Atlantic Multi-decadal variability

National Centre for Atmospheric Science
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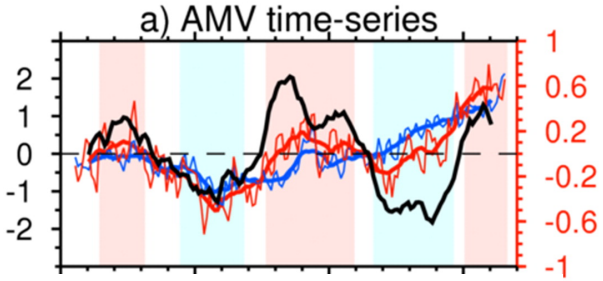

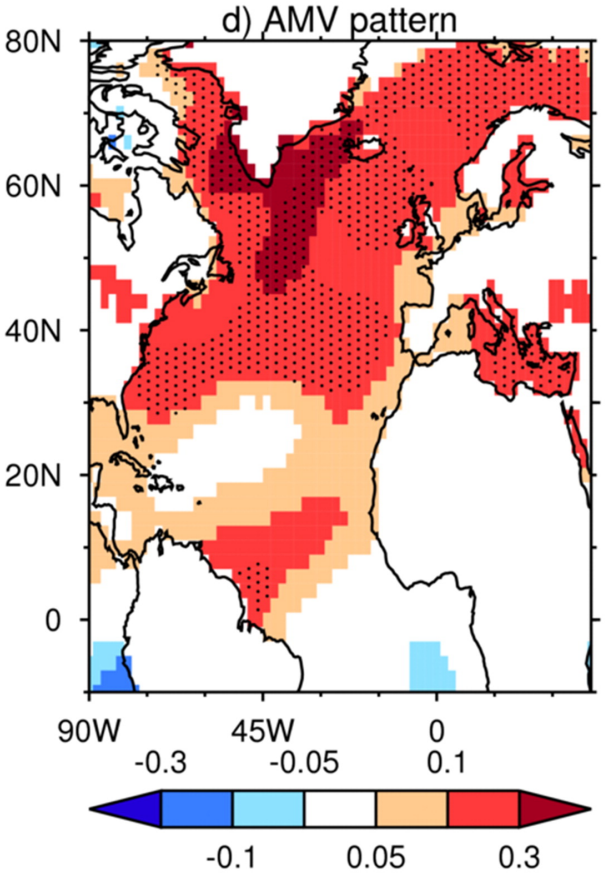

Sutton et al, 2018

Atlantic Multi-decadal variability

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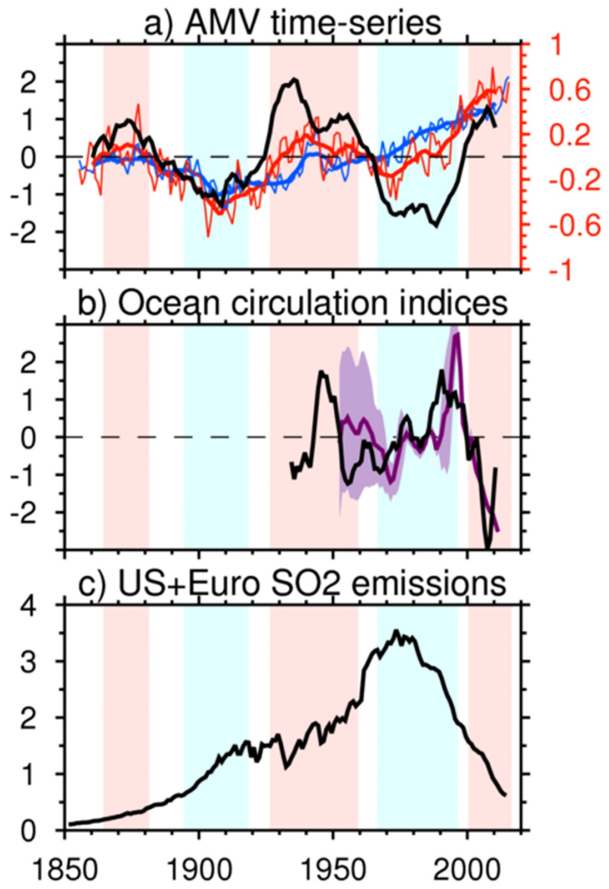

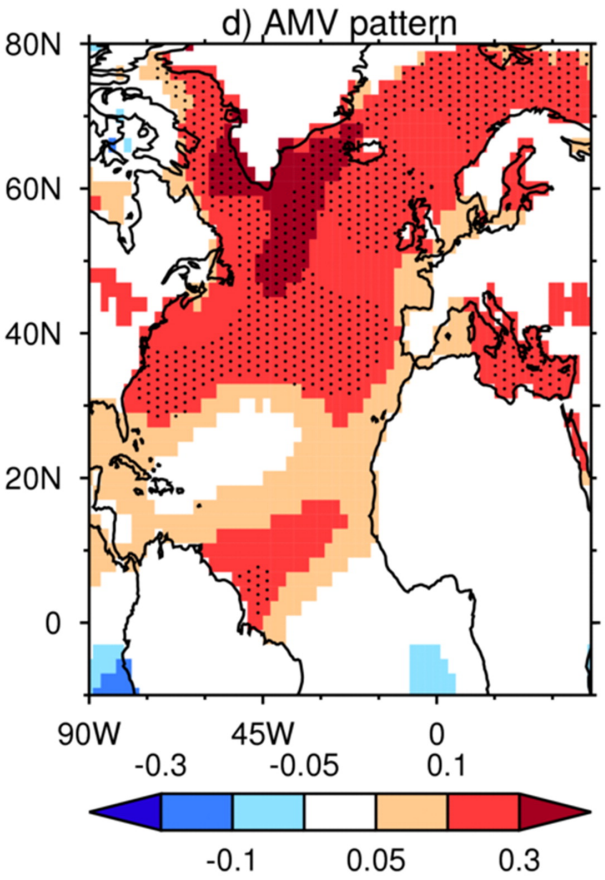

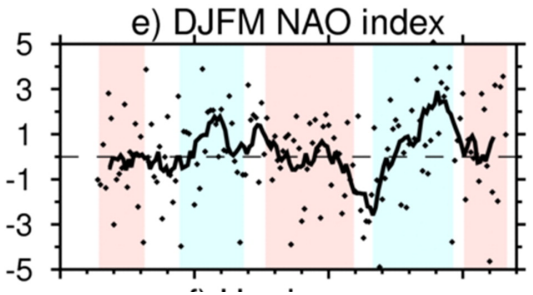

Sutton et al, 2018

Atlantic Multi-decadal variability

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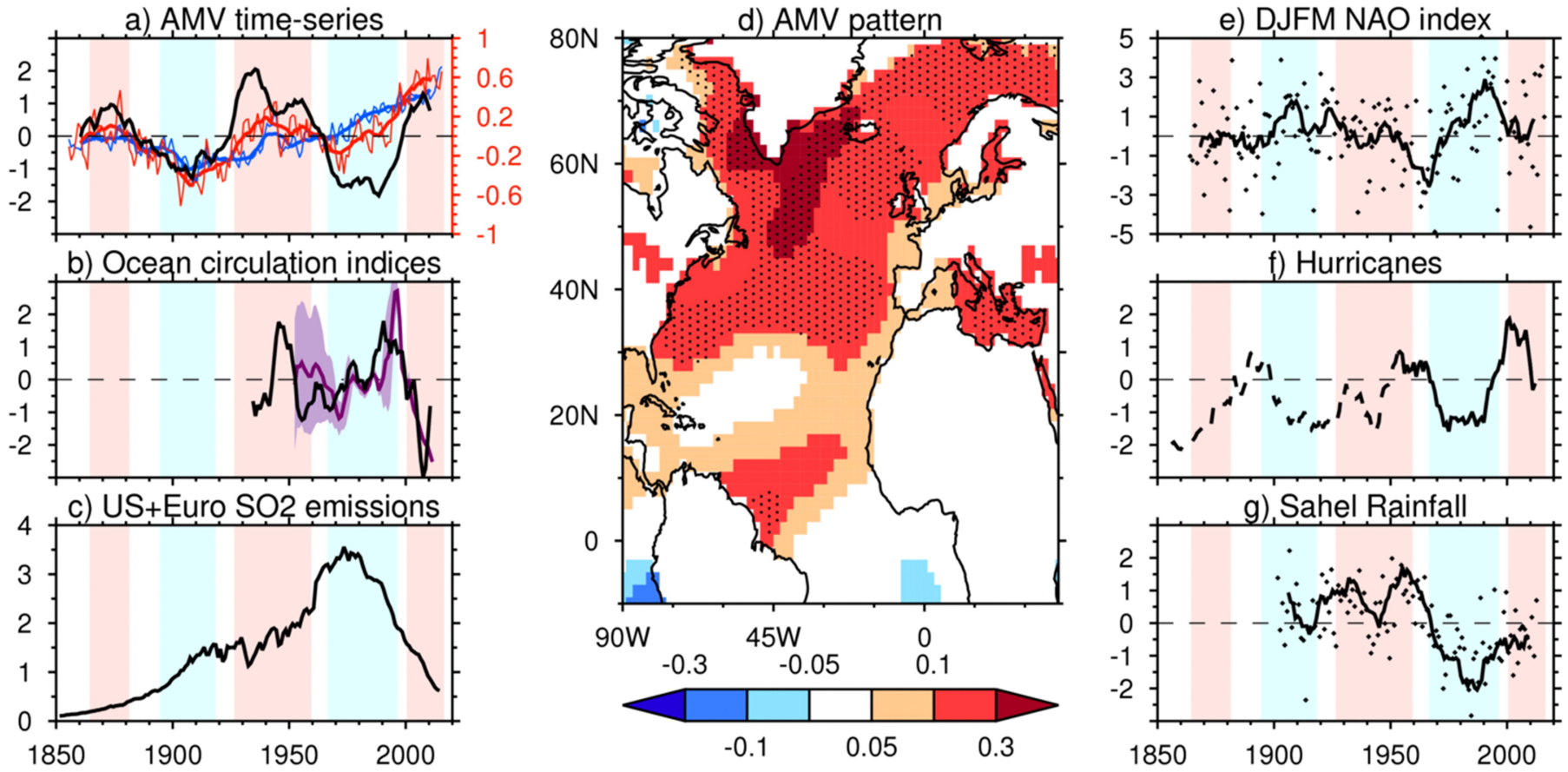

