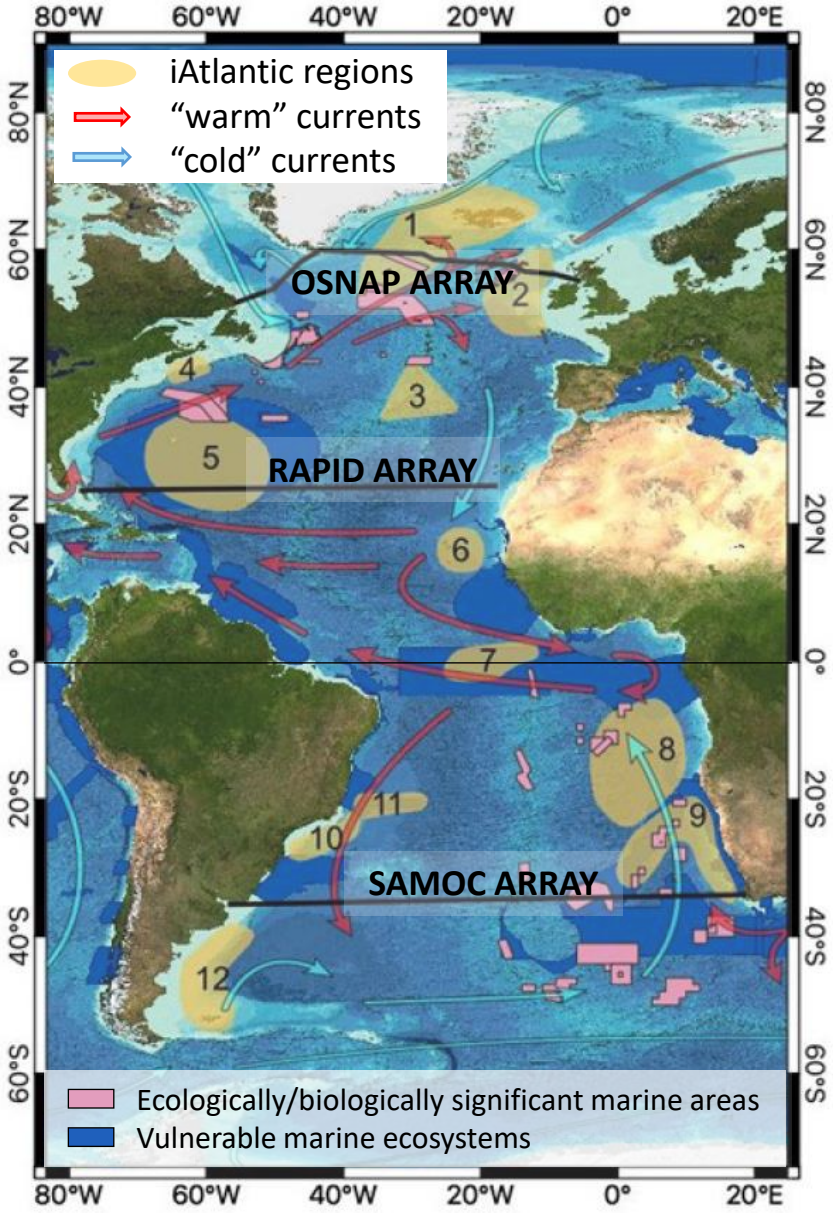

Hydrographic changes across the Atlantic Ocean - an EN4 data analysis

Kristin Burmeister*, Mark Inall, Clare Johnson

iAtlantic
INTEGRATED ASSESSMENT OF ATLANTIC MARINE ECOSYSTEMS IN SPACE AND TIME

- Assess the health of ecosystems for a responsible and sustainable management of Atlantic Ocean resources
- WP1: Atlantic Oceanography and Ecosystem Connectivity

*Kristin.Burmeister@sams.ac.uk – EGU 2020 – page 1

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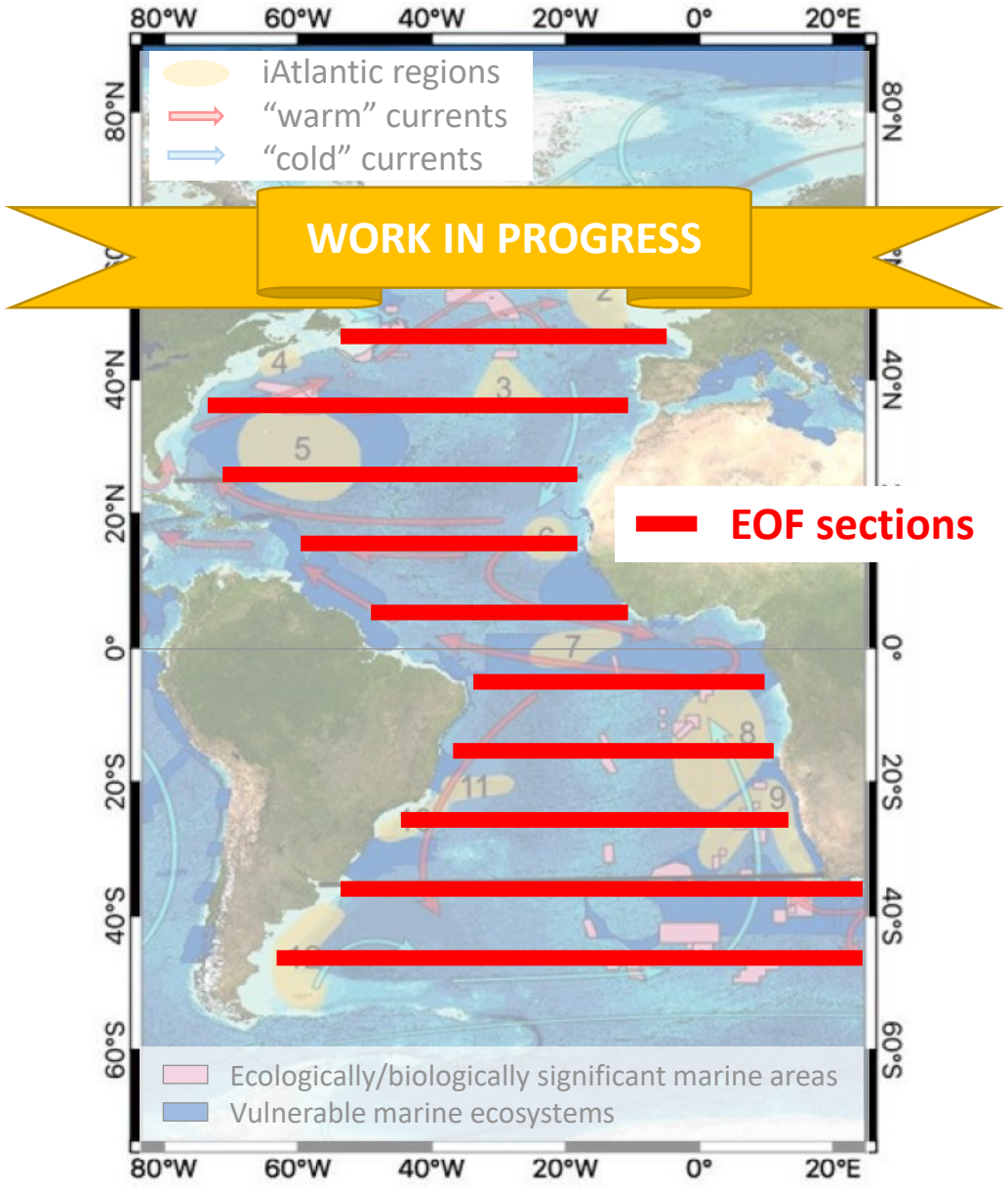
SAMS
Scottish Association for Marine Science



What is the dominant variability of temperature and salinity across the Atlantic basin?

EN.4.2.1 analysis data (Good et al., 2013):

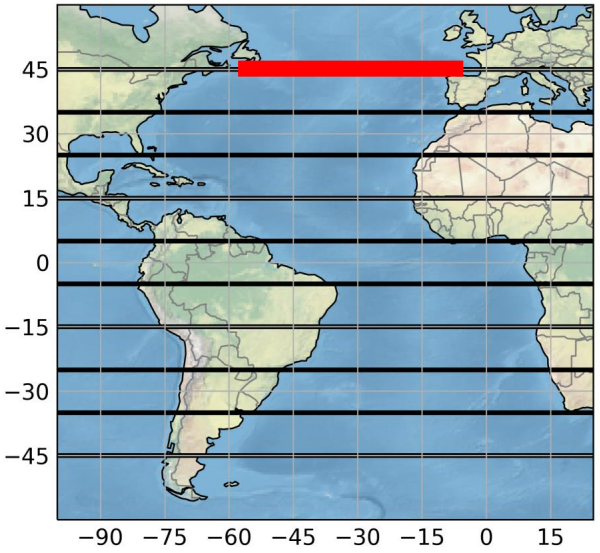
- Gridded temperature and salinity observations
- Period 2000-2019
- Atlantic region: 60°S-60°N, 100°W-25°E, below 100m
- Remapped onto potential density levels (reference pressure 1500 dbar)

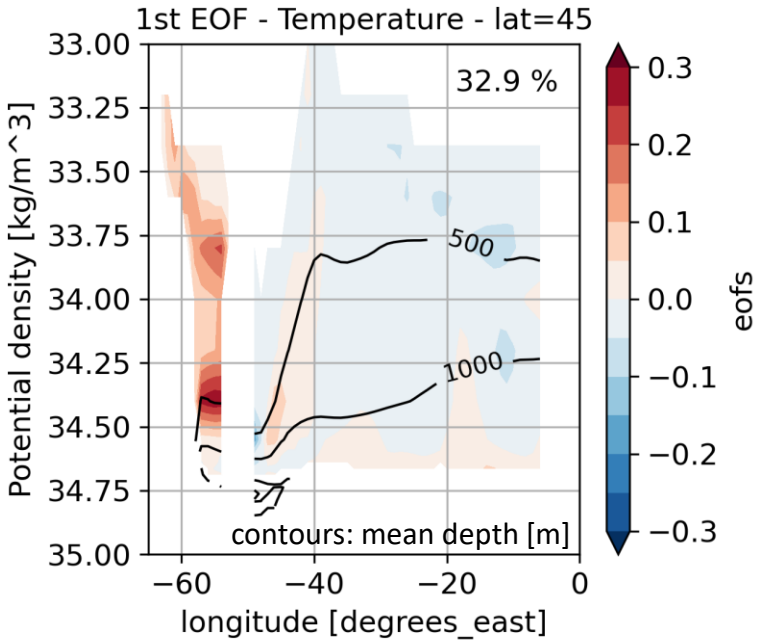
Empirical Orthogonal Function (EOF) analysis:

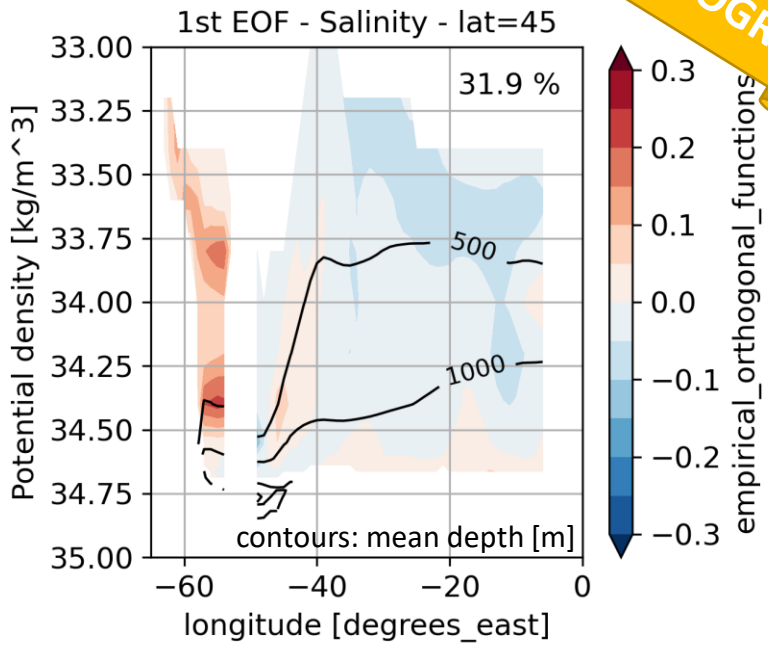
- Monthly anomalies with respect to 2000-2019 climatology
- Smoothed by 12-monthly running mean
- EOF analysis after Dawson et al. (2016) along zonal sections

Preliminary results – 45°N section

WORK IN PROGRESS

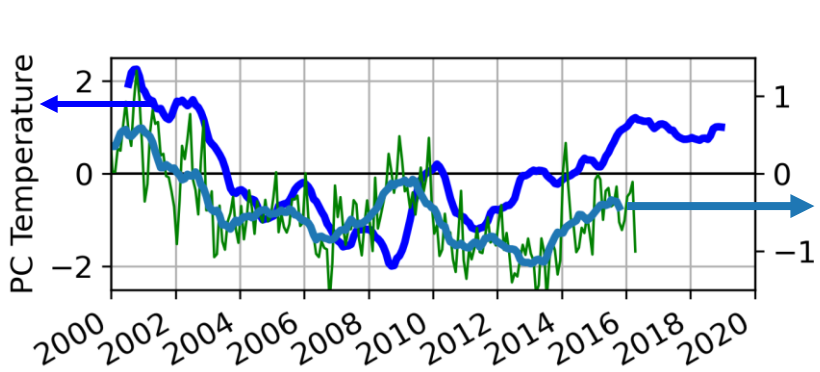


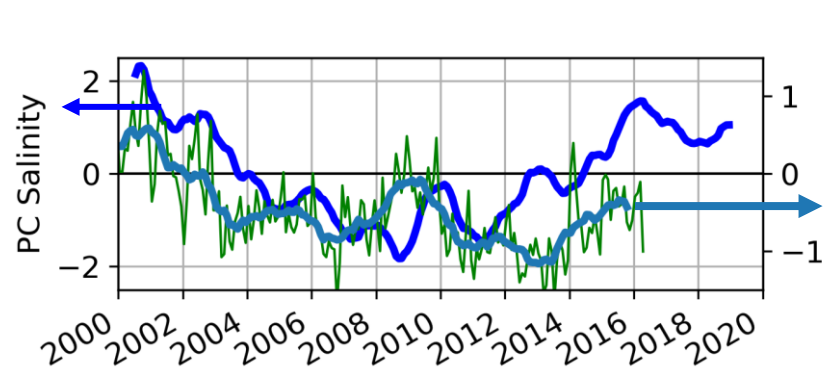




Pattern: If warm and salty at western boundary, cold and fresh elsewhere (upper 1000m).

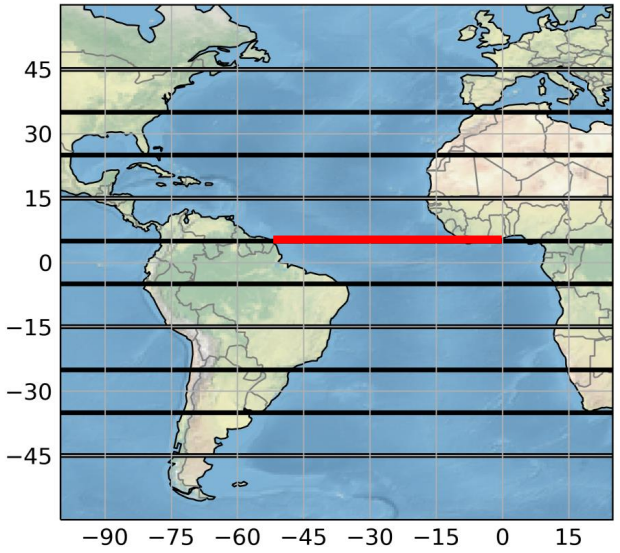
Linked to Subpolar Gyre dynamics?

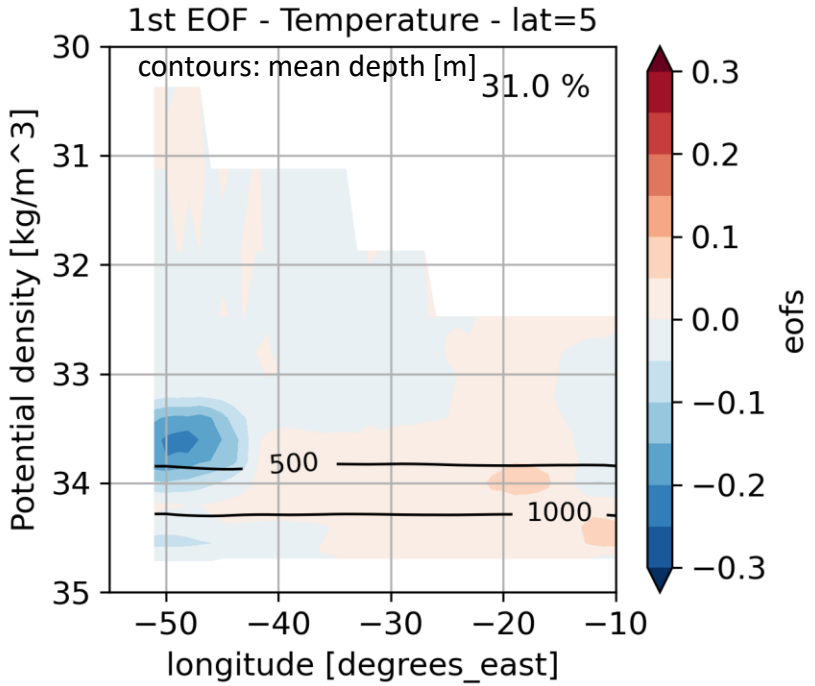


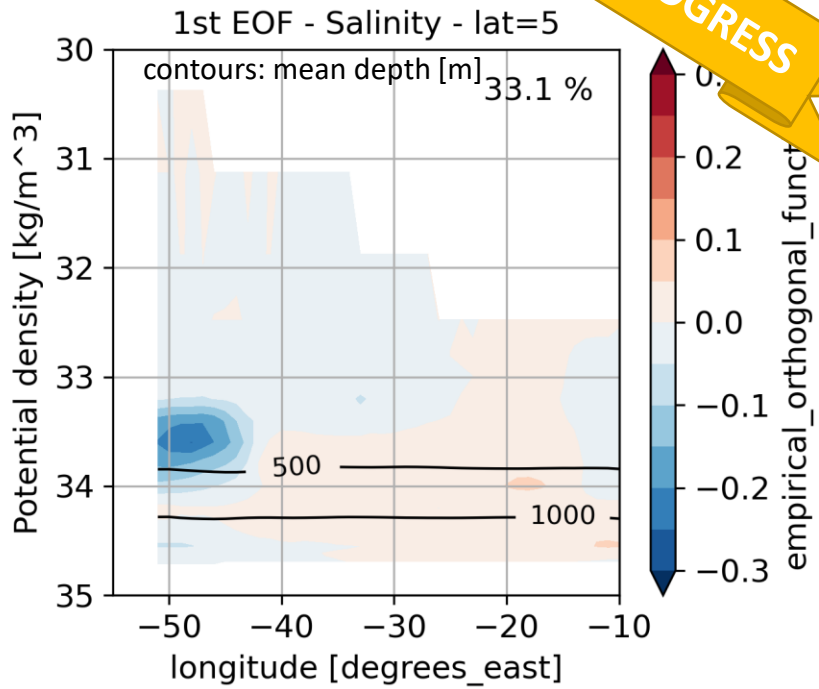


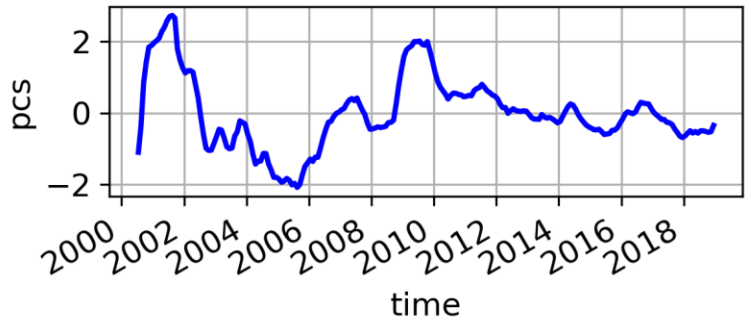
Preliminary results – 5°N section

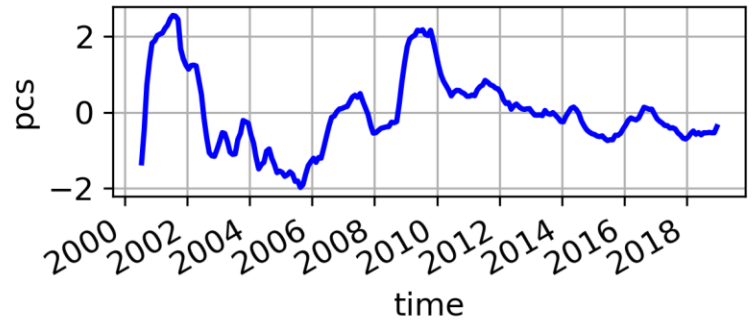
WORK IN PROGRESS









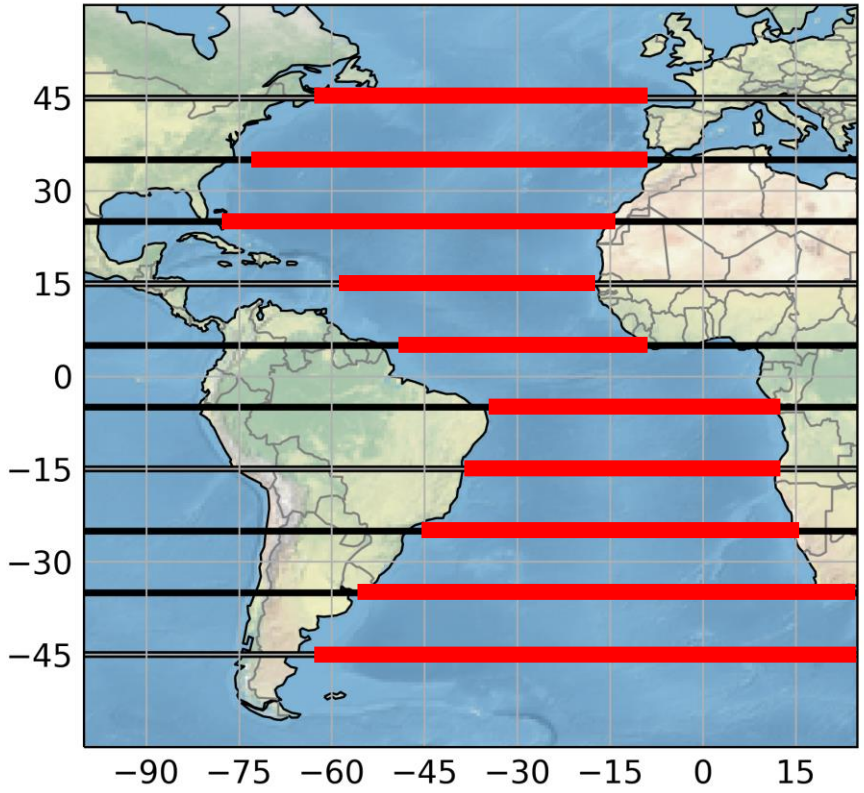


Western boundary changes: Warm and salty / cold and fresh

Link to water mass changes in southern hemisphere transported across equator by North Brazil Current?

