# Decadal variability of the Atlantic Niño

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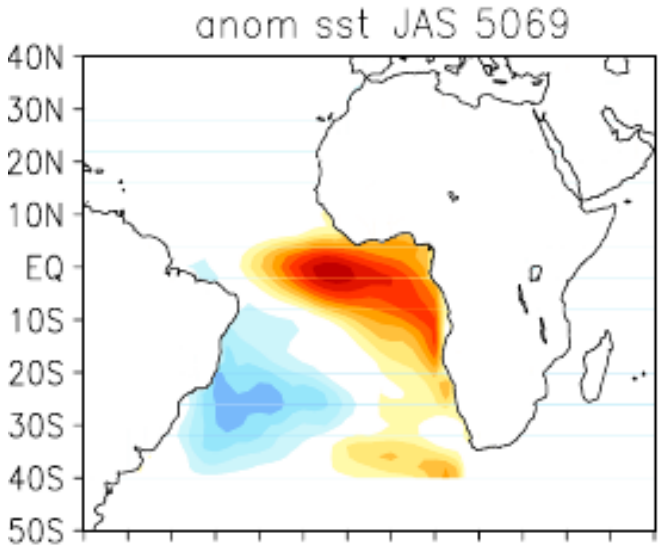
**Fred Kucharski, Noel Keenlyside*,….**

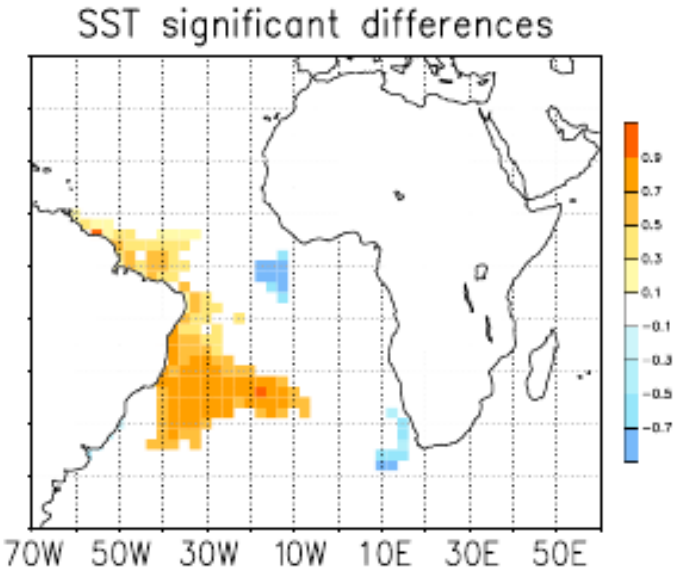
# Outline

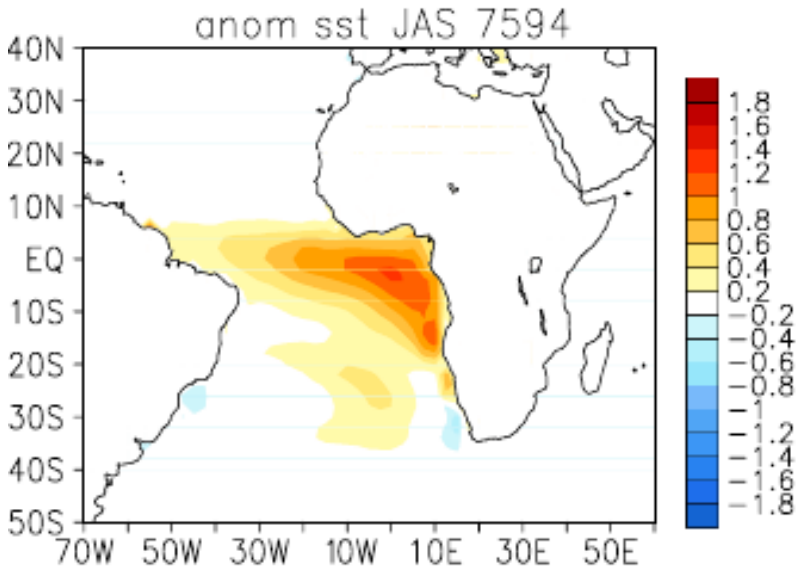
- Background and motivation
- Observations: interannual versus decadal variability
- Modelling results
- Discussions