Sutton et al, 2018

AMV is rather complex

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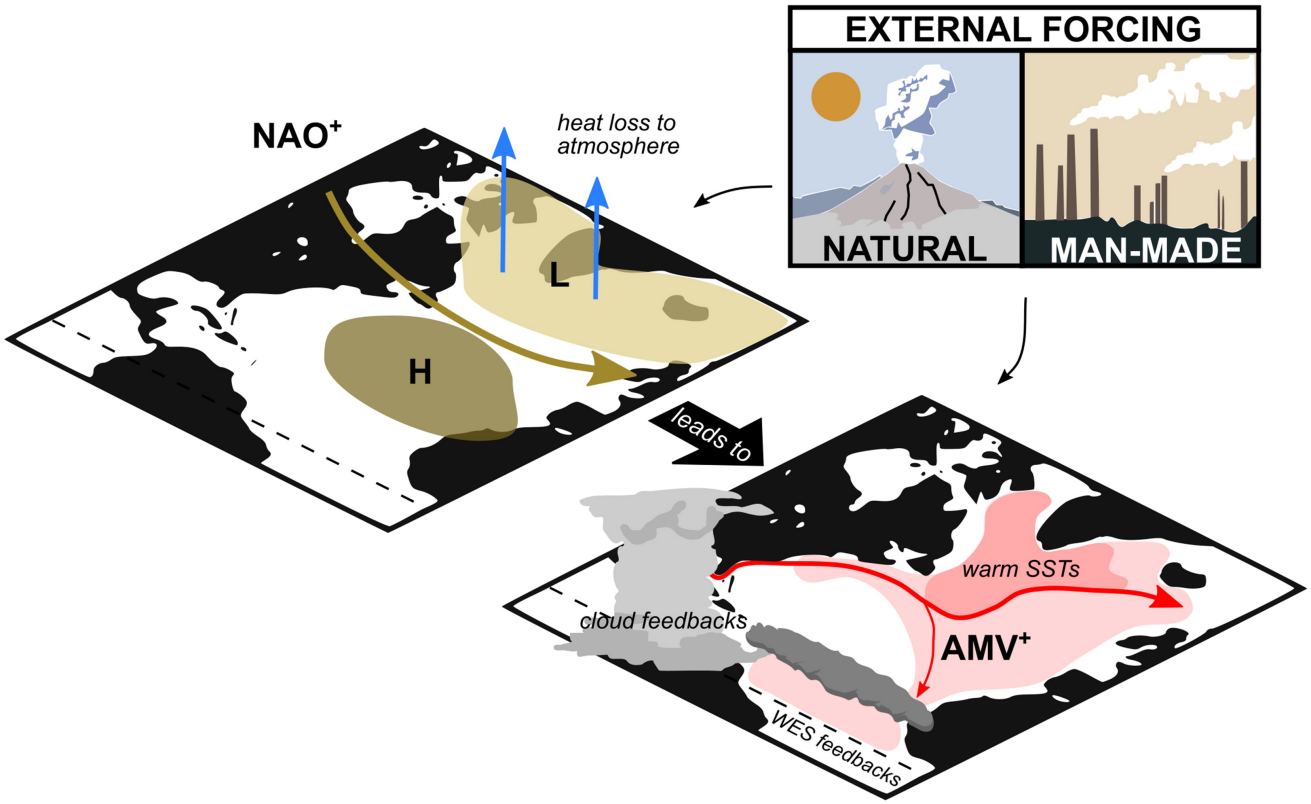

Sutton et al, 2018

Subpolar North Atlantic

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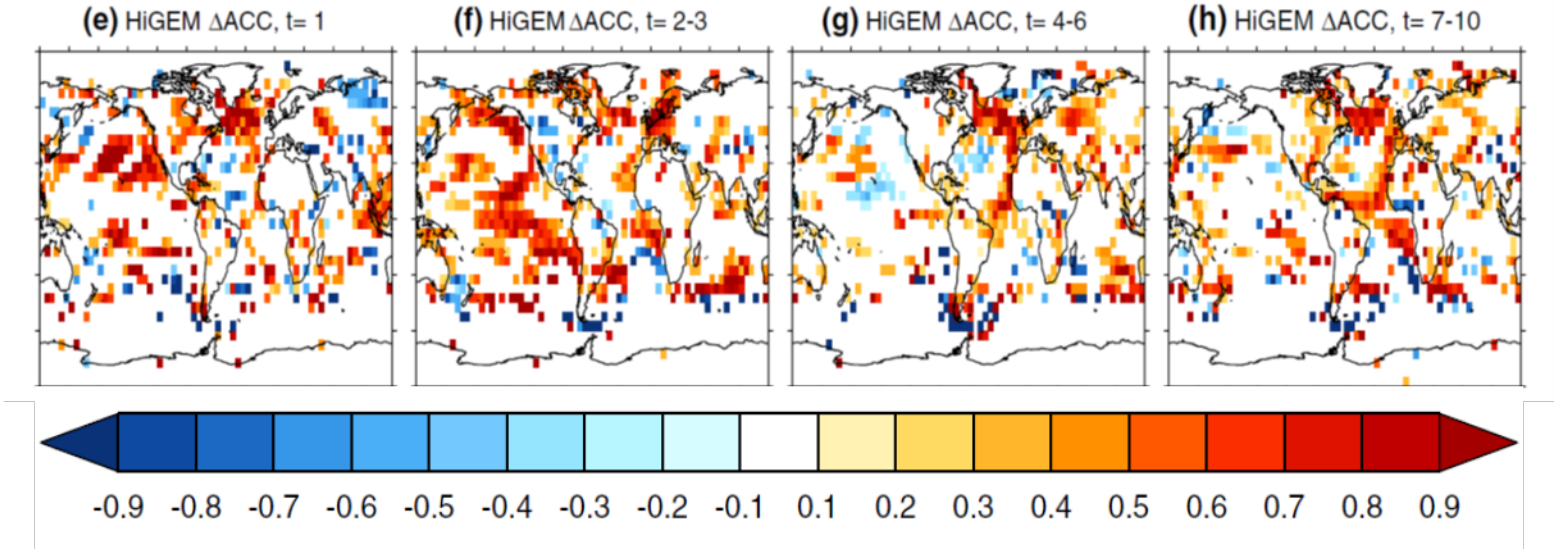
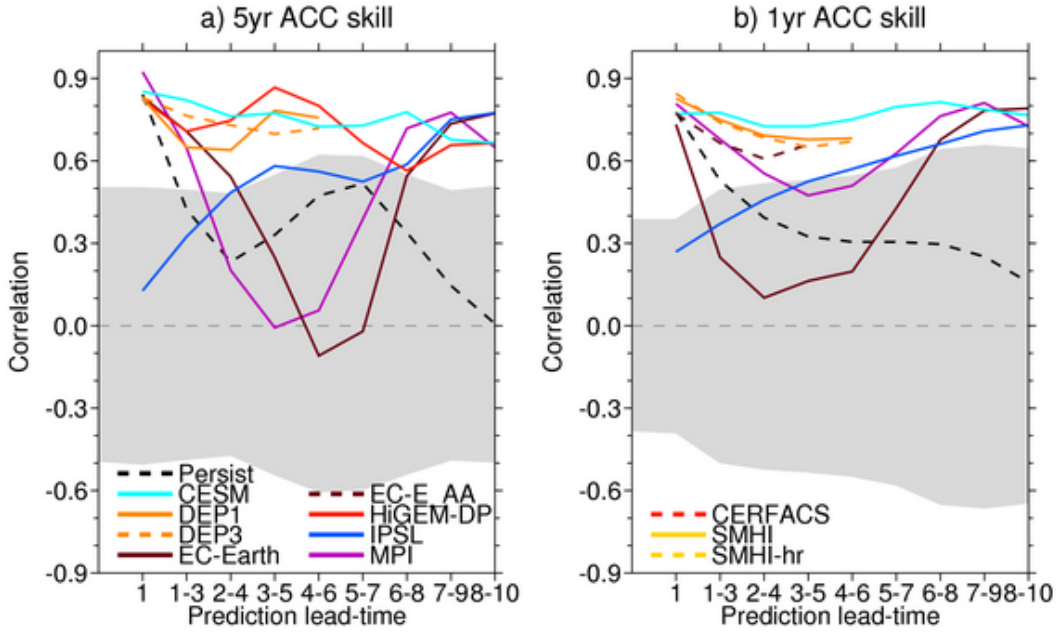


