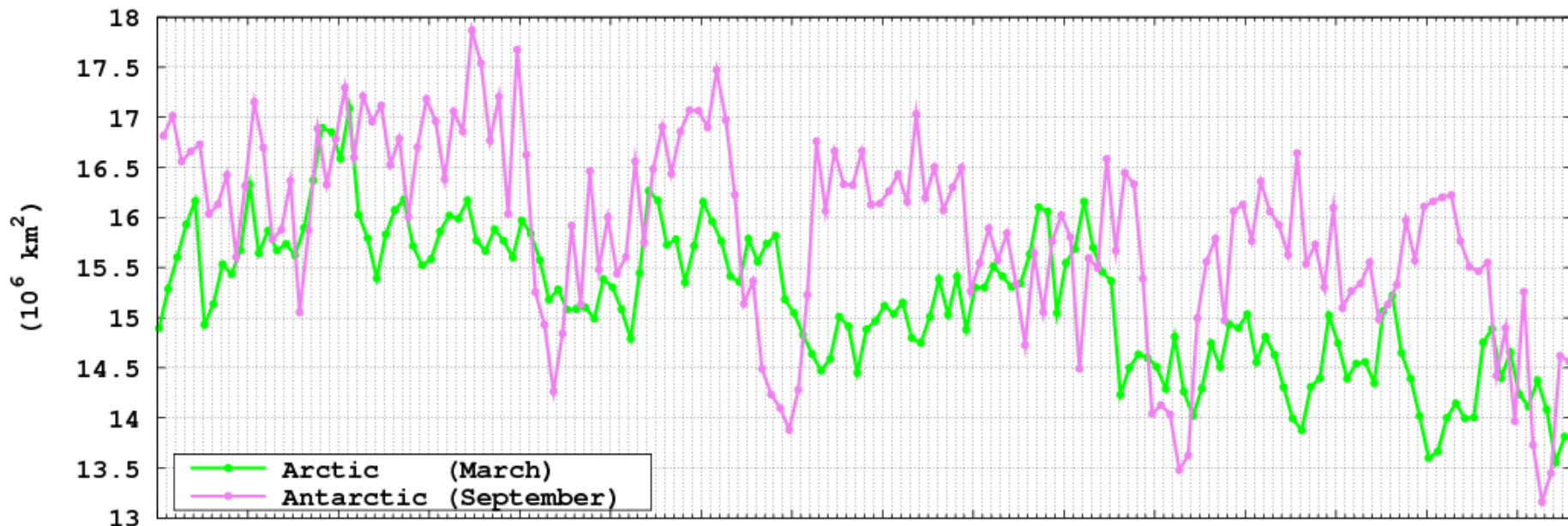
MHC1: maximum of monthly AMOC (38°N - 50°N and 500m - 2000m)