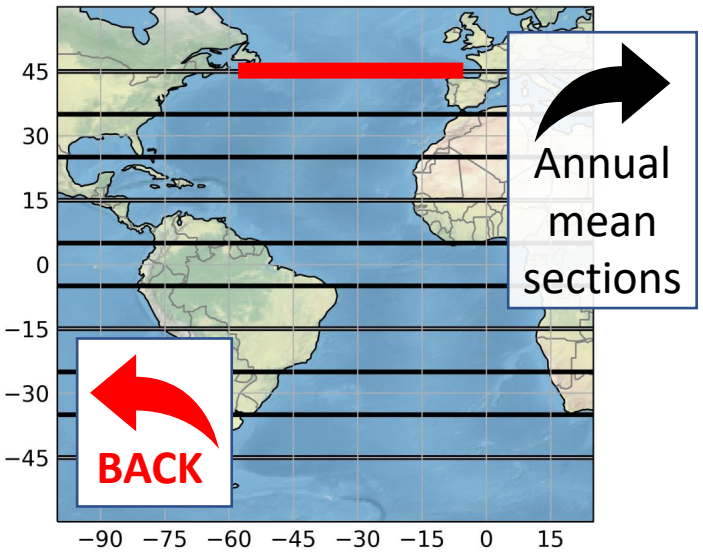
APPENDIX

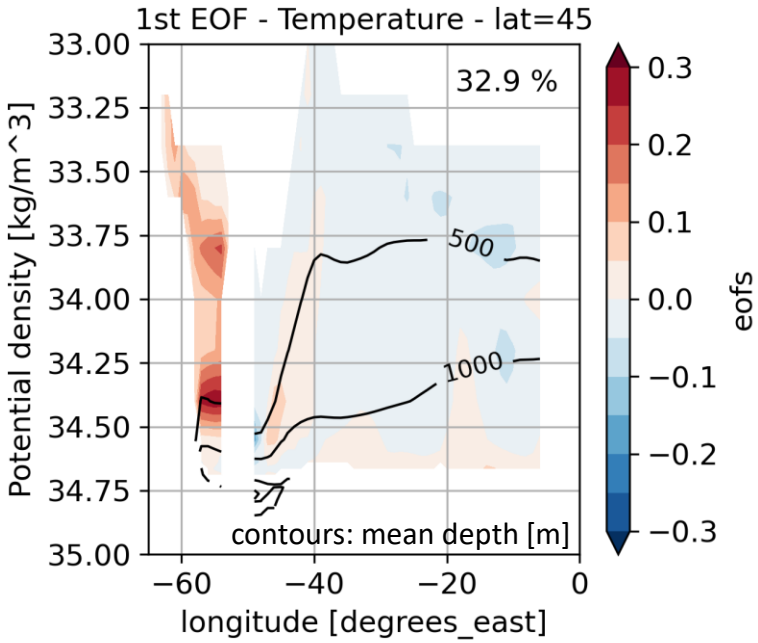
Click to see 1st EOF pattern and principle component (PC) of section

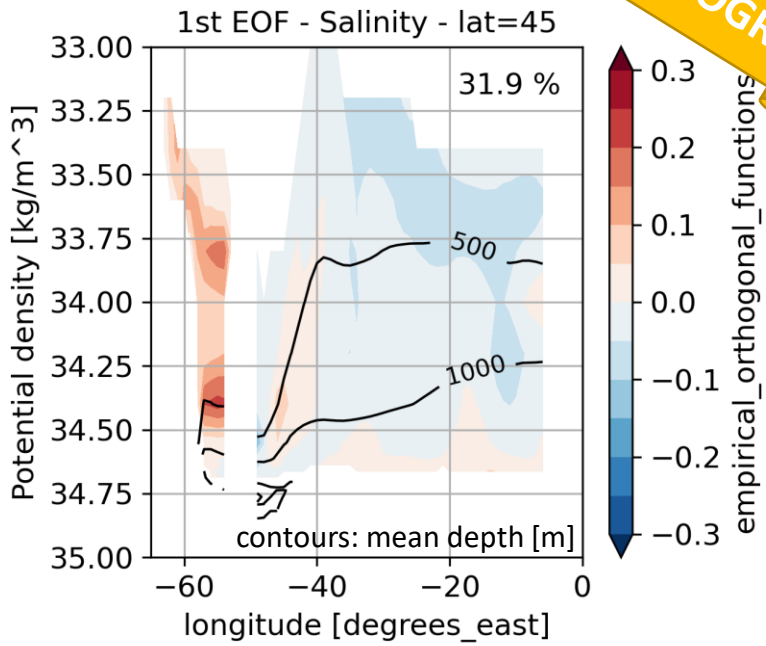


Preliminary results – 45°N section

WORK IN PROGRESS

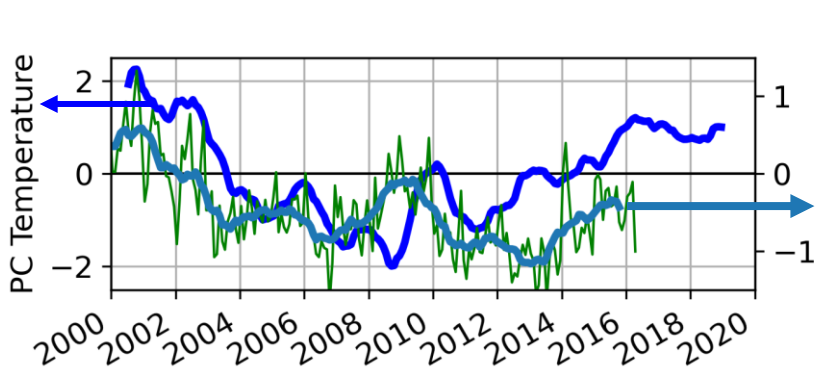


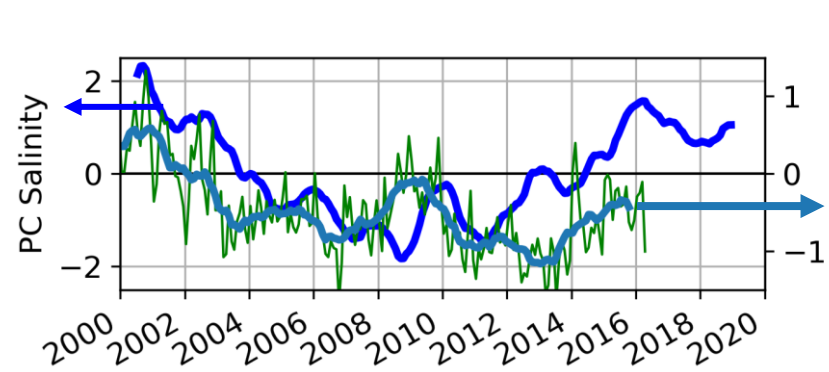




Pattern: If warm and salty at western boundary, cold and fresh elsewhere (upper 1000m).

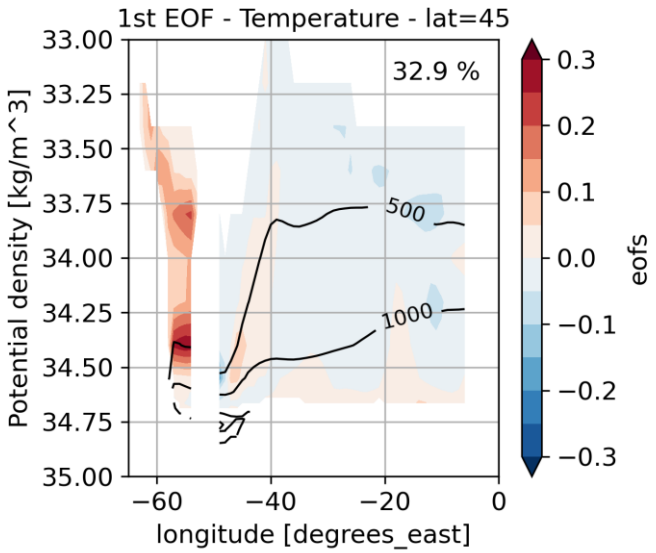
Linked to Subpolar Gyre dynamics?

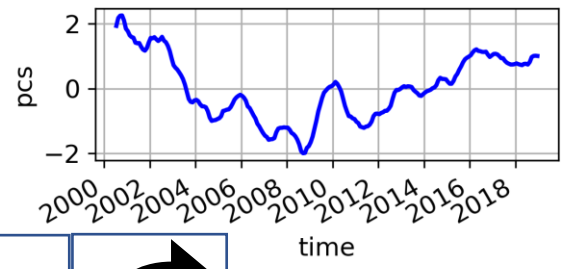


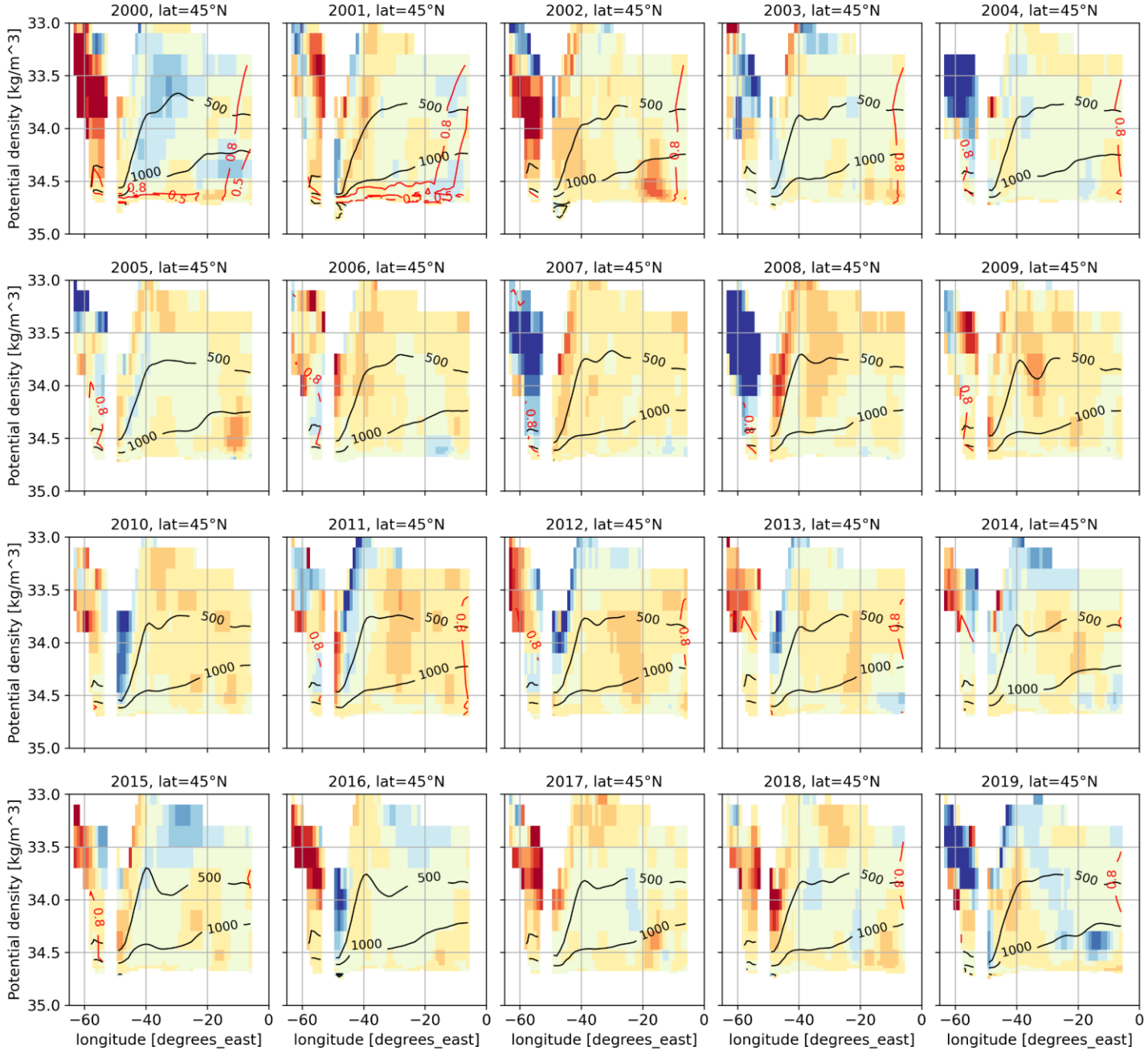


TEMPERATURE

45°N section







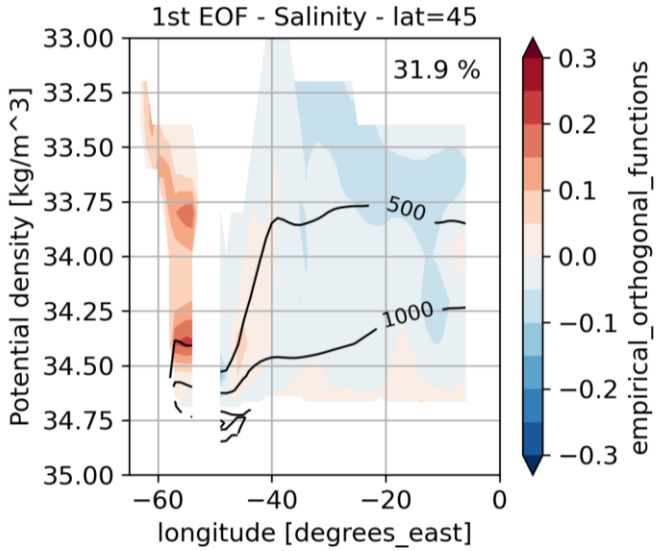
Annual mean temperature anomaly

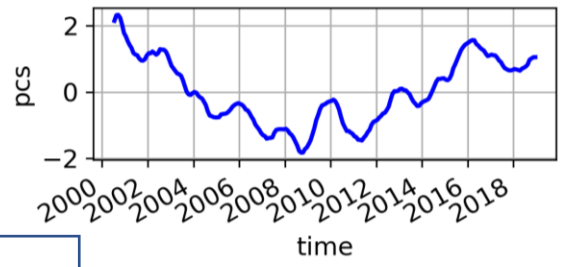
temperature_anomaly [degree_C]

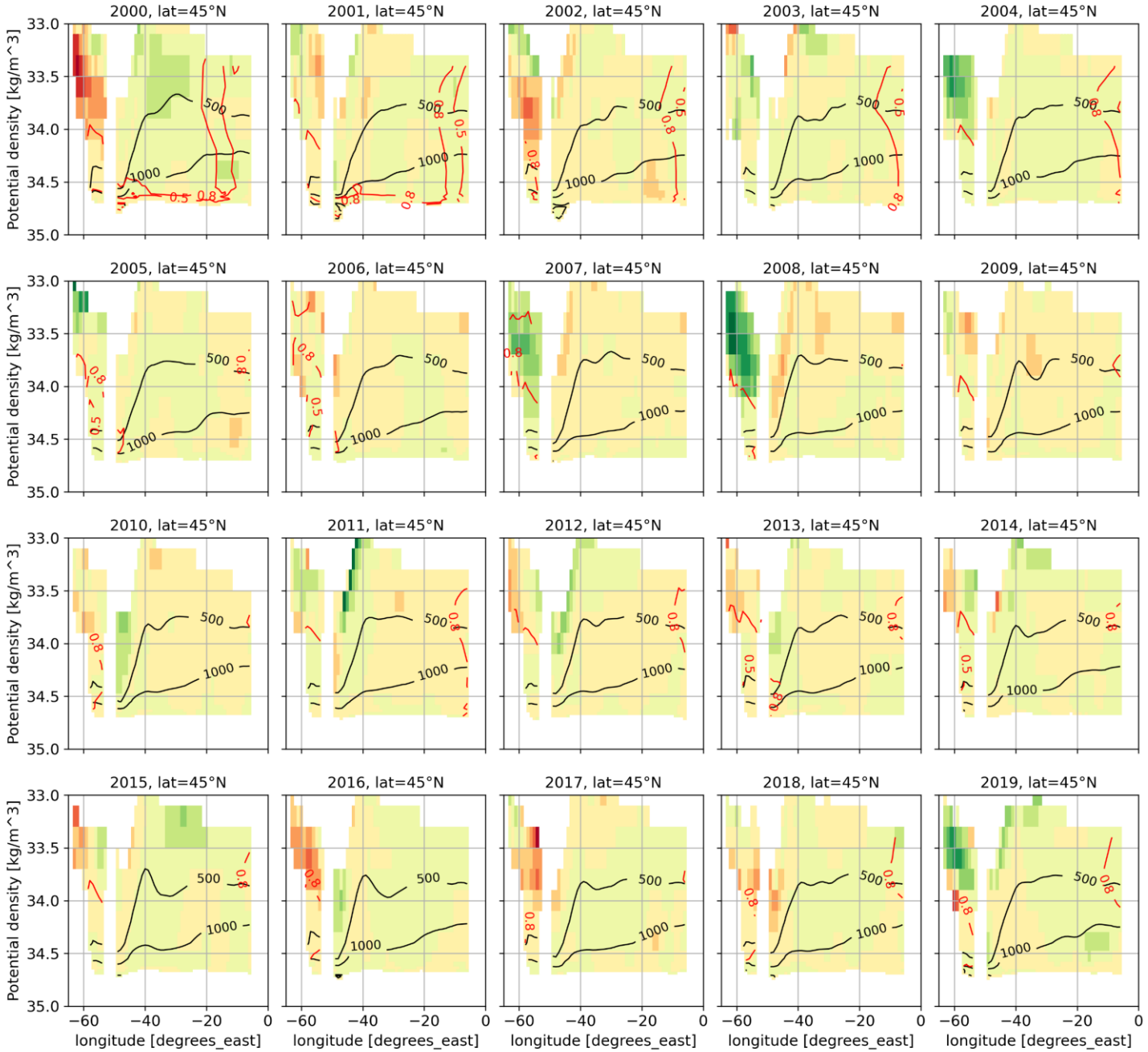
BACK SAL.

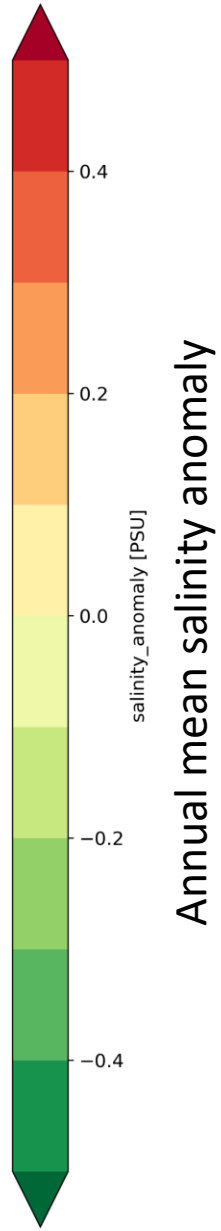
SALINITY

45°N section





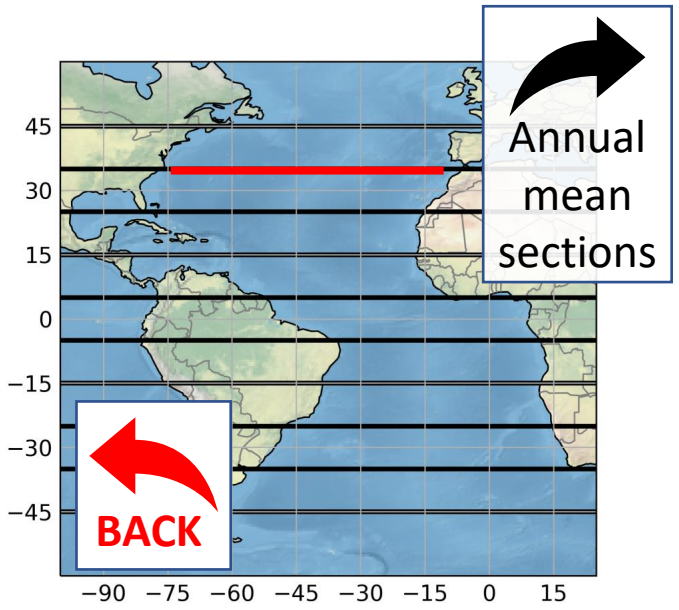


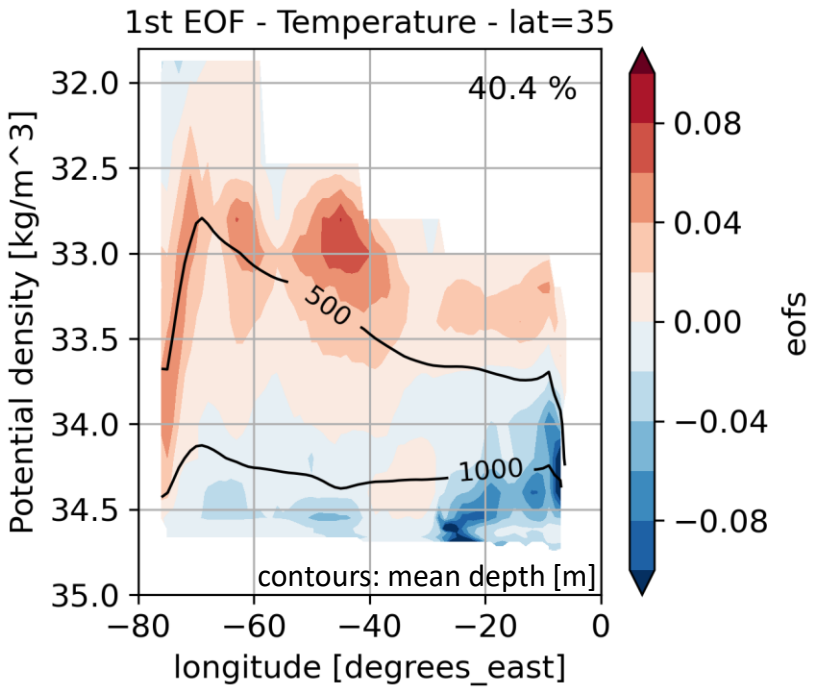


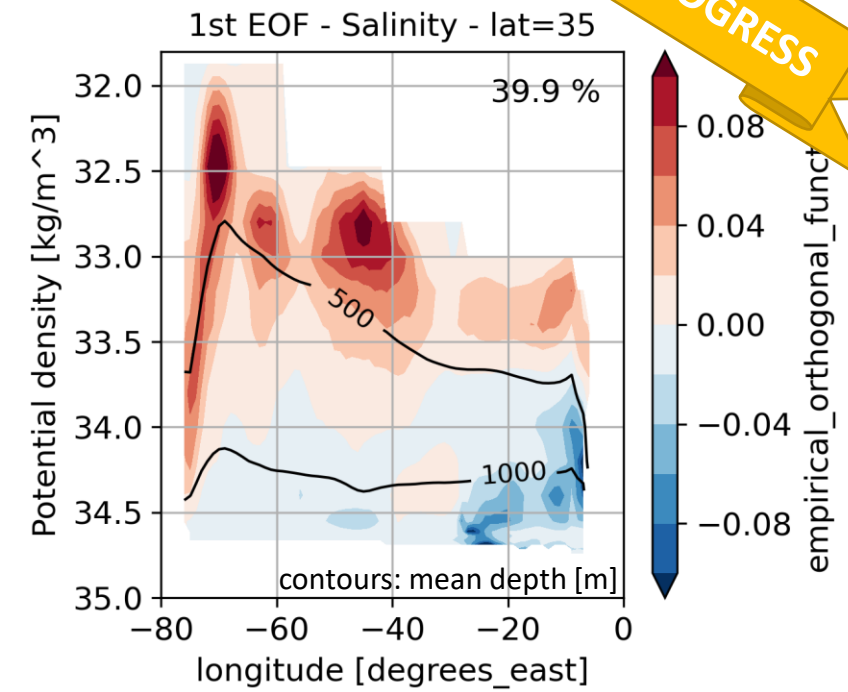
BACK

Preliminary results – 35°N section

WORK IN PROGRESS

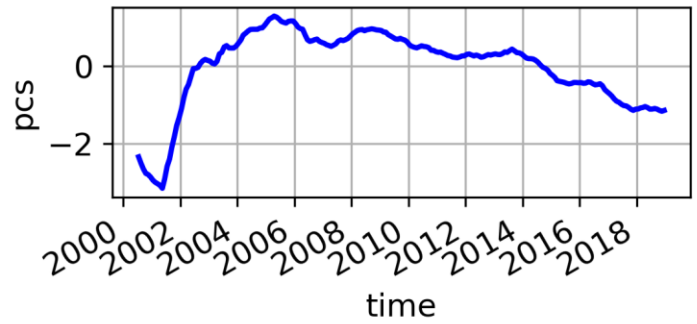


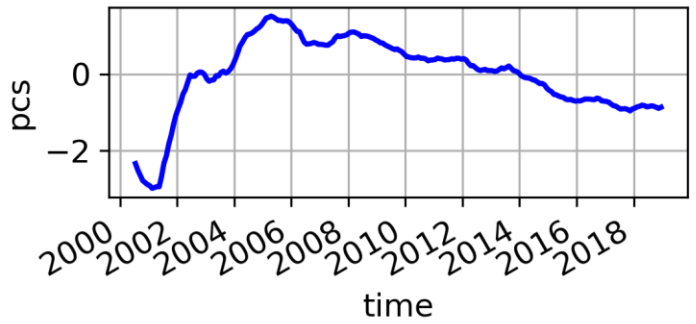




Eastern basin: anomalies associated with Mediterranean Sea?

Above 500m: link to changes in large-scale wind field?





iAtlantic Integrated Assessment of Atlantic Marine Ecosystems in Space and Time

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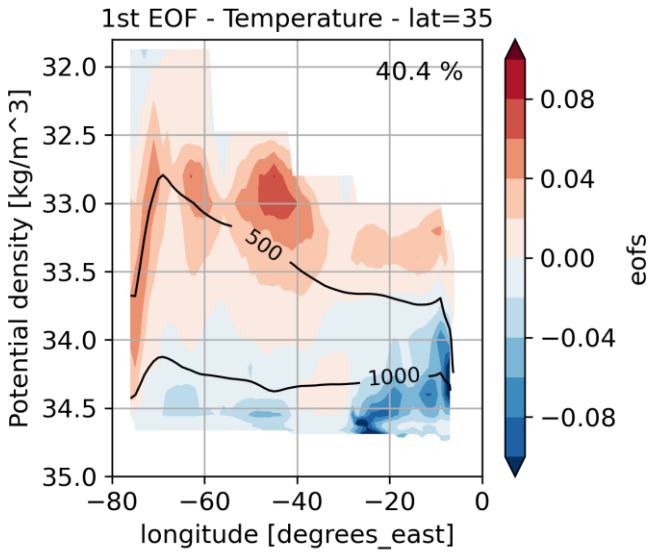
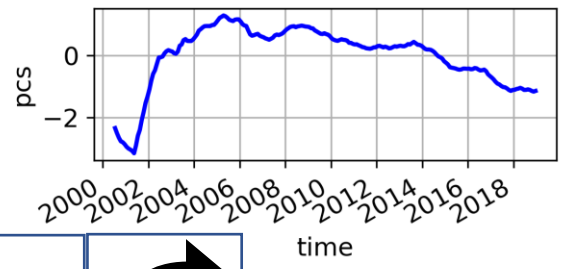
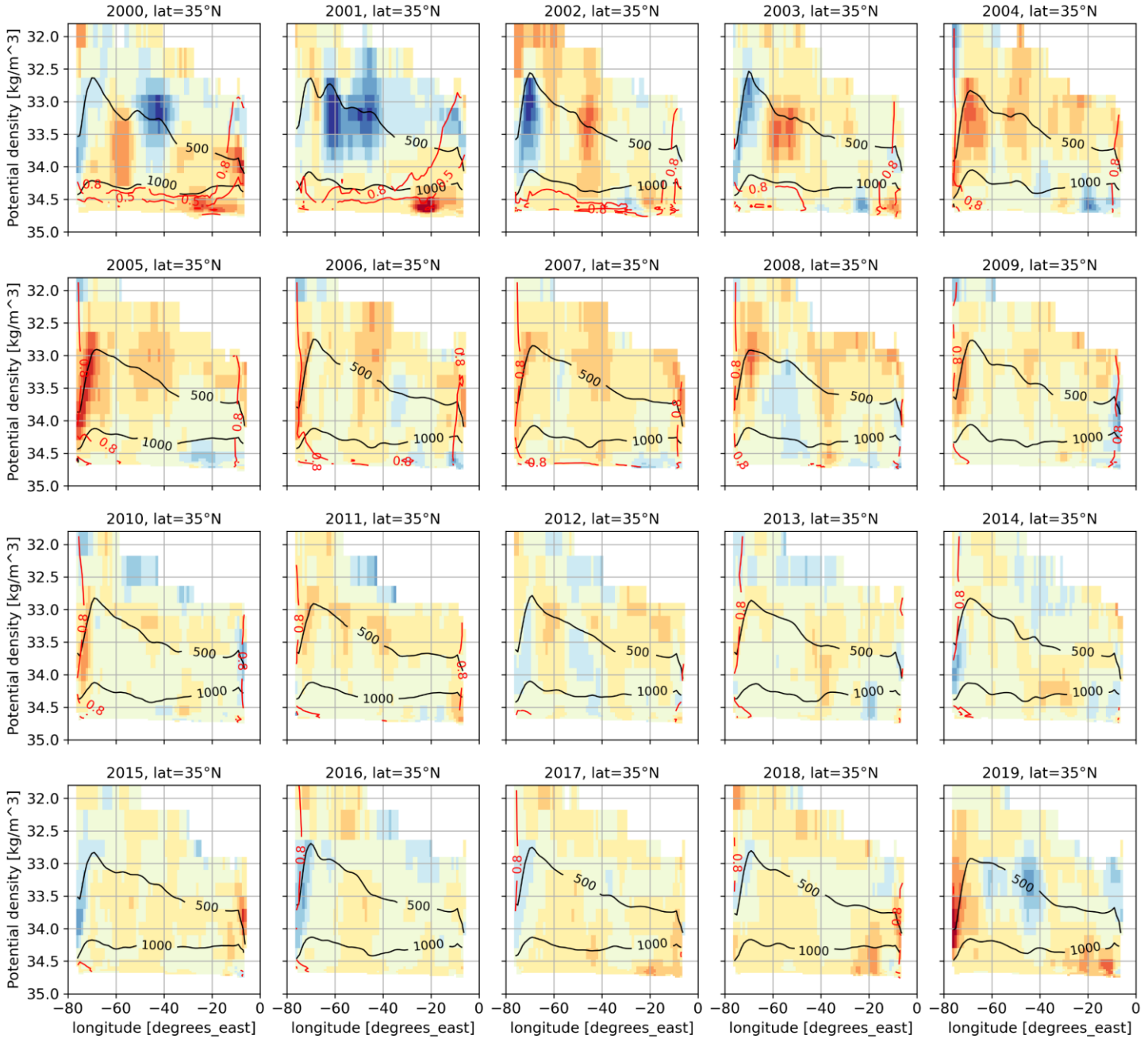
TEMPERATURE

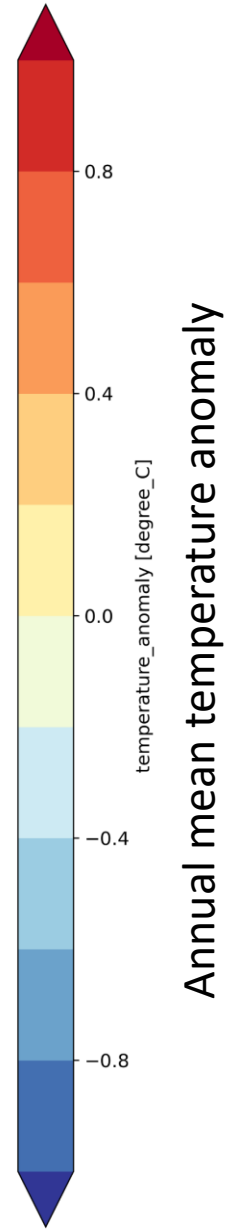
35°N section





BACK SAL.





