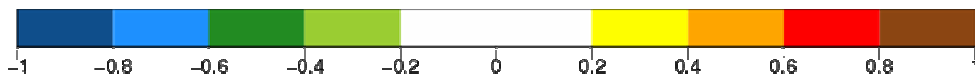
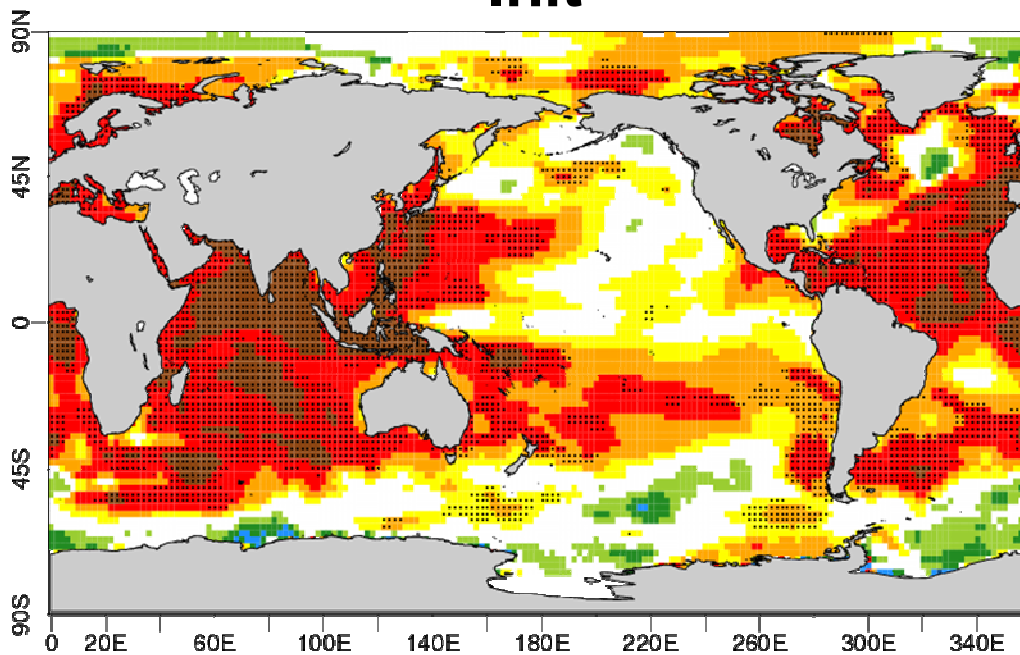


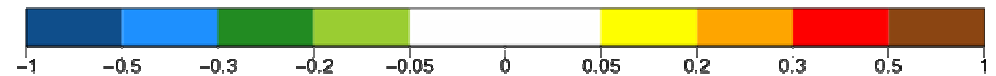
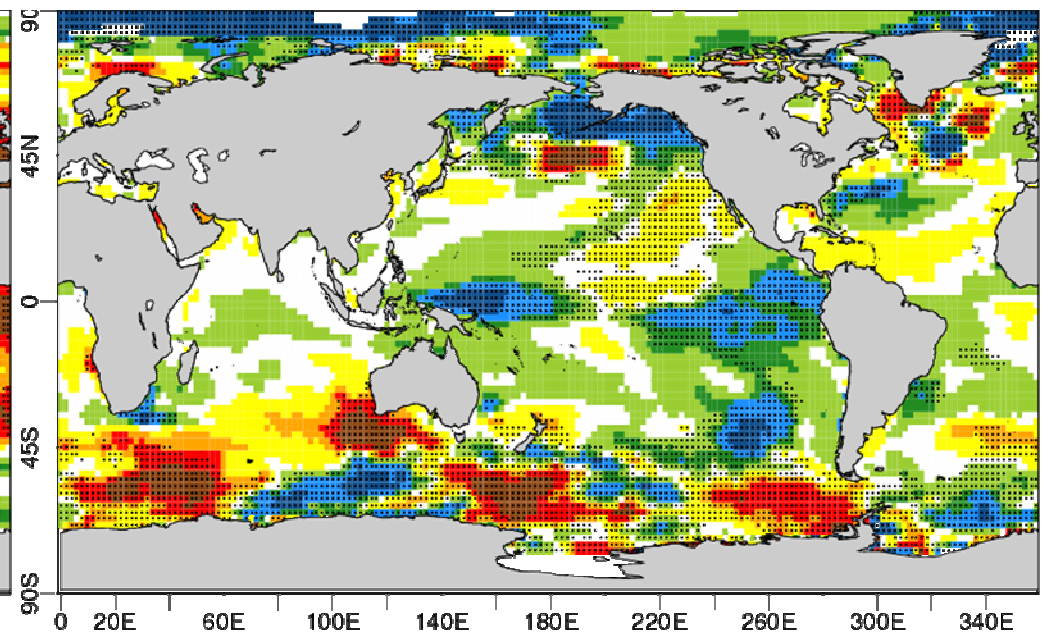
Sea Surface Temperature **ACC** – yearly hindcasts Forecast time : 2-5 years

Init



Correlation

Init-NoInit



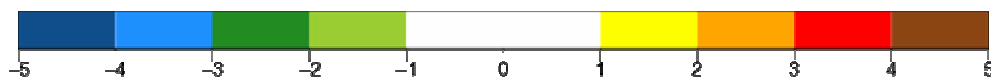
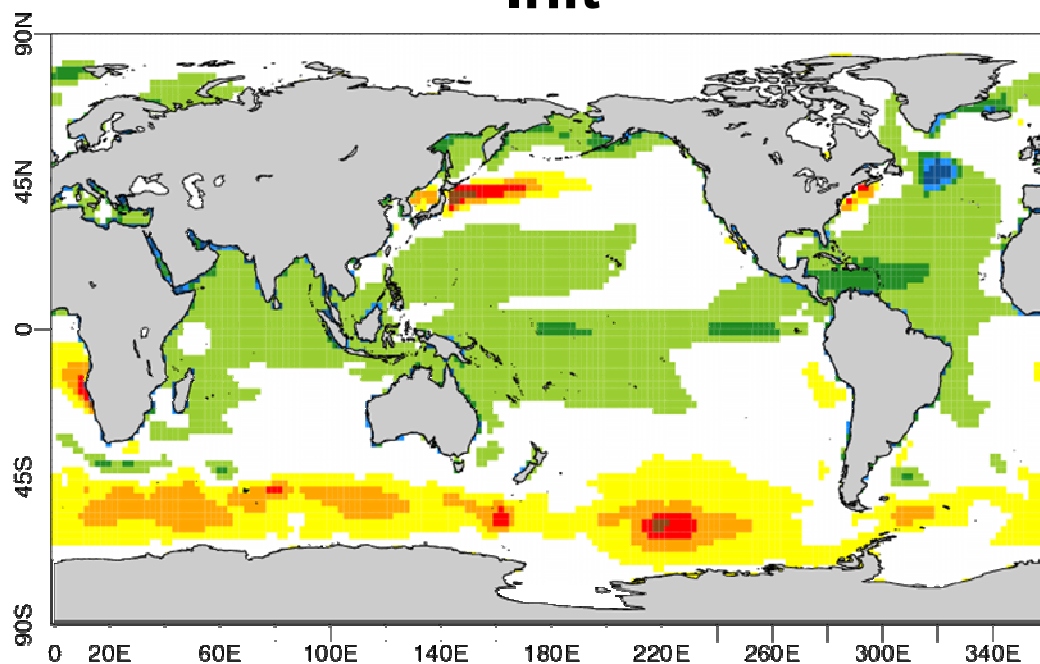
Difference in correlation