# Differences between pre- and post-1970s

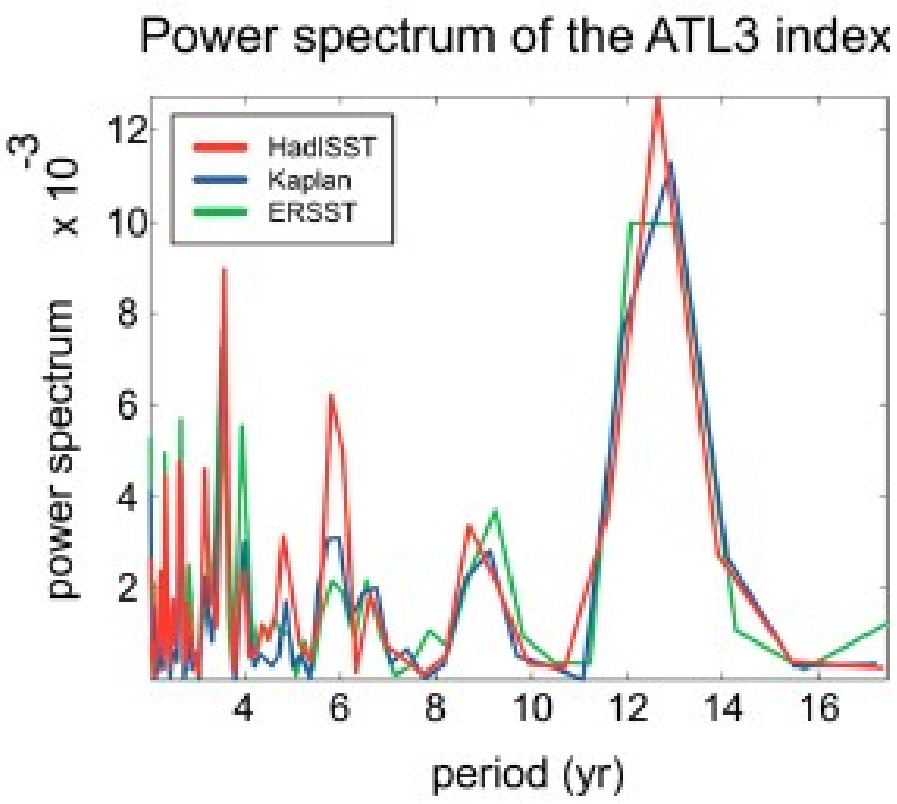
**Losada and Rodríguez-Fonseca, 2015.**



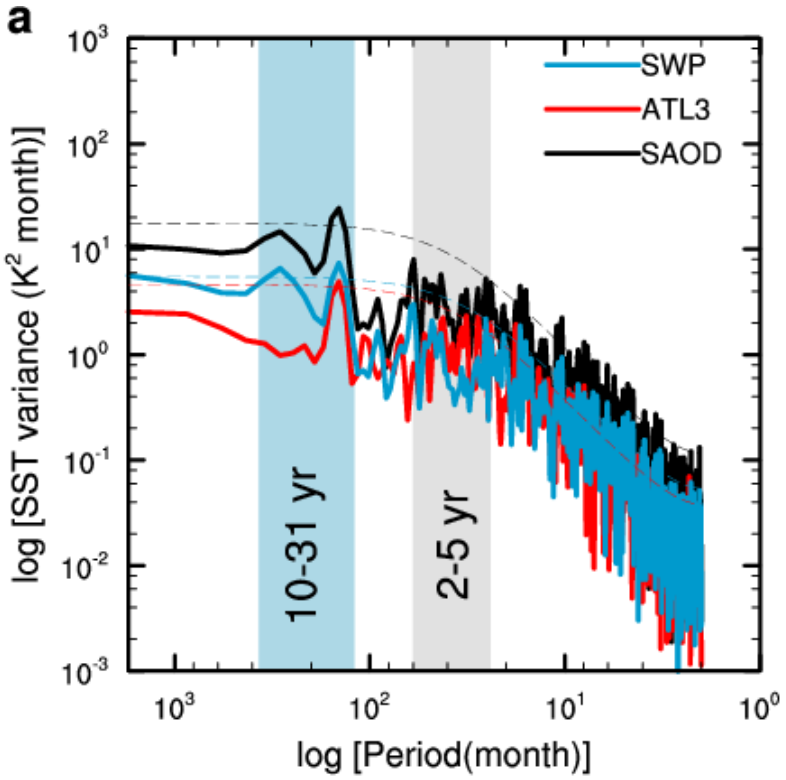



## Annual time series:
**Garcia-Serrano et al., 2013**




## Monthly time series:
**Nnamchi et al., 2016**




**Does Atlantic Niño have decadal variability?**

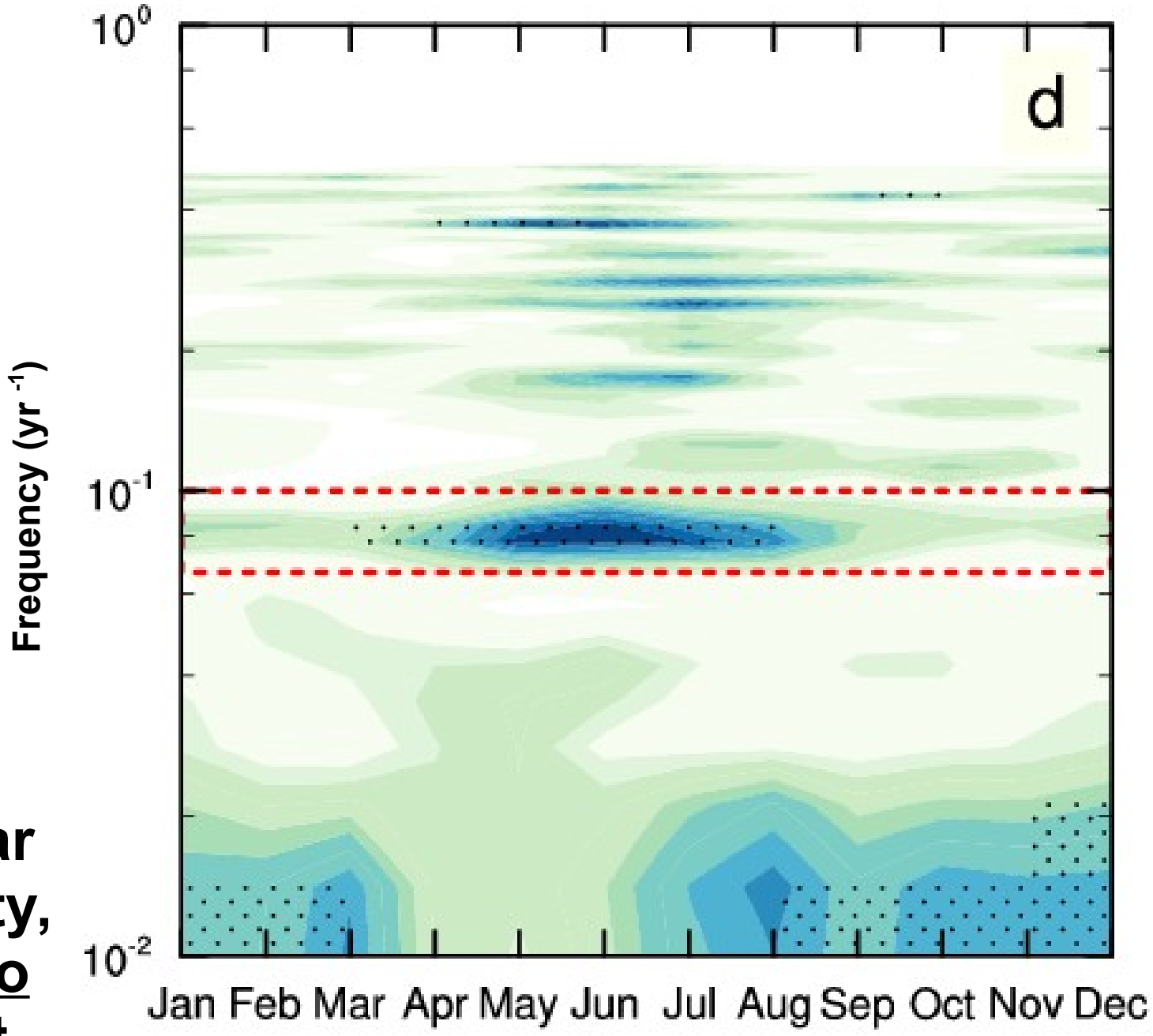
# Part 1: Observational results

## Data sets

**-SST data sets: ERSST, HadISST, KAPLAN; over 140 years.**
**-20C reanalysis: 1871-2012.