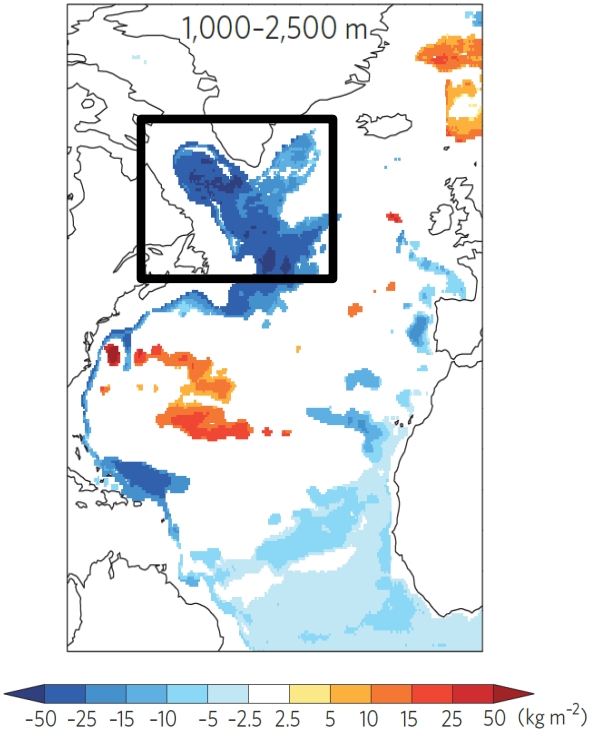
Shaffrey et al, 2017

Considerable improvement in the North Atlantic predictions – particularly the subpolar North Atlantic

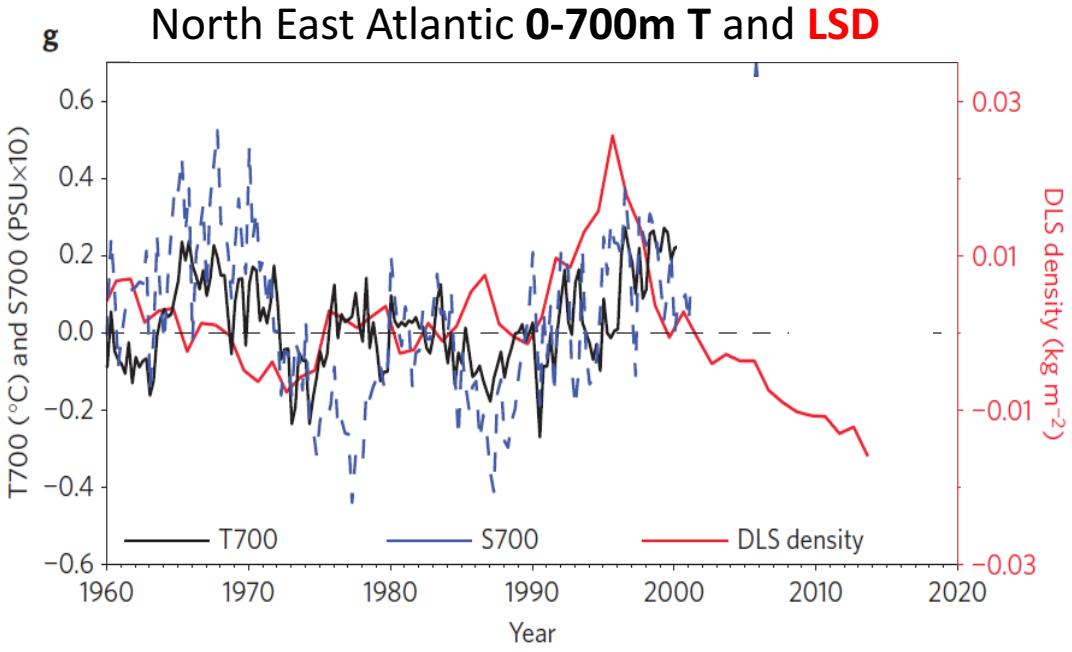
Improvement in SST consistent with improvement in upper ocean heat content



Observations: Labrador Sea Density (LSD) and SPG



Robson et al, 2014



Robson et al, 2016

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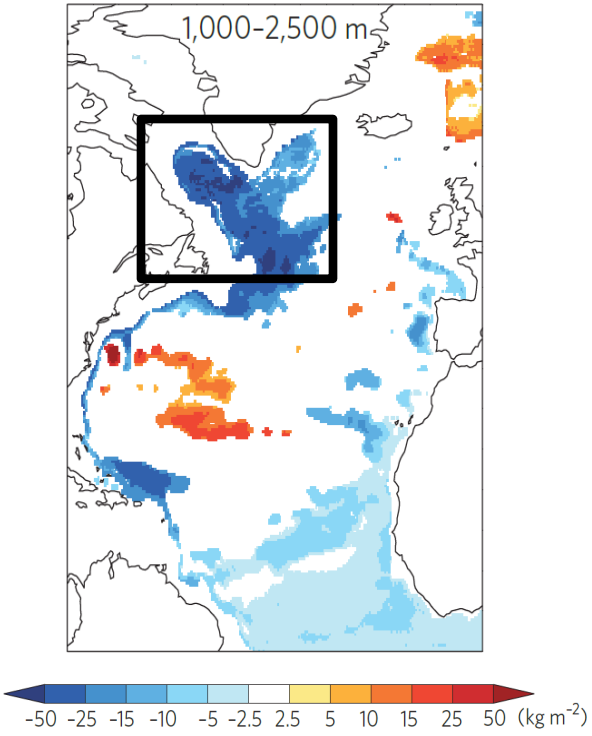
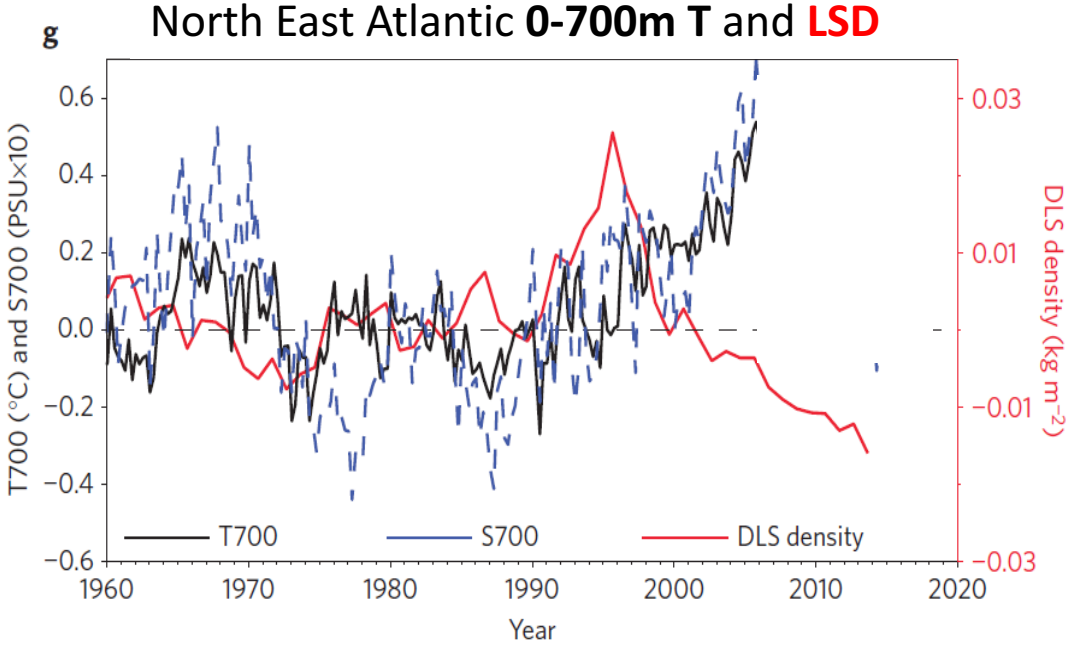
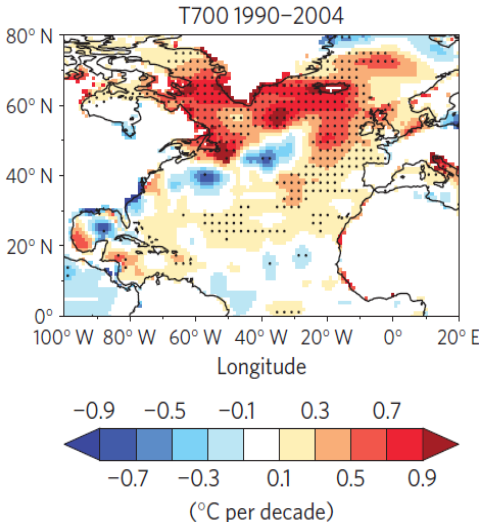