➡ **Benefits in the Austral Ocean, Northern and tropical Atlantic**

Sea Surface Temperature **bias** - yearly hindcasts

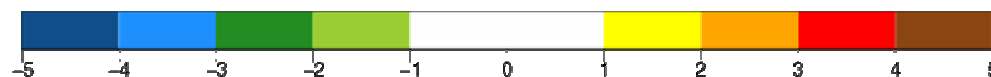
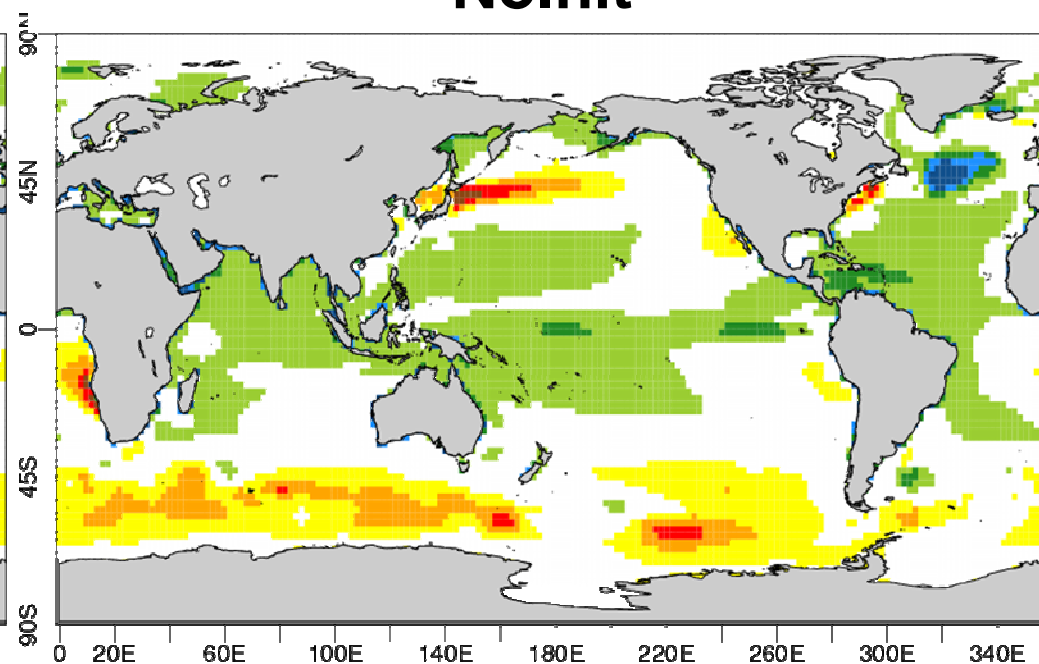
Forecast time : 6-9 years

Init



Bias (K)

Nolnit



Bias (K)

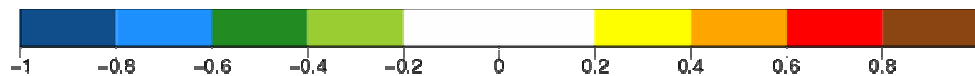
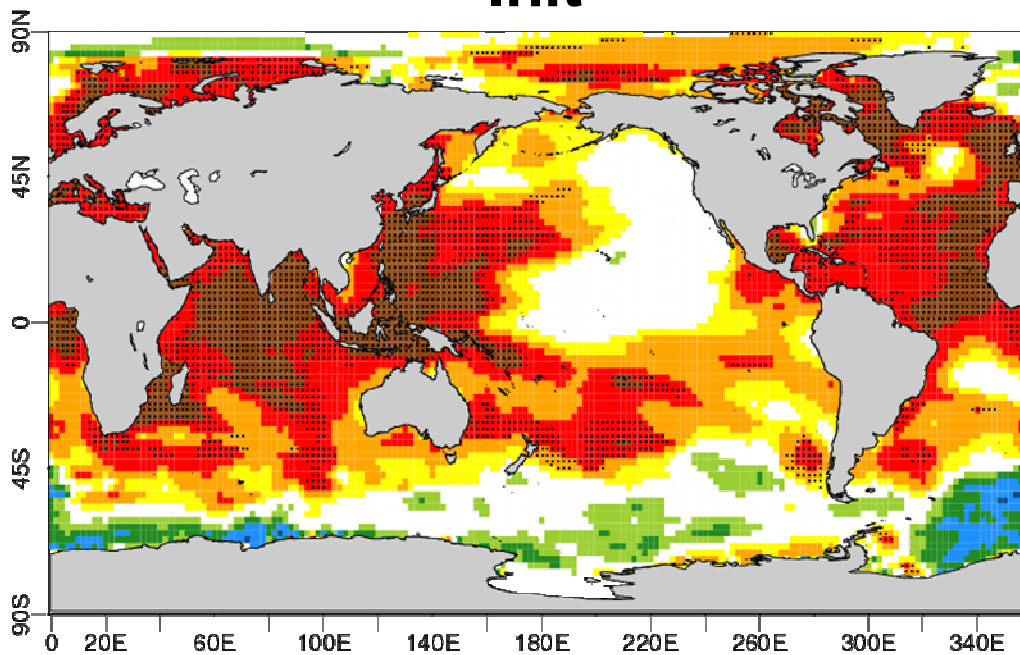


Convergence of Init bias toward Nolnit one

Sea Surface Temperature **ACC** – yearly hindcasts

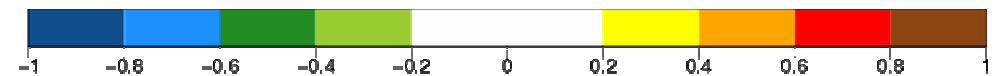
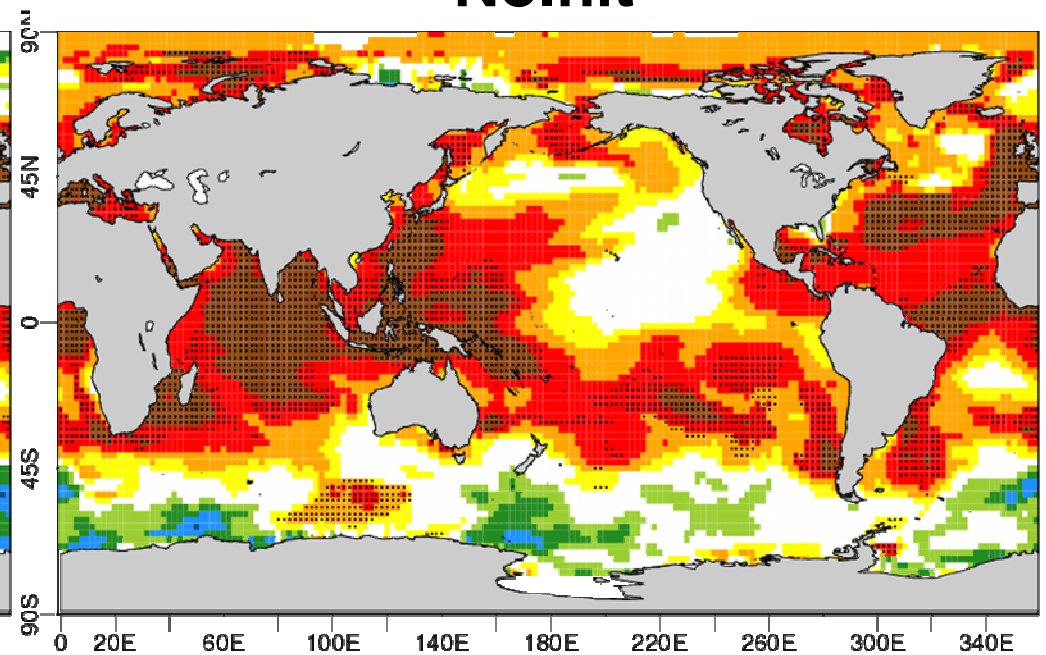
Forecast time : 6-9 years