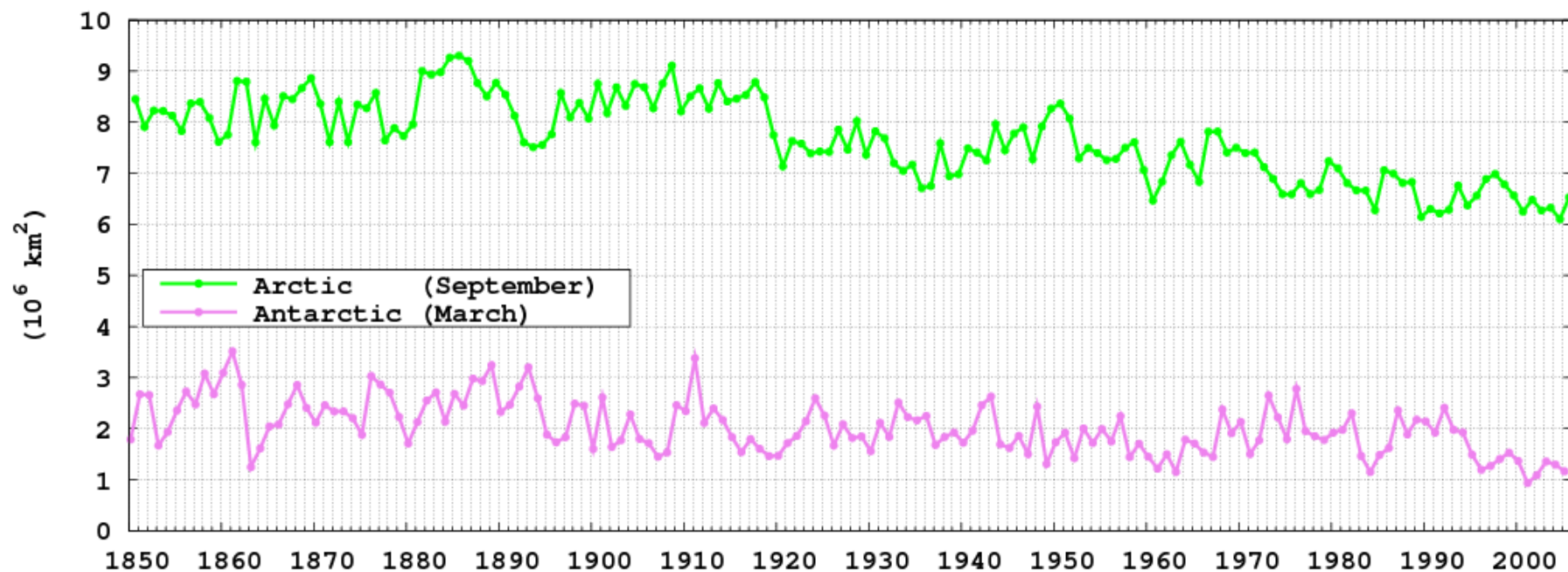
MHC2: maximum of monthly AMOC (38°N - 50°N and 500m - 2000m)



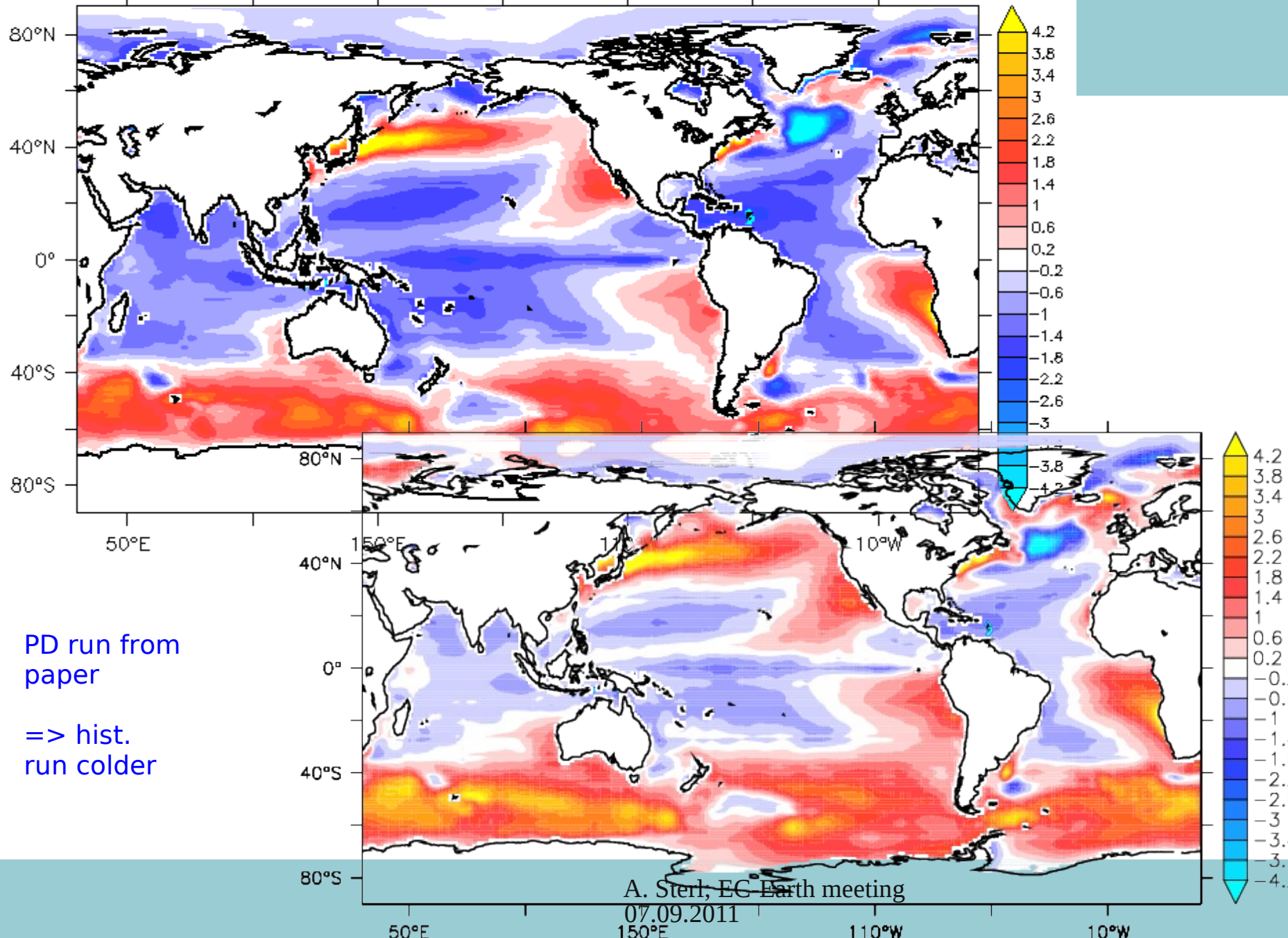
MHC1: mean sea-ice extent, end of local winter