Robson et al, 2014

North East Atlantic **0-700m T** and **LSD**





Robson et al, 2016

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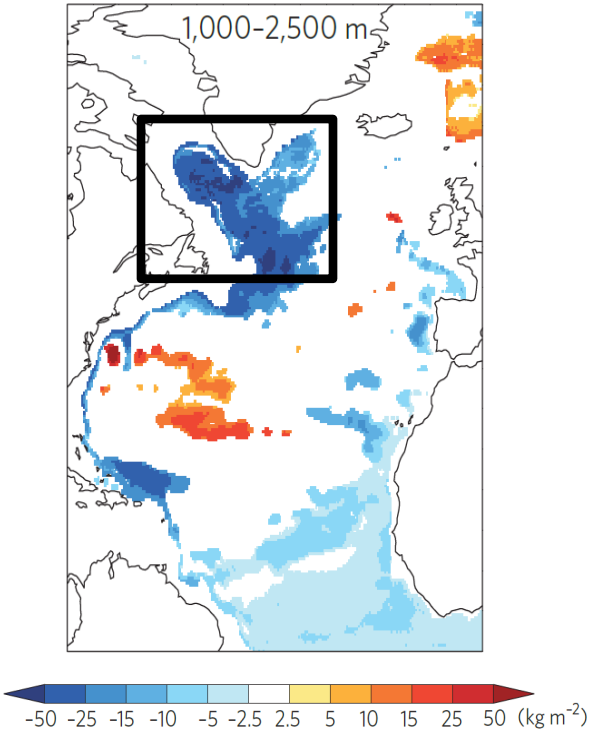
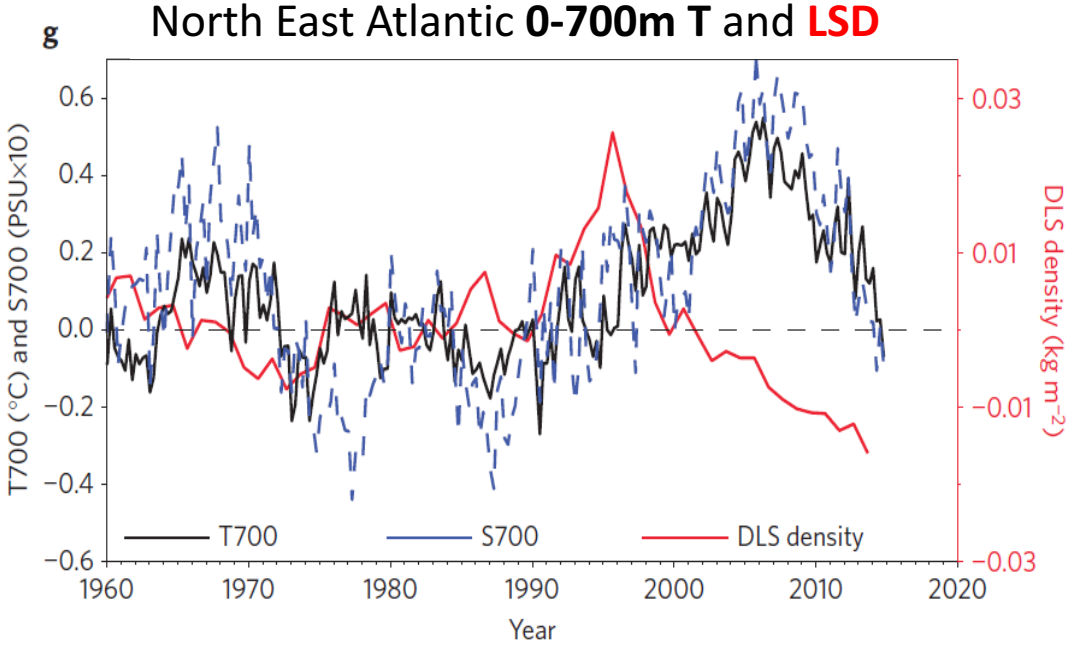
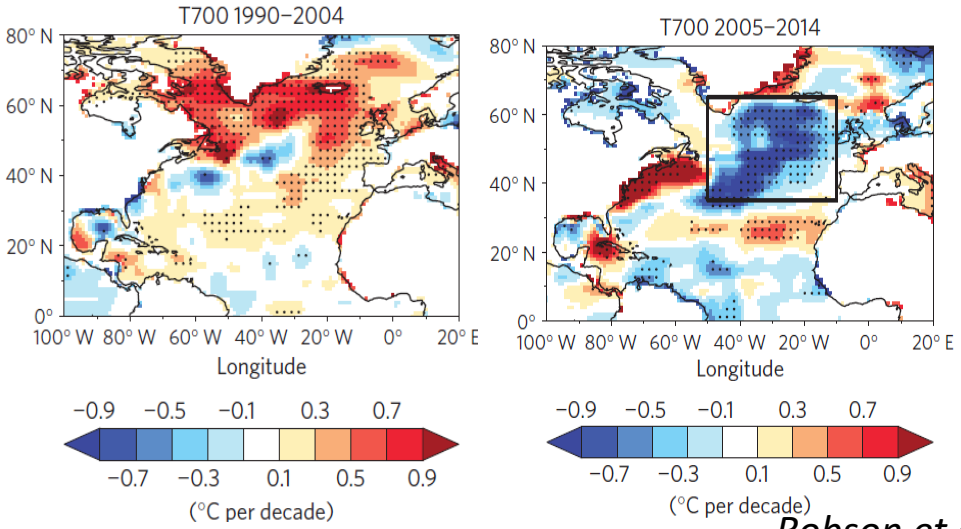


Robson et al, 2014





Robson et al, 2016

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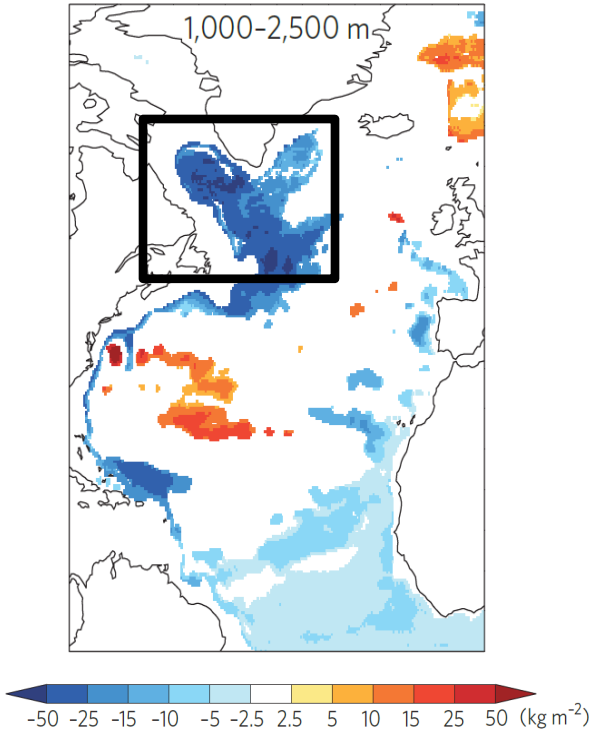
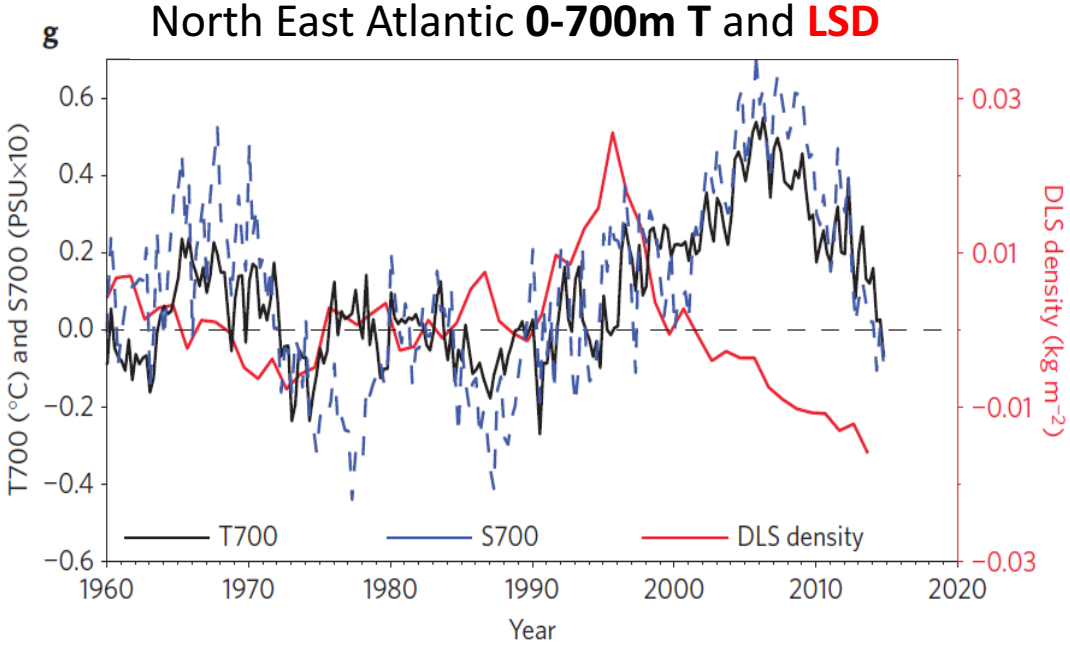
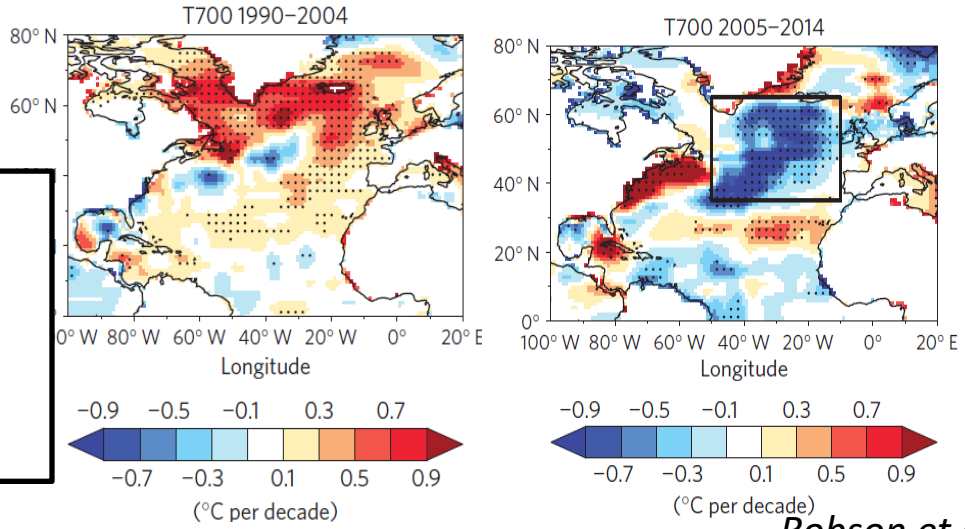