Annual mean temperature anomaly

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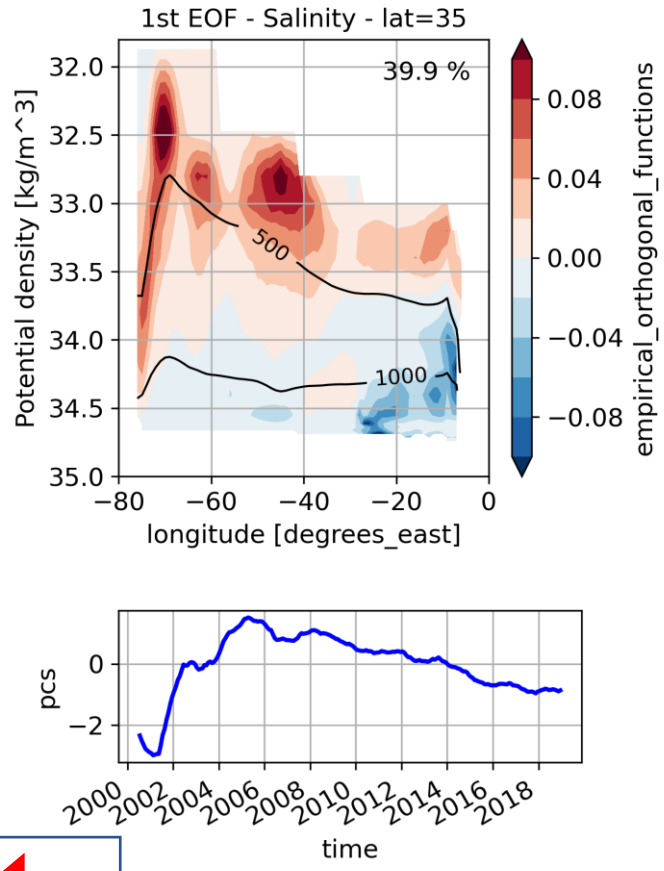
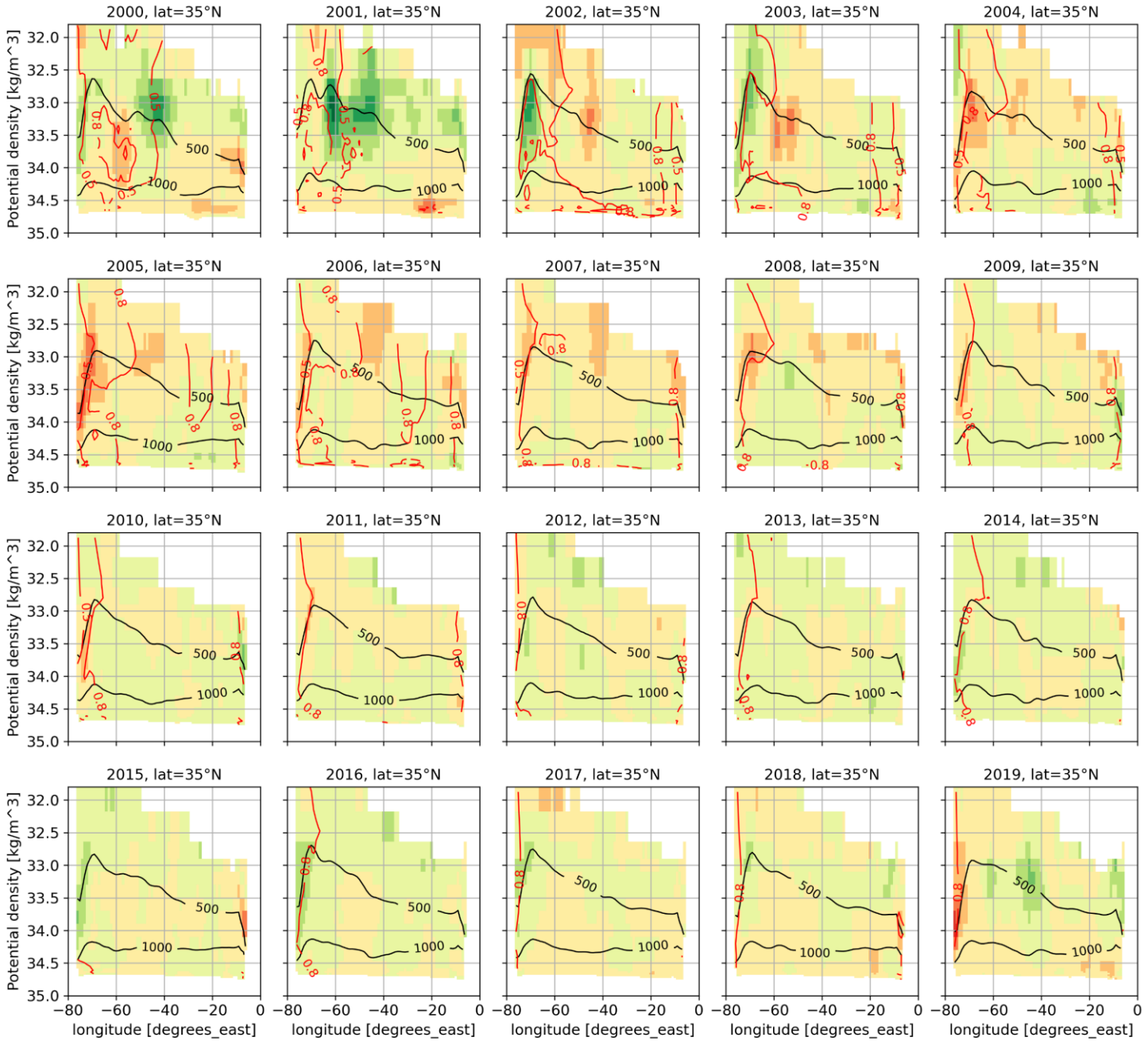
SALINITY

35°N section

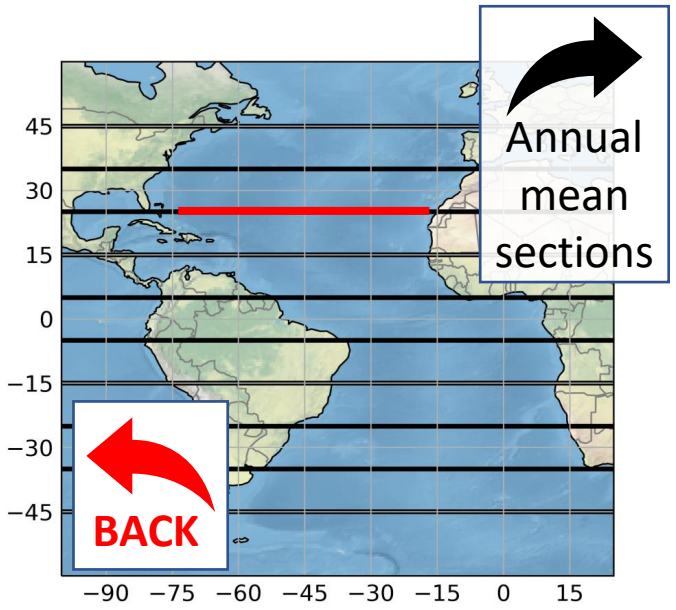


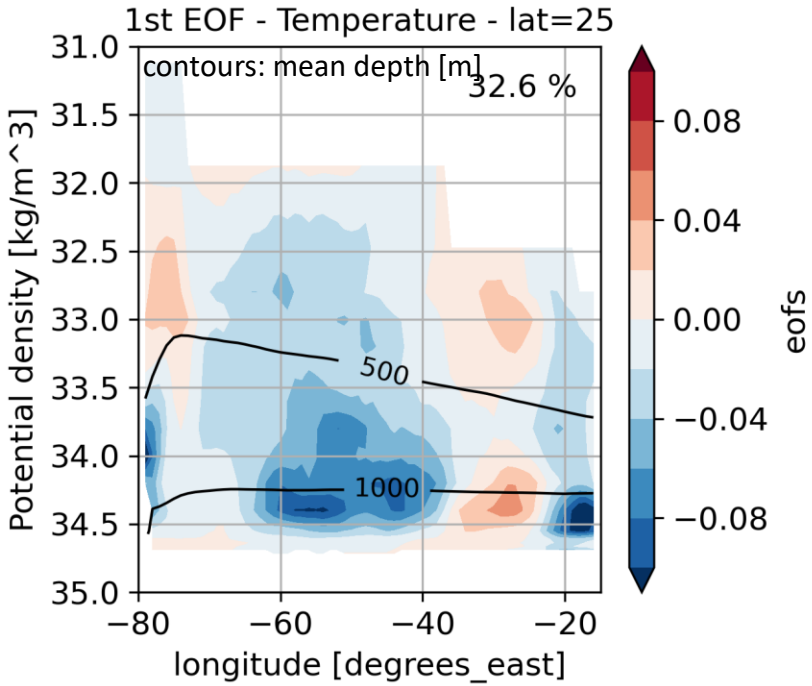


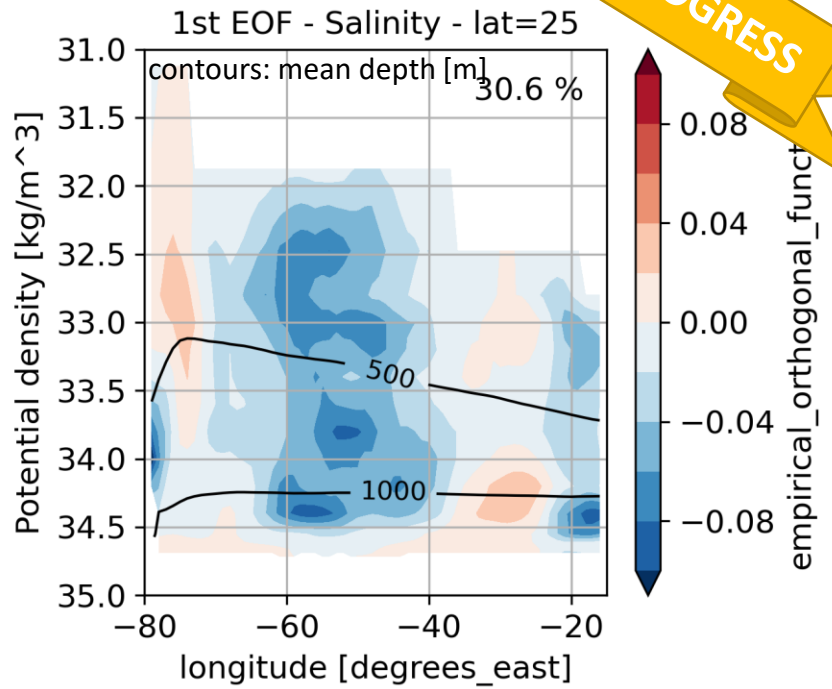
BACK

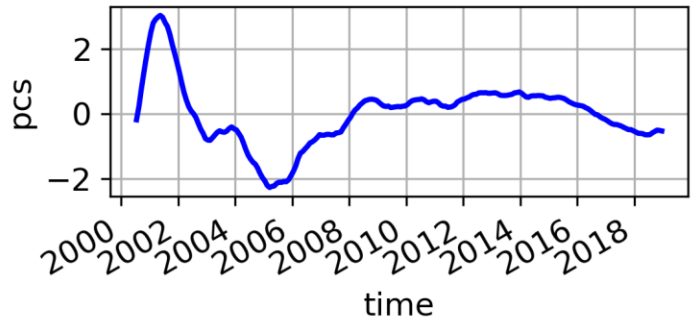
Preliminary results – 25°N section

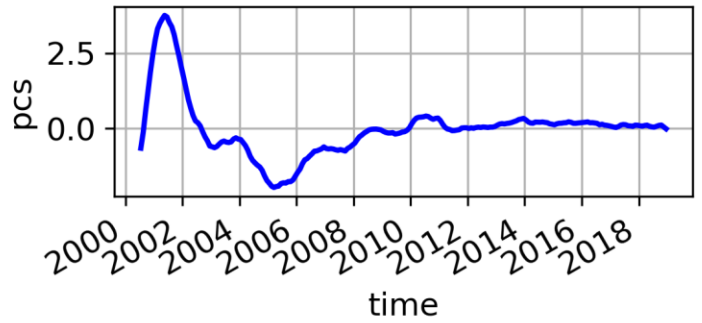
WORK IN PROGRESS











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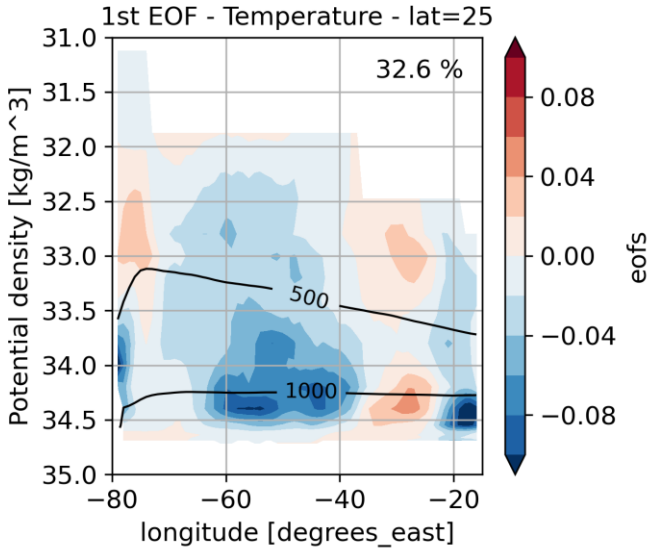
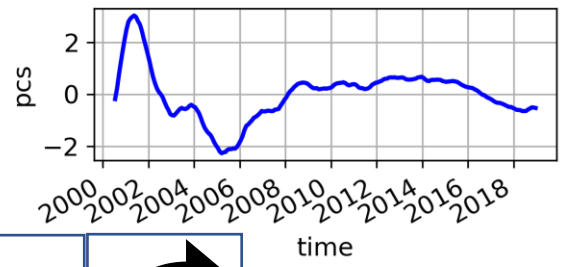
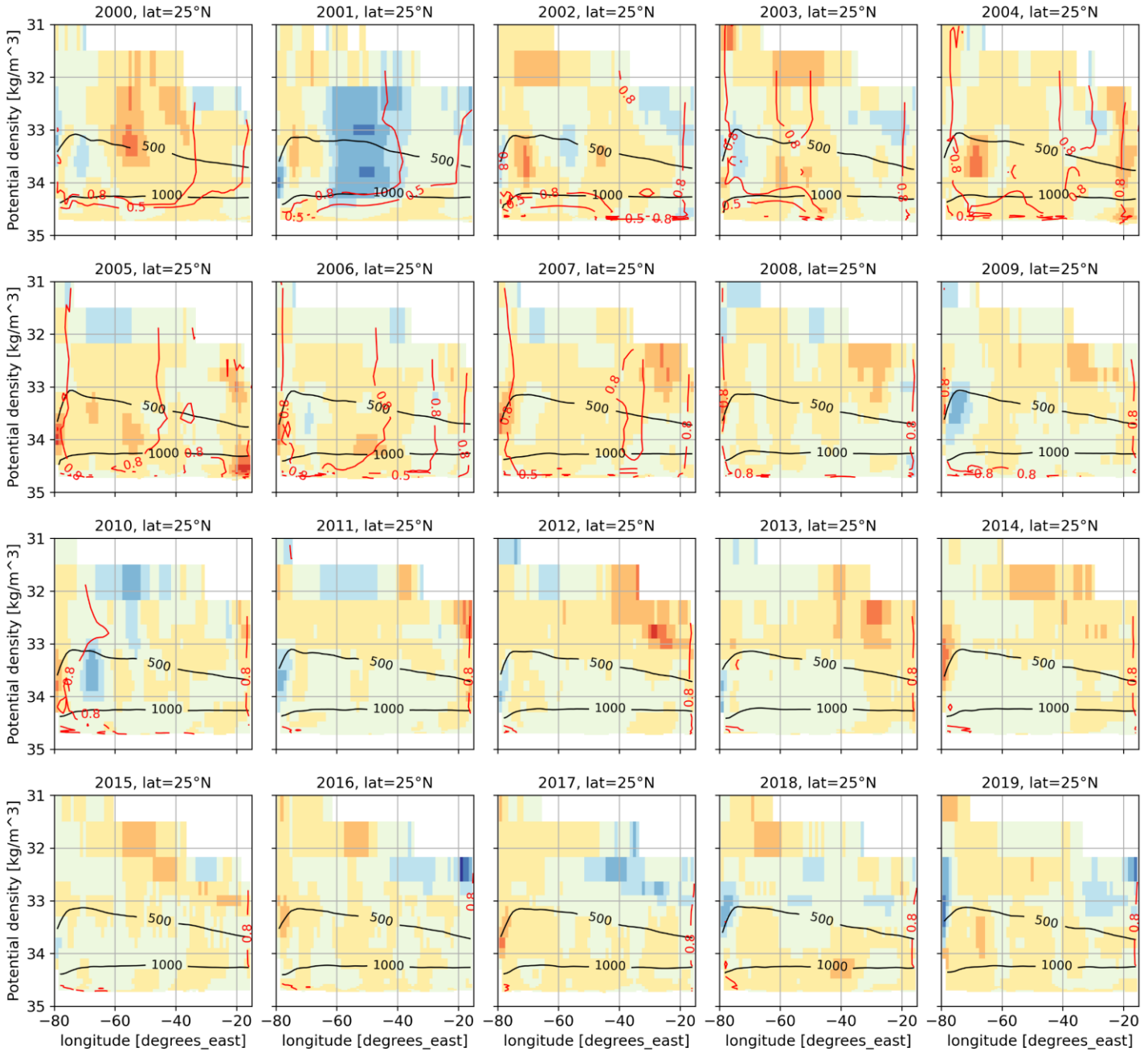
TEMPERATURE

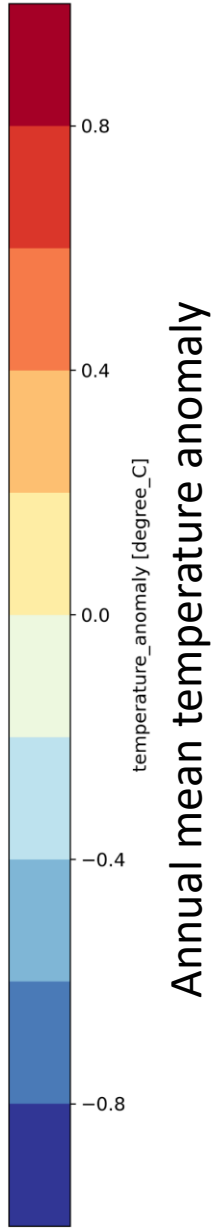
25°N section





BACK SAL.





iAtlantic INTEGRATED ASSESSMENT OF ATLANTIC MARINE ECOSYSTEMS IN SPACE AND TIME

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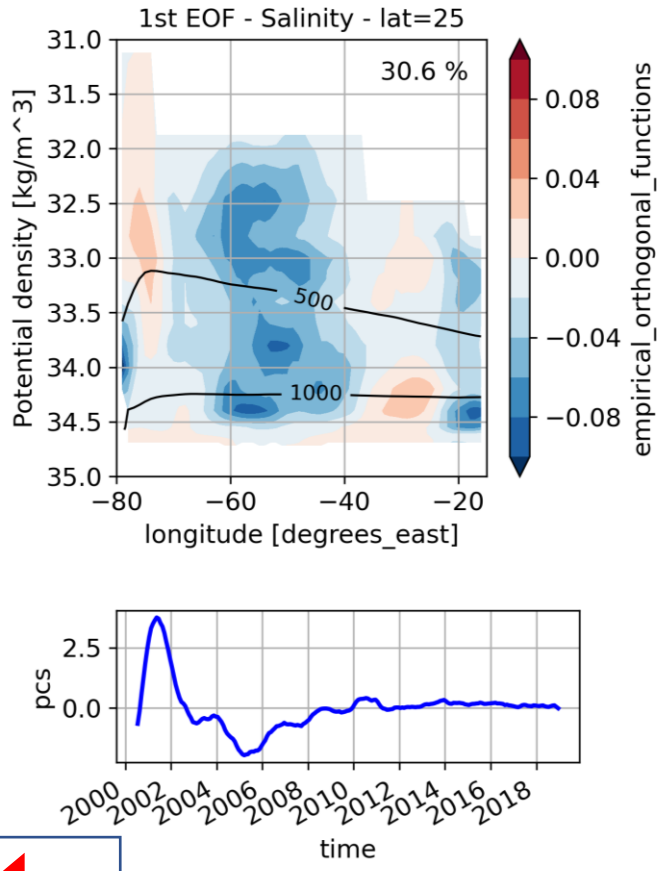
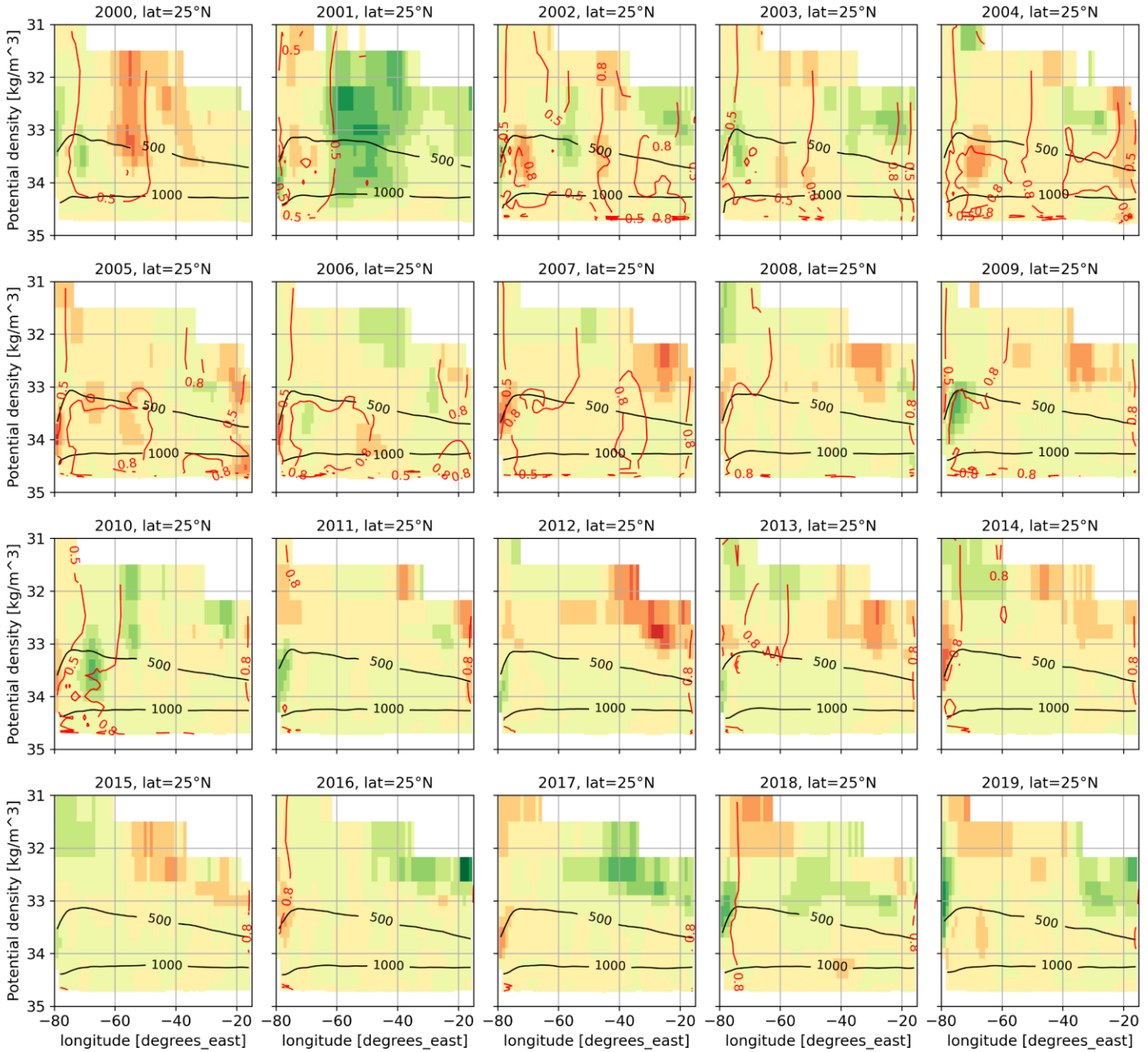
SALINITY