Init



Correlation

Nolnit

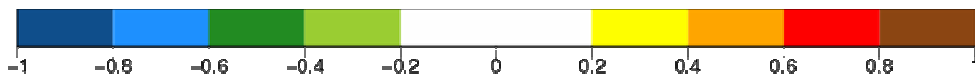
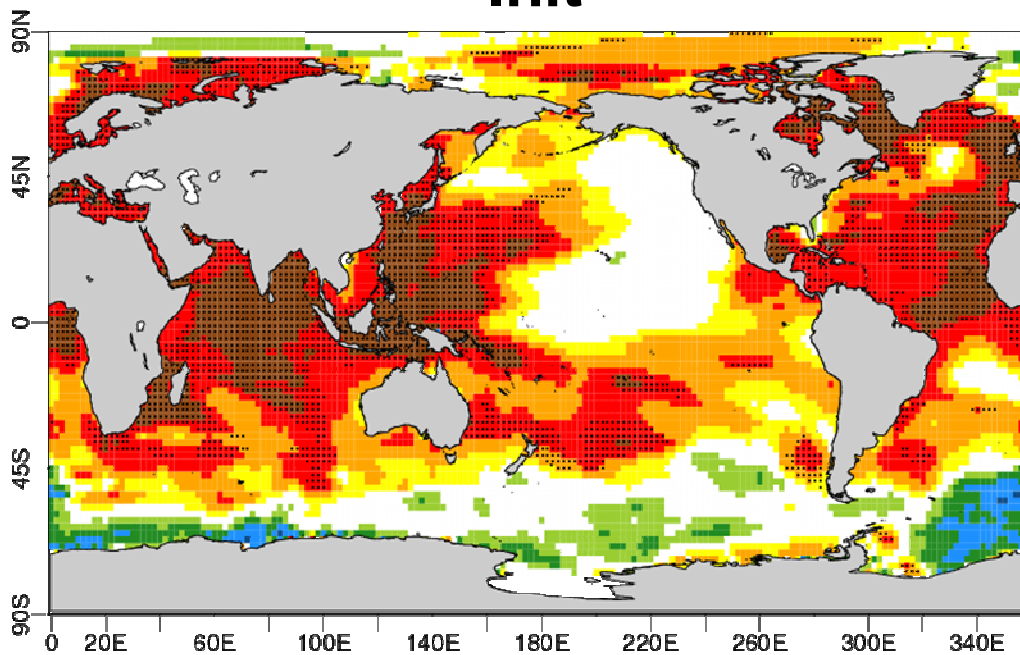


Correlation

Black dots indicate ACC reaching the 95% significance level

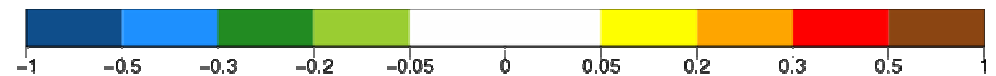
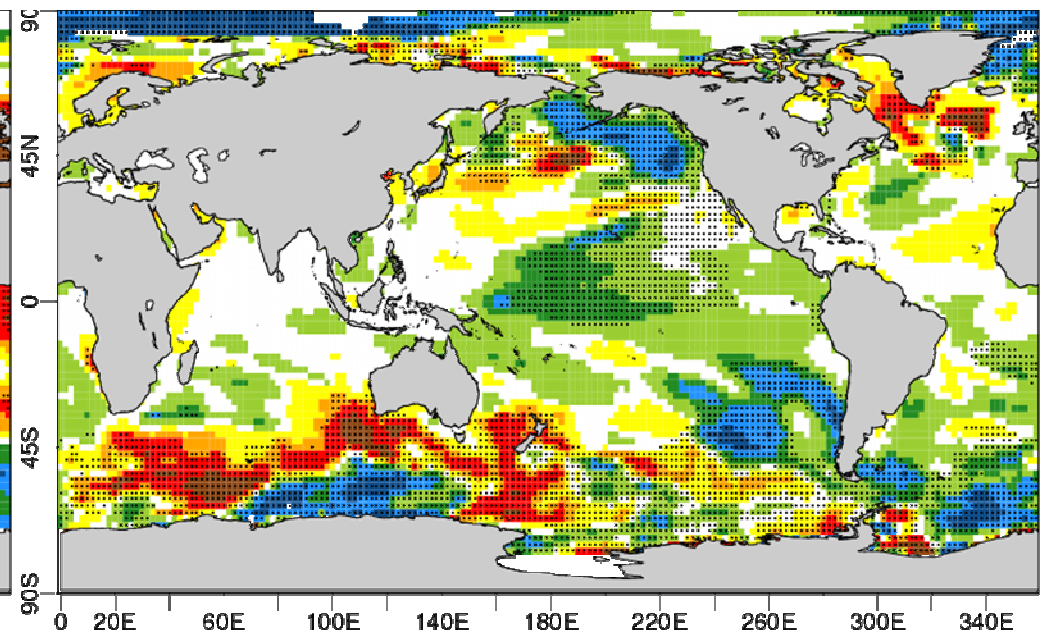
Sea Surface Temperature **ACC** – yearly hindcasts Forecast time : 6-9 years