**

## Data analysis

**Spectral analysis, Lanczos filter, S-EOF**




**8-15 year variability, <u>March to August</u>**

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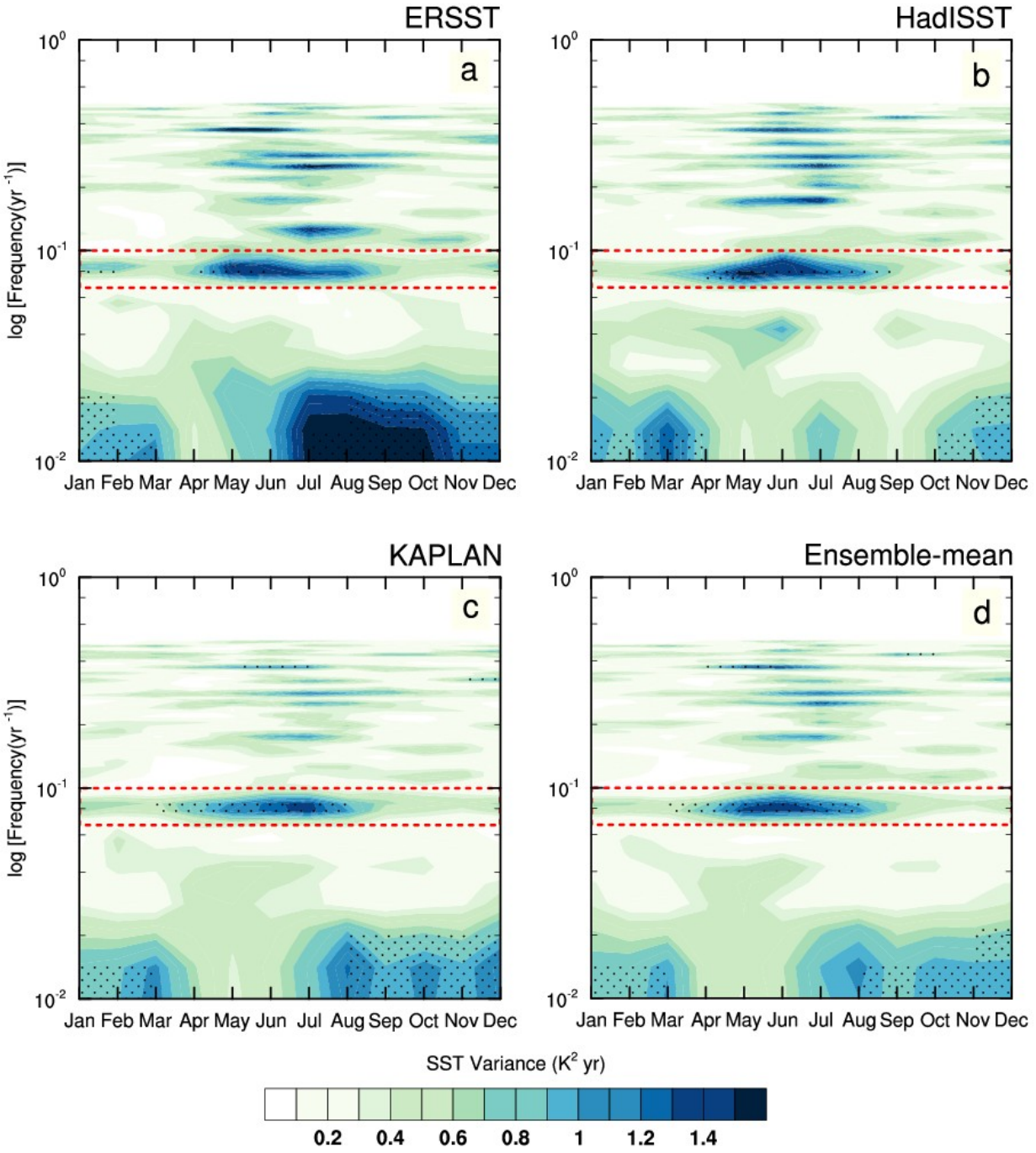
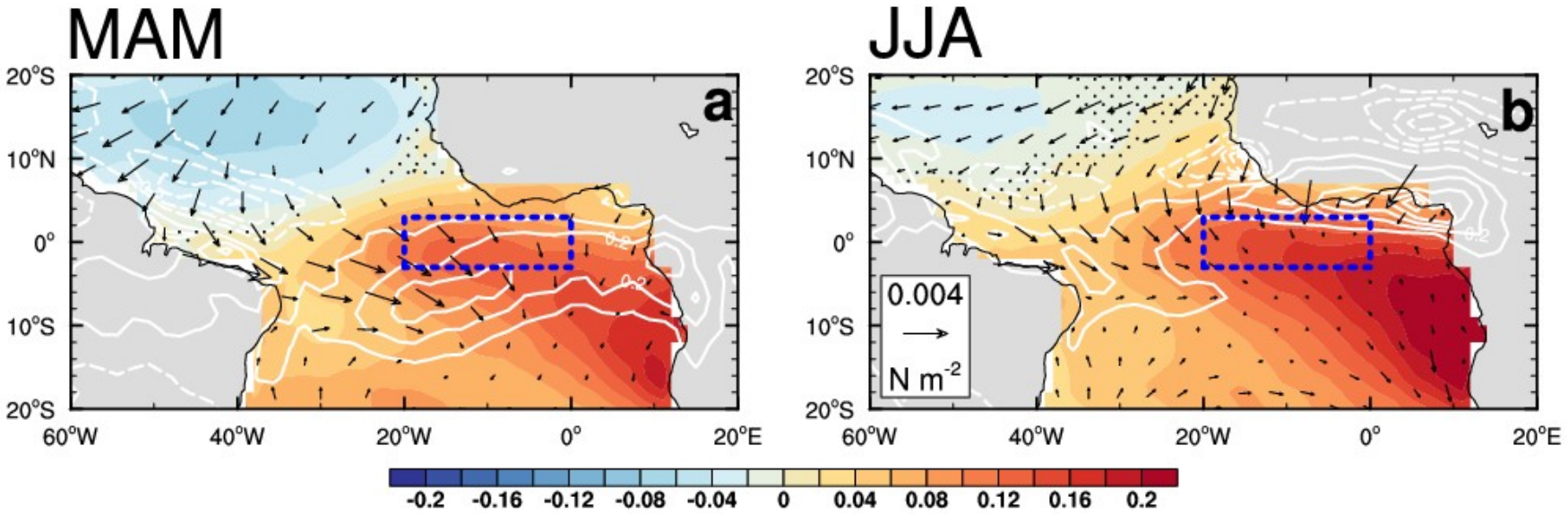
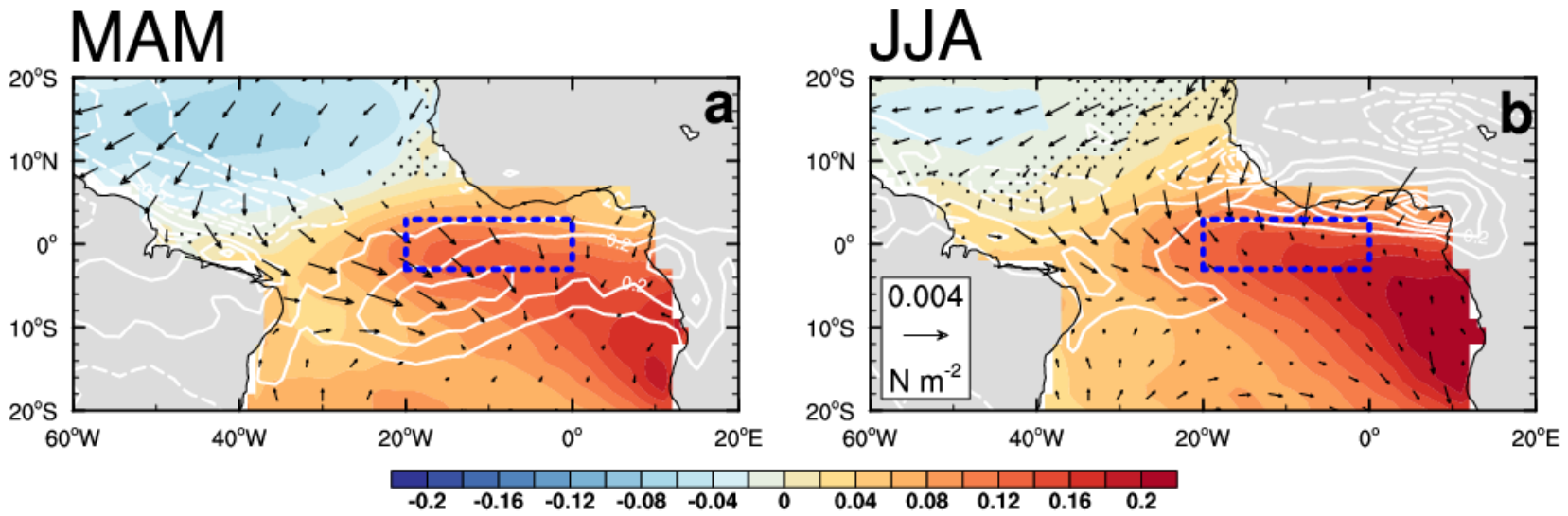


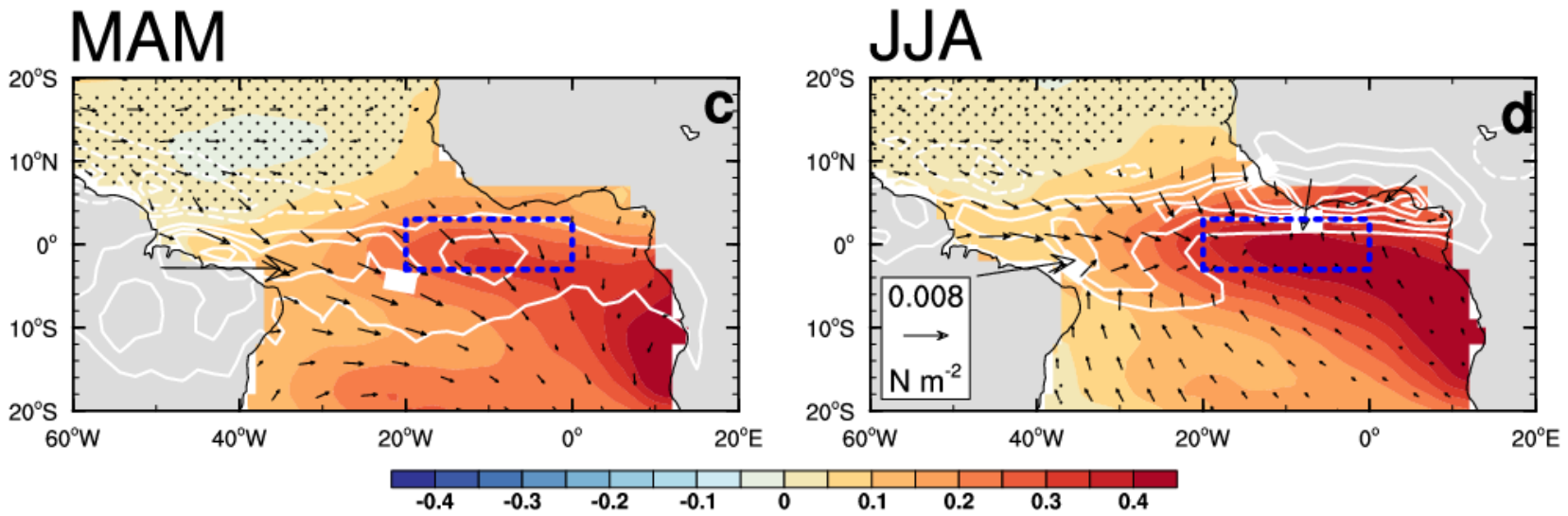
# 8-15 Lanczos filtered S-EOF, SST 5°N-5°S



**8-15 yr**


MAM
JJA
a
b
20°S
10°N
0°
10°S
20°S
60°W
40°W
20°W
0°
20°E
0.004
N m-2
-0.2 -0.16 -0.12 -0.08 -0.04 0 0.04 0.08 0.12 0.16 0.2