MHC1: mean sea-ice extent, end of local summer



SST(1990-1999)-Levitus (KNMI-run)





Short summary of historical runs

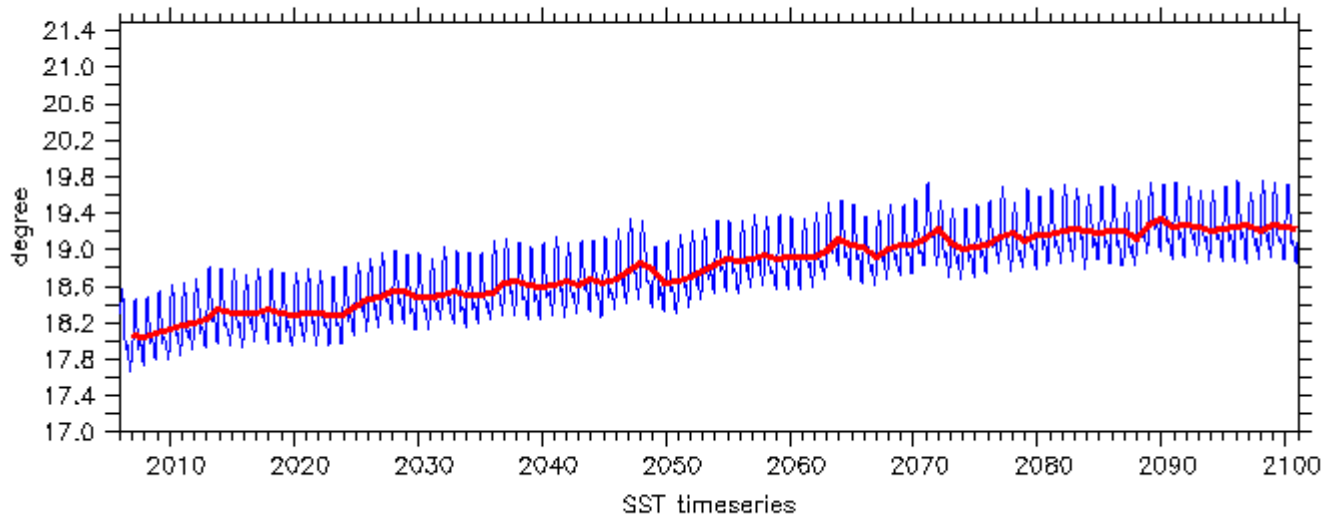
- External forcing (volcanoes + GHGs) clearly visible
- Large variability (within and between runs)
- Key quantities like transports and ice extent as in earlier version (see ocean paper)
- Same is true for ENSO
- SST in SO still much too warm, but whole ocean surface colder