Init



Correlation

Init-NoInit



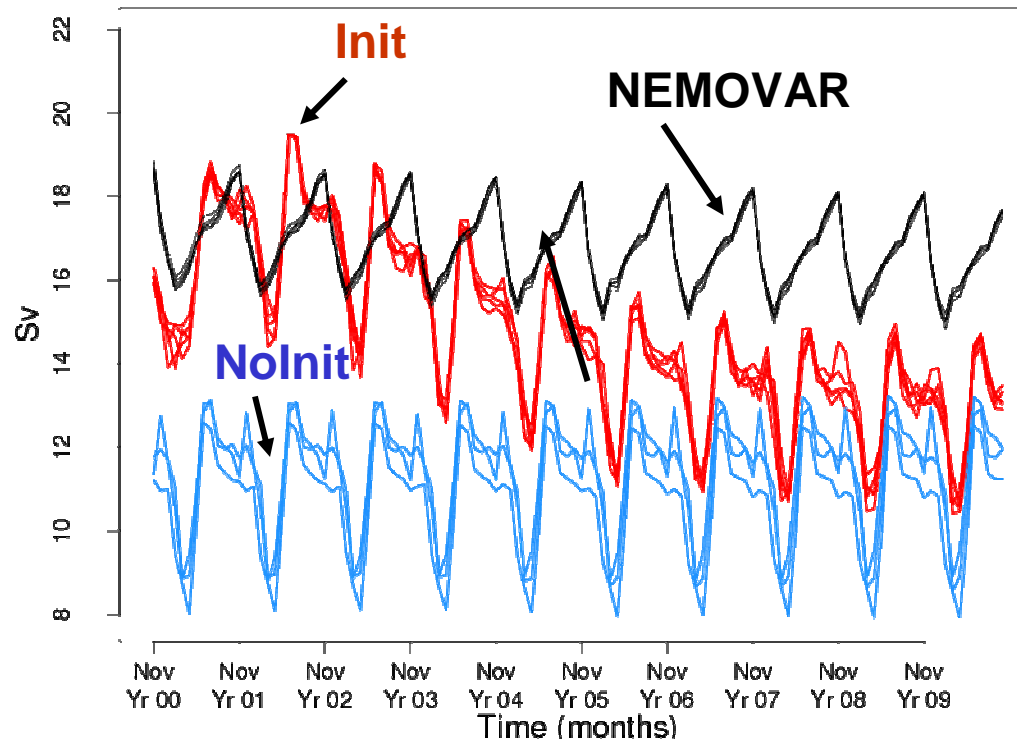
Difference in correlation

➡ **Benefits in the Austral Ocean, Northern and tropical Atlantic**

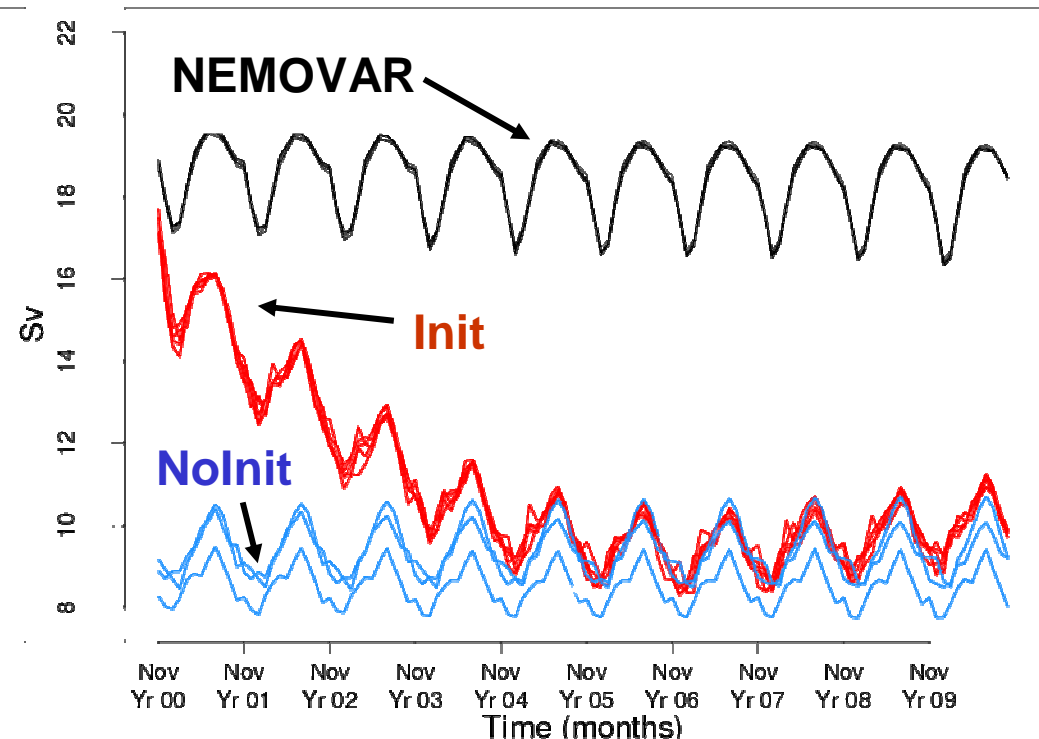
Atlantic Meridional Overturning Circulation

Climatology

AMOC 30N-40N 1-2km



AMOC 40N-55N 1-2km

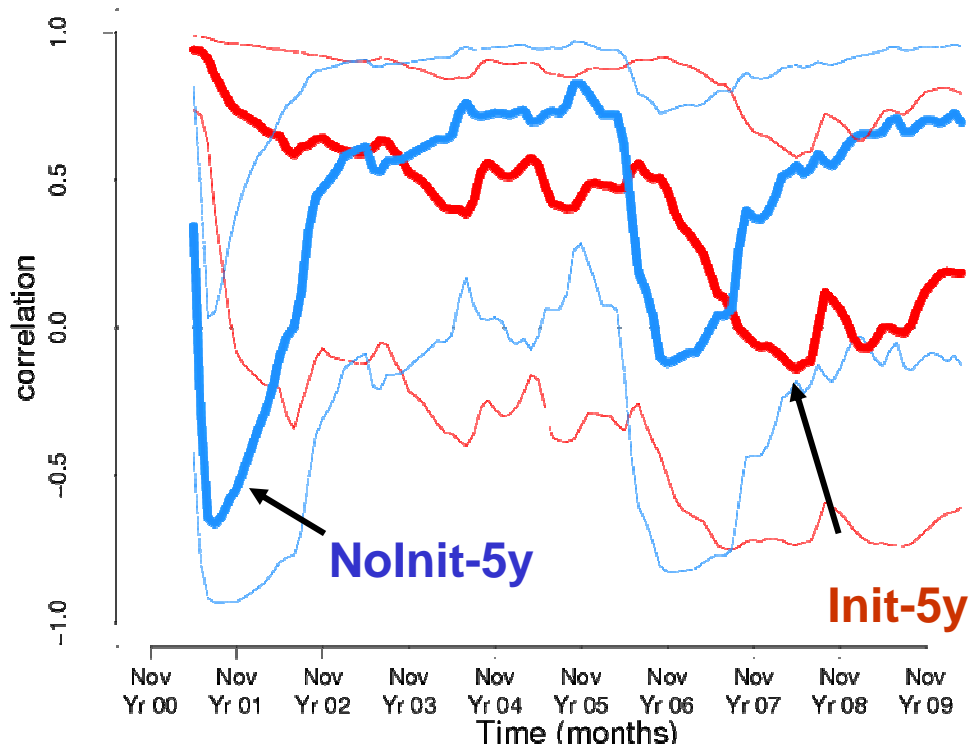


➡ Very strong drift, very weak AMOC

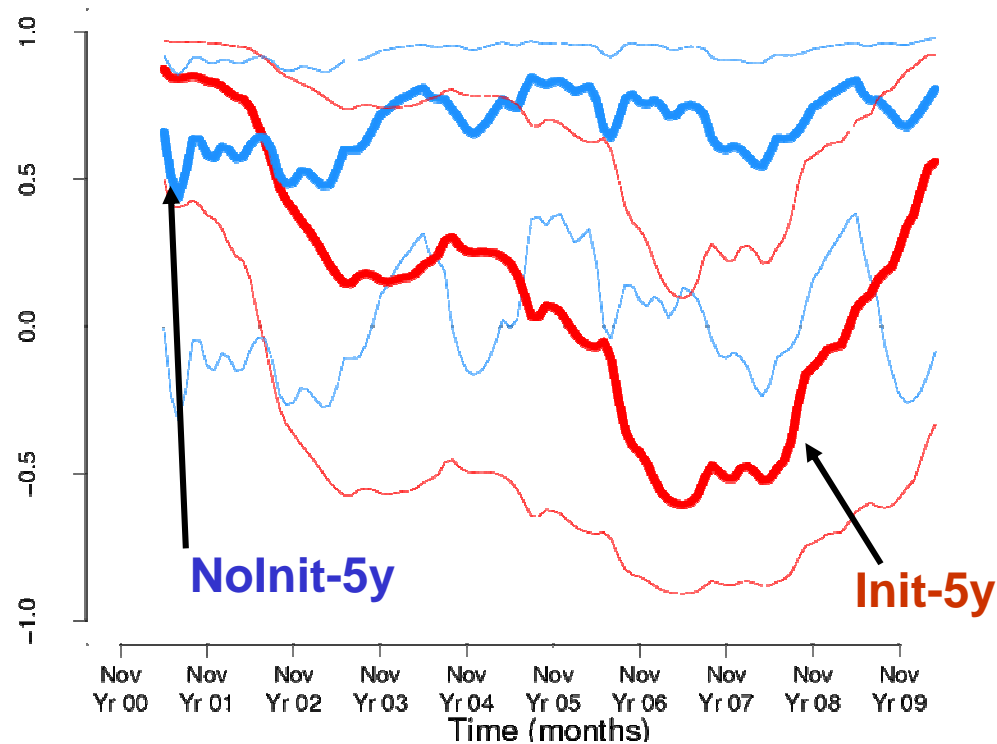
Atlantic Meridional Overturning Circulation

If we use 5-year hindcasts (=CMIP5 setup):