**<7 yr**


MAM
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20°S
10°N
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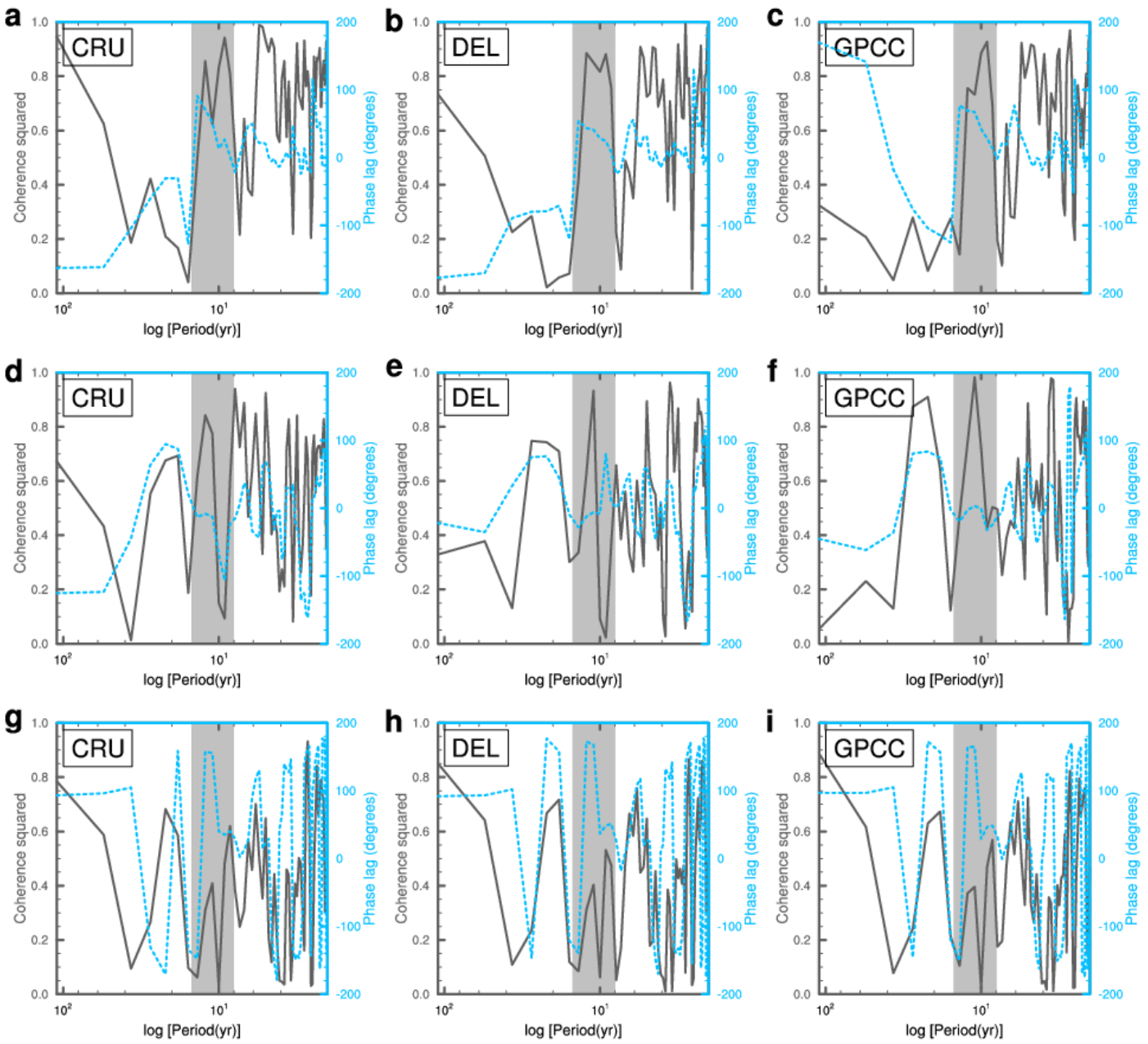
10°S
20°S
60°W
40°W
20°W
0°
20°E
0.008
N m-2
-0.4 -0.3 -0.2 -0.1 0 0.1 0.2 0.3 0.4

# Decadal coherence with precipitation

**Guinea Coast**
**[4-10°N, 20°W-10°E]**

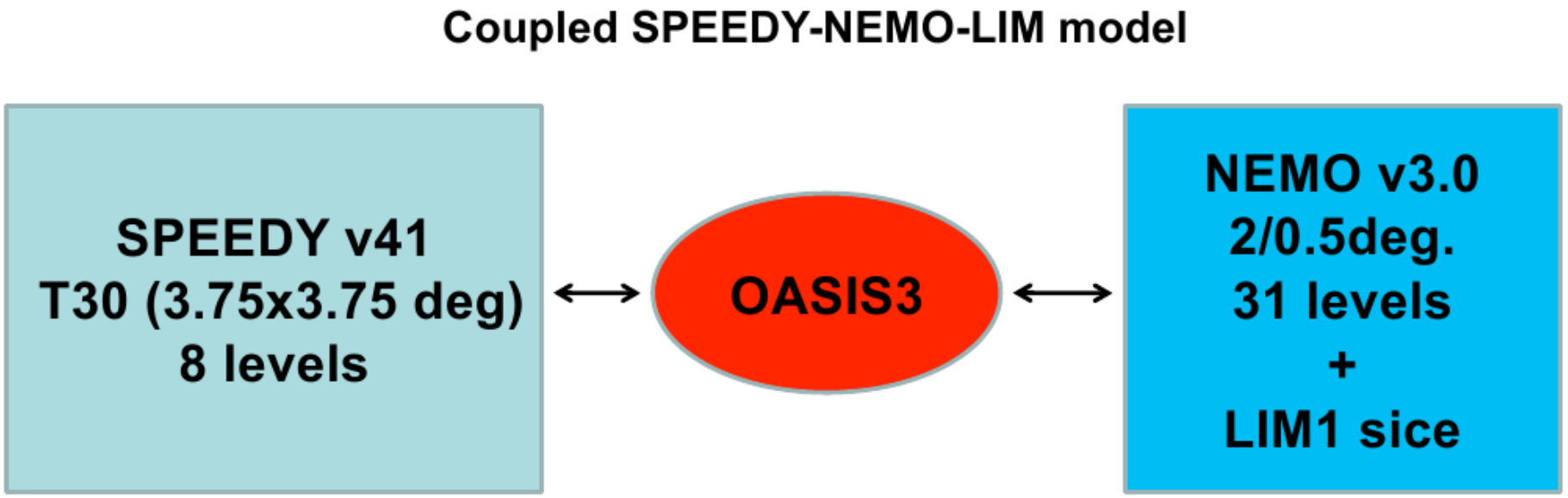
**N-S America**
**[10°S-10°N, 35-180°W]**

**Sahel**
**[11-20°N, 20°W-10°E]**



# Modelling

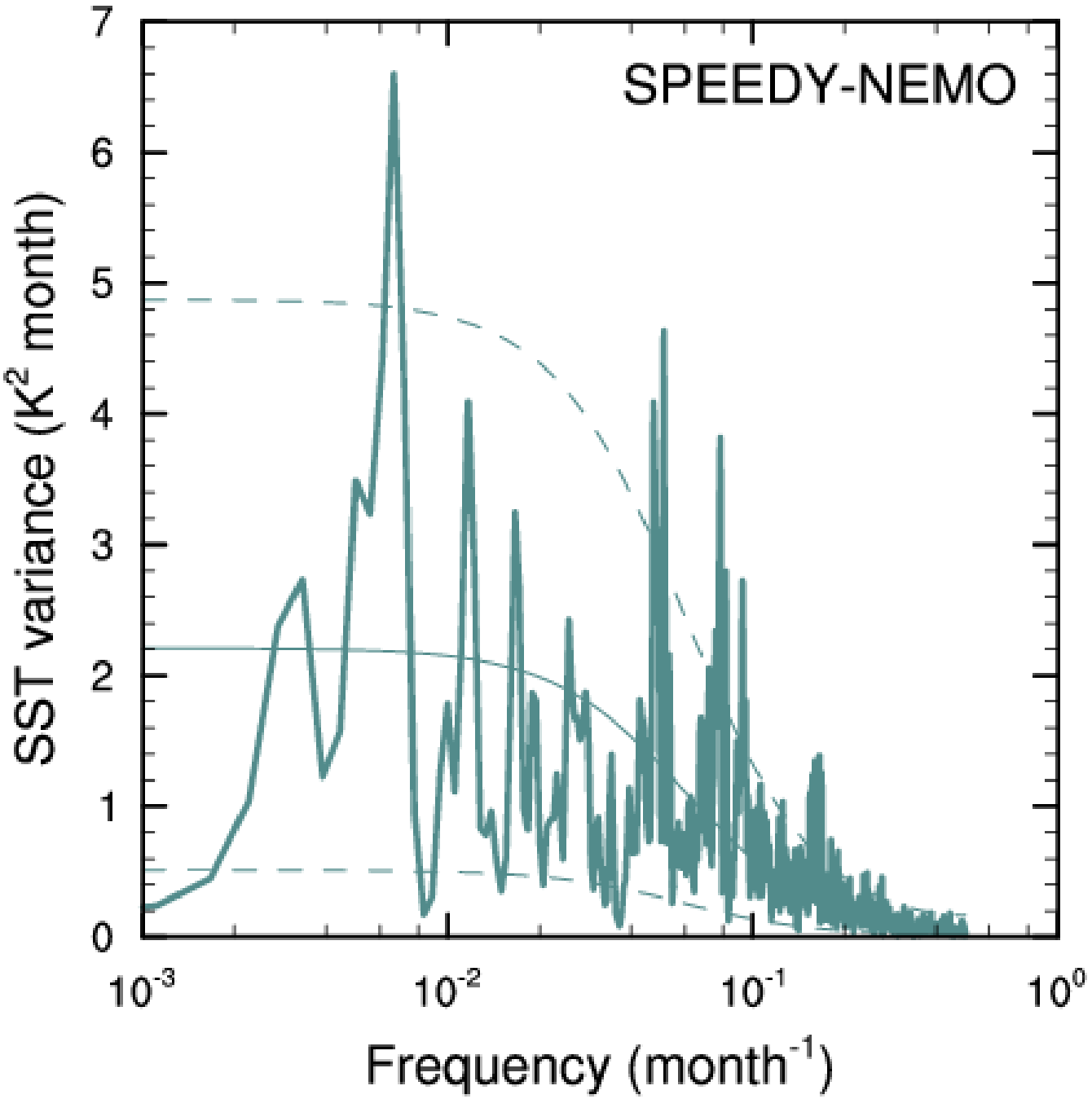
# Part 2:

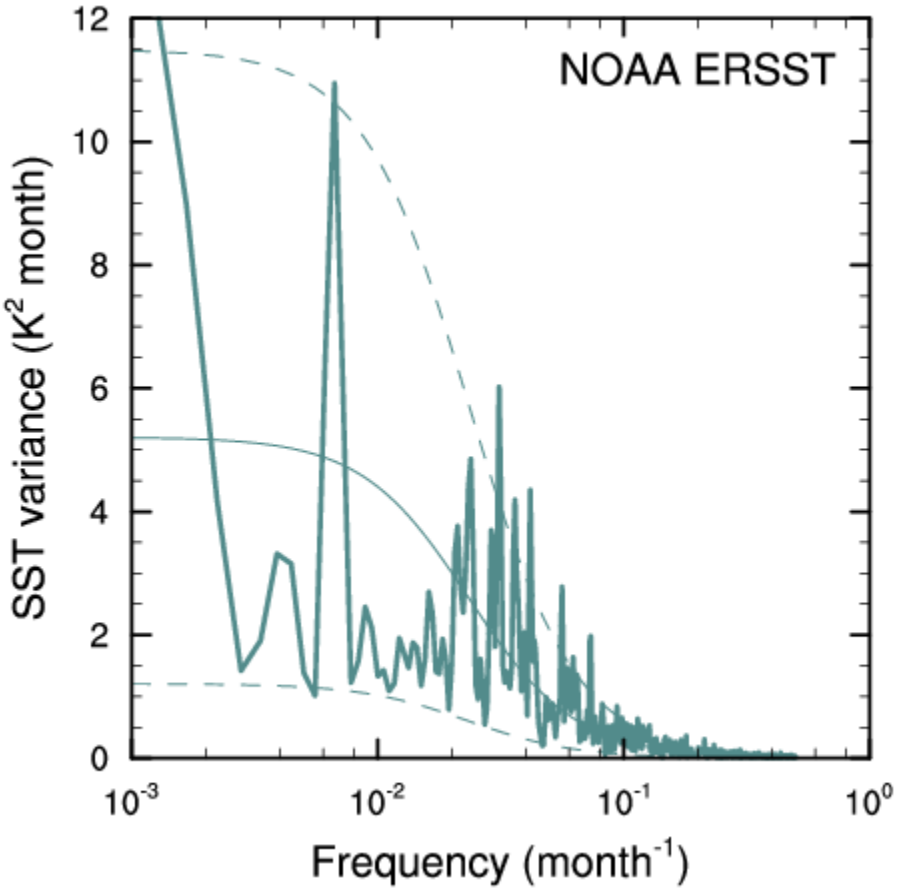


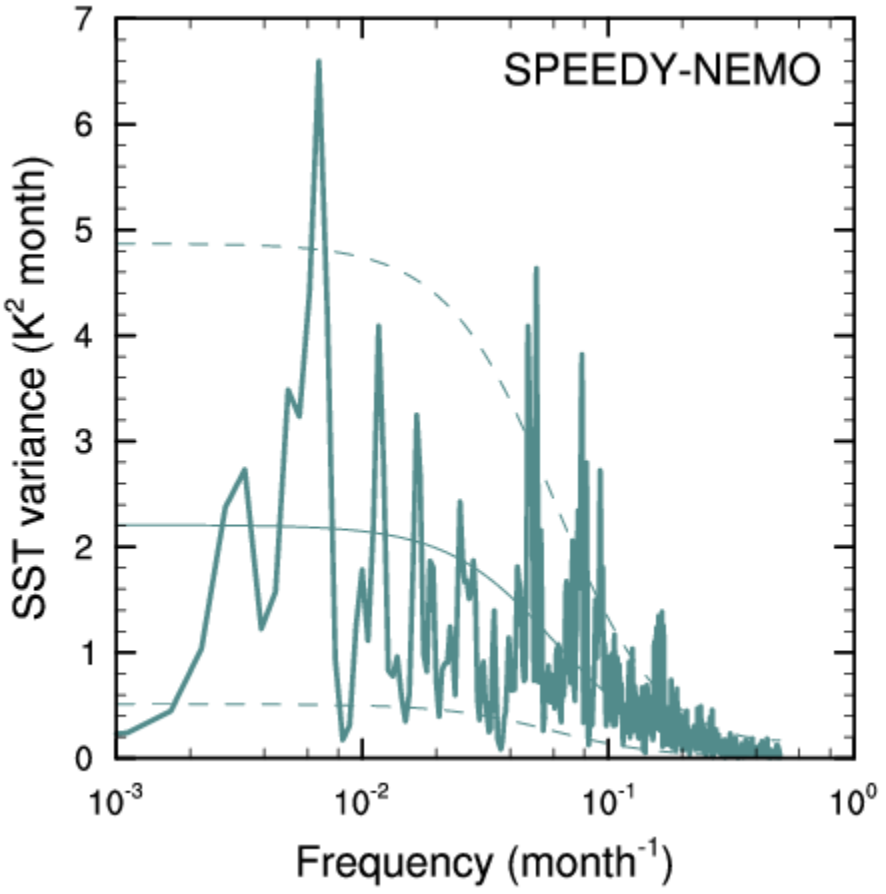

**307+ years control integration; last 150 years analyzed here.**

*From F. Kucharski*

**Strong variability at decadal frequency: 12.5 $yr^{-1}$**



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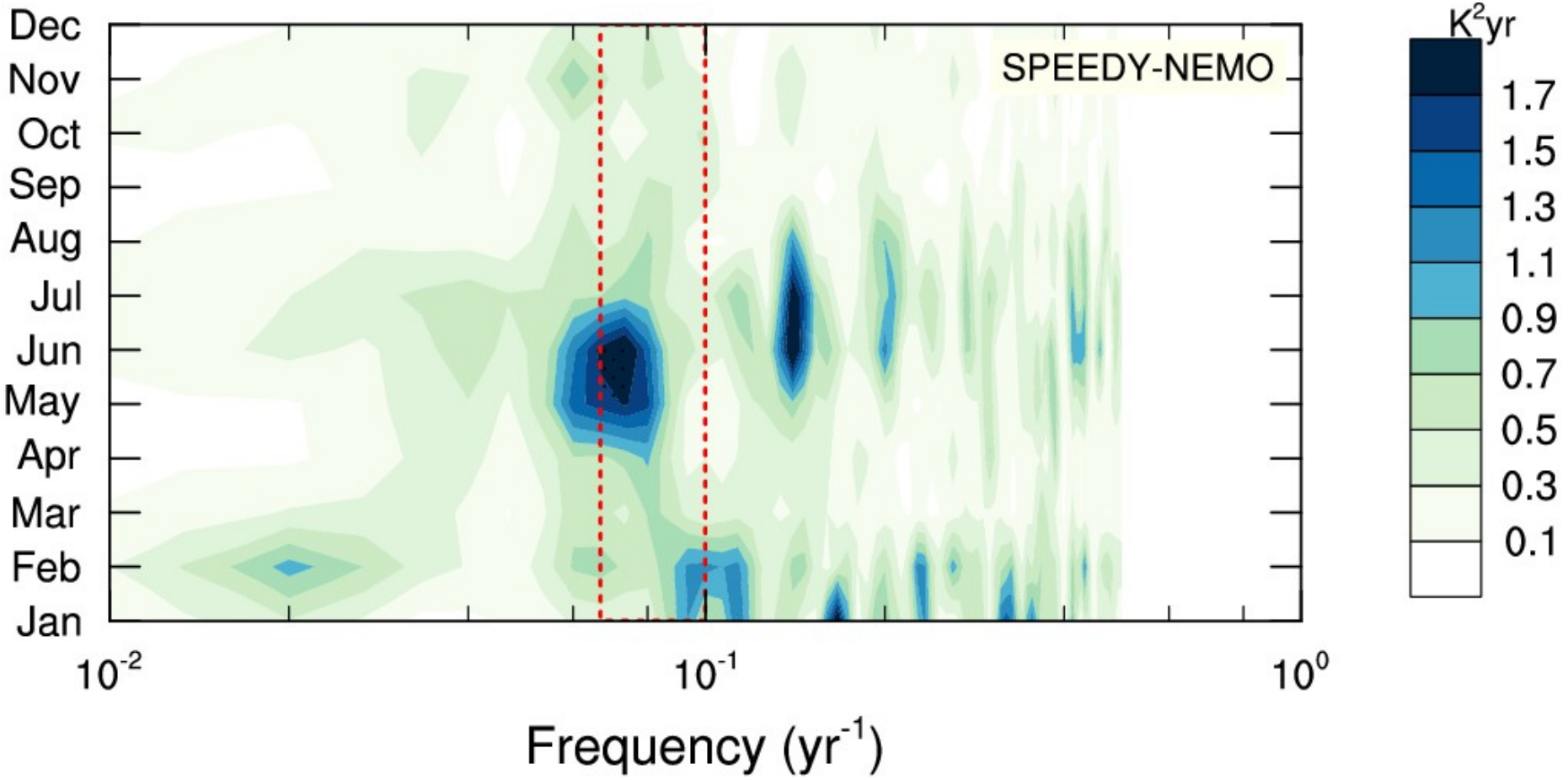