Robson et al, 2014





Consistent with:

-AMOC-related variability

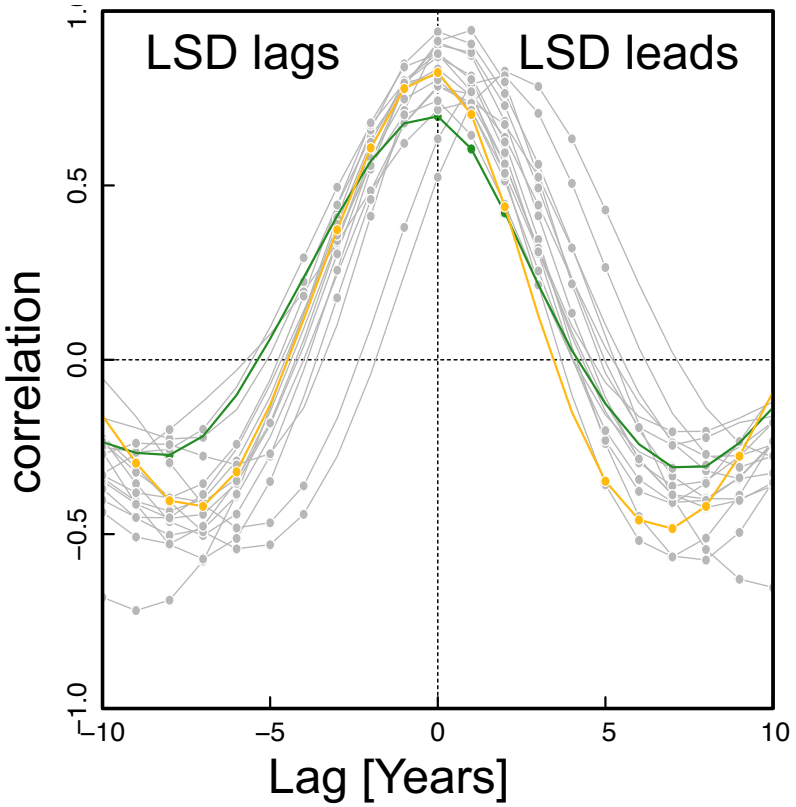
- lagged response of the ocean to the NAO

Robson et al, 2016

But how consistent is this mechanism across models?

National Centre for Atmospheric Science
NATURAL ENVIRONMENT RESEARCH COUNCIL

Crosscorrelations LSD vs AMOC@45N



All coupled (and ocean-only) models show a strong in-phase link between LSD and the AMOC at 45N (and subpolar gyre)

Ortega et al, in prep

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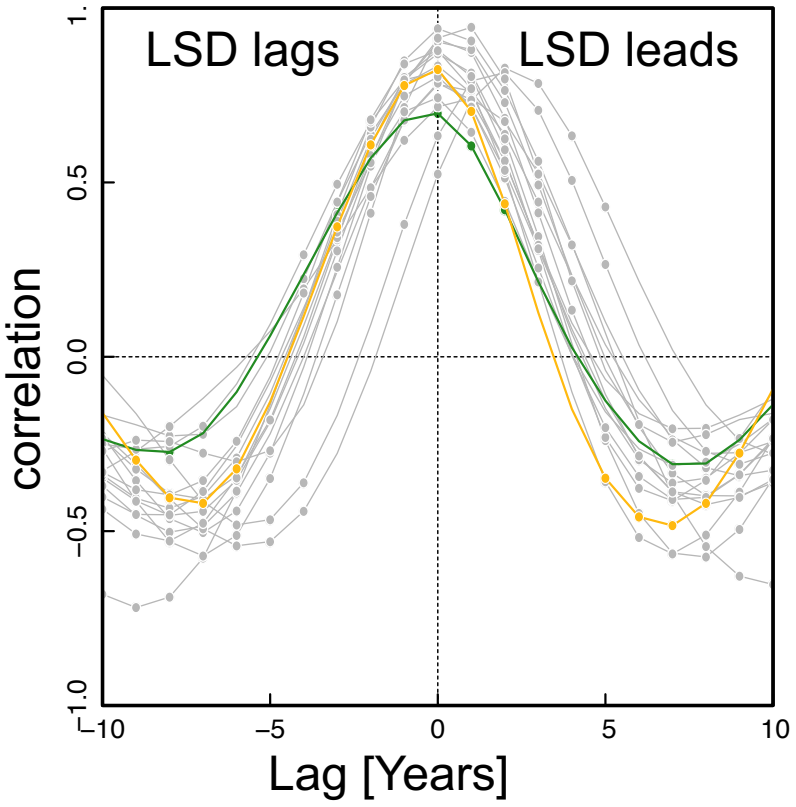
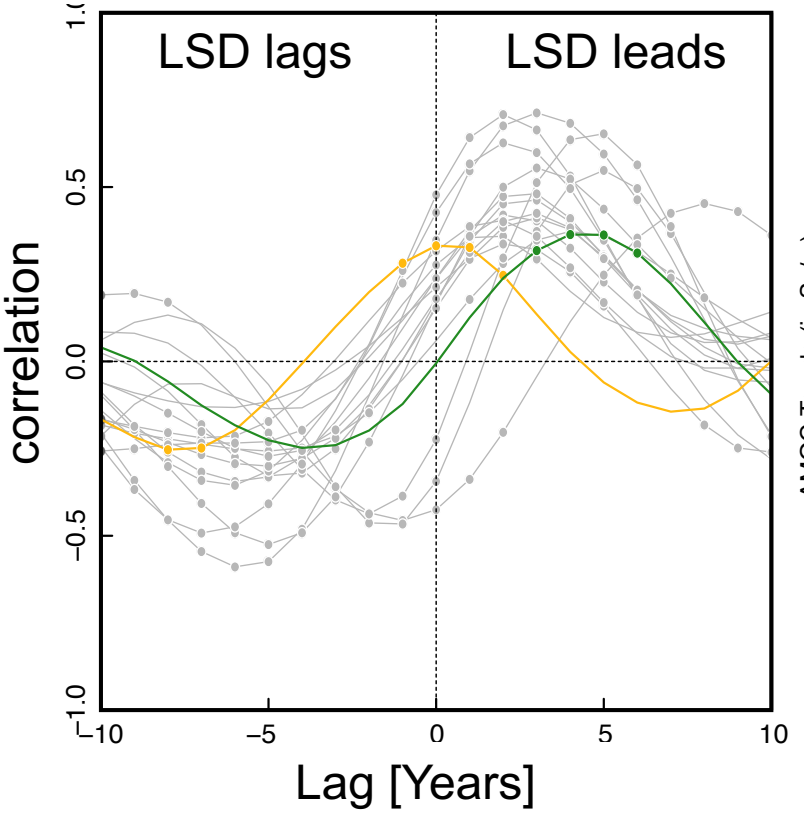