ACC AMOC 30N-40N 1-2km



ACC AMOC 40N-55N 1-2km

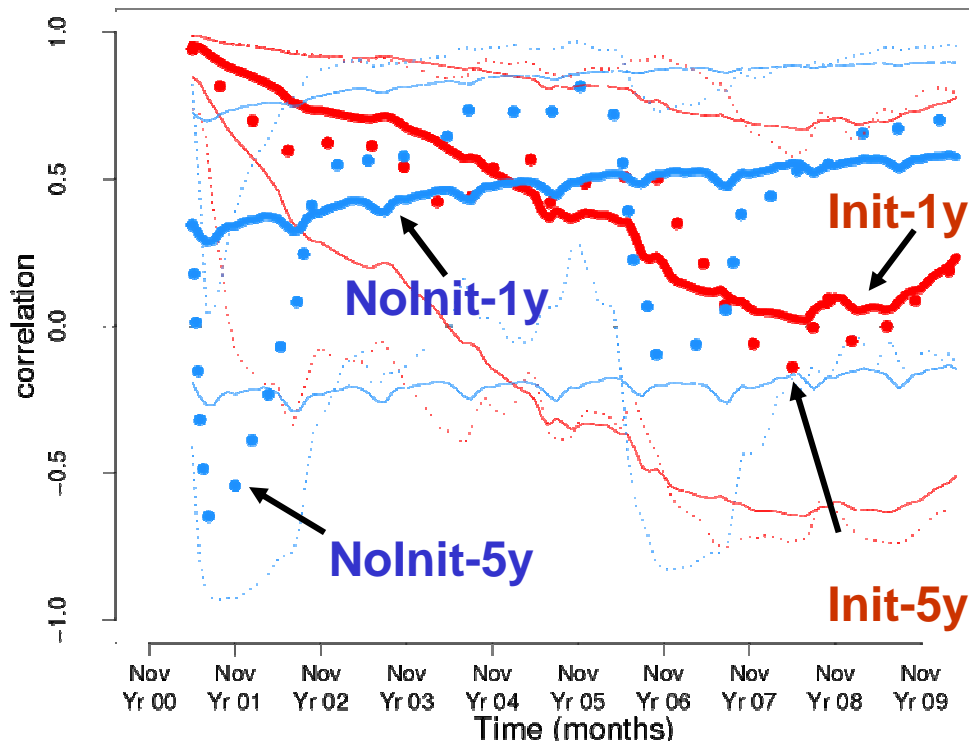


➡ Noisy scores, benefit from initialisation barely distinguishable

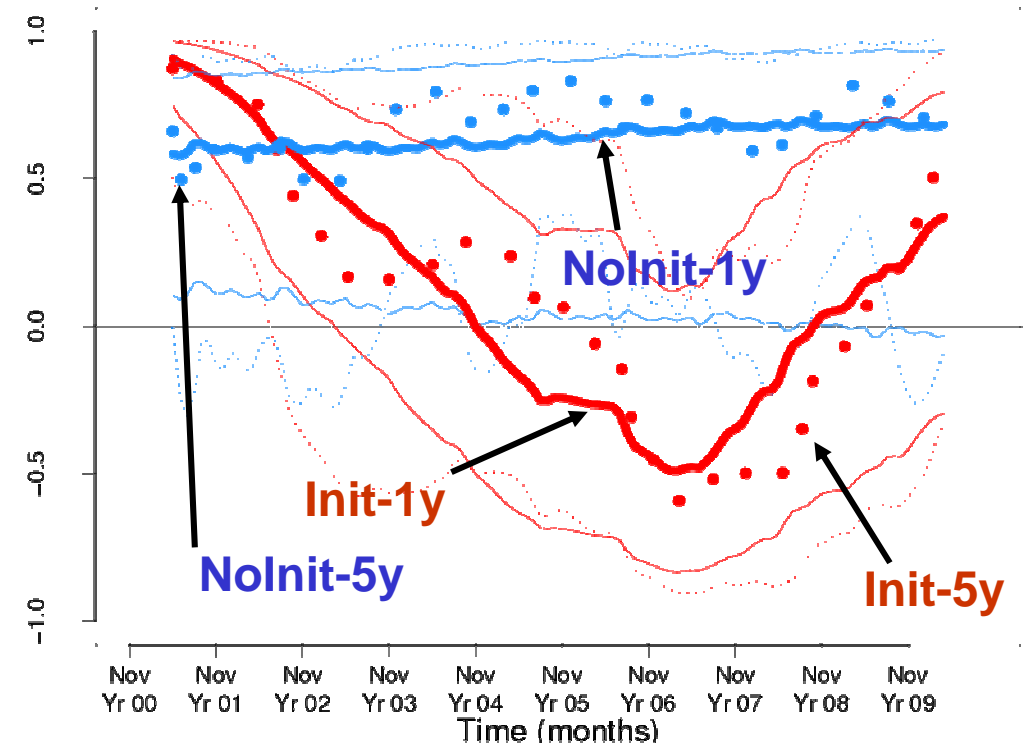
Atlantic Meridional Overturning Circulation

If we use yearly hindcasts:

ACC AMOC 30N-40N 1-2km



ACC AMOC 40N-55N 1-2km

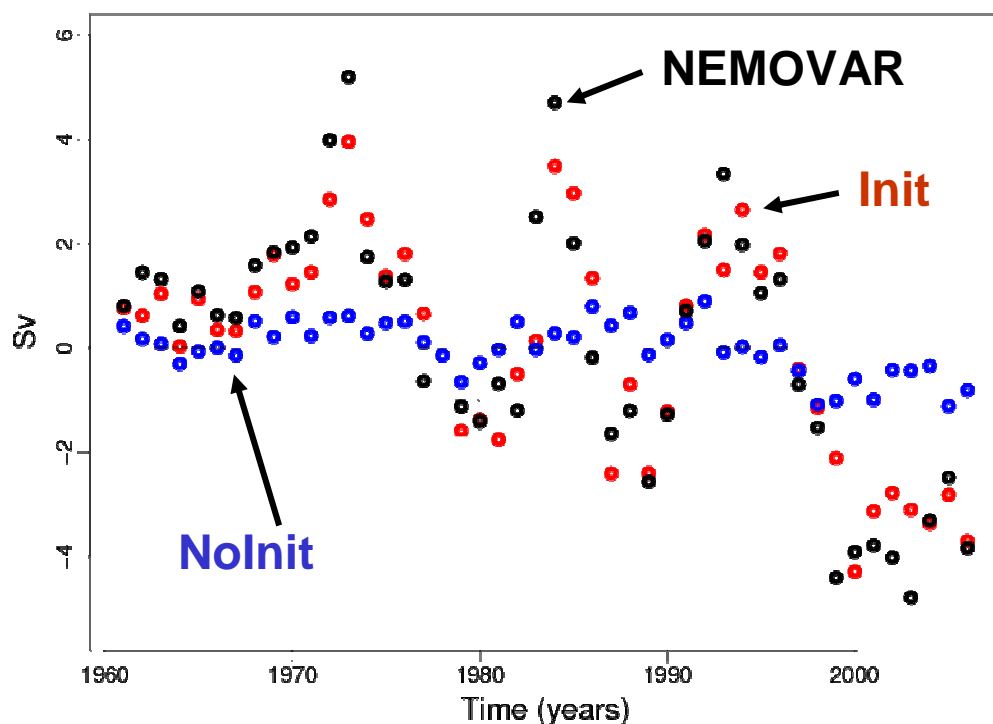


➡ Significant AMOC skill for 3 years in Init

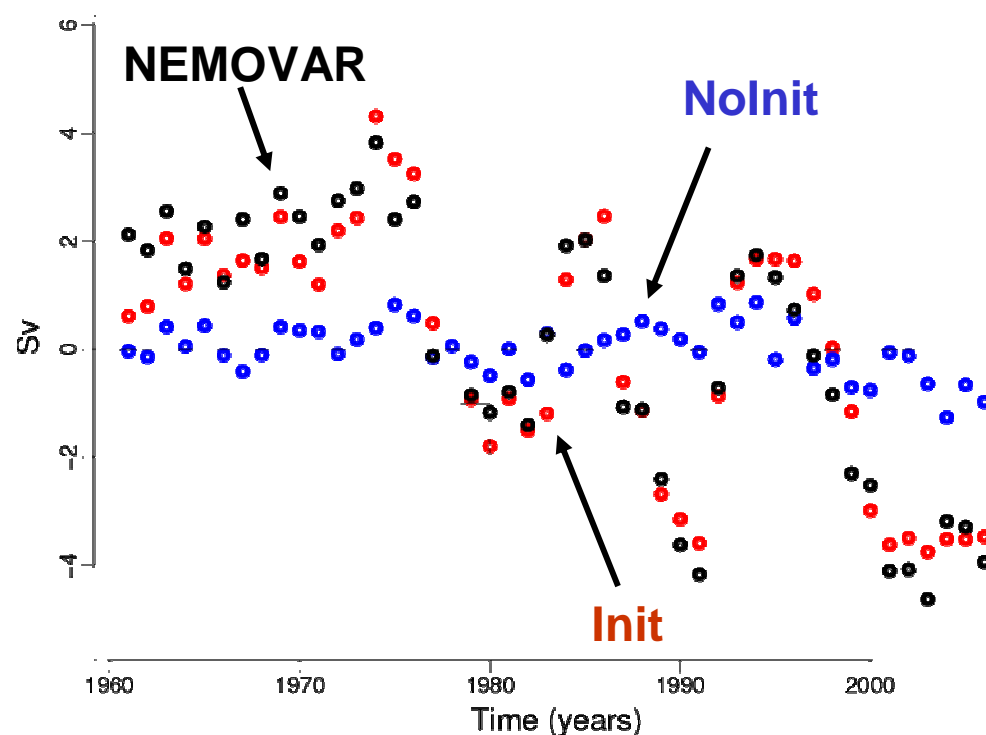
Atlantic Meridional Overturning Circulation

Anomalies : Forecast times 1st year

AMOC 30N-40N 1-2km



AMOC 40N-55N 1-2km

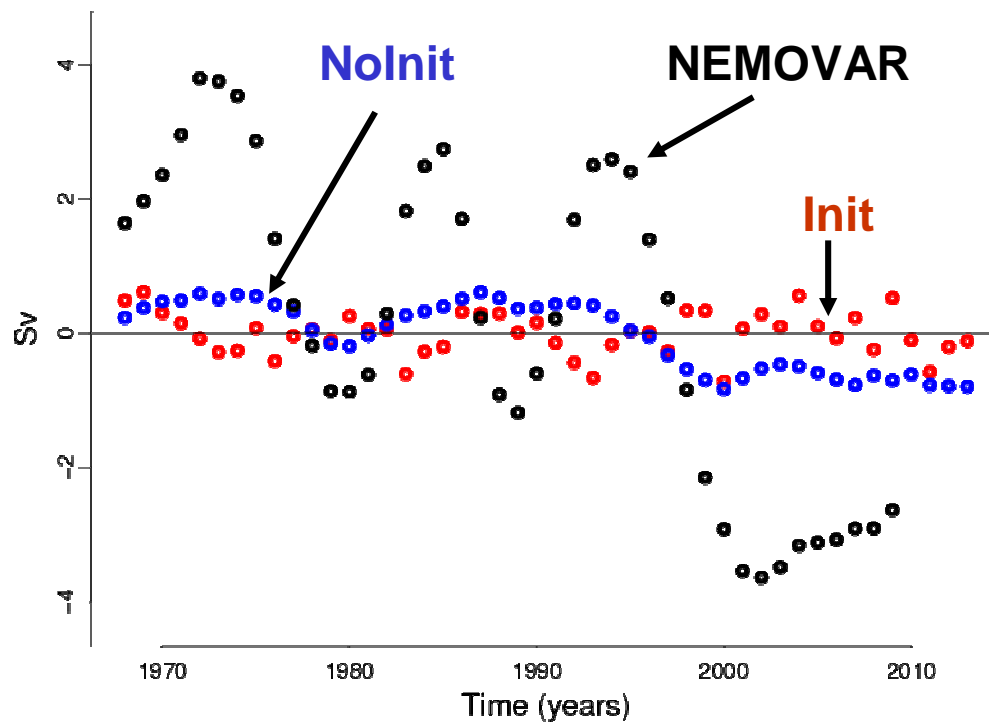


➡ Persistence / slight damping of the initial anomaly

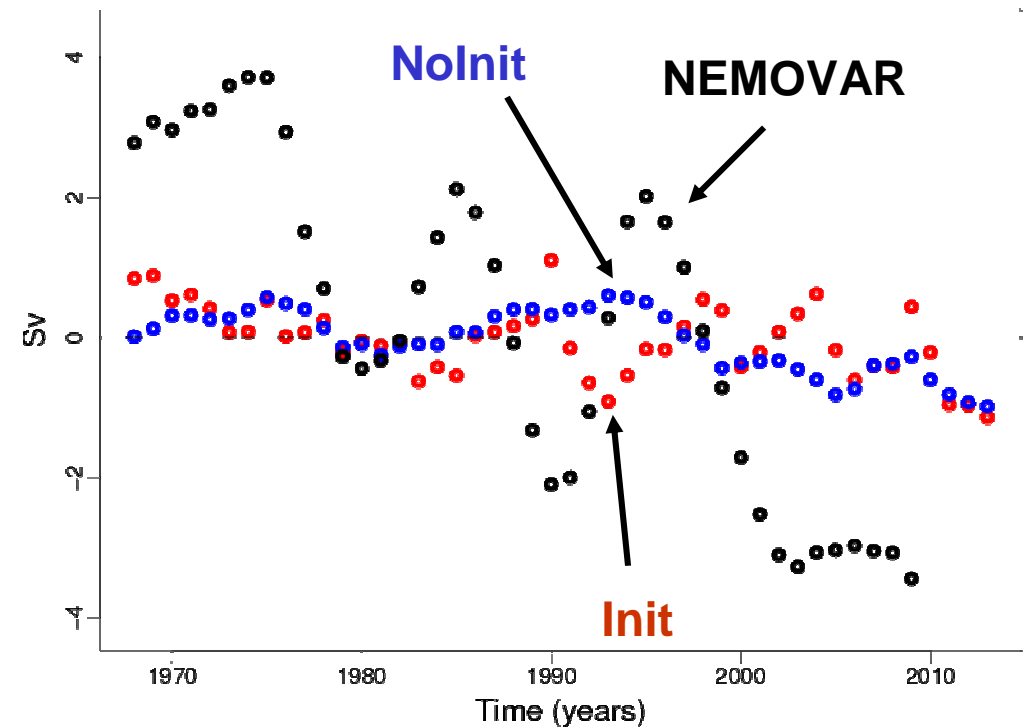
Atlantic Meridional Overturning Circulation