25°N section

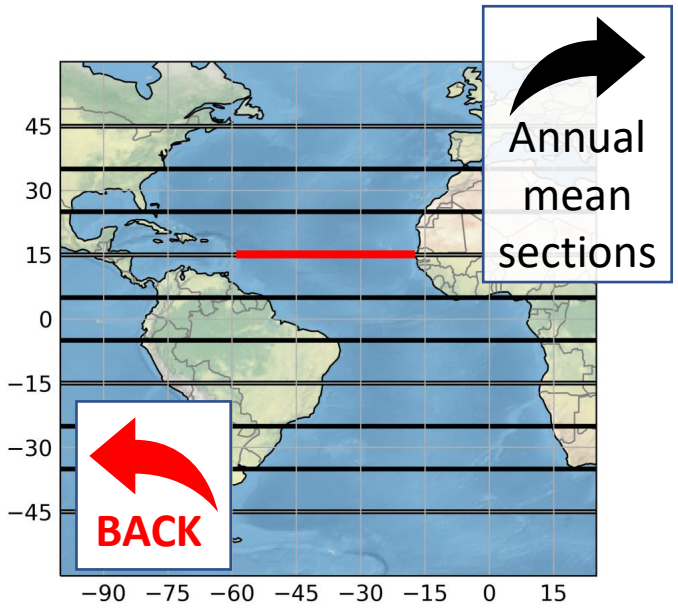


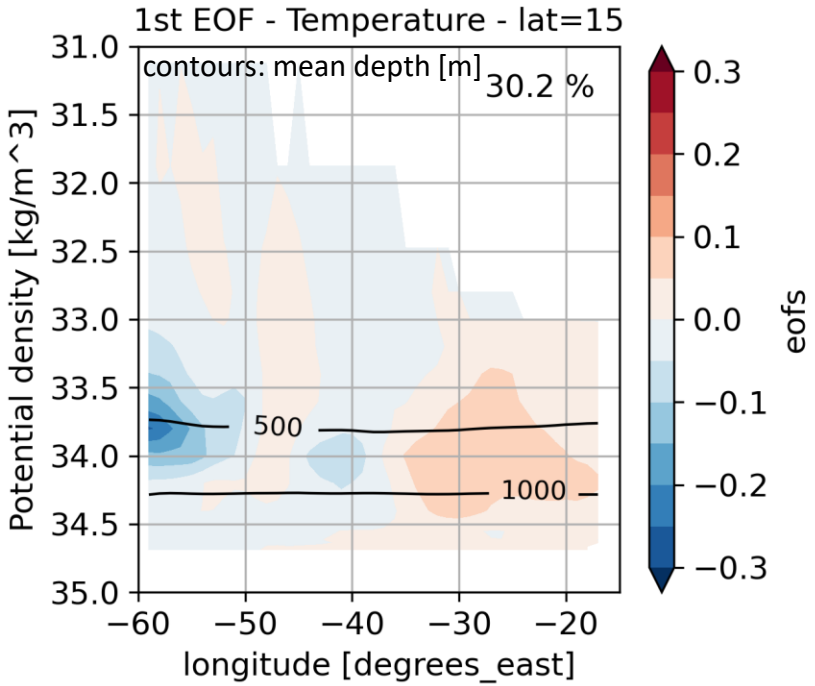


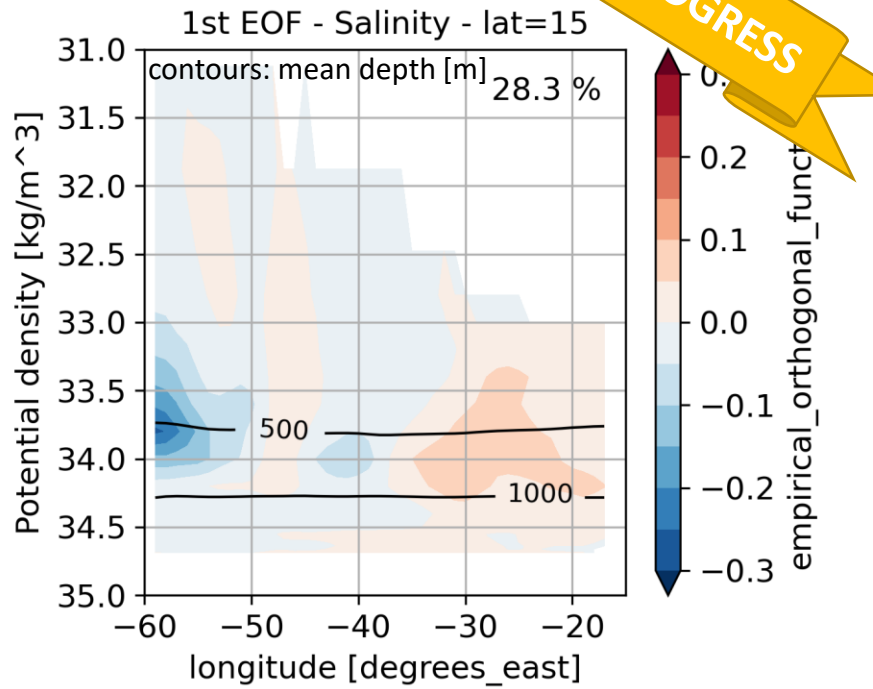
BACK

Preliminary results – 15°N section

WORK IN PROGRESS

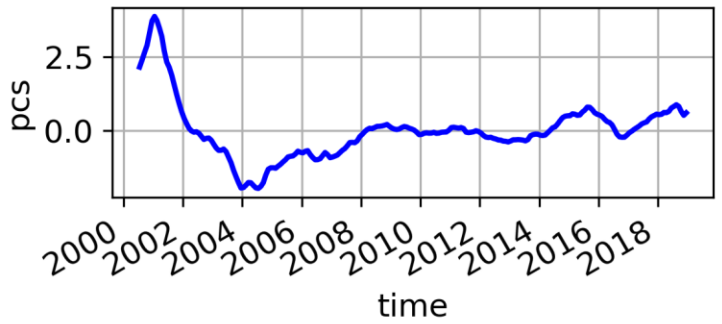


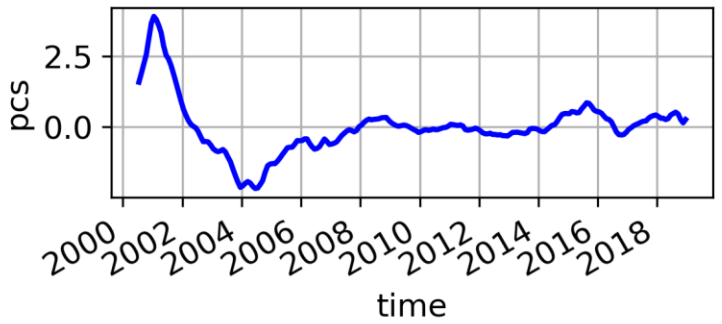




Western boundary changes: Warm and salty / cold and fresh

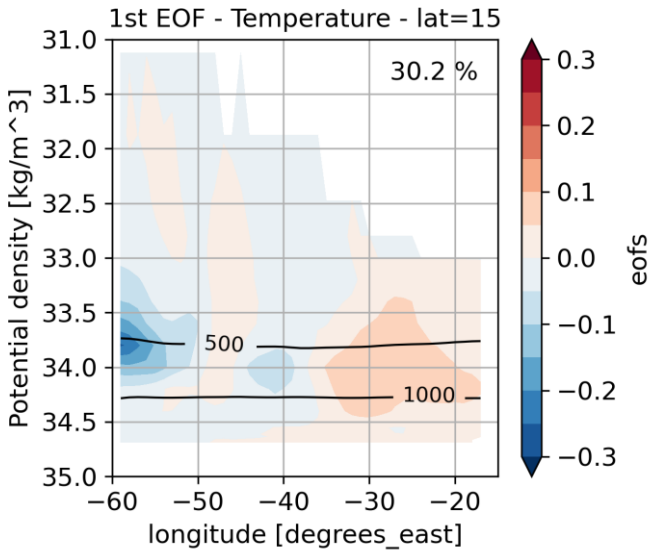
Link to water mass changes in southern hemisphere trans-ported by North Brazil Current (see 5°N)?

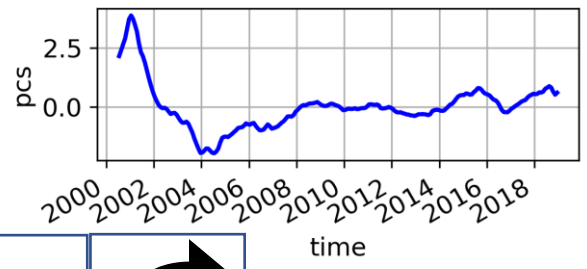




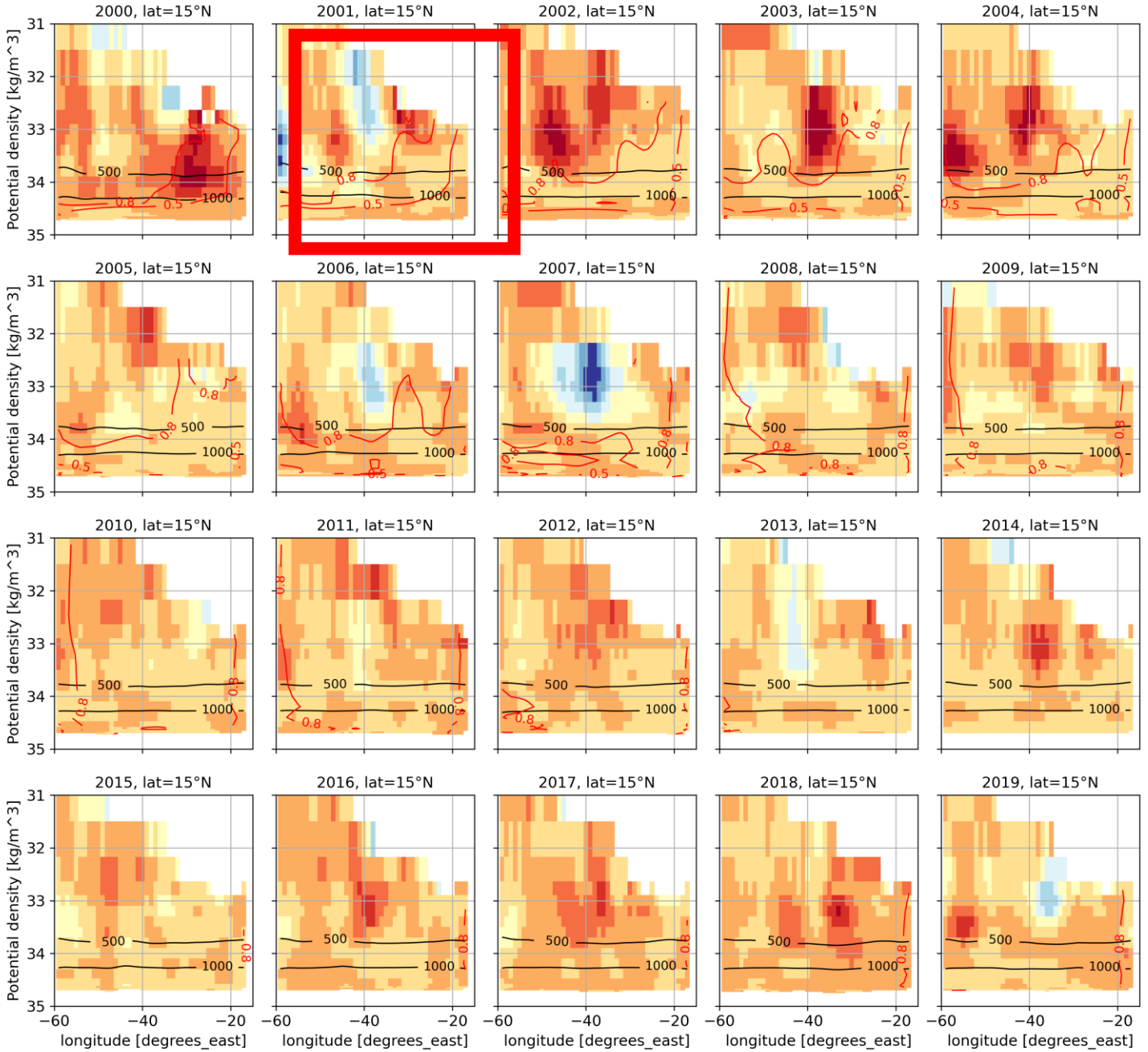
TEMPERATURE

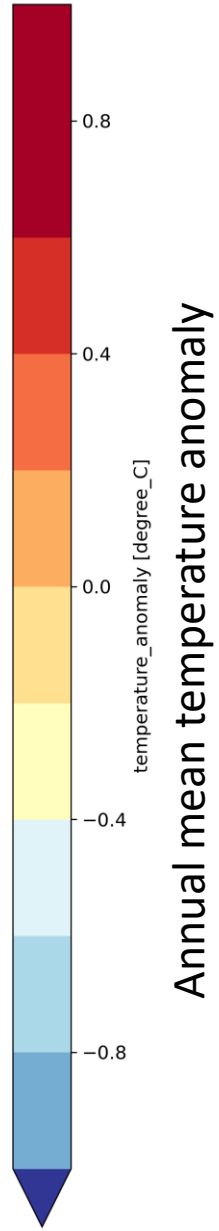
15°N section





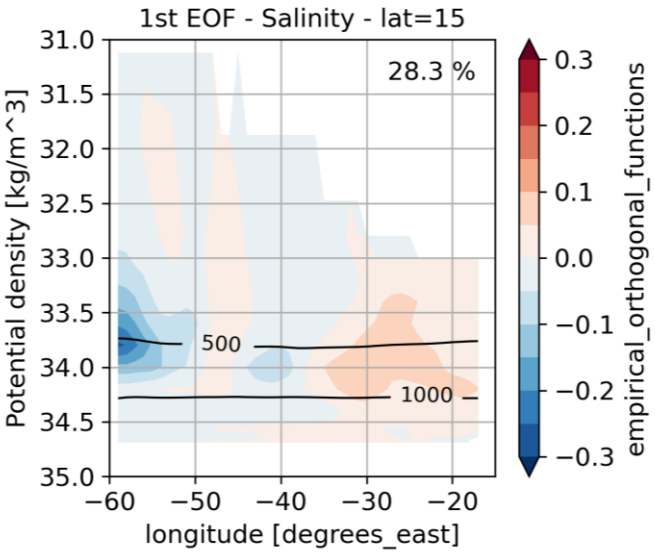
BACK SAL.

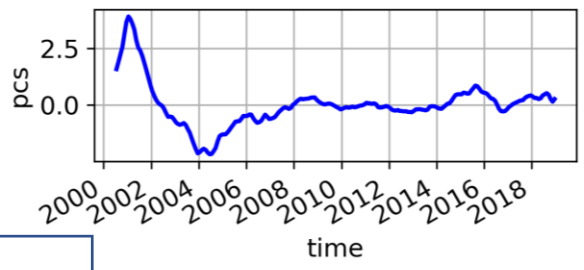


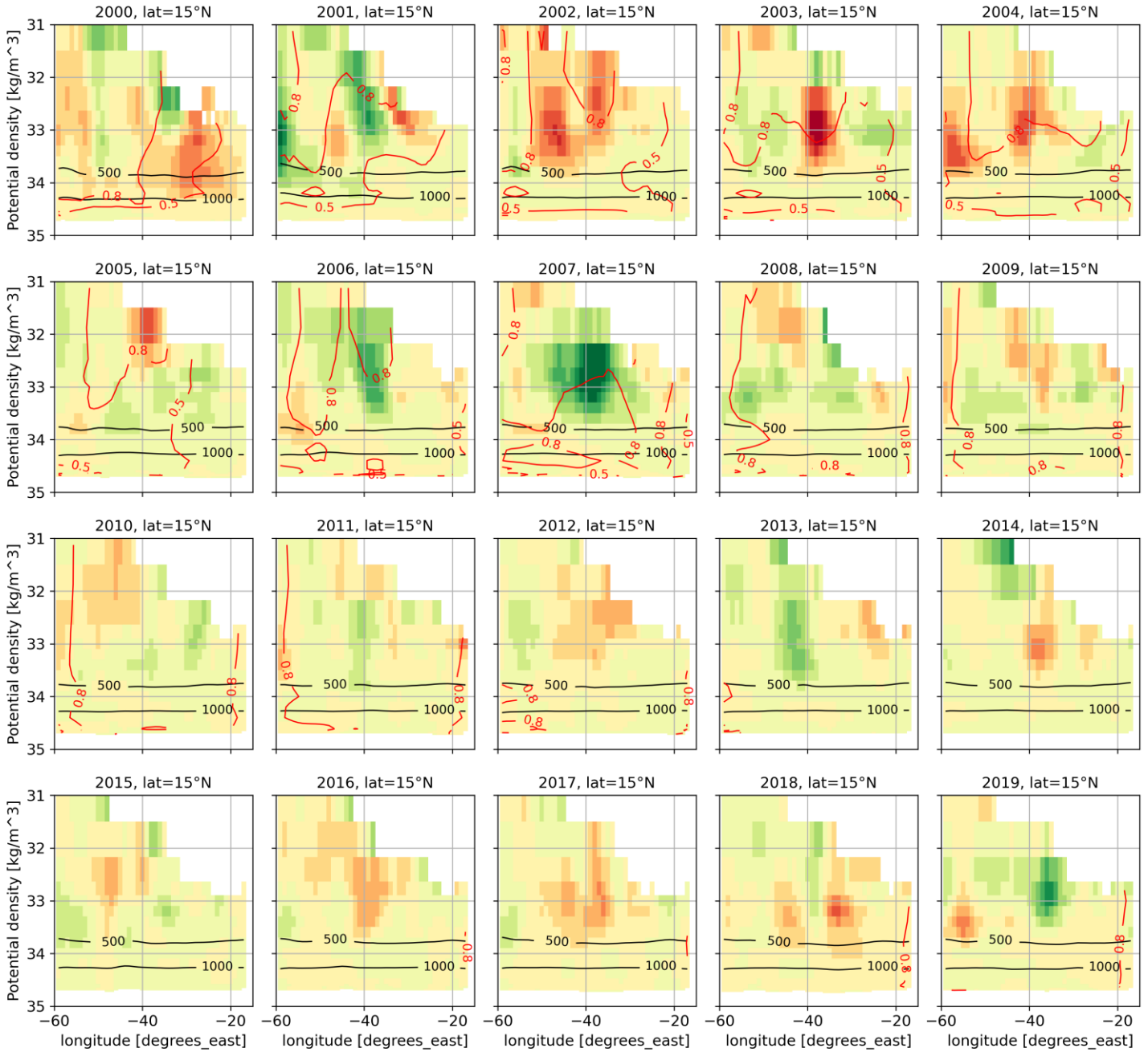


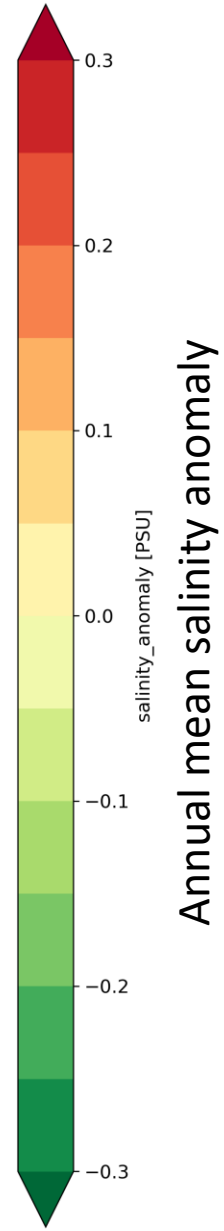
SALINITY

15°N section





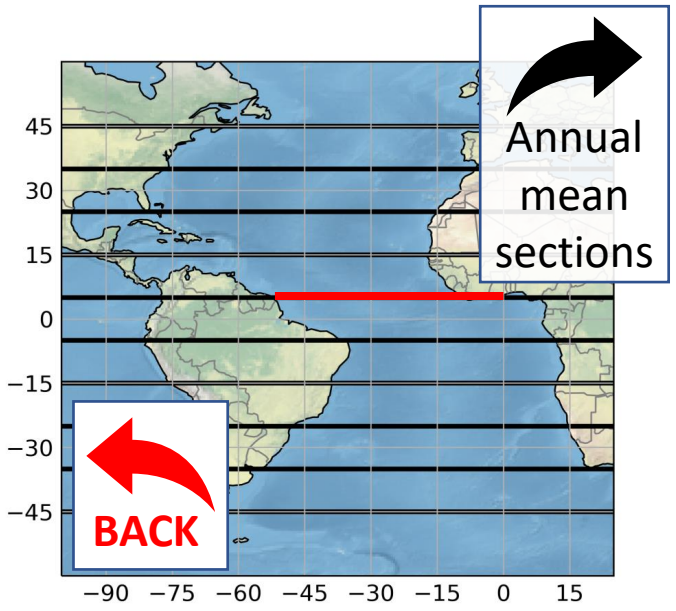


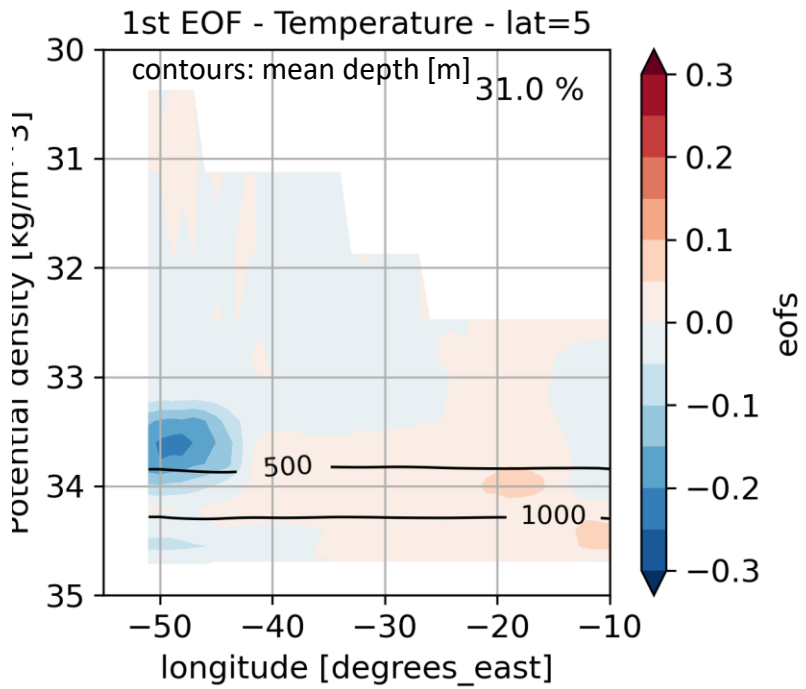


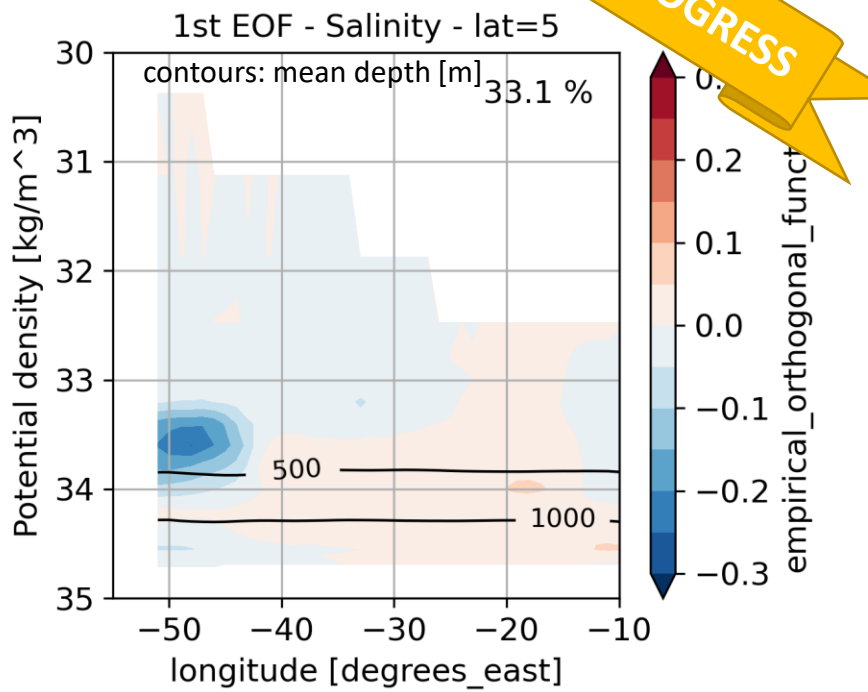
BACK

Preliminary results – 5°N section

WORK IN PROGRESS

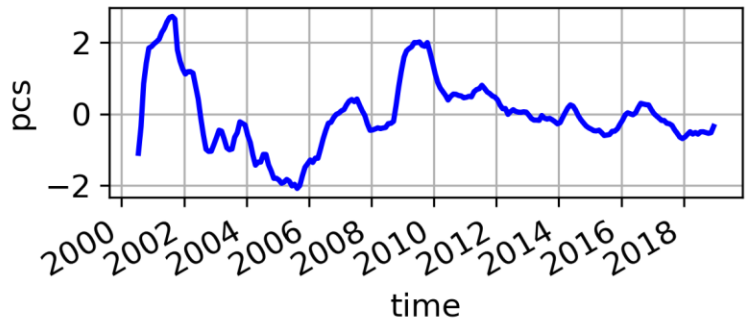


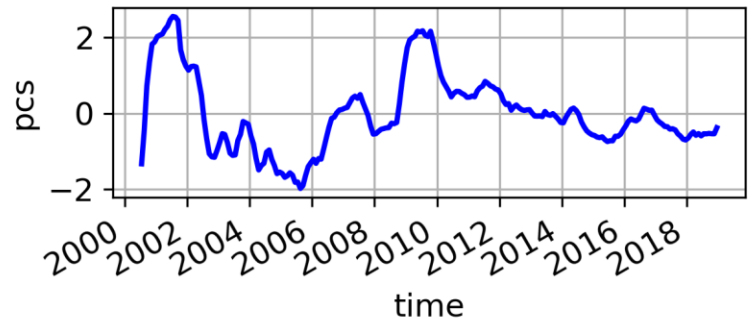




Western boundary changes: Warm and salty / cold and fresh

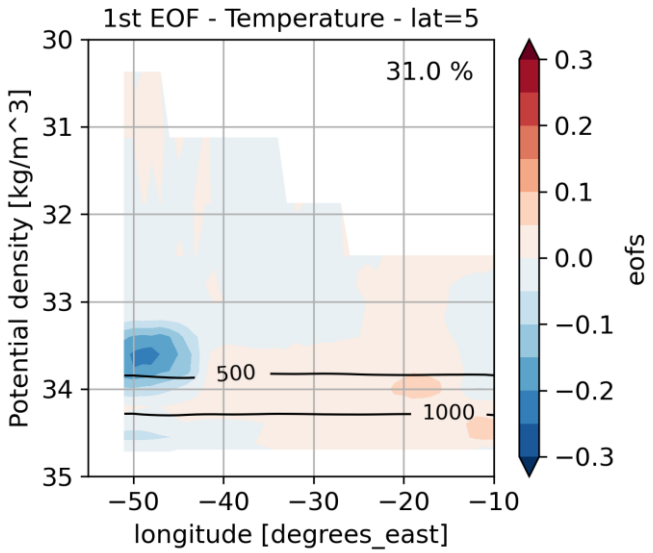
Link to water mass changes in southern hemisphere trans-ported by North Brazil Current?