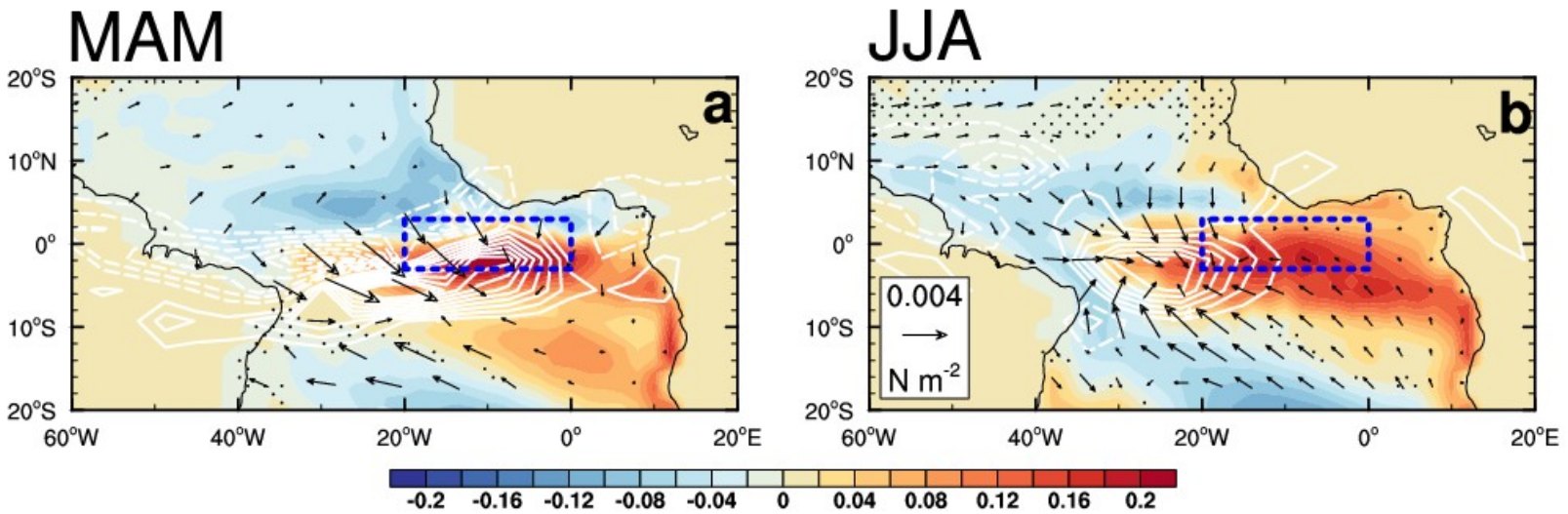



**Model partly captures the seasonality: <u>April to July</u>**

8-15 yr


MAM
JJA
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20°S
10°N
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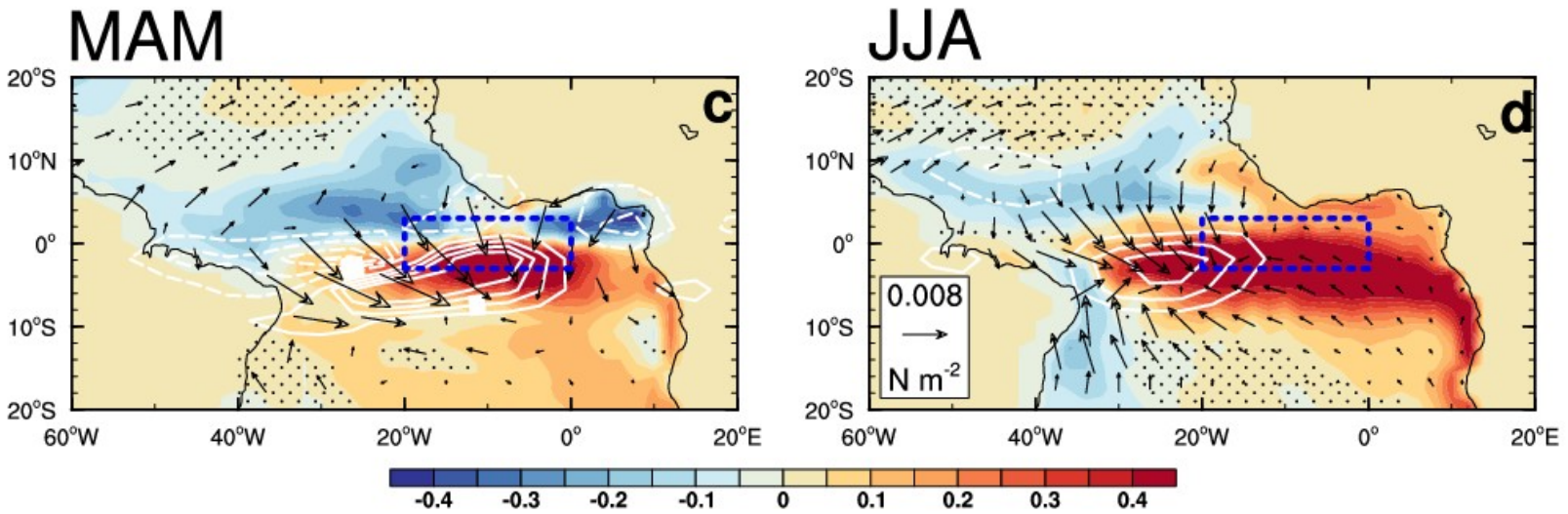
<7 yr