Anomalies : Forecast times 6-9 years

AMOC 30N-40N 1-2km



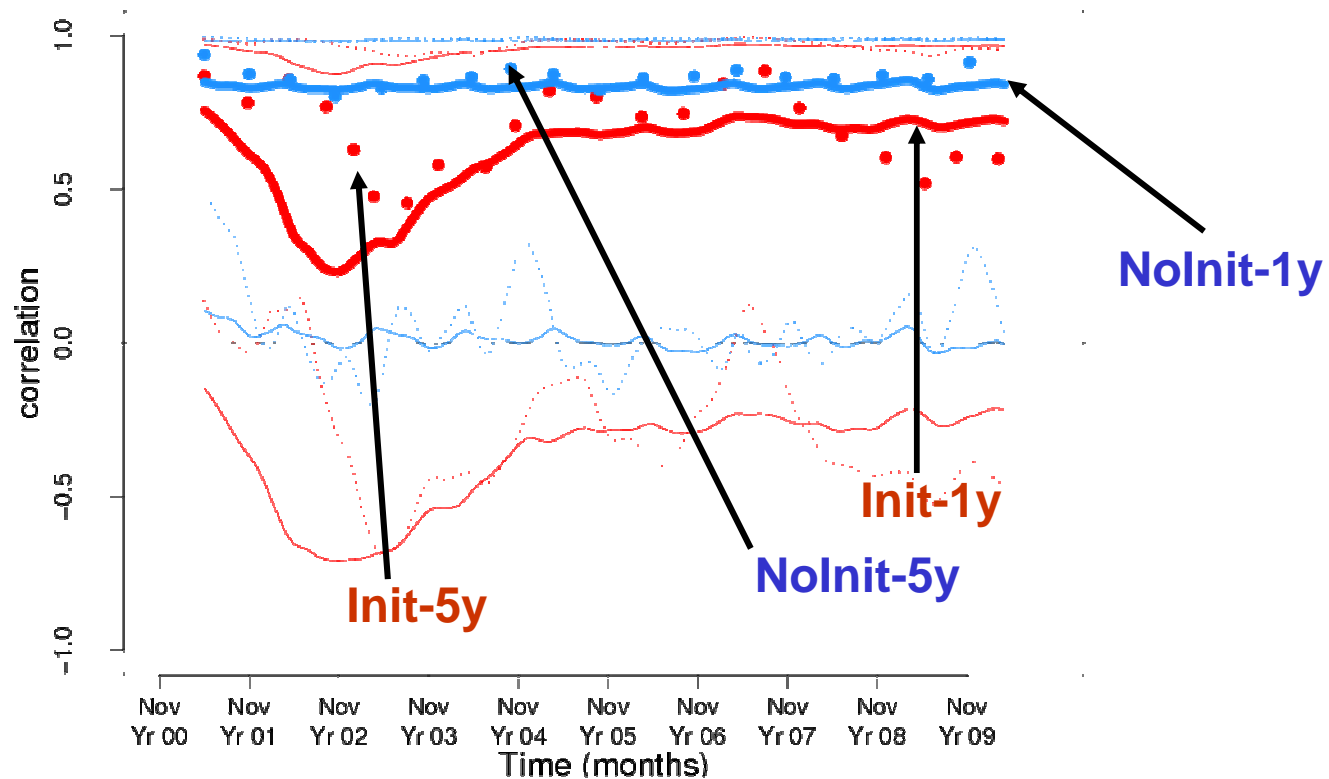
AMOC 40N-55N 1-2km



➡ Very bad performances for both Init and Nolnit after a few years

Arctic sea ice area

ACC Arctic sea ice area



➡ Poor skill, crucial need for improved initial sea ice conditions

Conclusions

- Initial warm bias – Austral ocean warm bias already during 1st year – Pronounced cold tropical bias 2-5 years
 - Better performance during the last decade – ARGO profiles
 - Benefit from initialisation detected with yearly hindcasts on
 - 1) Global SST up to 2nd year
 - 2) AMOC up to 3rd year
 - 3) Ocean heat content during the first 3 years (not shown)
- => correspond to the timescales of the drift
- Little benefits from initialization on SST maps after the 1st year
 - Particularly poor results in the Arctic : crucial need for improved sea ice initial conditions