- => conclusions of common paper still hold

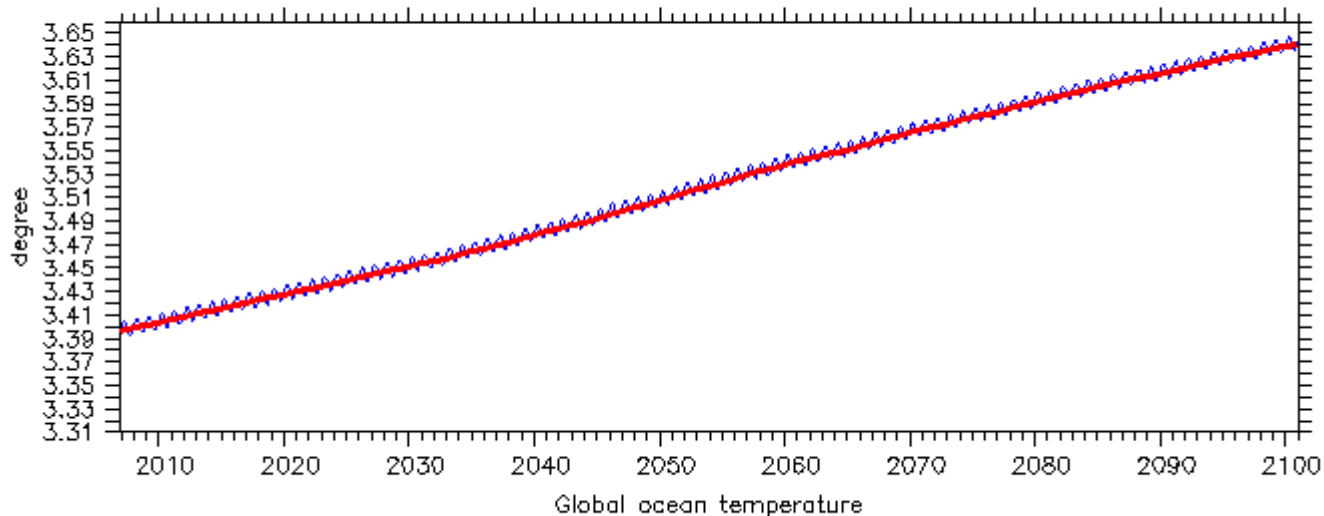


RCP45 runs

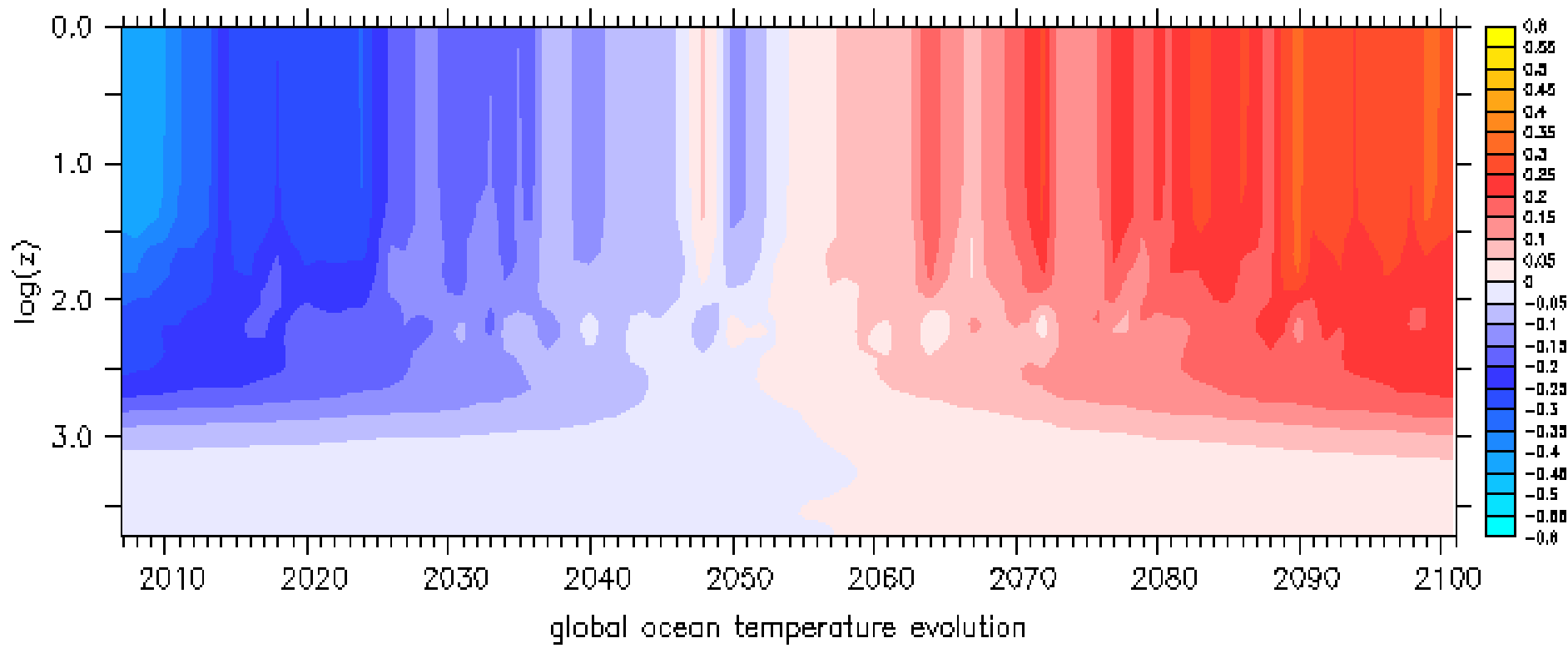