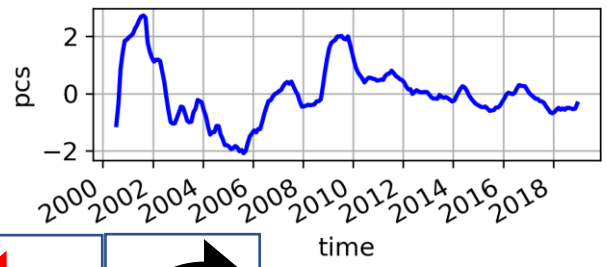




TEMPERATURE

5°N section





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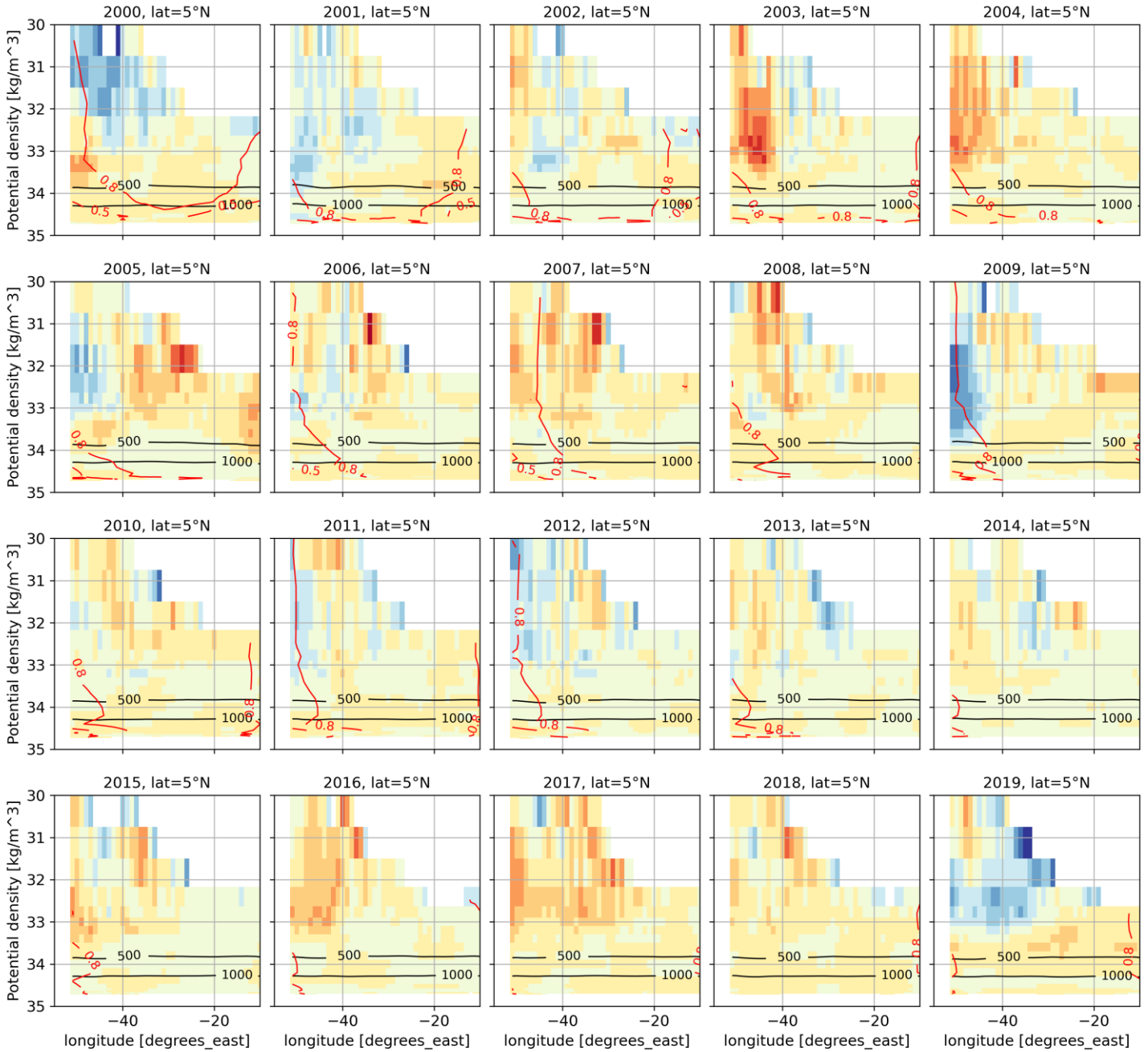

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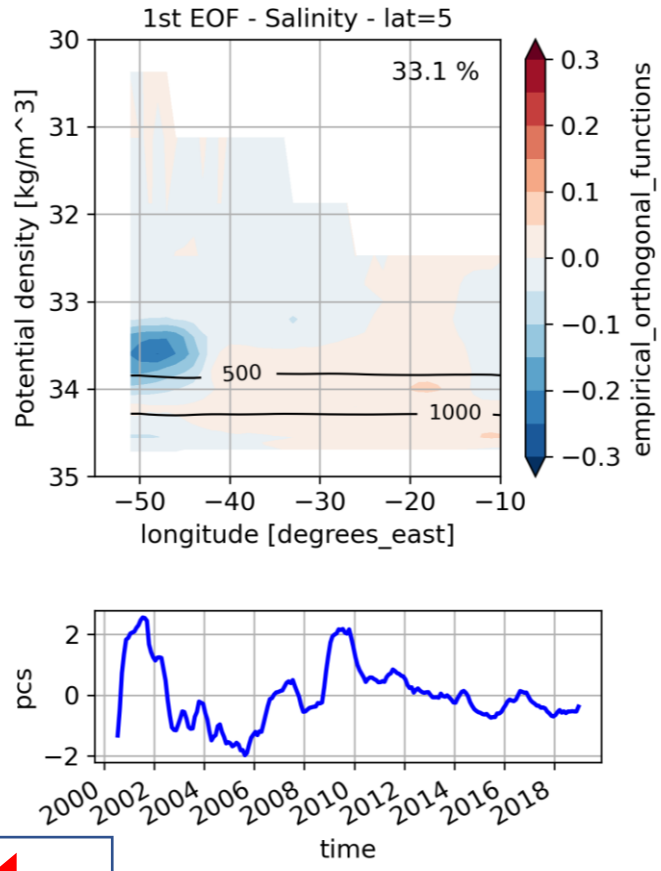
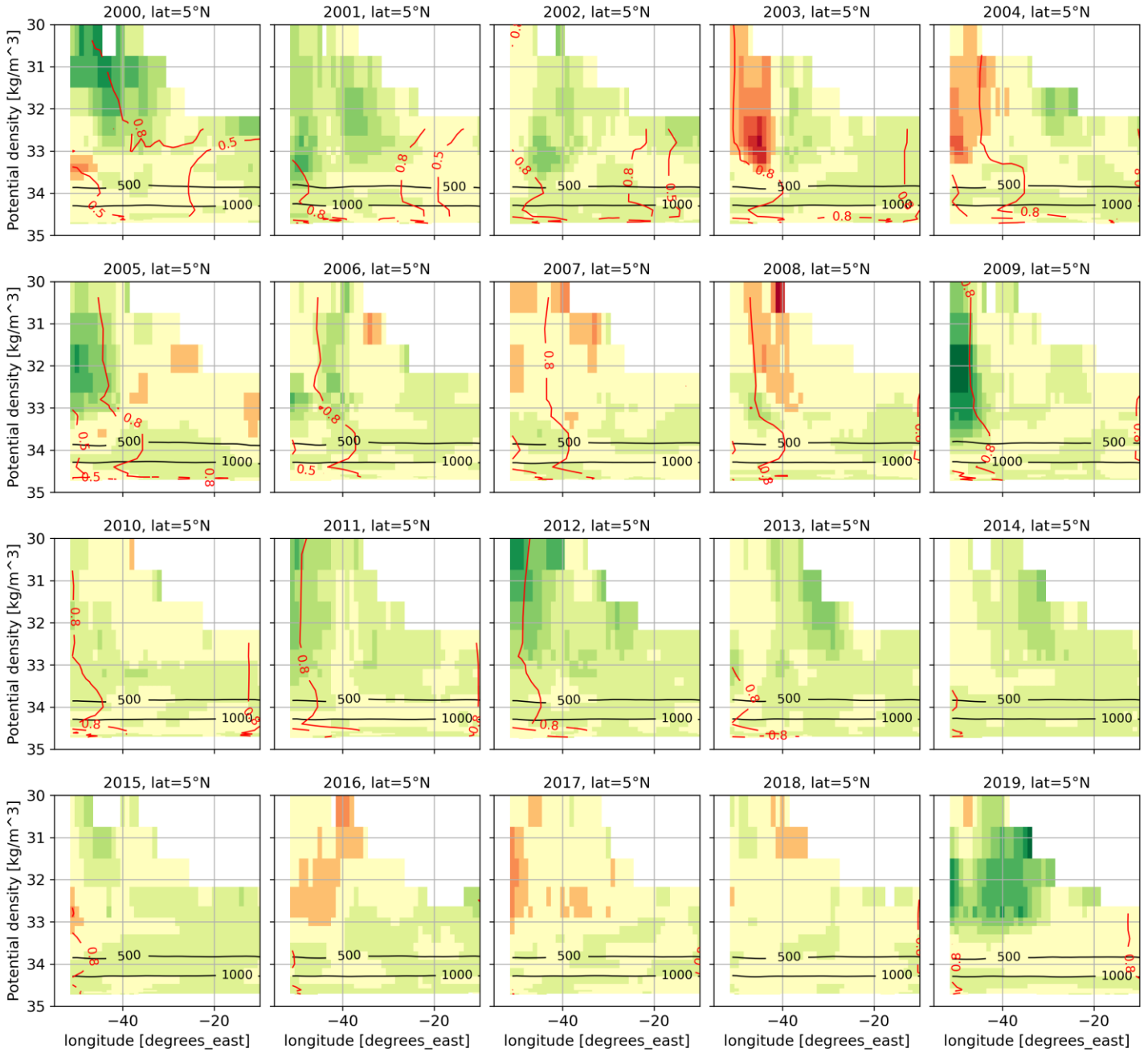
SALINITY

5°N section

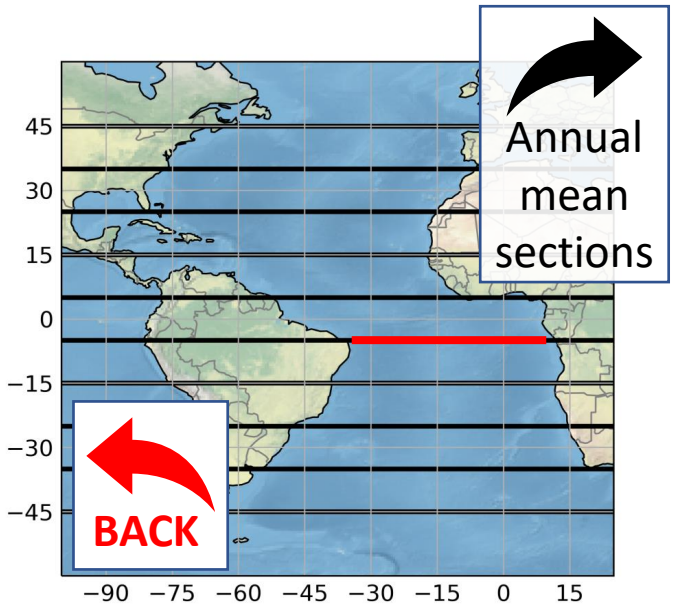


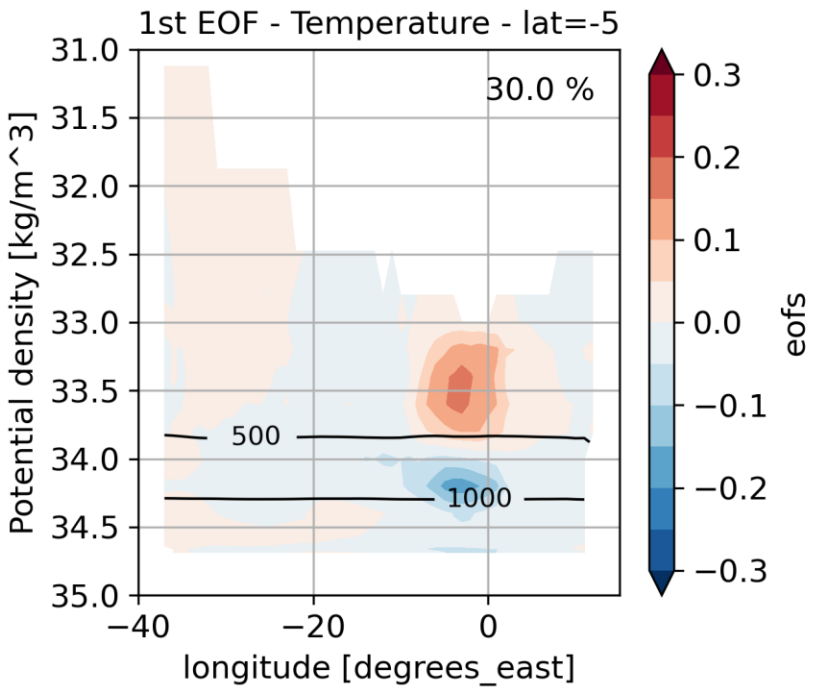


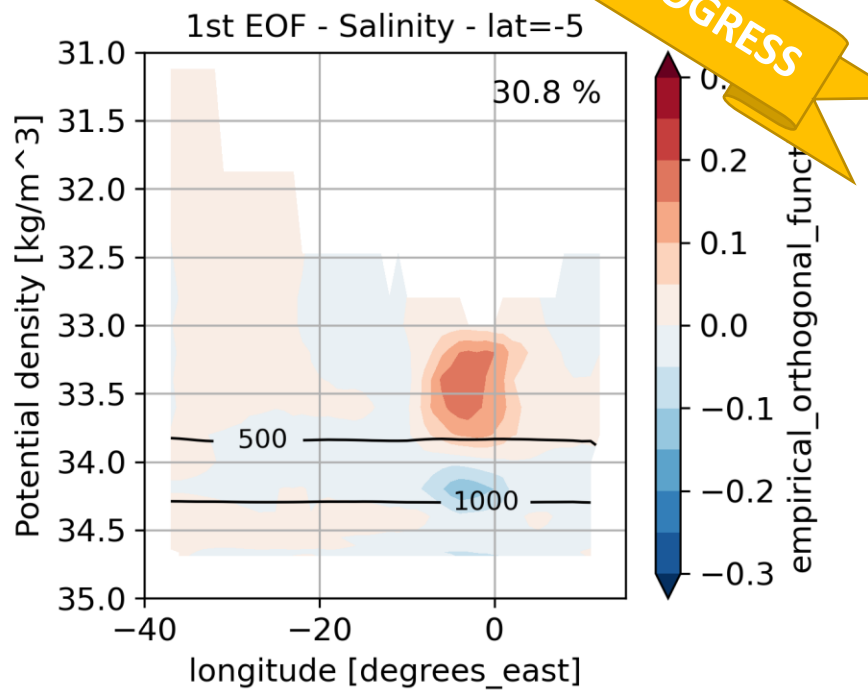
BACK

Preliminary results – 5°S section

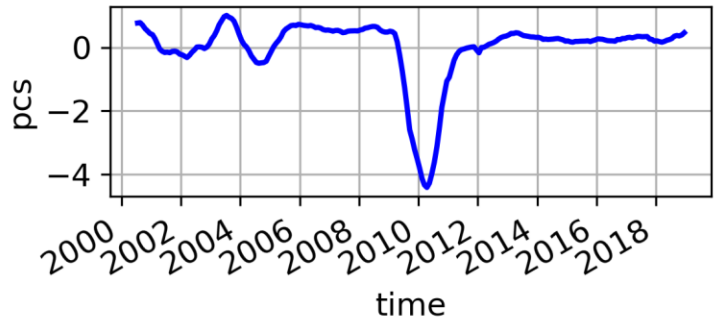
WORK IN PROGRESS

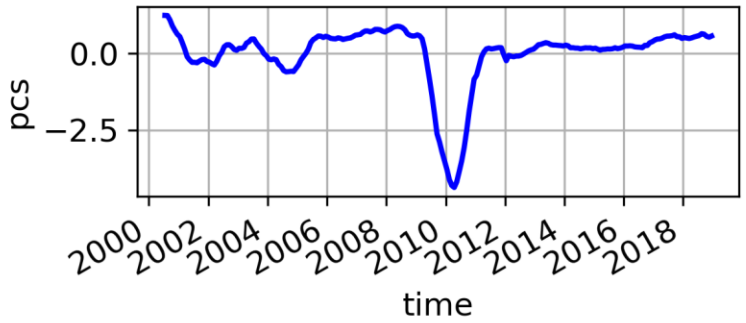






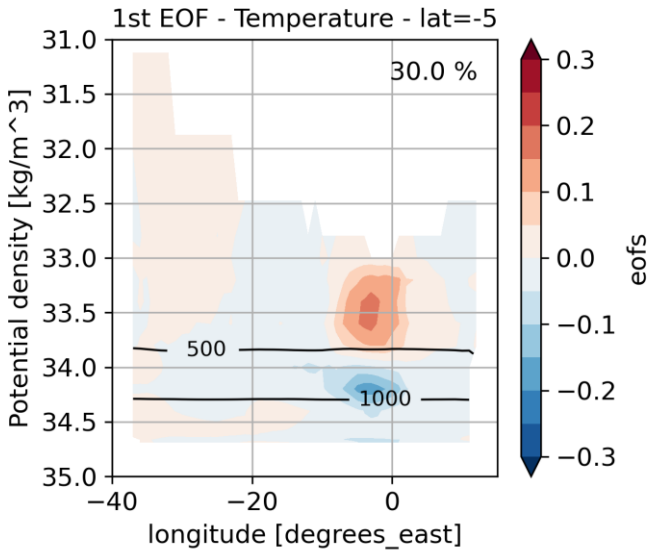
Seems spurious. Data problem?

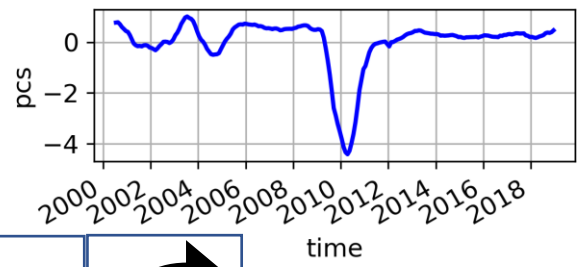




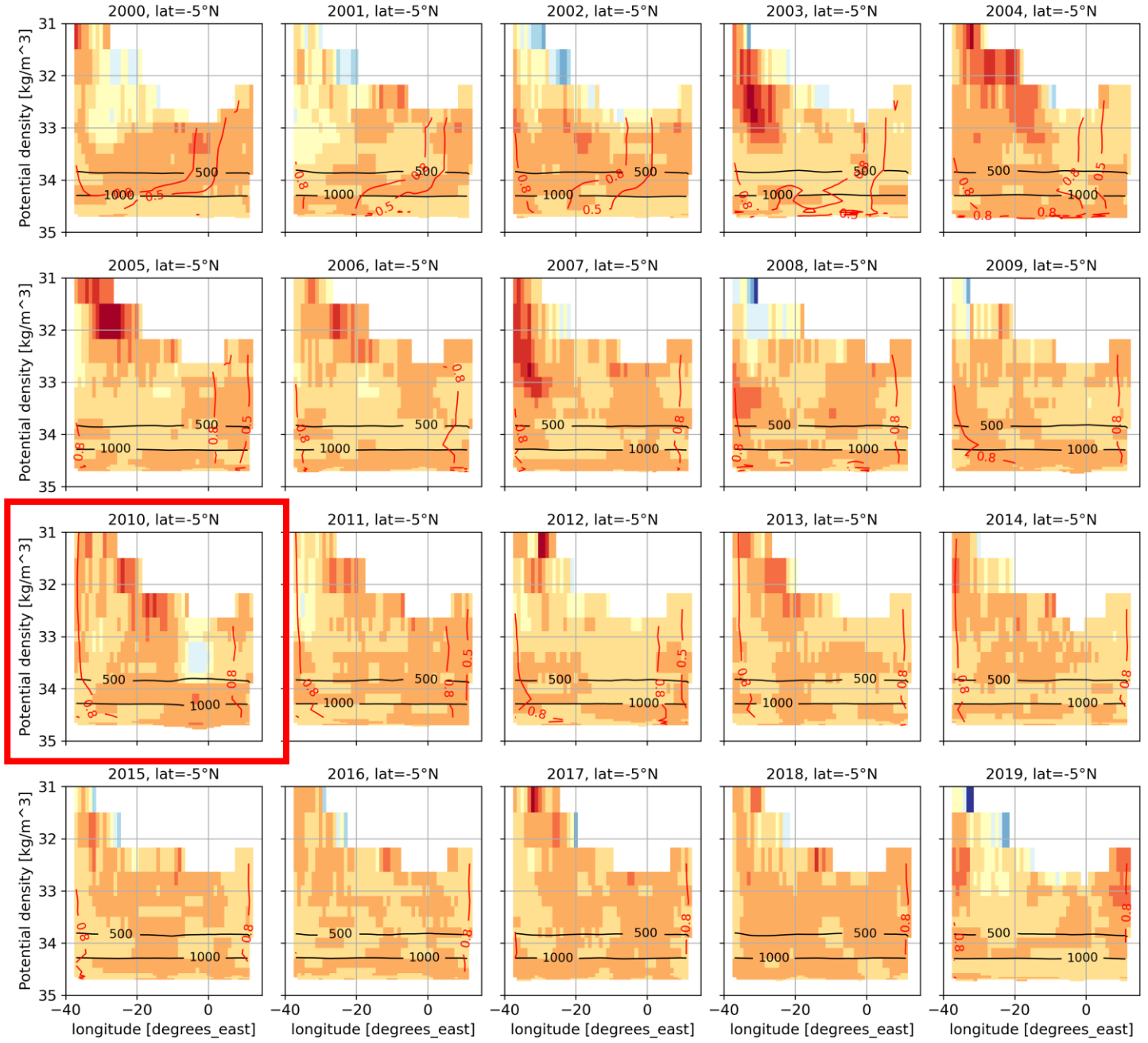
TEMPERATURE

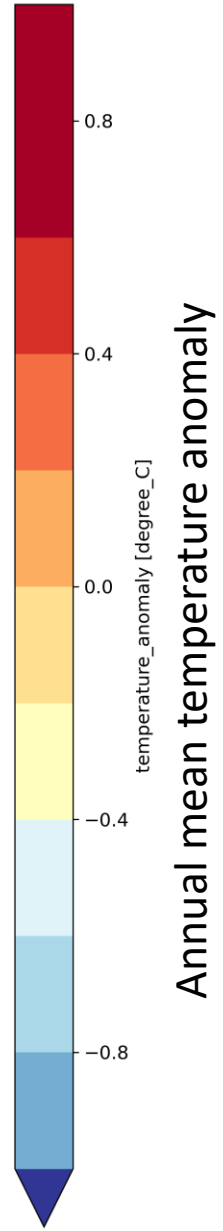
5°S section





BACK SAL.