MAM
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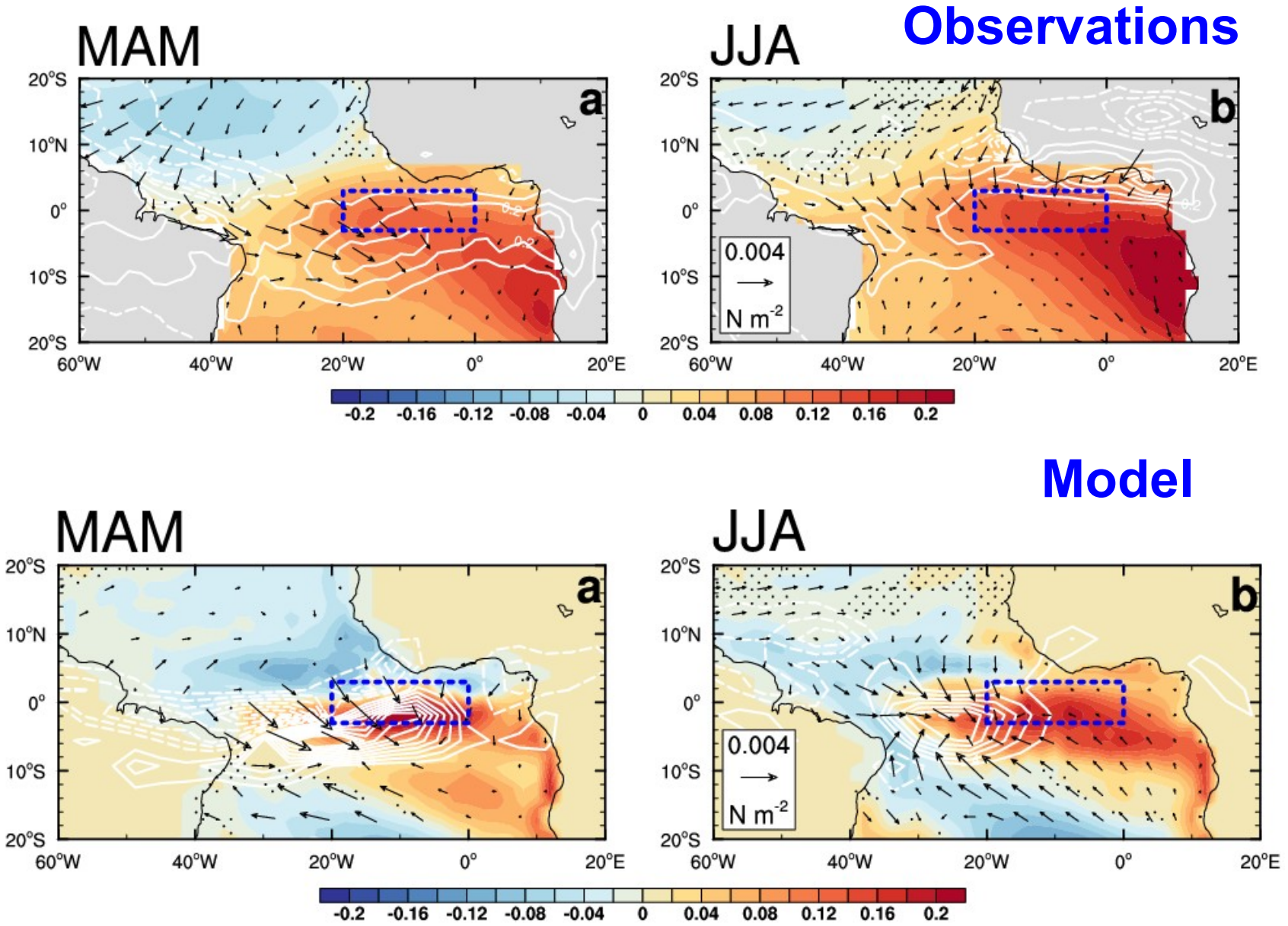
Observations
MAM
JJA
a
b
20°S
10°N
0°
10°S
20°S
60°W
40°W
20°W
0°
20°E
0.004
N m-2
-0.2
-0.16
-0.12
-0.08
-0.04
0
0.04
0.08
0.12
0.16
0.2
Model
MAM
JJA
a
b
20°S
10°N
0°
10°S
20°S
60°W
40°W
20°W
0°
20°E
0.004
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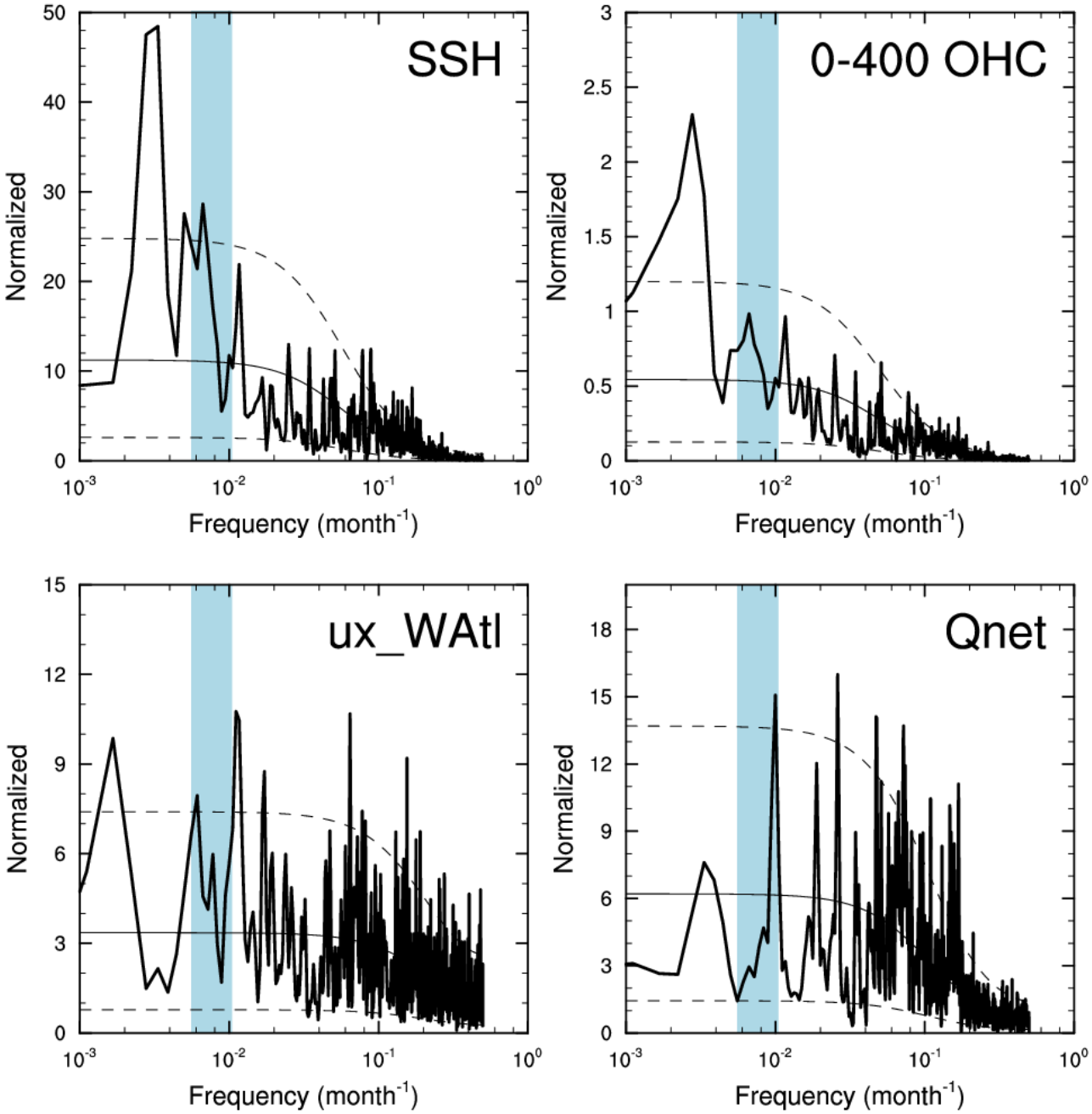
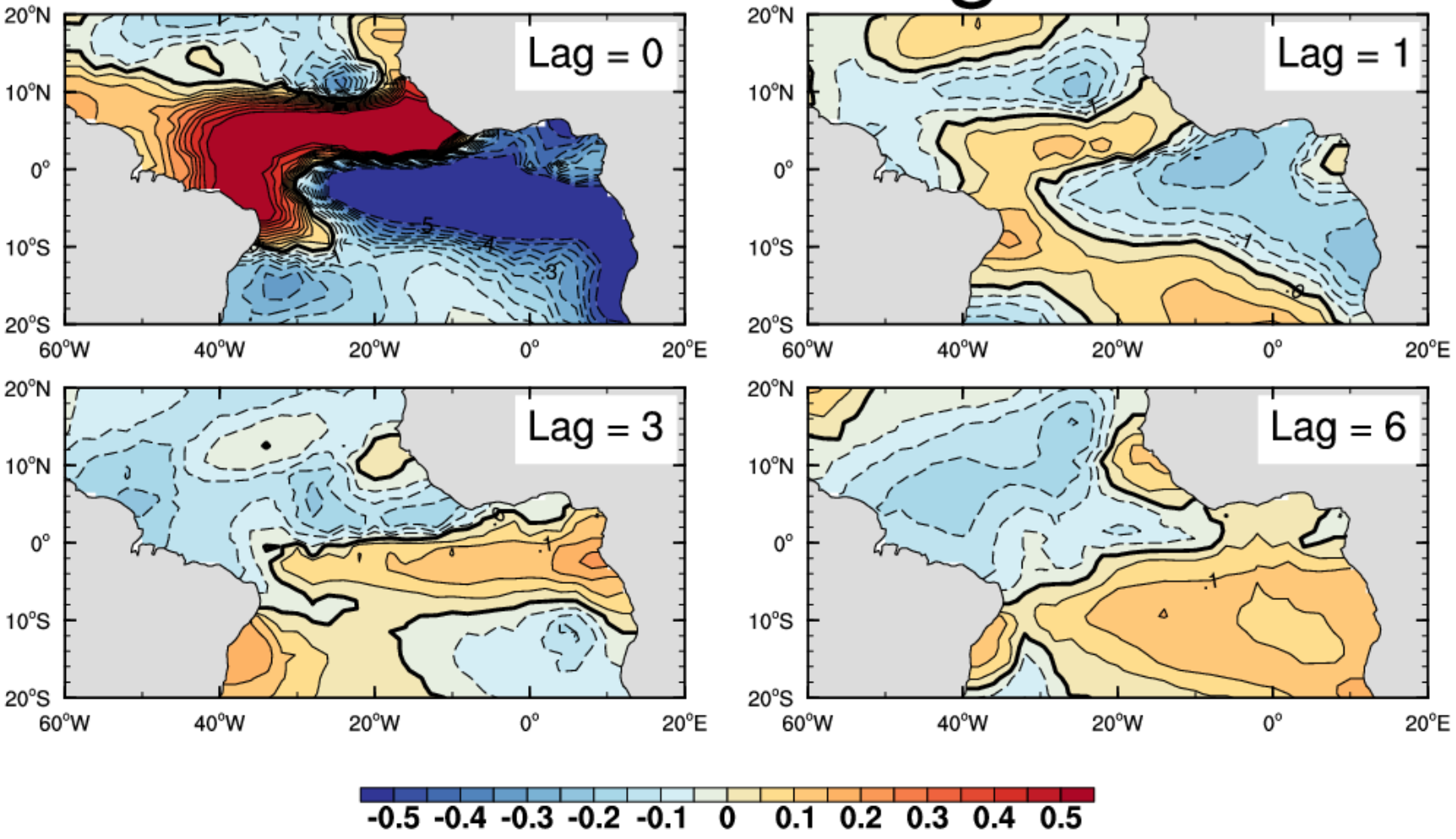
-0.2
-0.16
-0.12
-0.08
-0.04
0
0.04
0.08
0.12
0.16
0.2