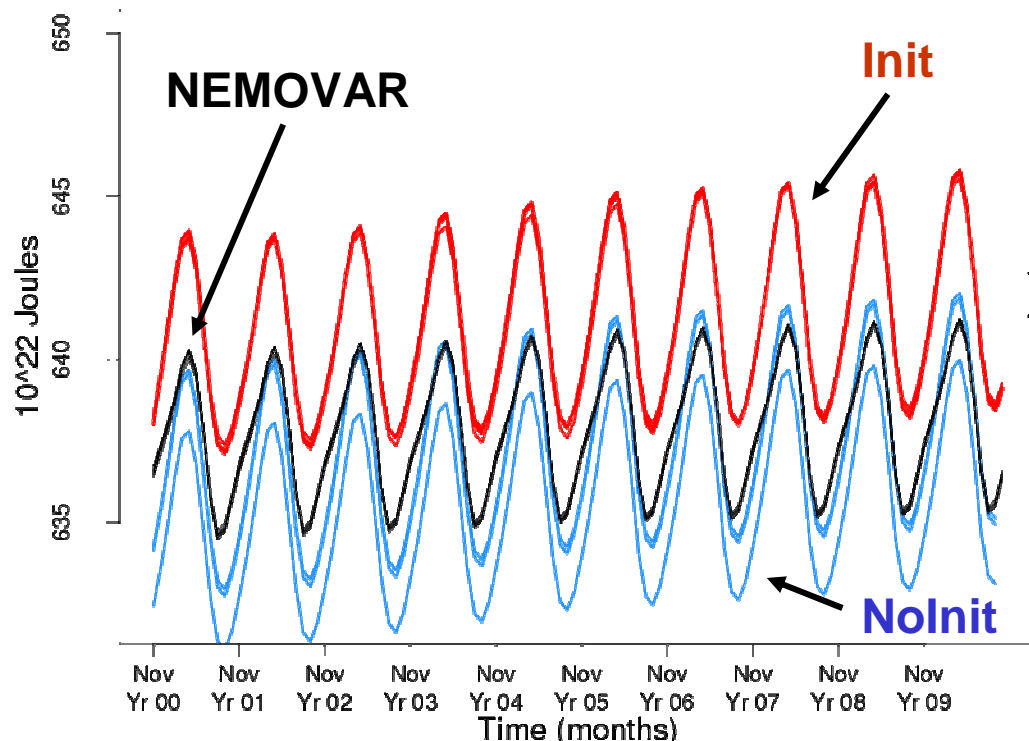
Thank you very much for your attention

vguemas@ic3.cat

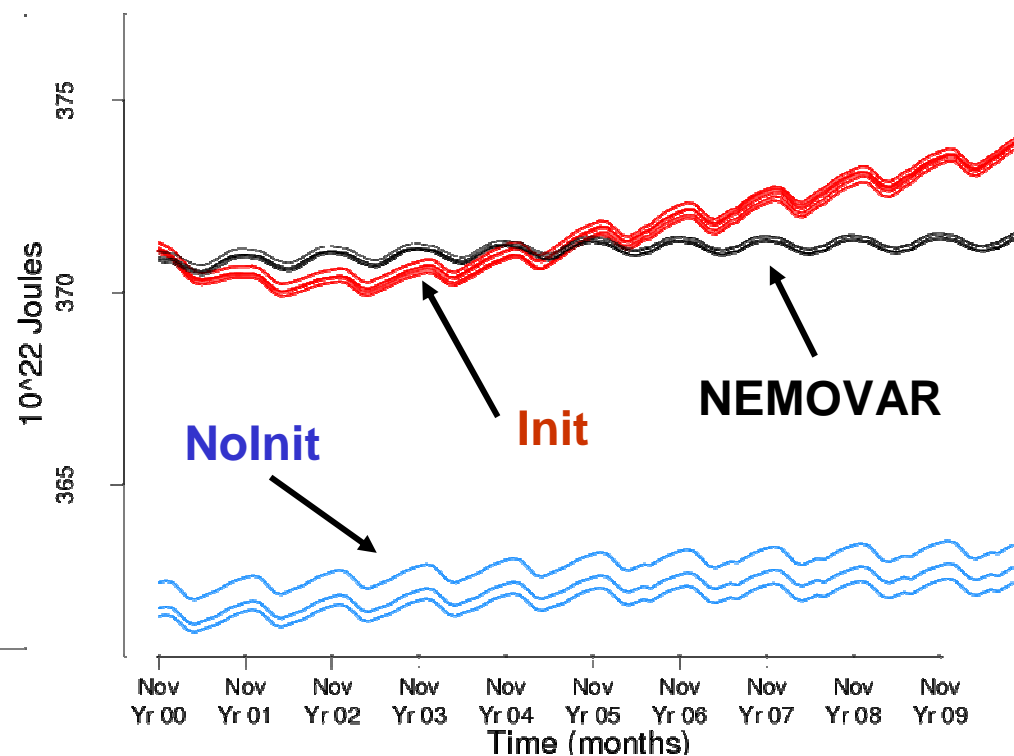
Global ocean heat content

Climatology

global OHC 0-350m



global OHC 350-800m

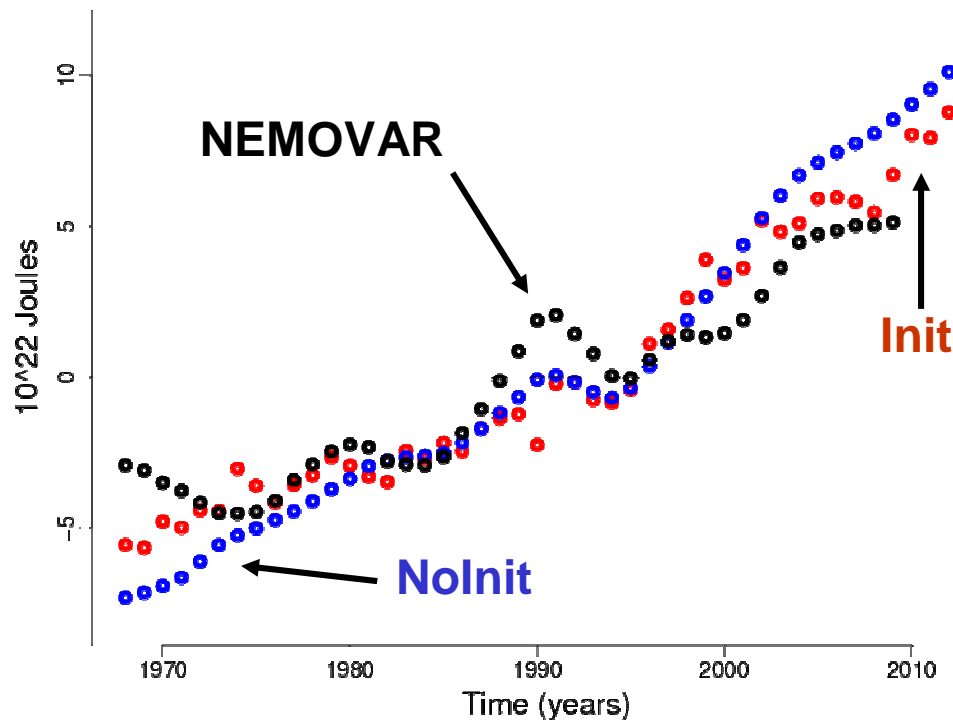


➡ Init global ocean heat content far from equilibrium

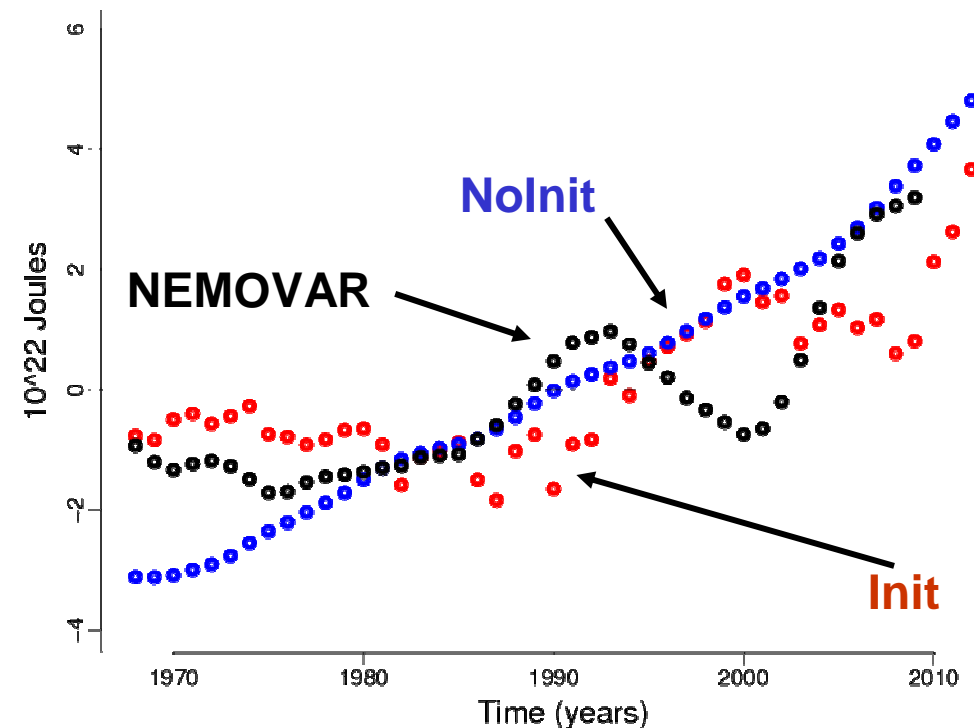
Global ocean heat content

Anomalies : Forecast times 6-9 years

global OHC 0-350m

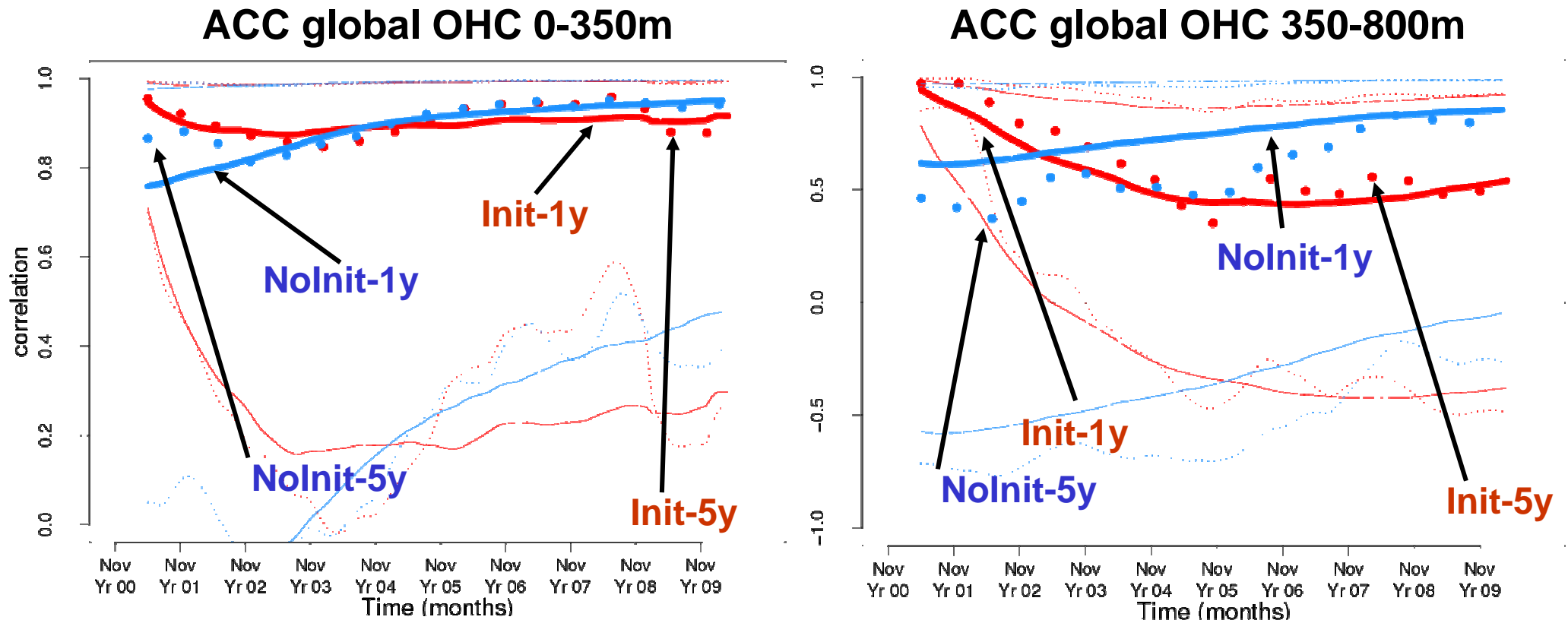


global OHC 350-800m



Significant skill in heat content all along the hindcast in the top layer, during the first three years in the 350-800m layer

Global ocean heat content



Significant skill in heat content all along the hindcast in the top layer, during the first three years in the 350-800m layer