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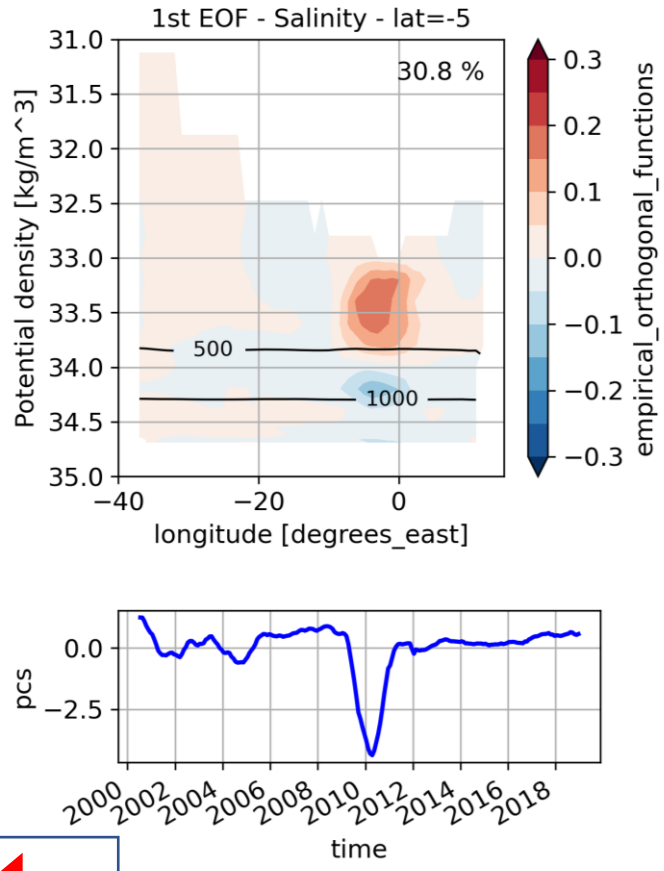
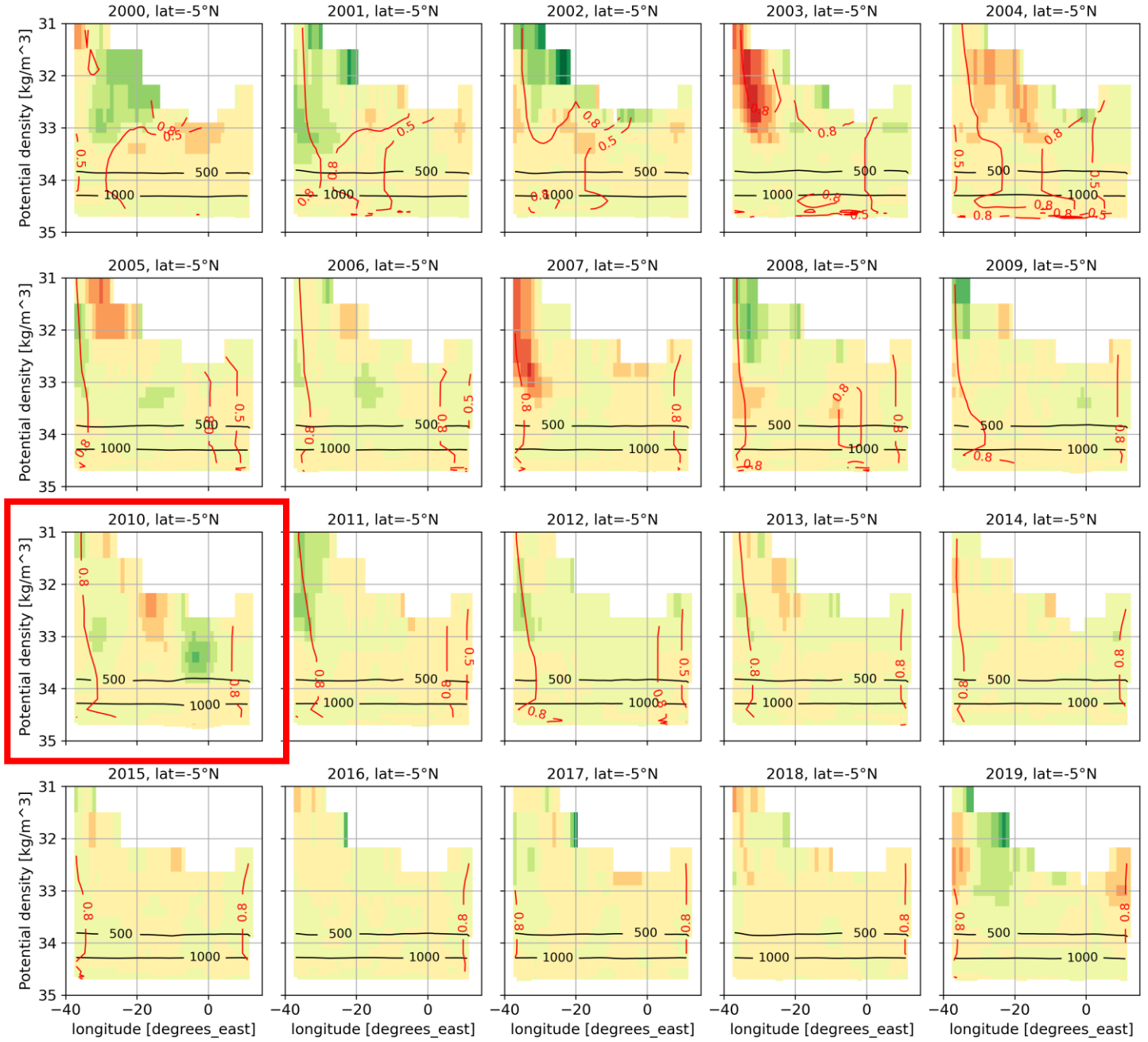
SAMS Scottish Association for Marine Science

SALINITY

5°S section

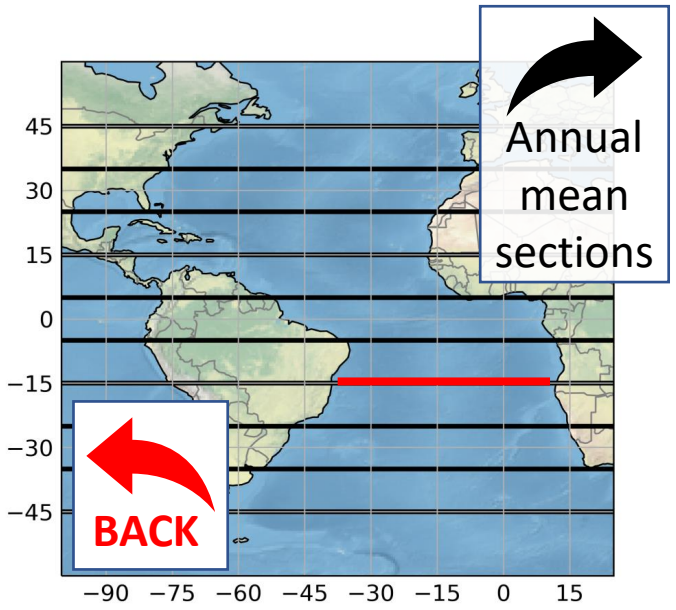




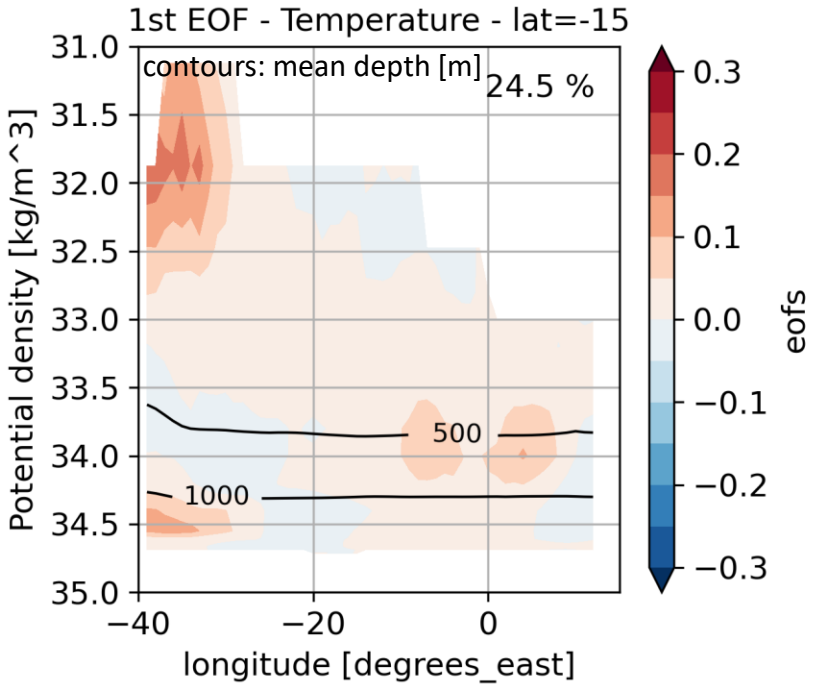
BACK

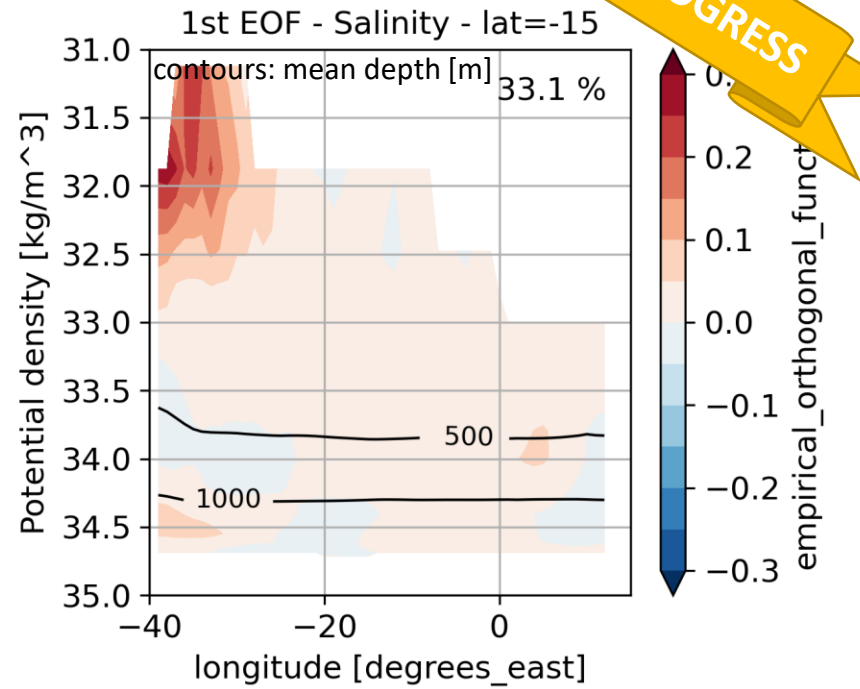
Preliminary results – 15°S section

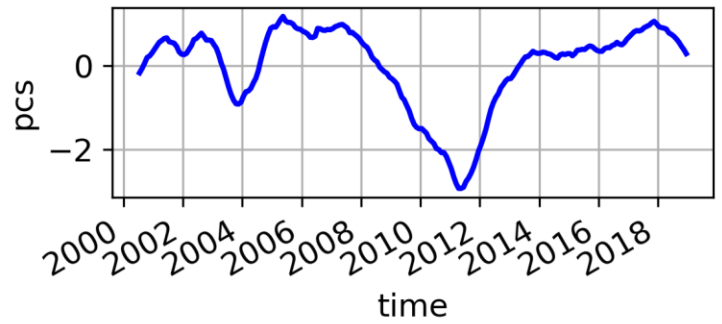
WORK IN PROGRESS

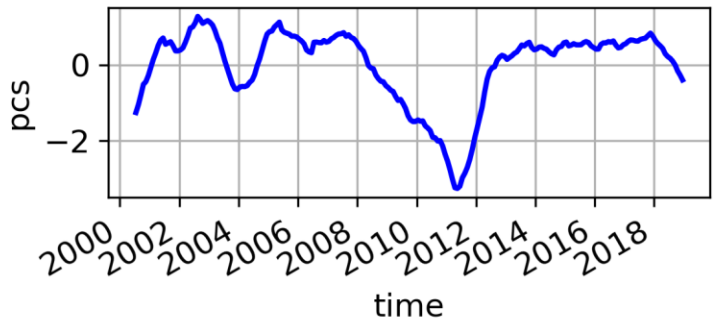


Changes of water masses at western boundary linked to Agulhas leakage (Kolodziejczyk et al., 2014; Hummels et al., 2015)?









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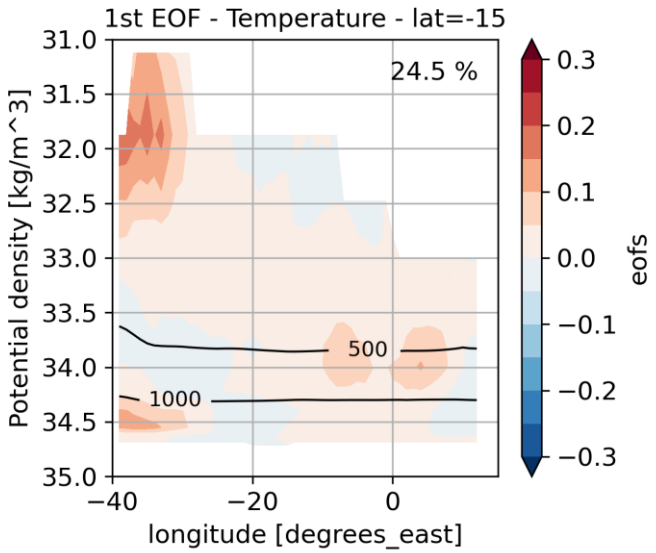
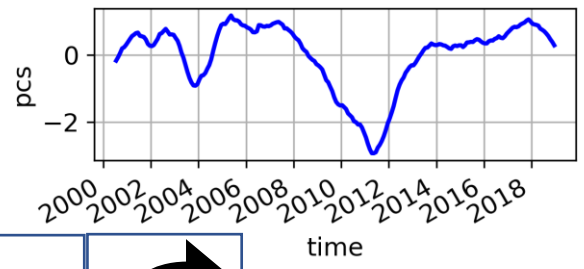
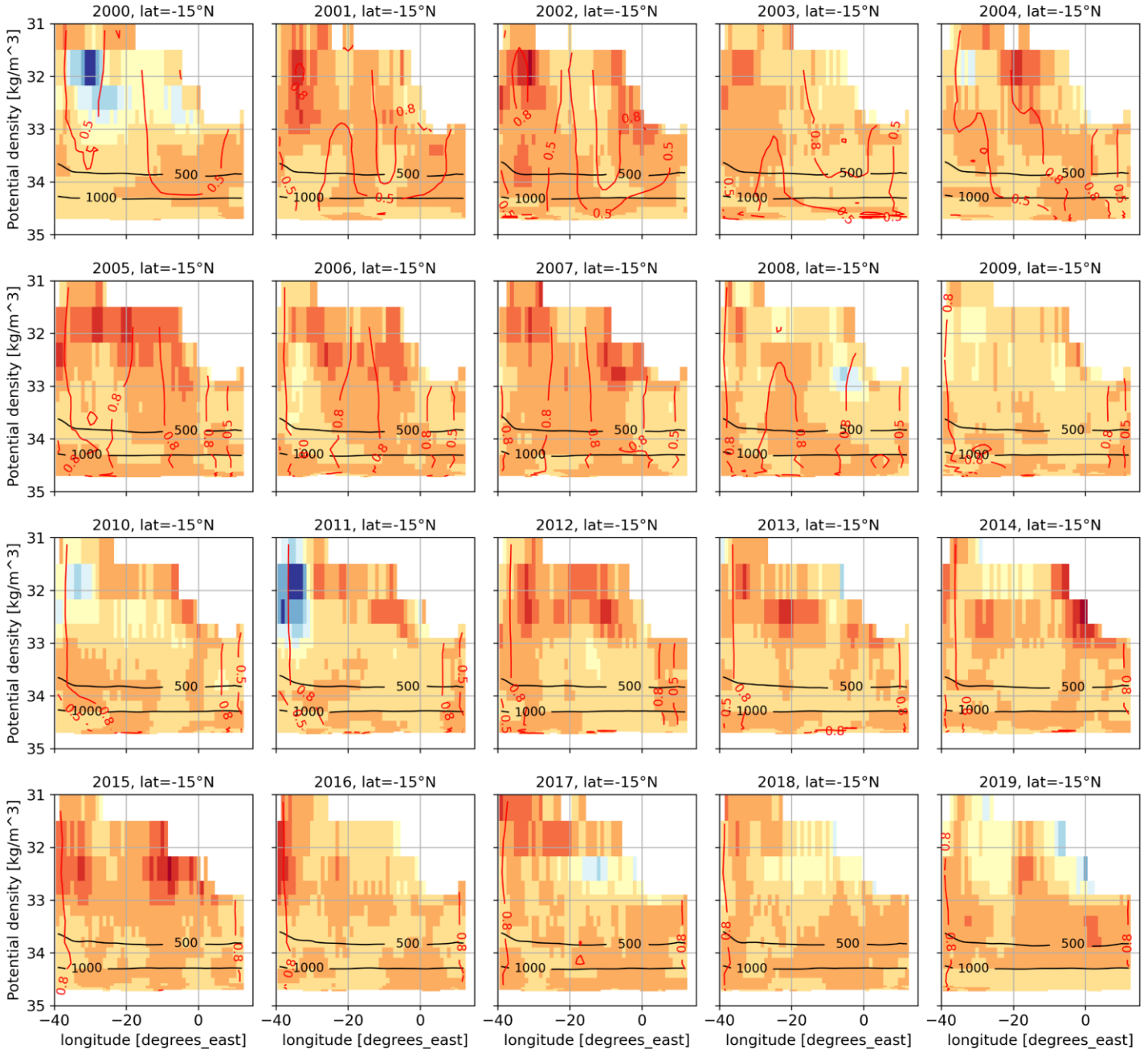
TEMPERATURE

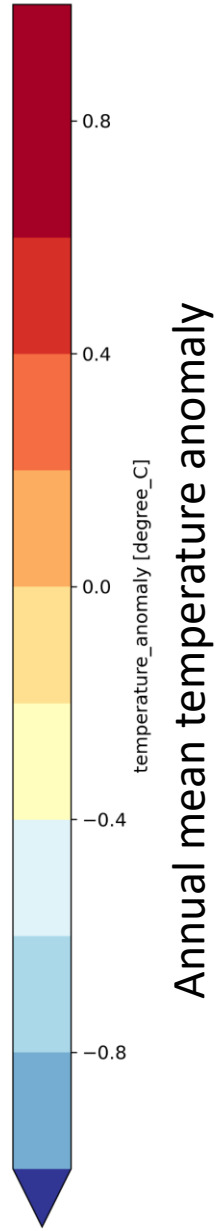
15°S section





BACK SAL.





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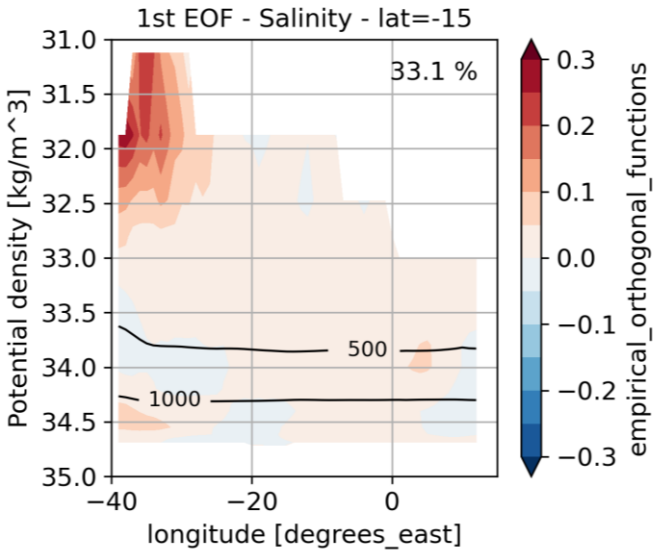
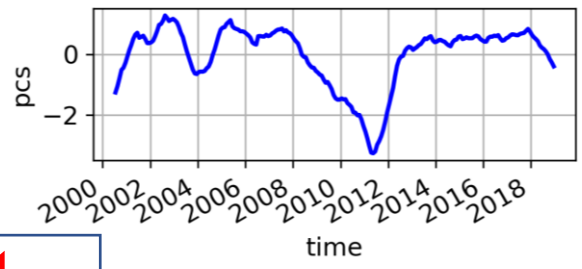
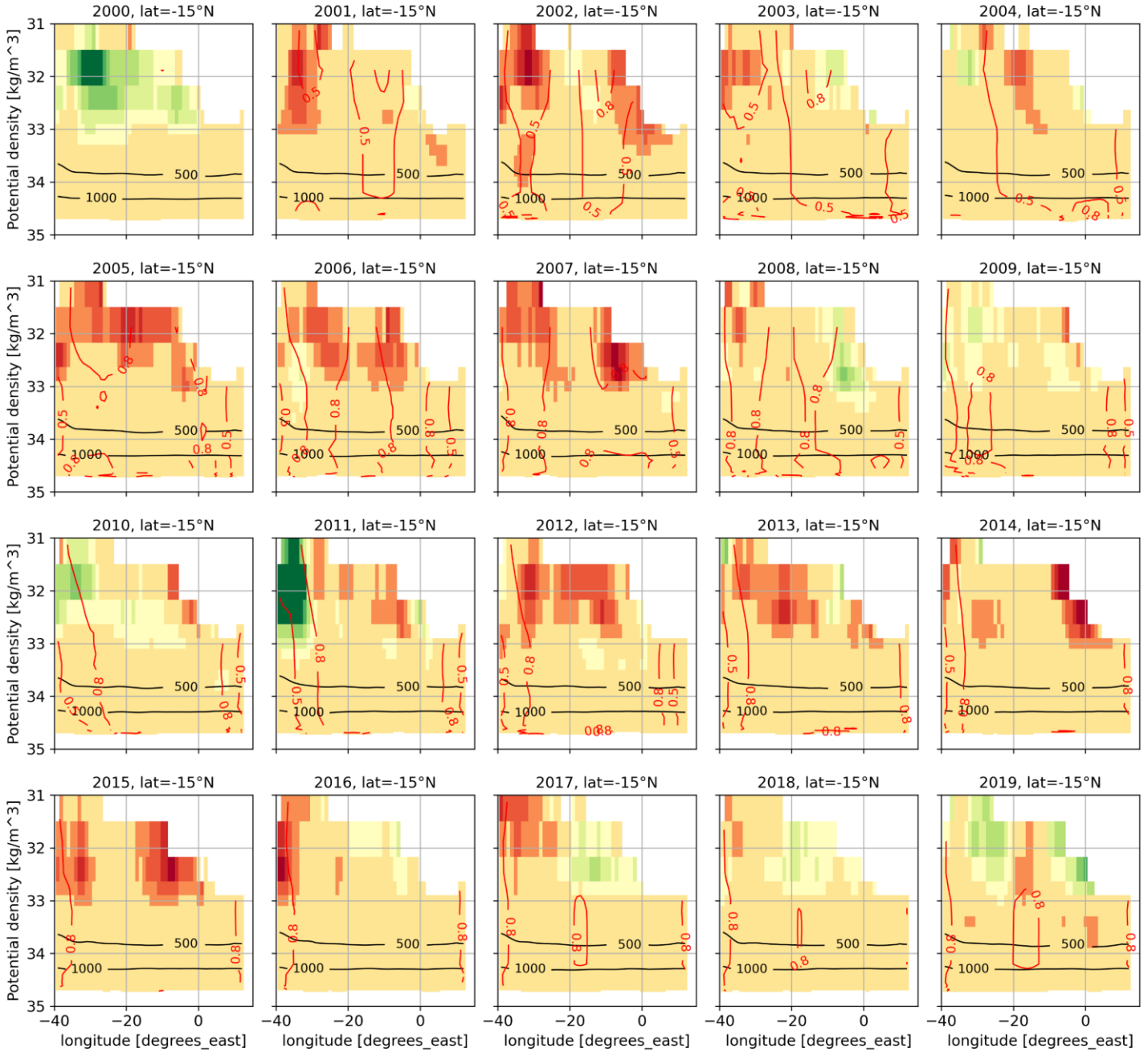
SALINITY