# Discussions

1. Bjerknes
2. Qnet ?

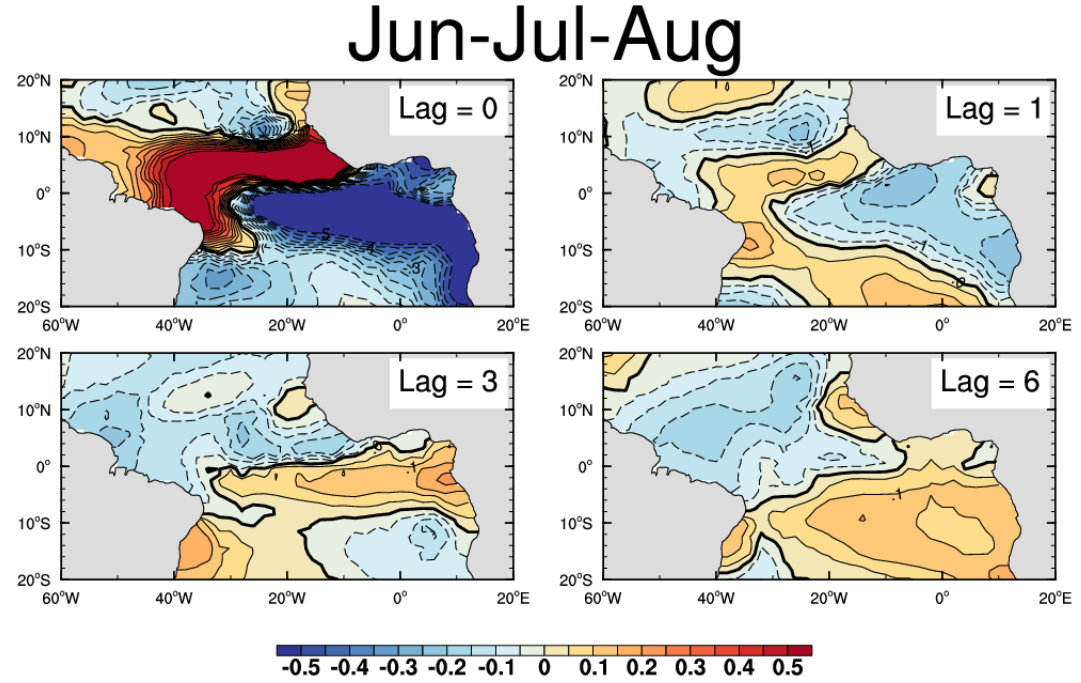


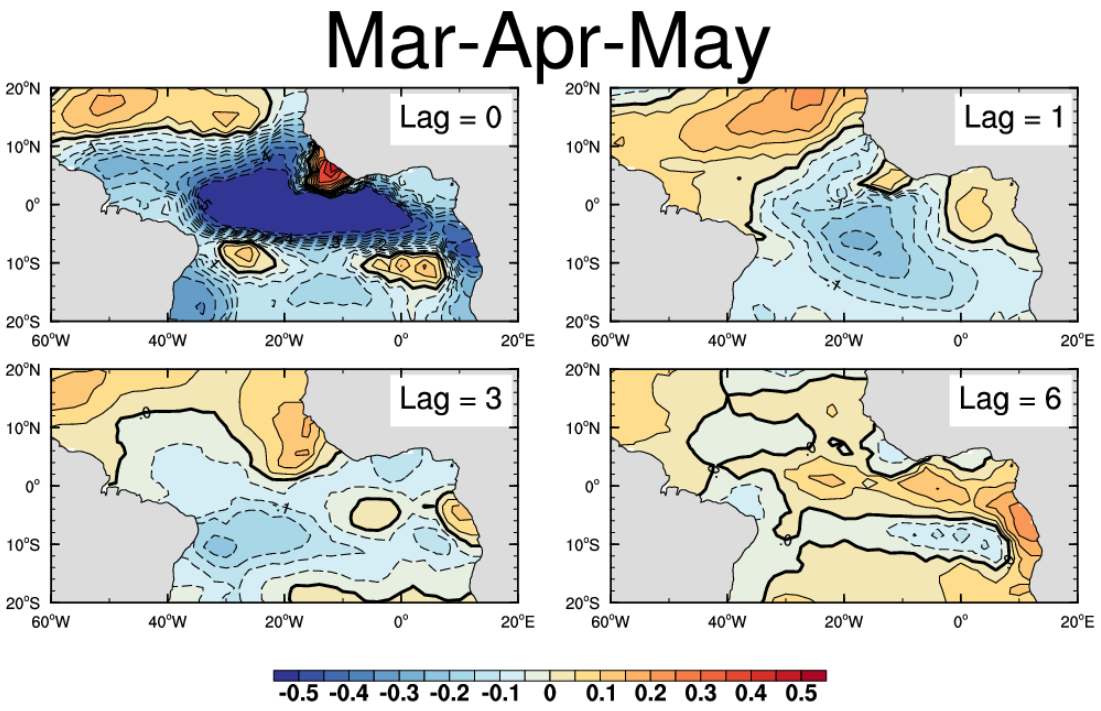
# Jun-Jul-Aug




**Qnet maps lead Atl3 index by lags**

**Similar maps for MAM**



# Some Preliminary Concluding Remarks

- **Robust decadal variability of the Atlantic Niño index, spatial pattern.**
- **Coherence with decadal precipitation anomalies over Guinea Coast and northern parts of South America.**
- **Bjerknes feedbacks; maybe some roles for Qnet.**

**Thank you.**