Only plots from KNMI run

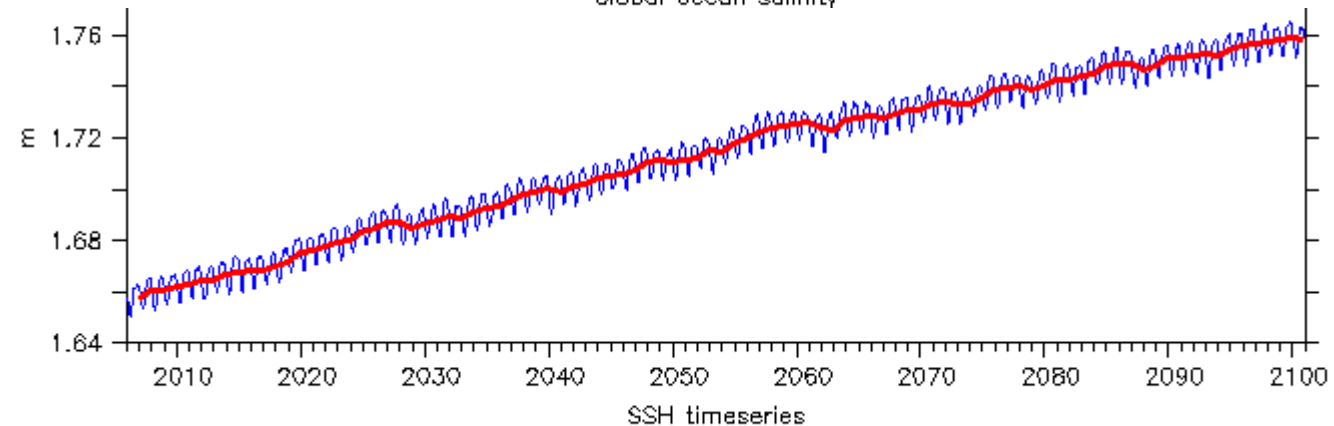
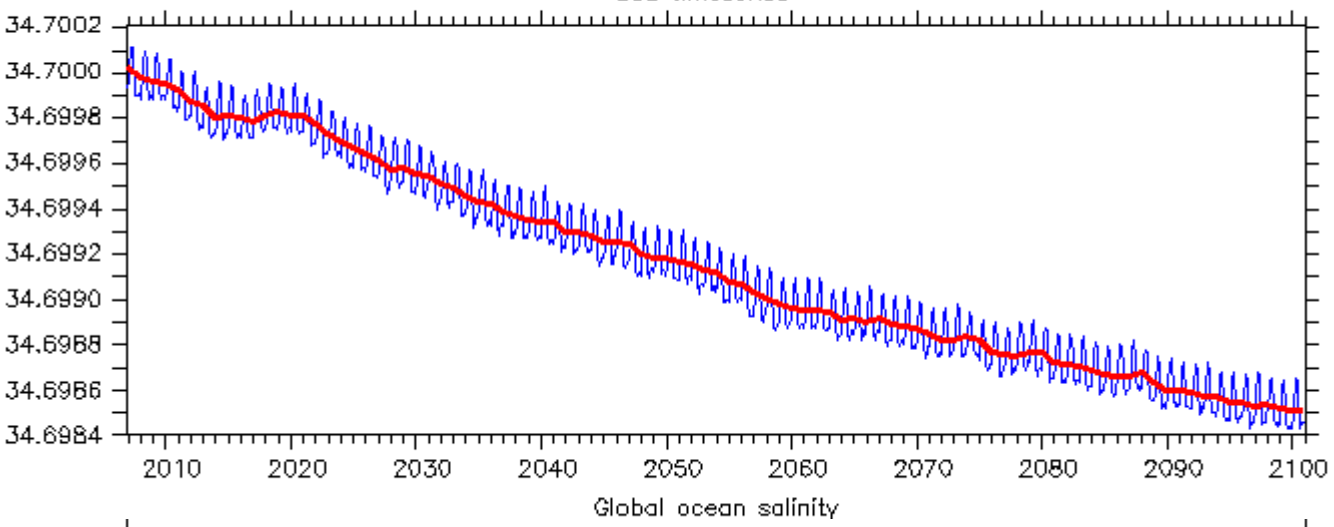
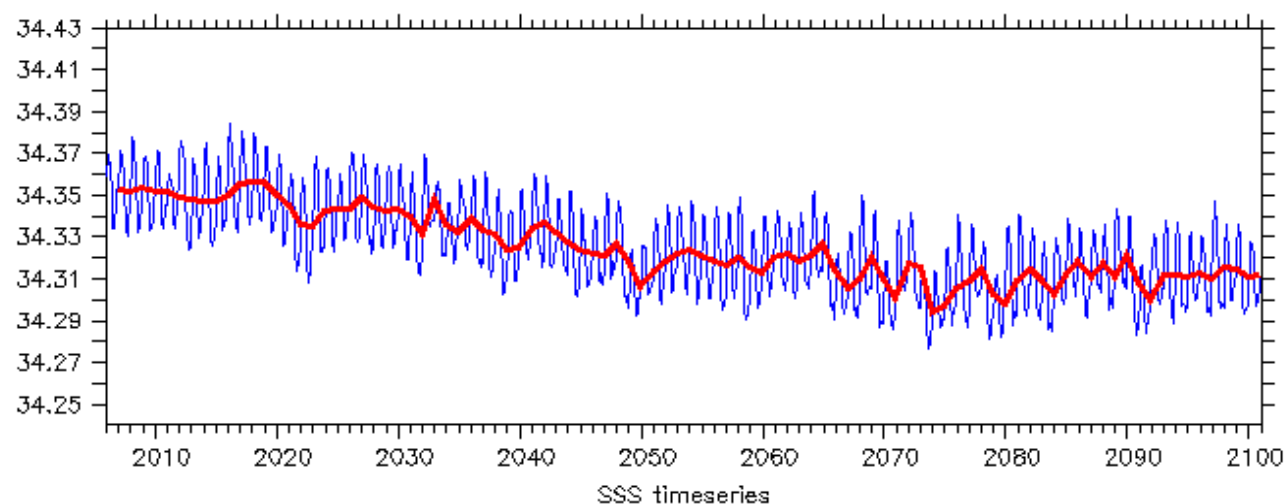


SST seems to stop rising (RCP45 is leveling off!),



but rise of total ocean heat content shows no sign of slowing down.