15°S section



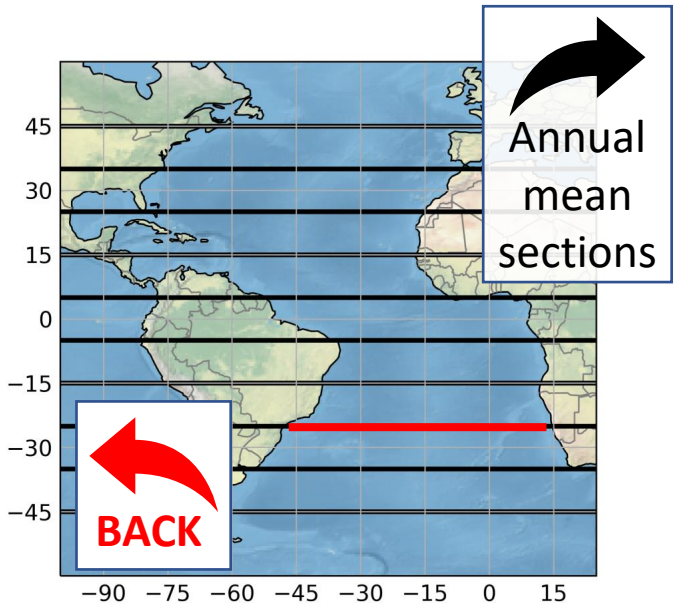




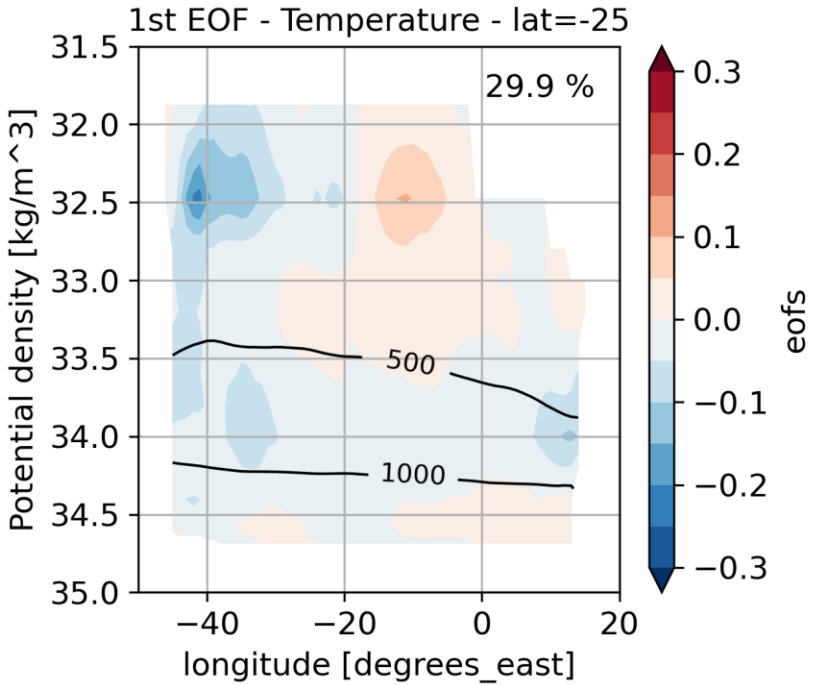
BACK

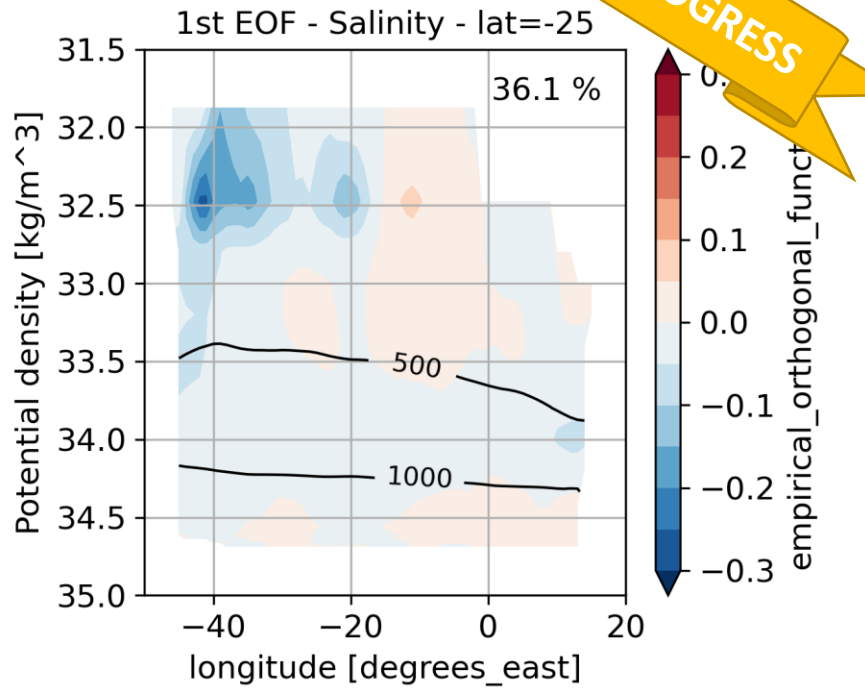
Preliminary results – 25°S section

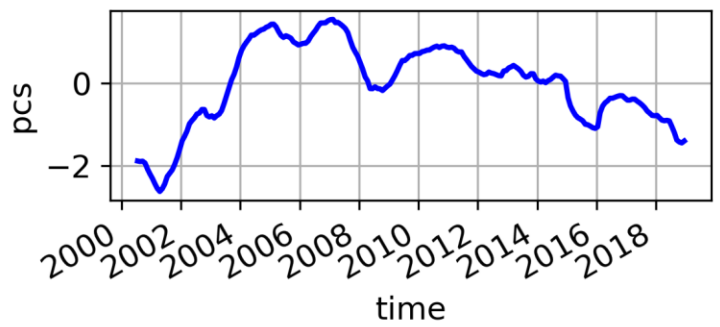
WORK IN PROGRESS

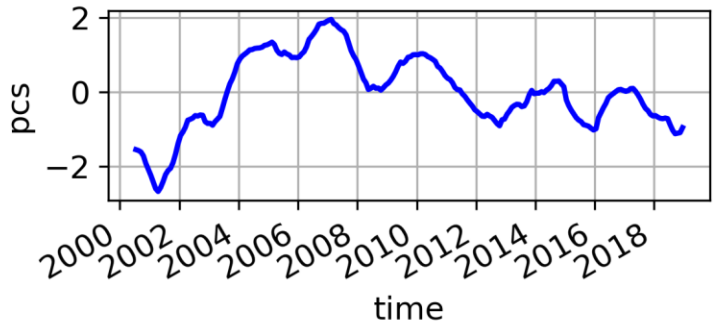


Changes of water masses at western boundary linked to Agulhas leakage (Kolodziejczyk et al., 2014; Hummels et al., 2015)?



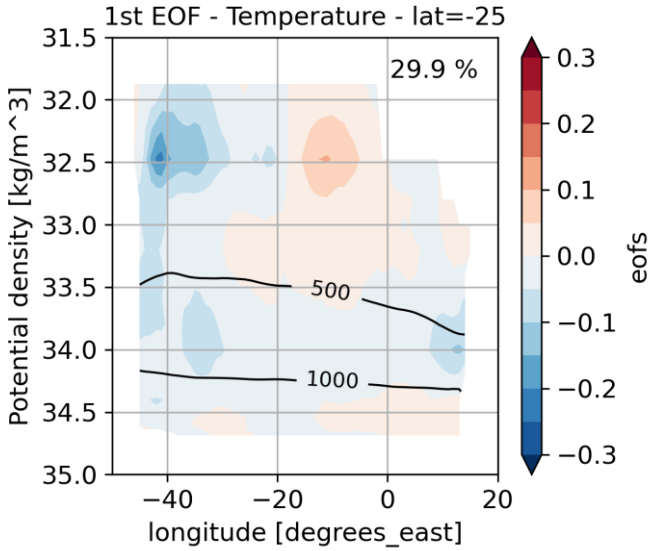


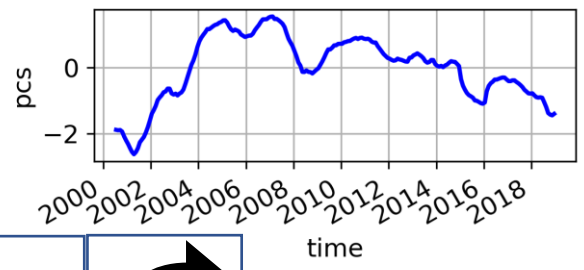




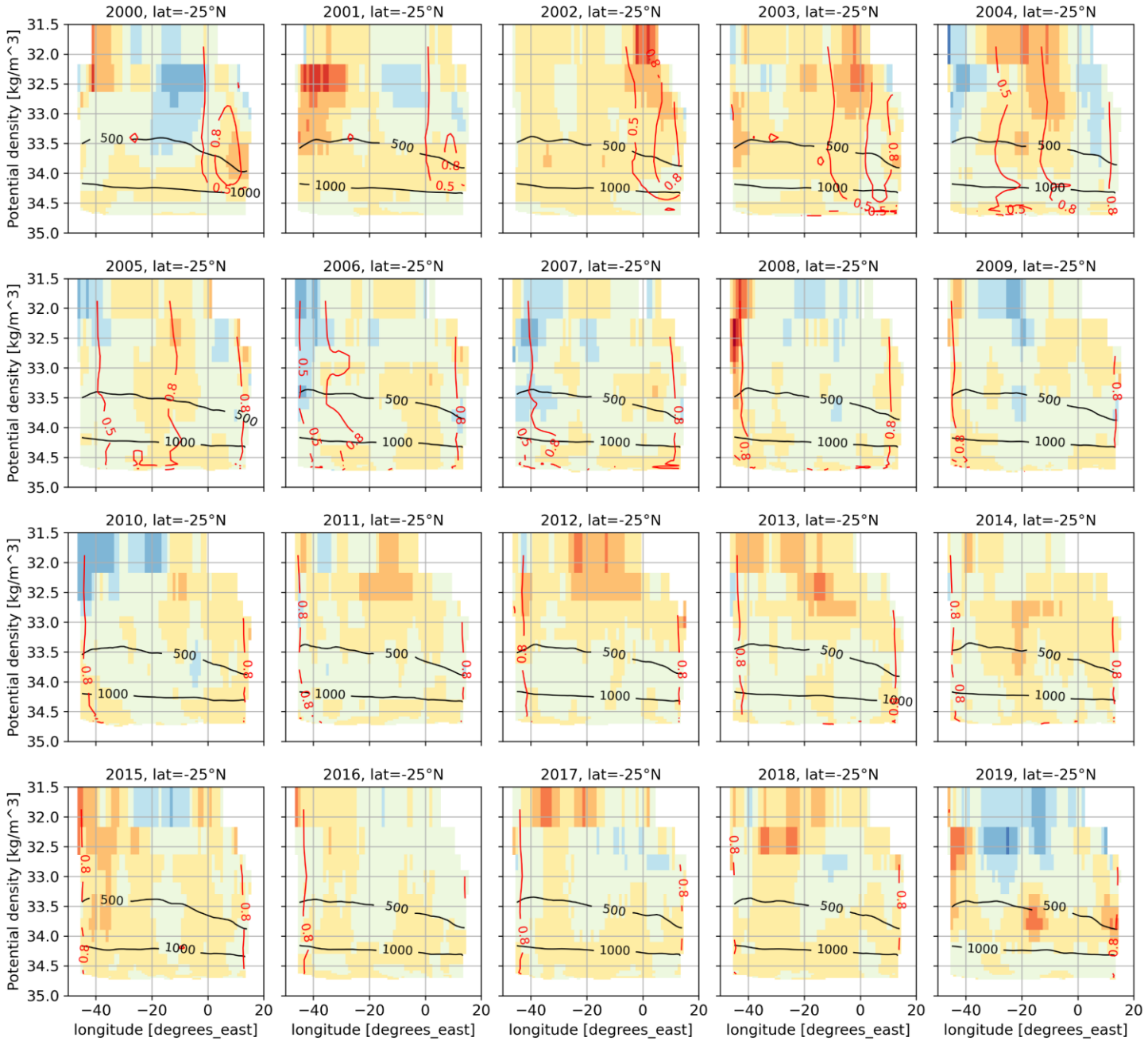
TEMPERATURE

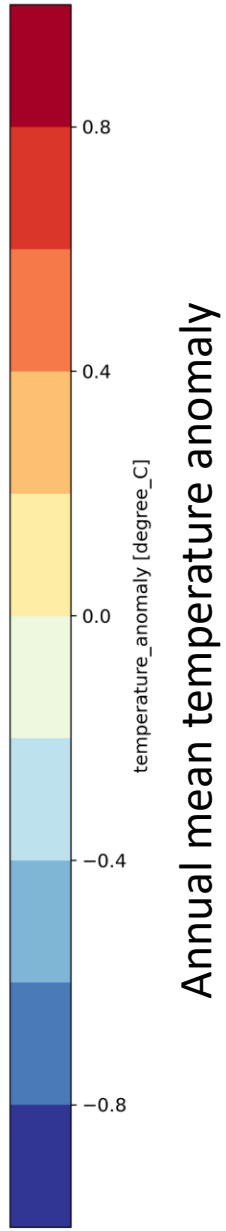
25°S section





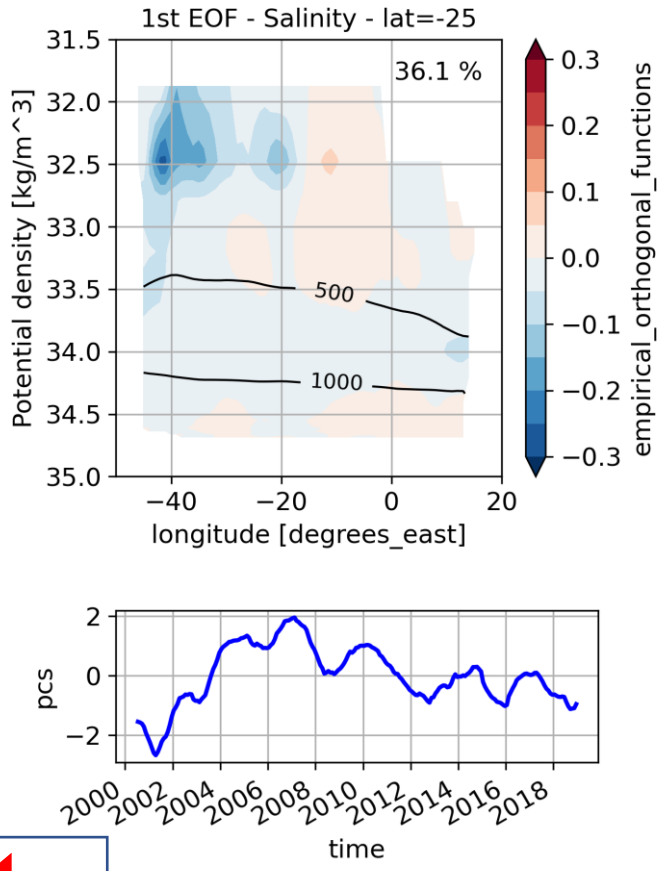
BACK SAL.

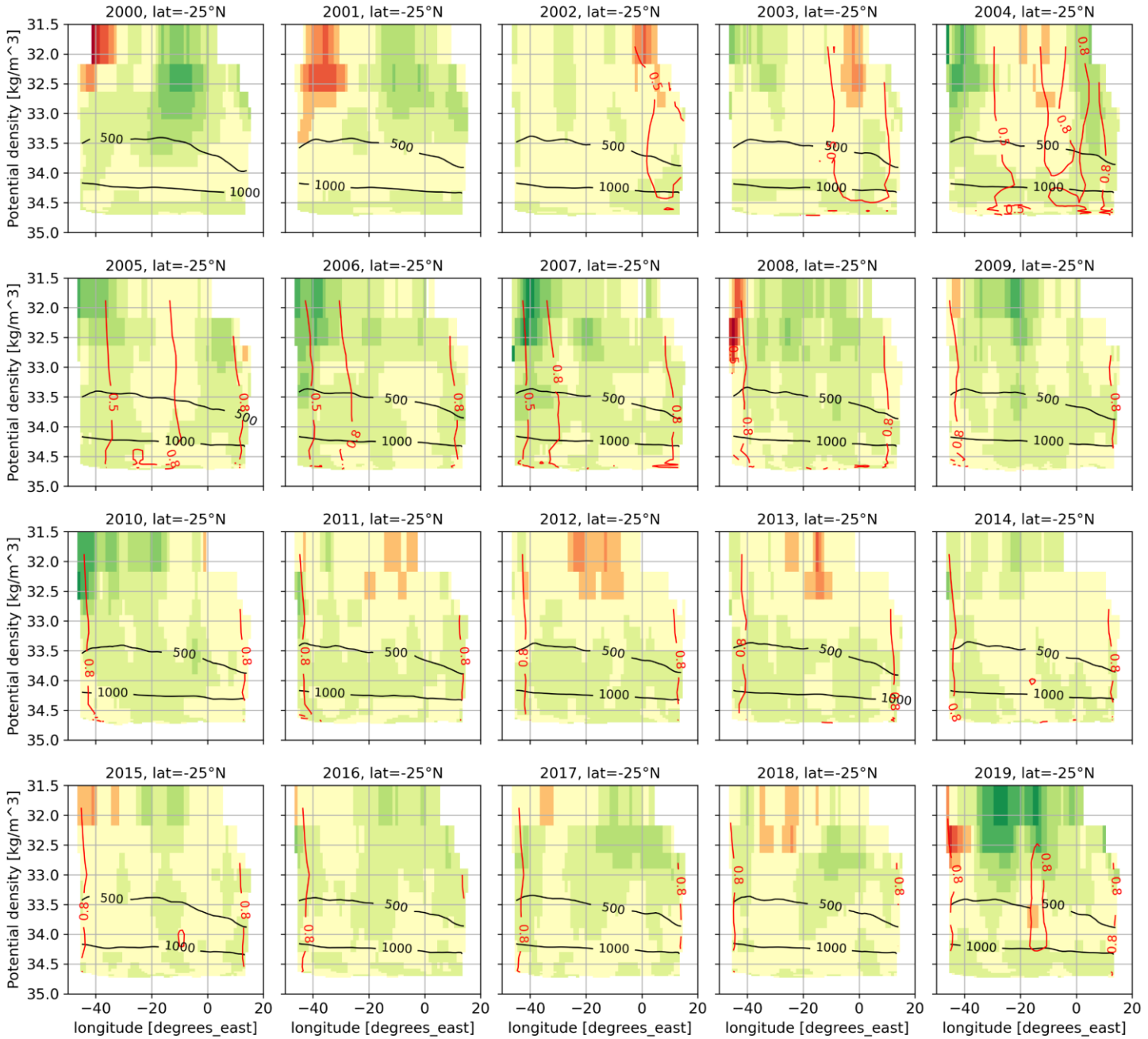


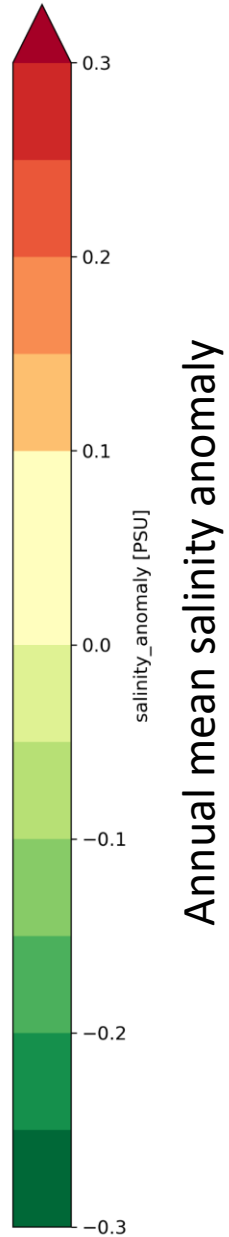


SALINITY

25°S section







Annual mean salinity anomaly

BACK

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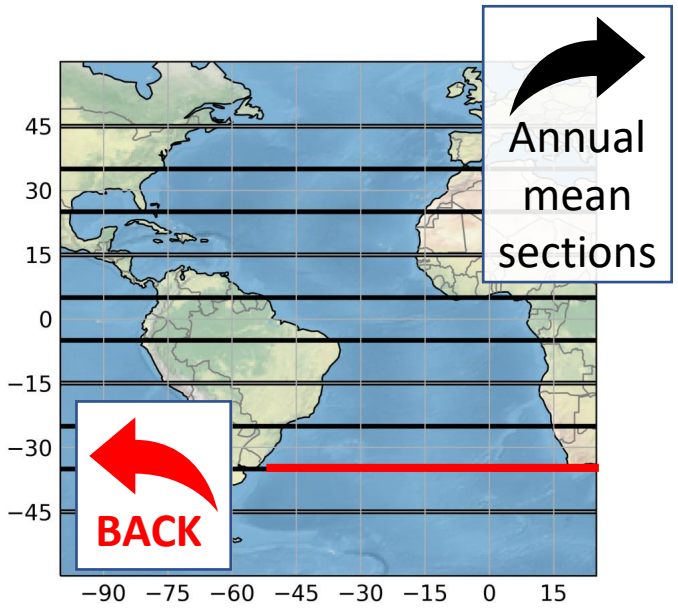
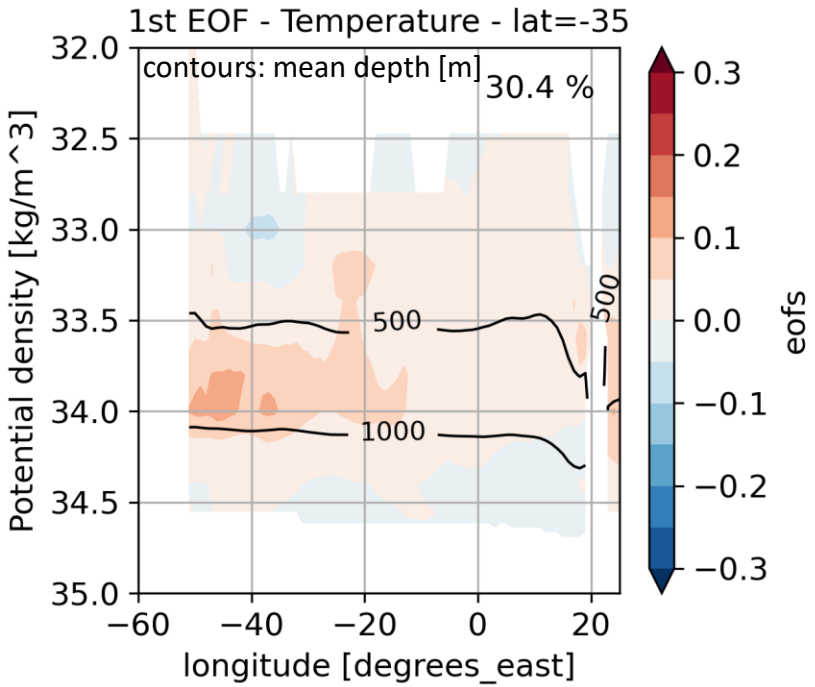
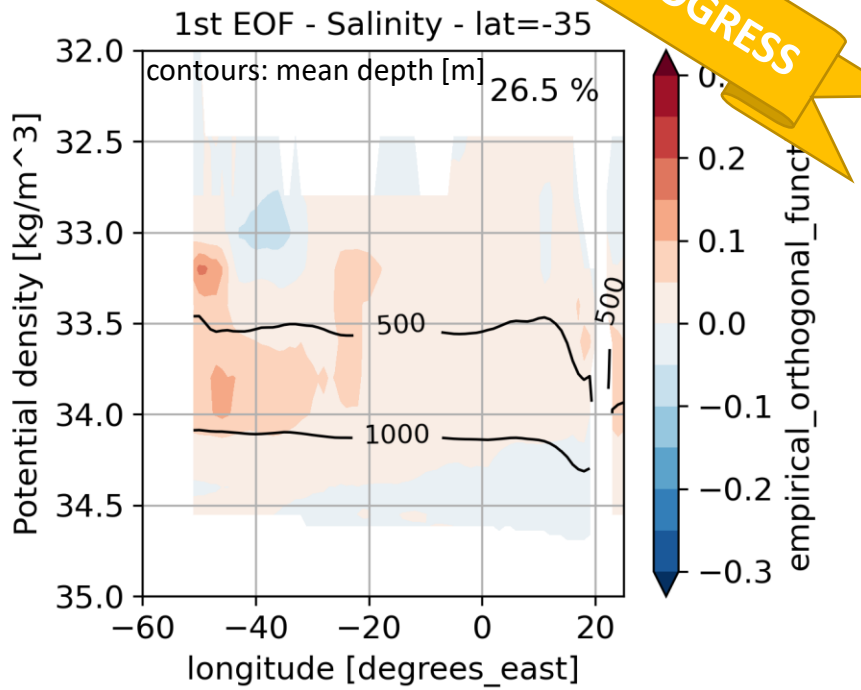
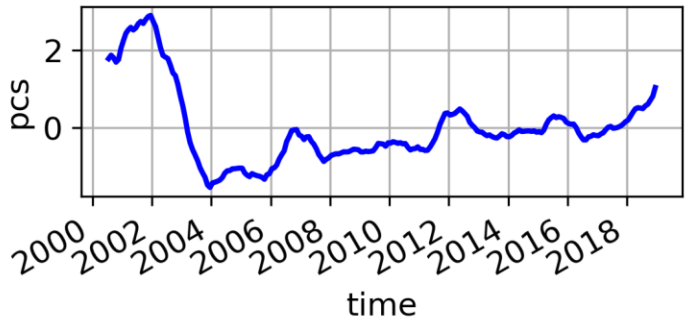
Preliminary results – 35°S section