Crosscorrelations LSD vs AMOC@26N



All coupled (and ocean-only) models show a strong in-phase link between LSD and the AMOC at 45N (and subpolar gyre)

Link is more uncertain at 26N

Ortega et al, in prep

LSD and the wider North Atlantic

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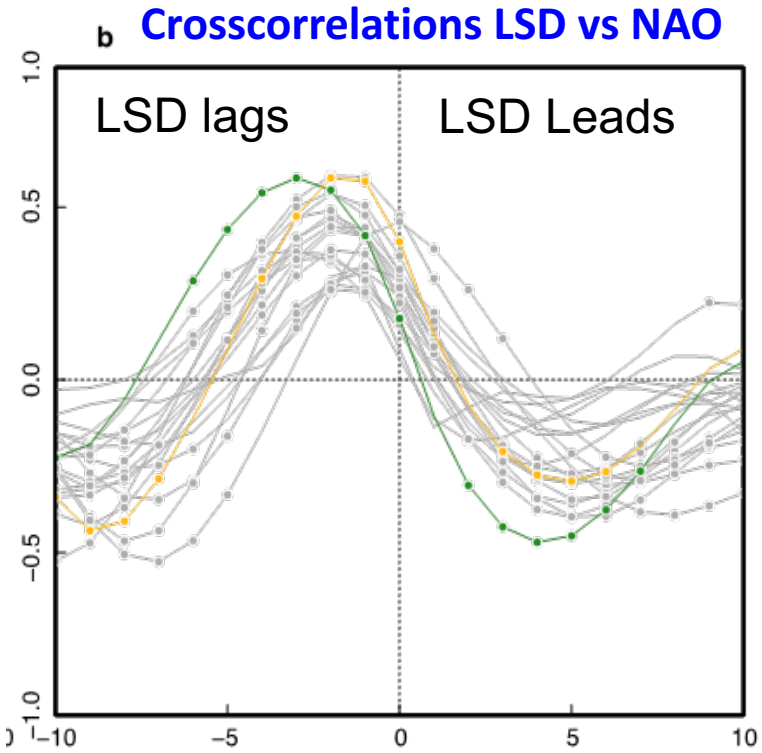
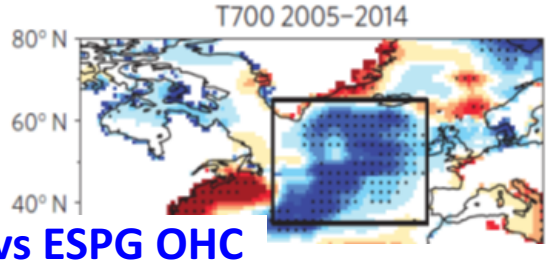


NAO leads LSD in models (and hence AMOC)

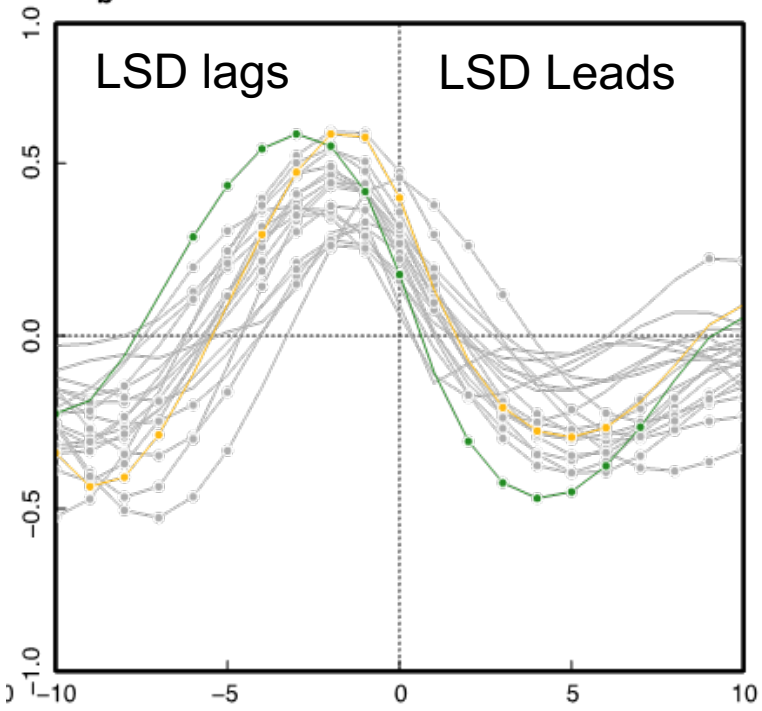
LSD leads heat content change in the Eastern SPG

Ortega et al, in prep

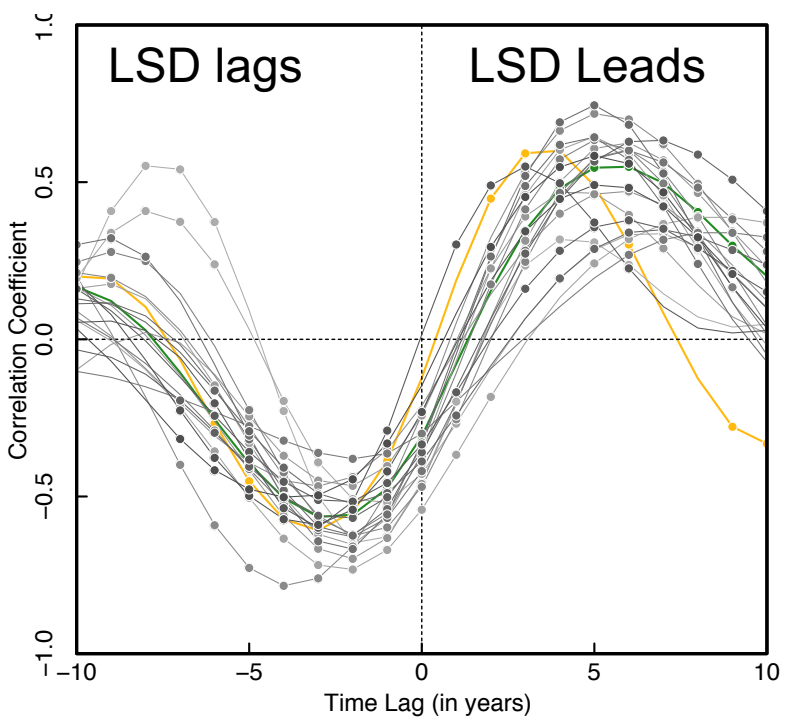
LSD and the wider North Atlantic



b **Crosscorrelations LSD vs NAO**



Crosscorrelations LSD vs ESPG OHC



NAO leads LSD in models (and hence AMOC)

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Ortega et al, in prep

Initialisation of Ocean also important for skill

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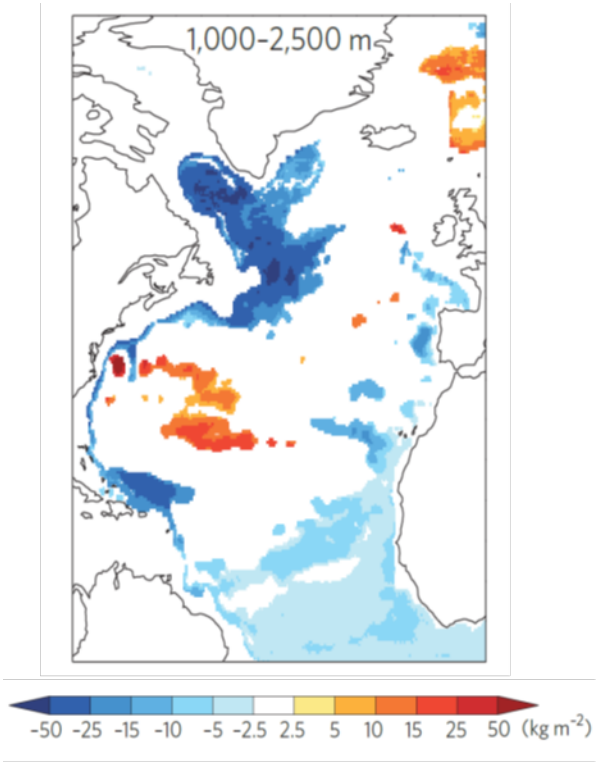
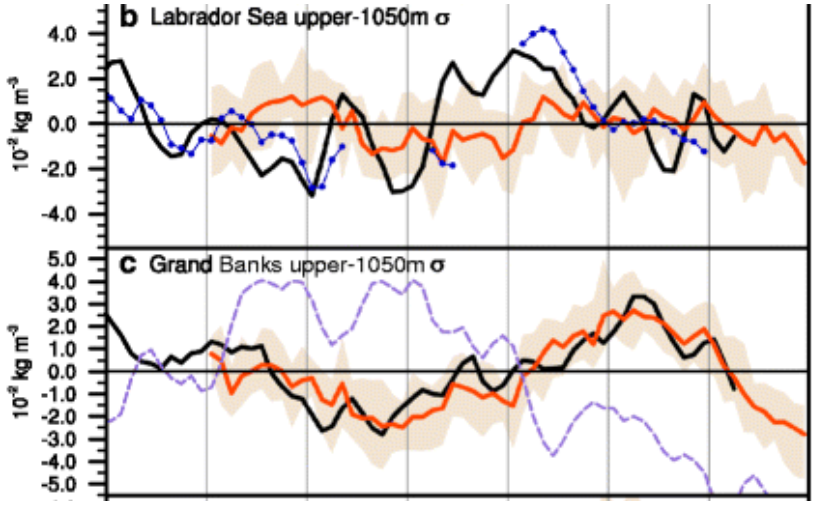