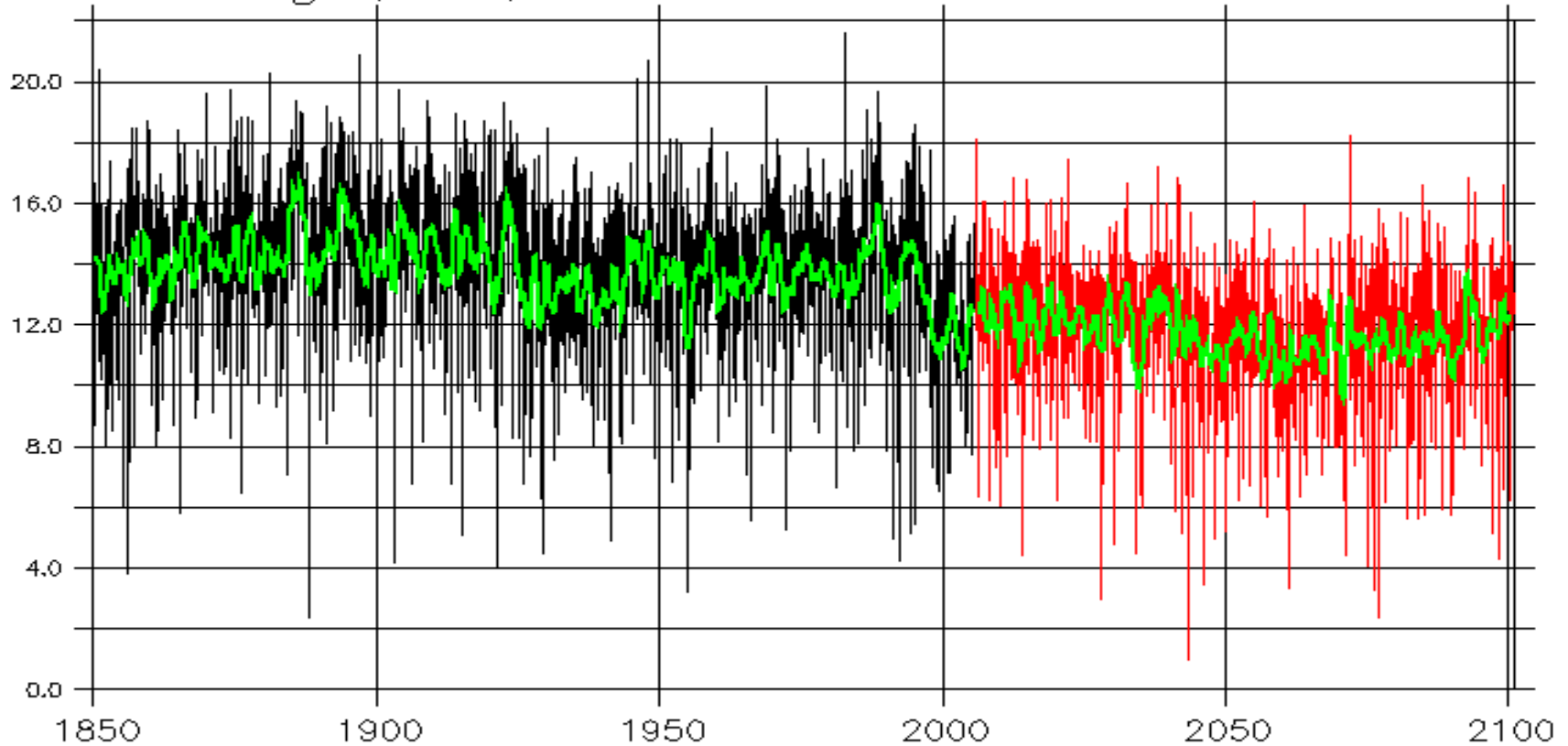
Salinity:

leveling-off of trends

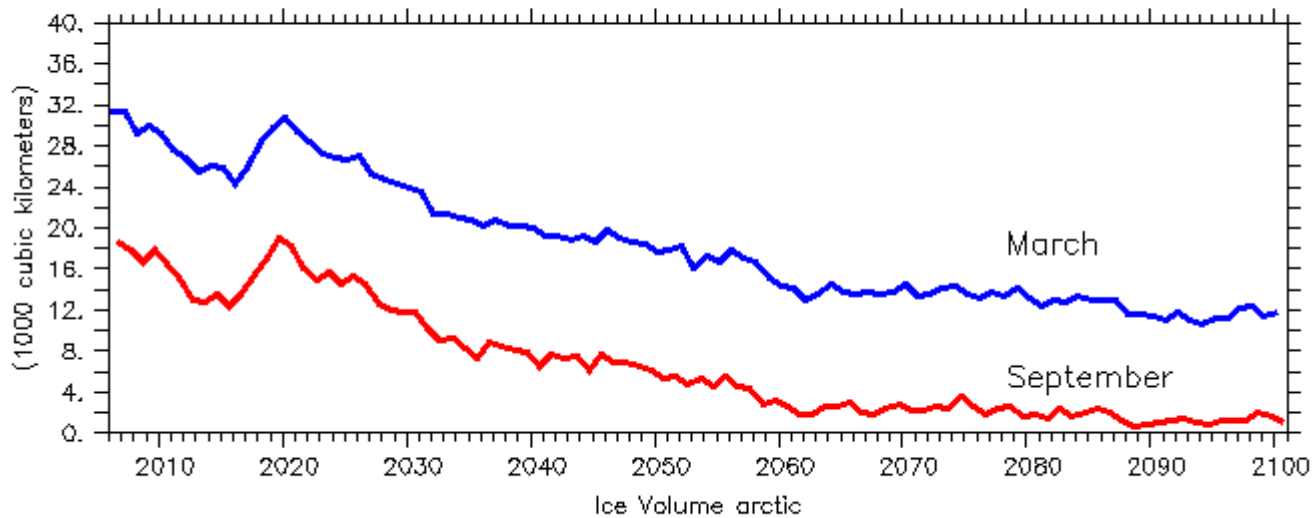
SSS development in Run me41 quite different!



MOC strength, 30N, KNMI run

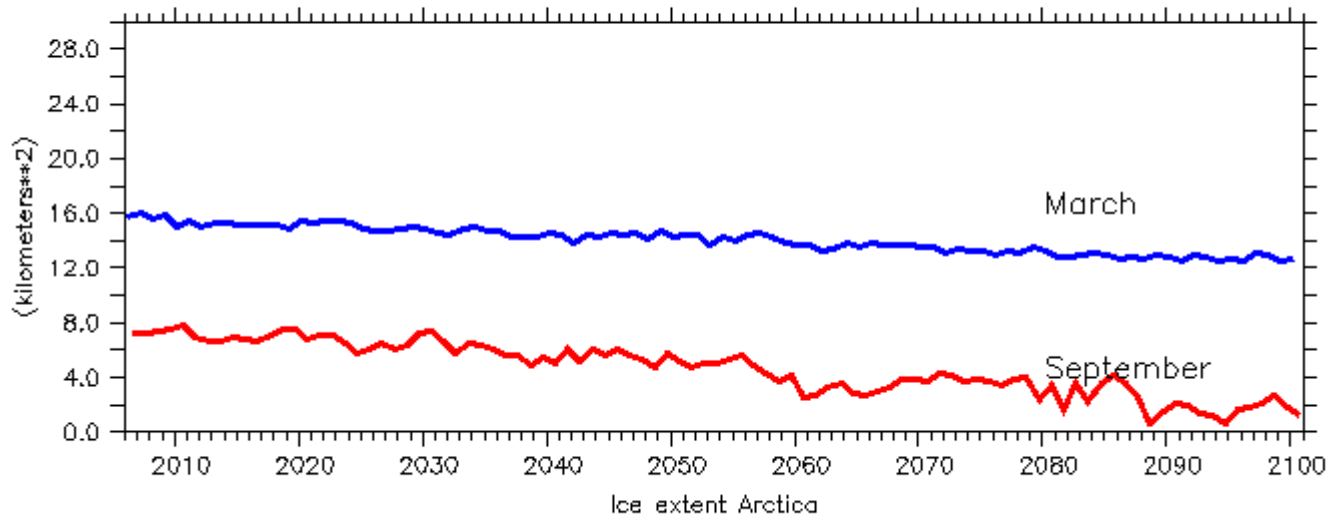


Similar drop in MOC strength also in MetEireann runs



Decrease faster in summer than in winter

Still large extent after 2060; probably unrealistic





Short summary of RCP45 runs

- Warming of ocean at constant rate
- Salinity/SSH changes get smaller
- Tendency to weaker AMOC
- Increasing transport through Arctic
- No or only weak tendency for other transports
- Still sea ice in Arctic at end of summer (extent, but volume small)



Summary

- No significant differences to earlier runs (paper!), but ...
- ... SST colder
- Historical evolution realistic
- Considerable variability between runs
- Future sea ice extent probably to large