Robson et al, 2014



DP
Ocean-only

Yeager and Robson, 2017

Initialisation of Ocean important for skill

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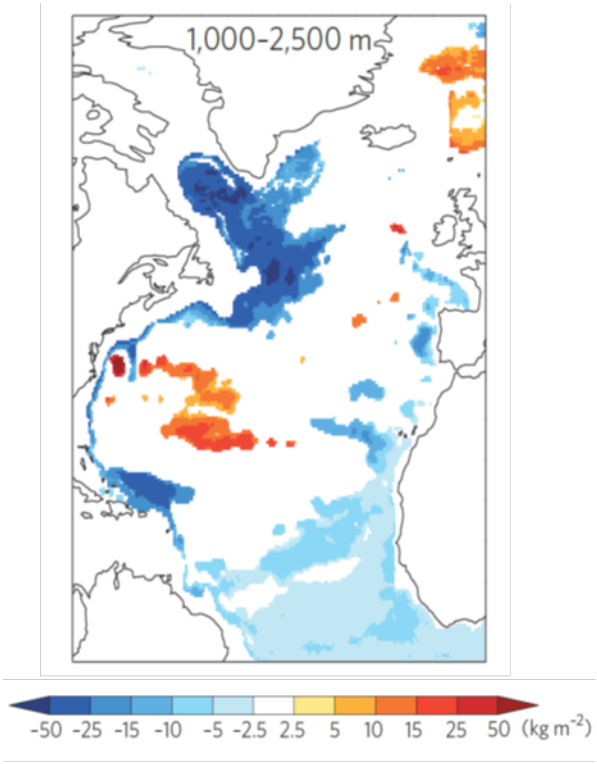
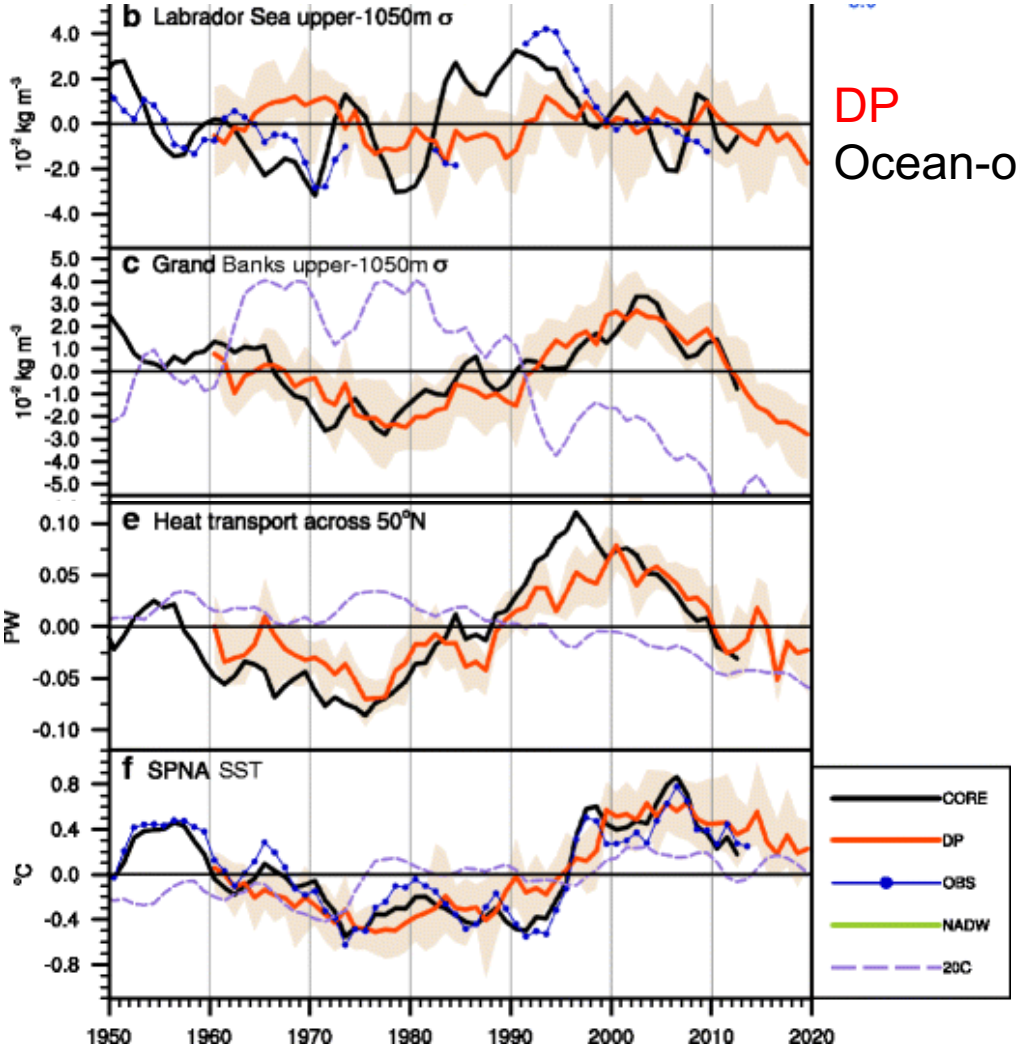


Robson et al, 2014

Improved skill is consistent with initialization of NAO related variability in the AMOC



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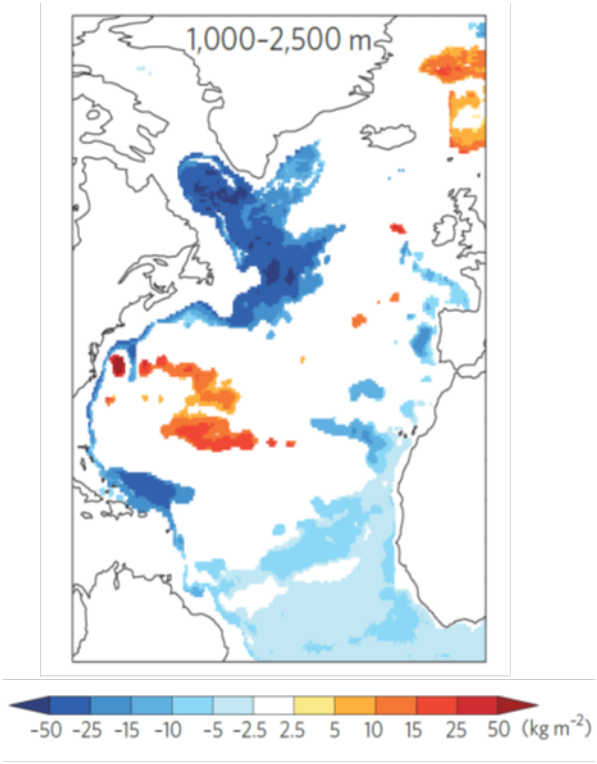
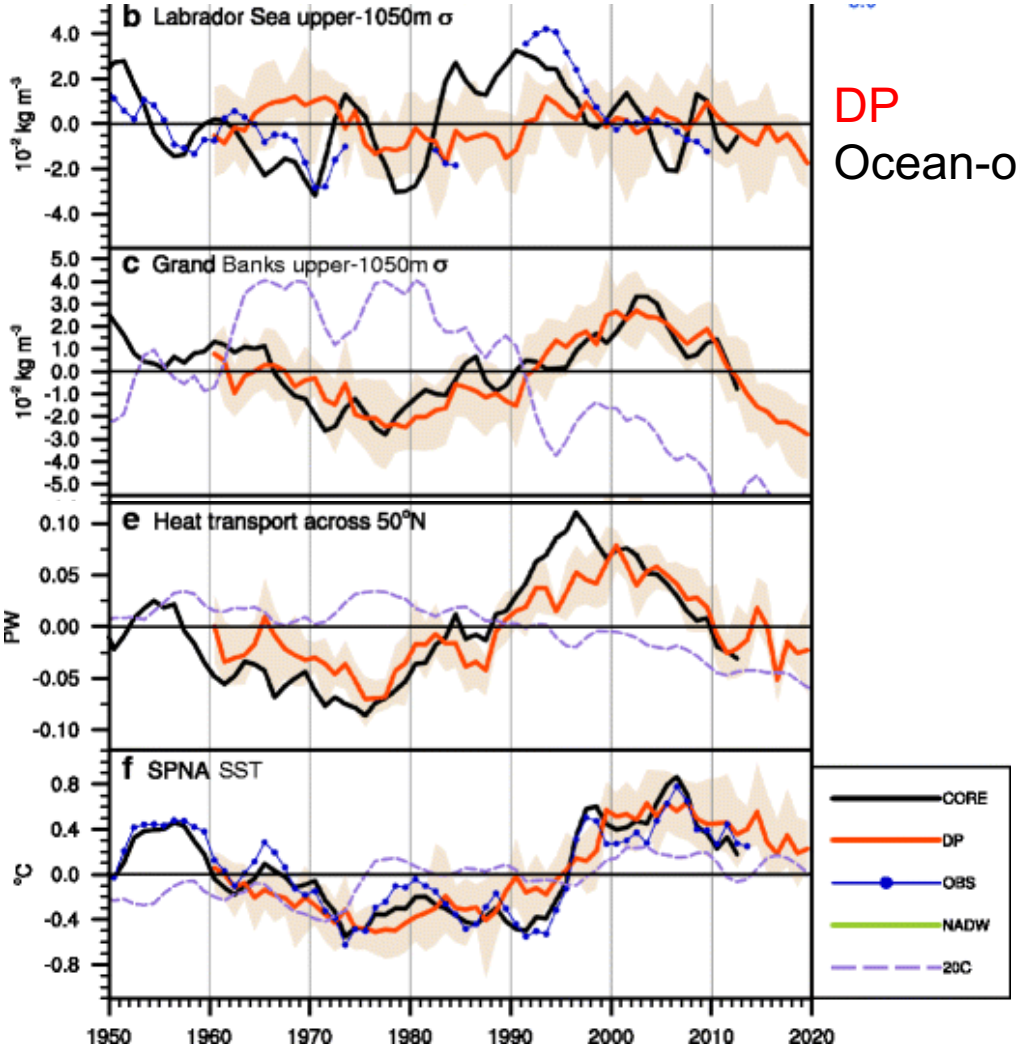


Robson et al, 2014



DP
Ocean-only

Improved skill is consistent with initialization of NAO related variability in the AMOC

at least in some models…..

Yeager and Robson, 2017

Significant skill related to North Atlantic

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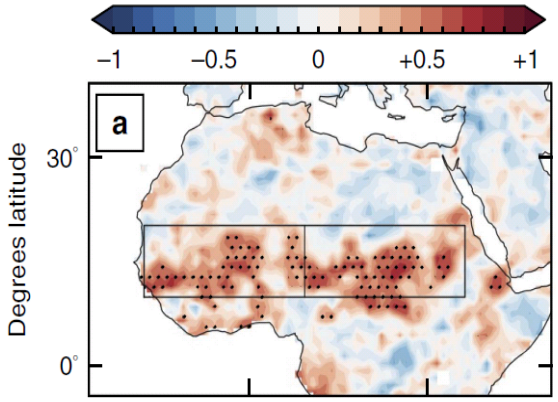
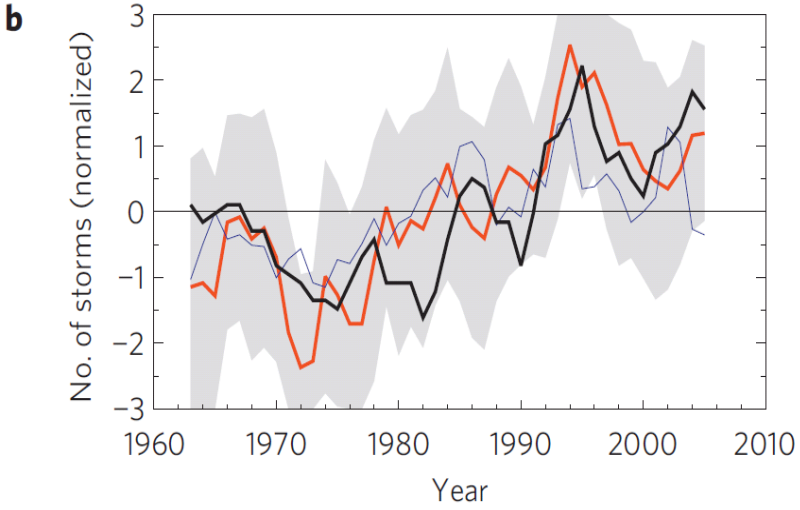
Skill in Sahel rainfall



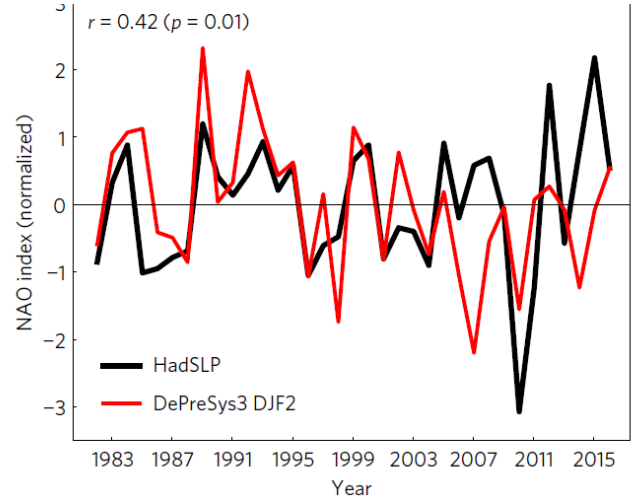
Sheen et al, 2017

Hurricane Frequency

Smith et al, 2010



b NAO skill



Dunstone et al, 2016

- Seasonal temperature anomalies over Europe *(Müller et al, 2012; Robson et al, 2013)*
- Walker-circulation shifts, and pacific temperatures *(Chikamoto et al, 2015)*
- Arctic sea ice trends *(Yeager et al, 2015)*

Improved predictions of East Asia

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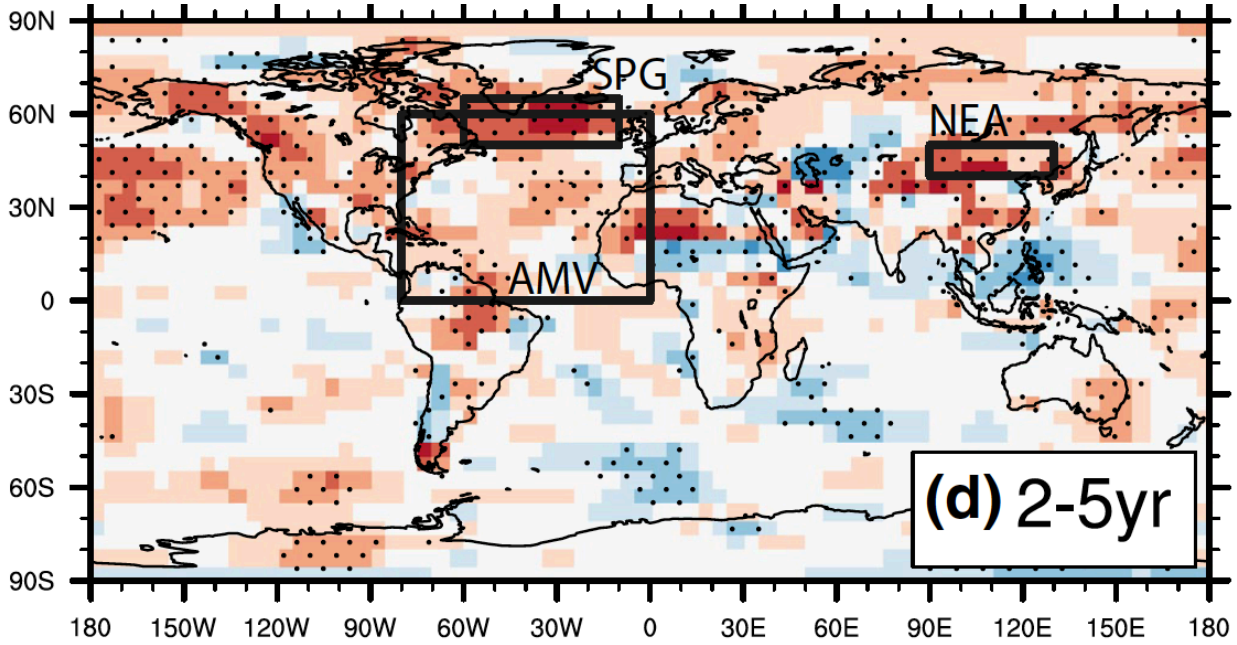
ACC skill score for SAT in summer (JJAS) at a lead time of 2-5 years.



Monerie et al. 2018, Climate Dynamics