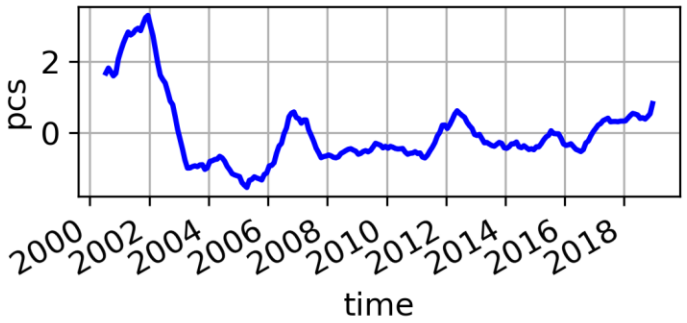
WORK IN PROGRESS











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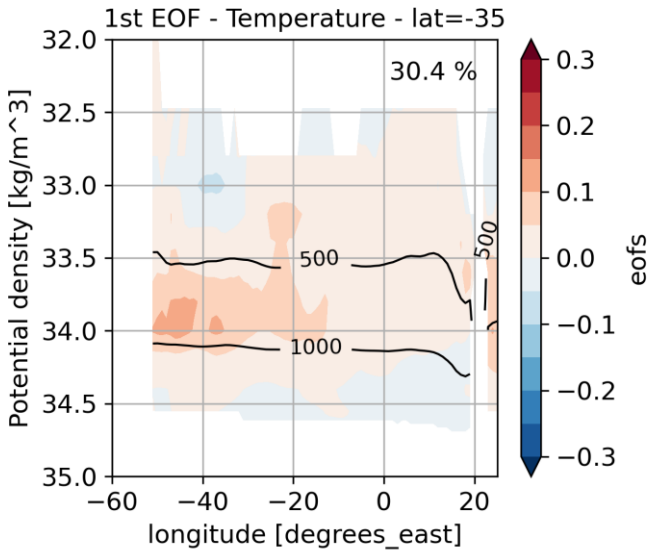
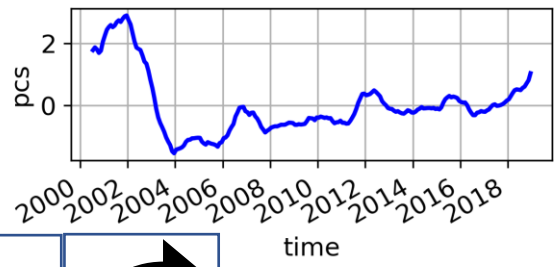
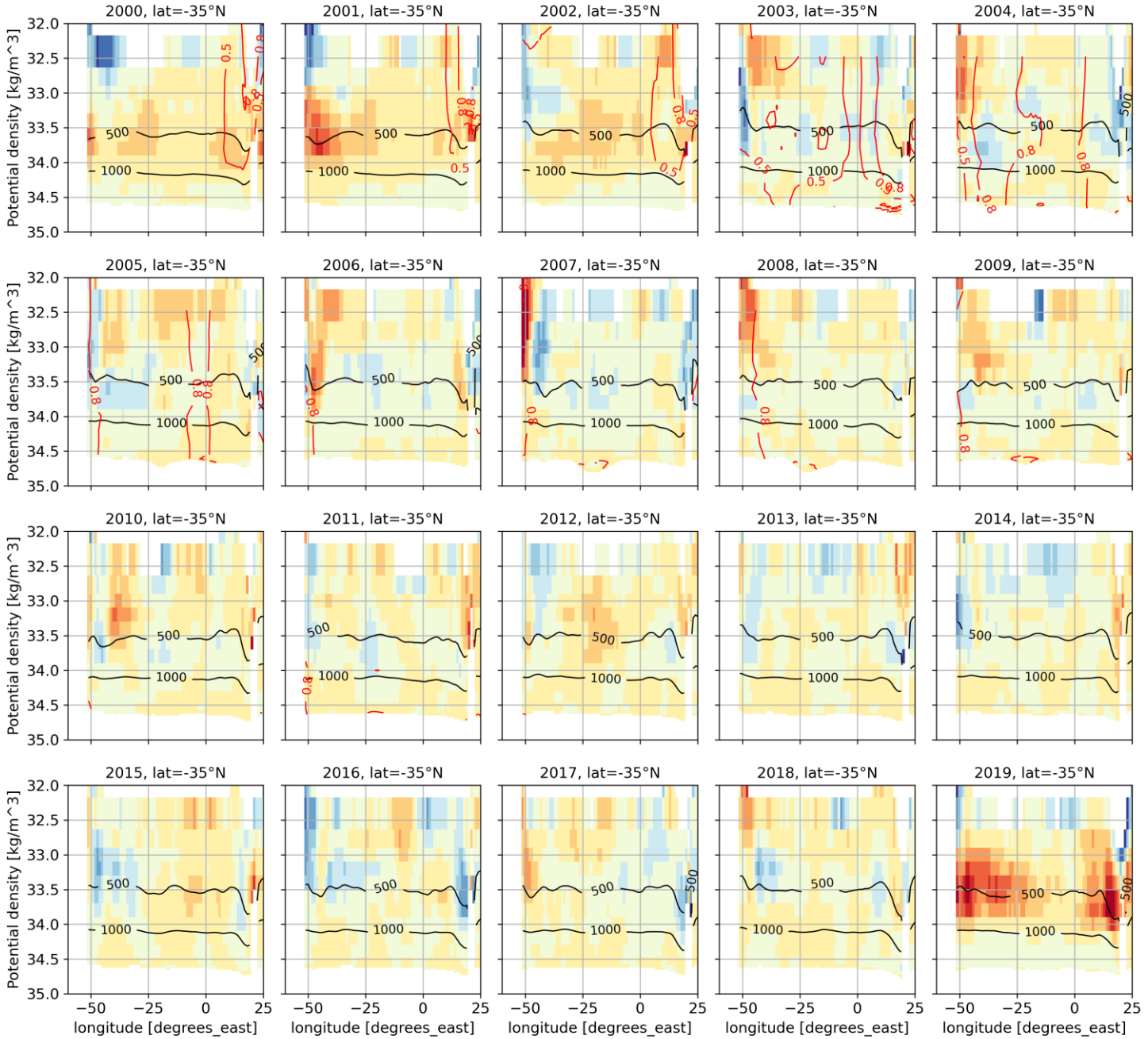
TEMPERATURE

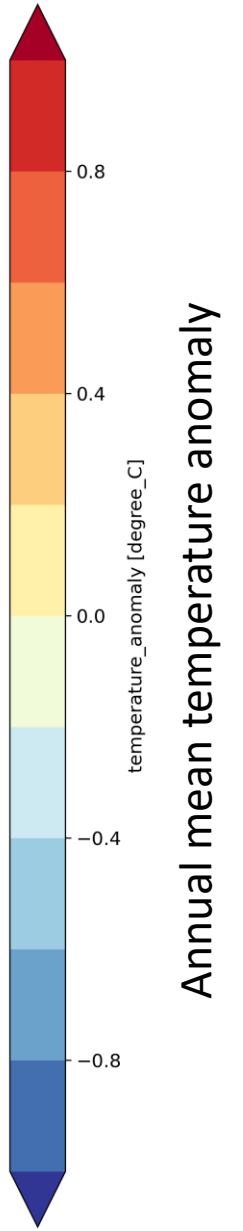
35°S section





BACK SAL.





iAtlantic INTEGRATED ASSESSMENT OF ATLANTIC MARINE ECOSYSTEMS IN SPACE AND TIME

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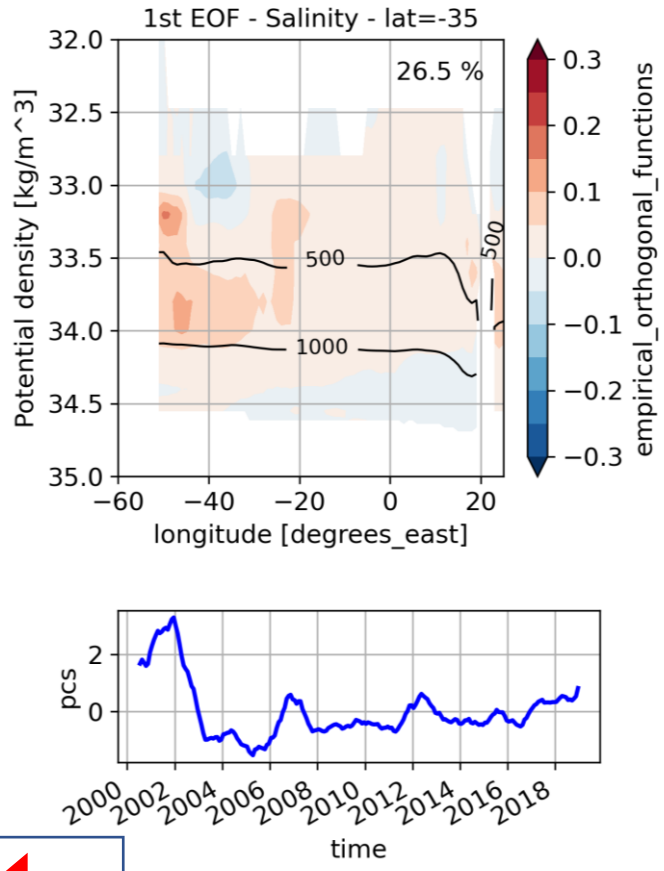
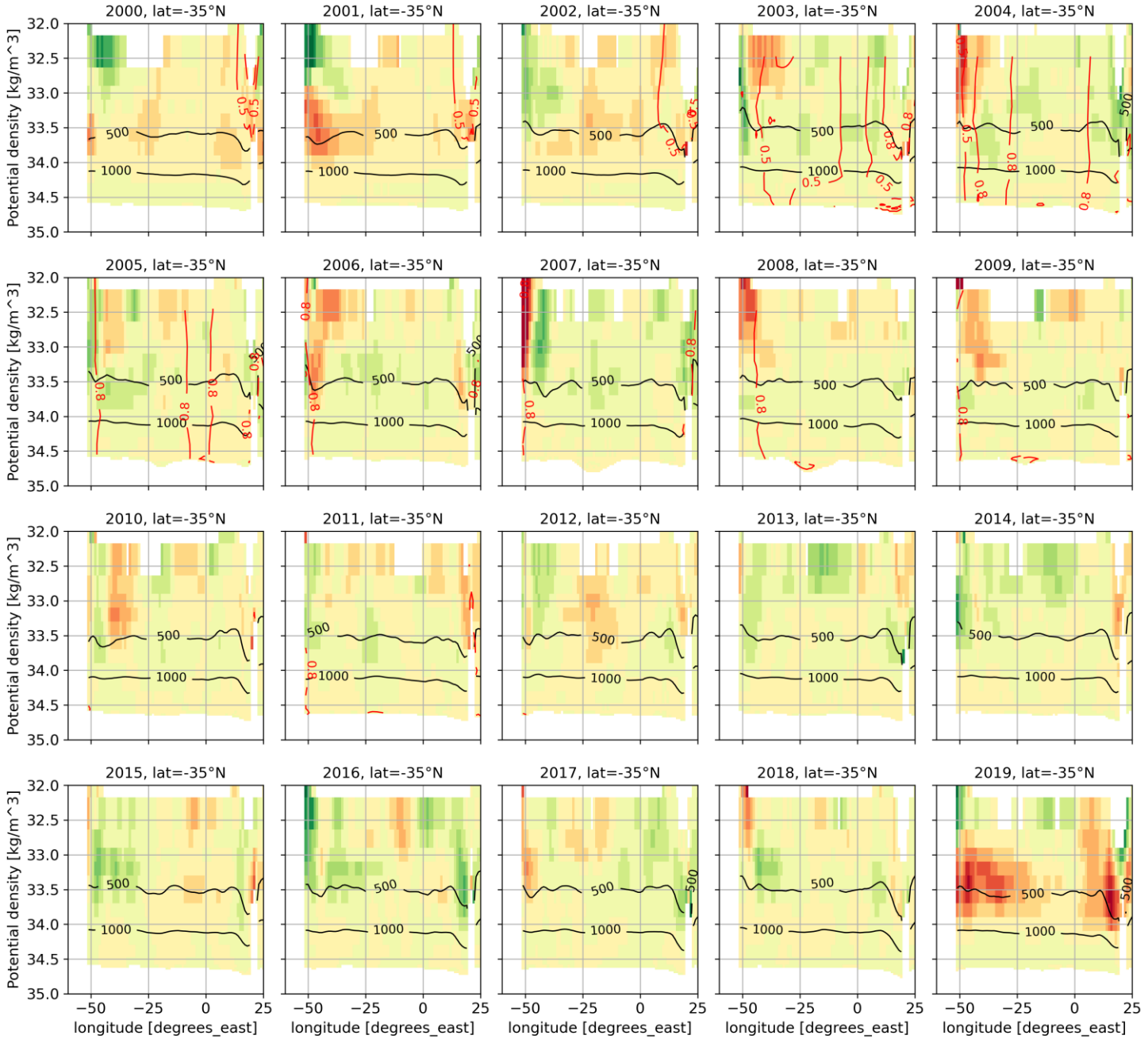
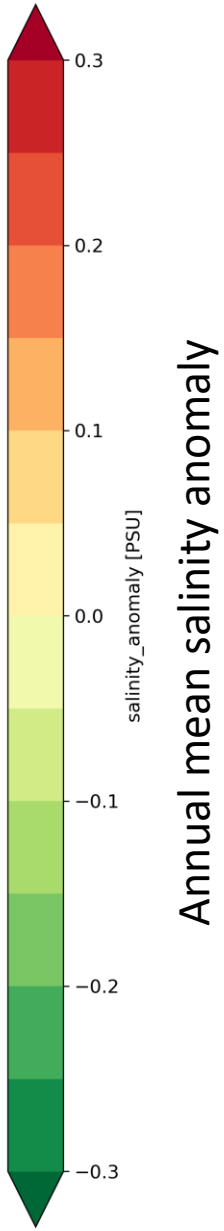
SAMS Scottish Association for Marine Science

SALINITY

35°S section







BACK

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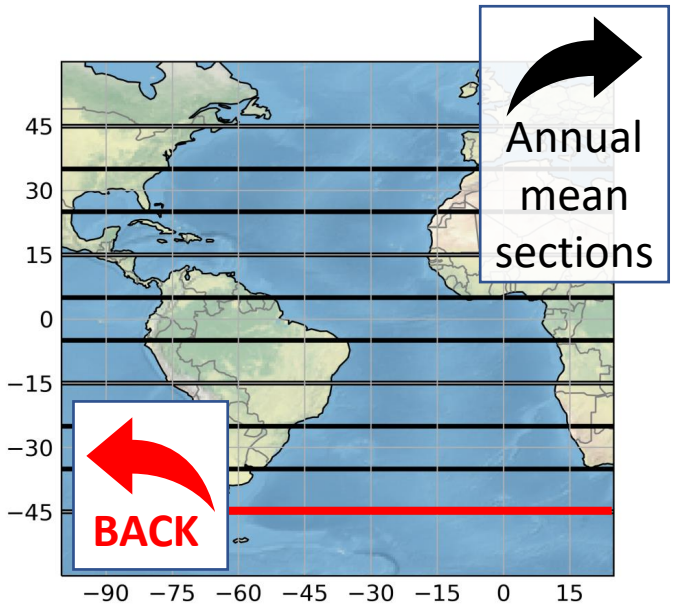
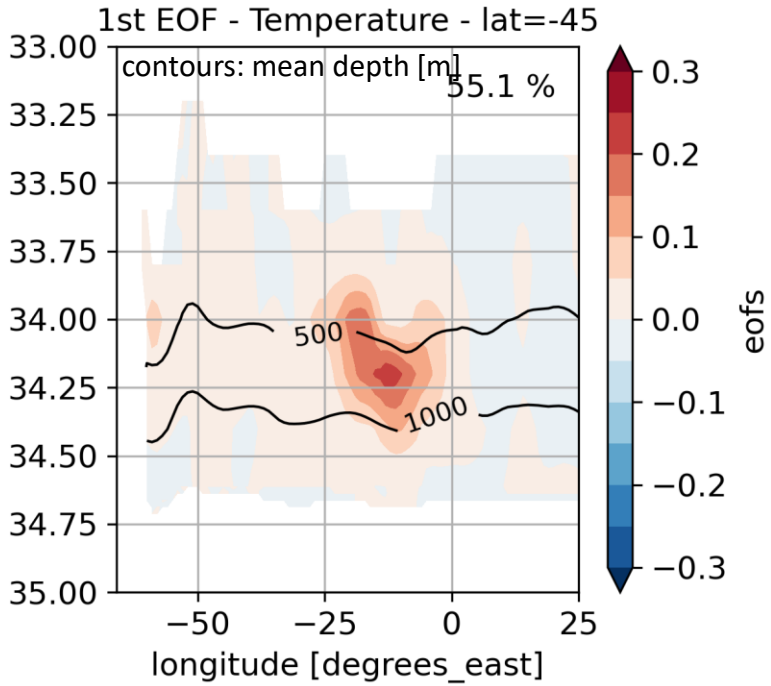
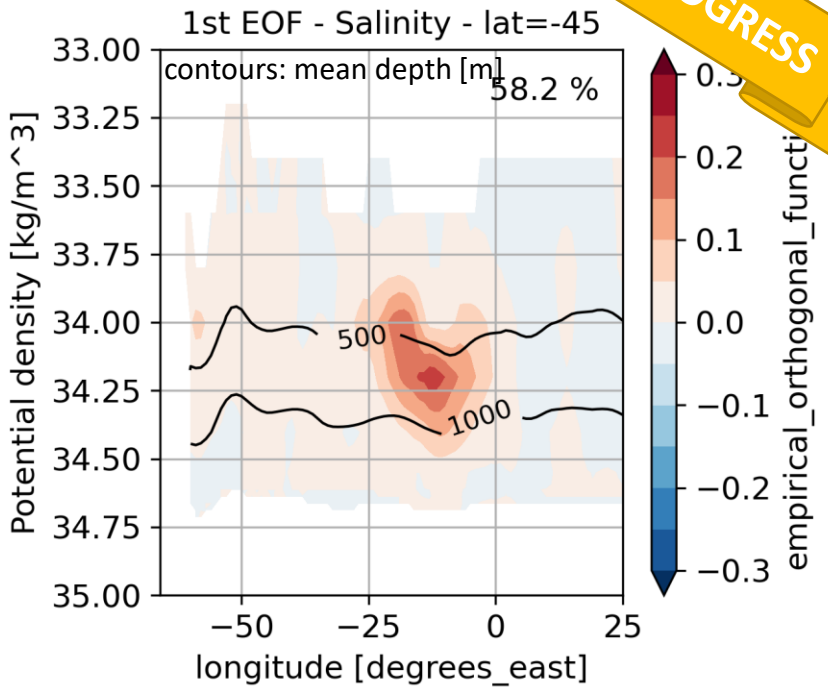
Preliminary results – 45°S section

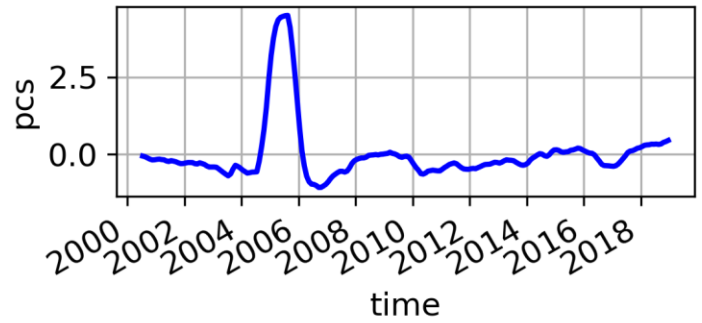
WORK IN PROGRESS

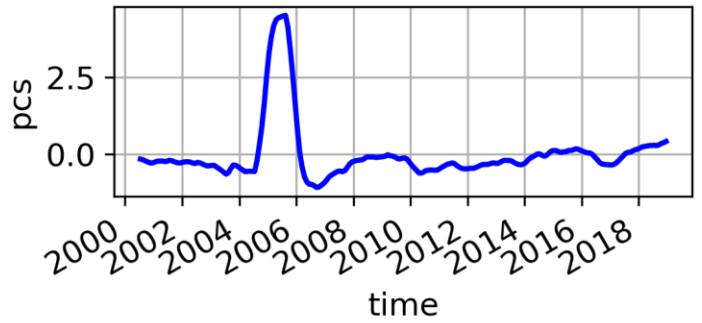






Seems spurious. Data problem?





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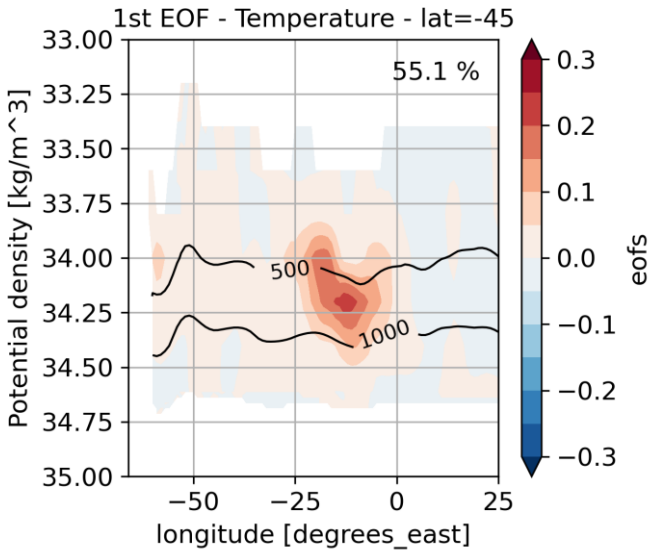
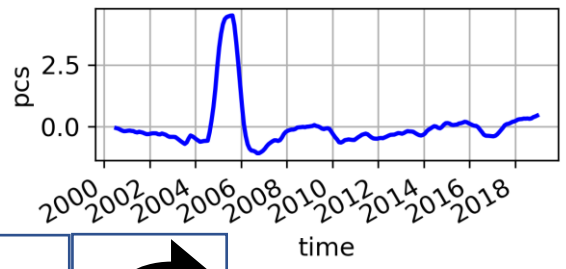
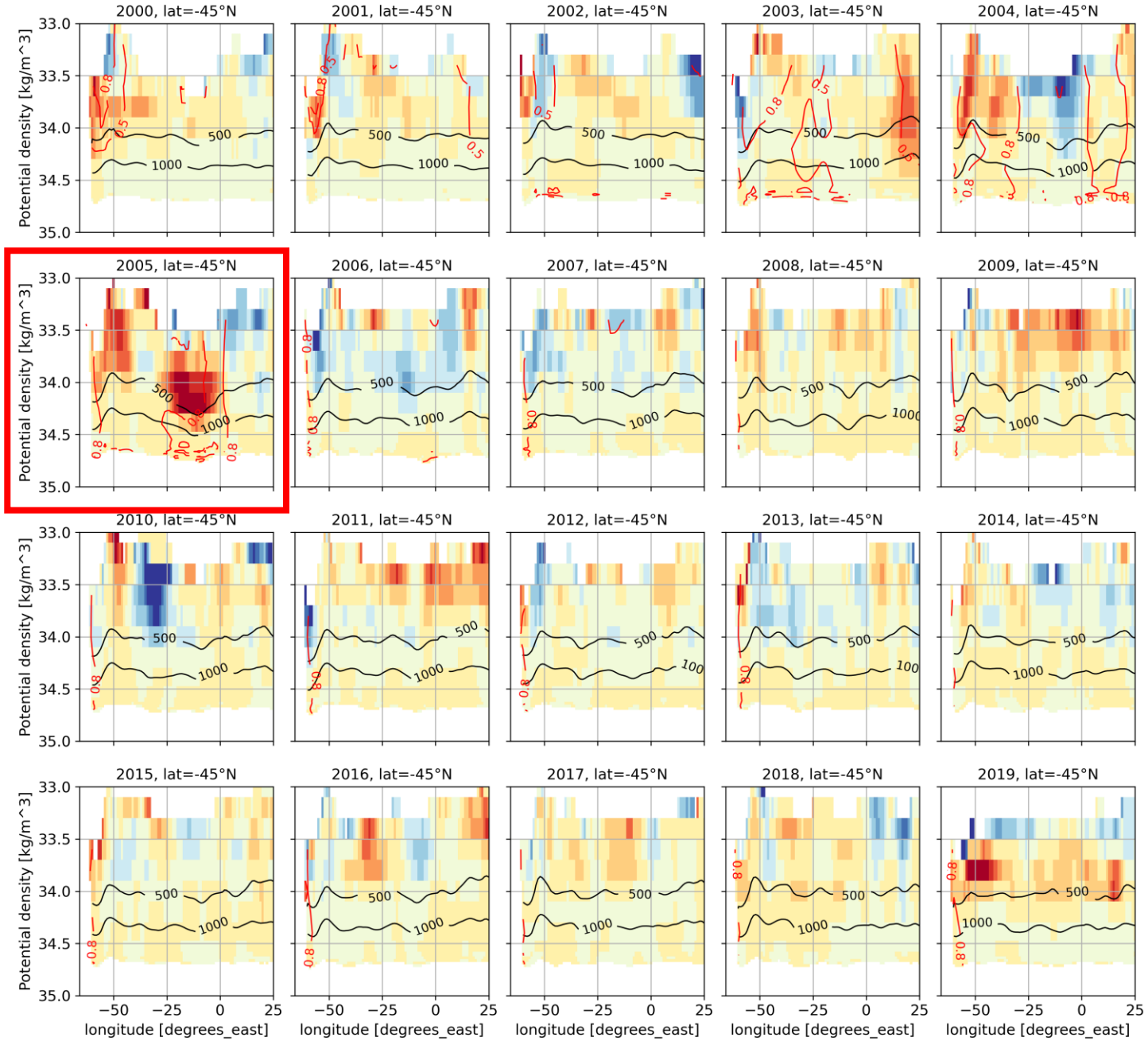
TEMPERATURE

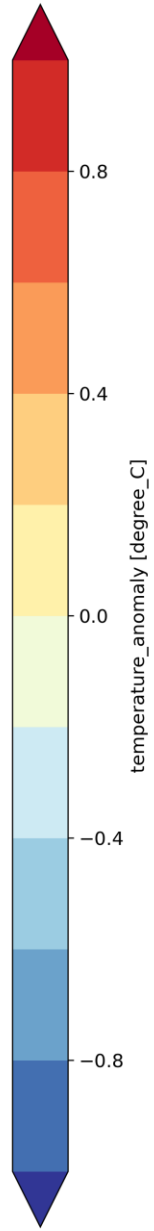
45°S section





BACK SAL.





Annual mean temperature anomaly

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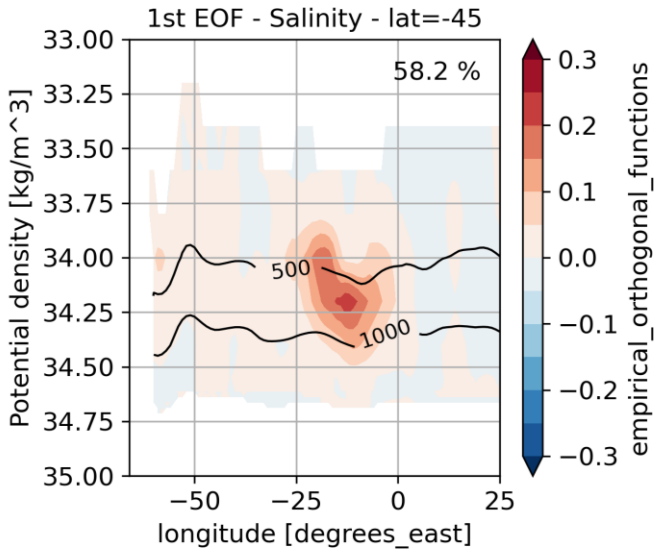
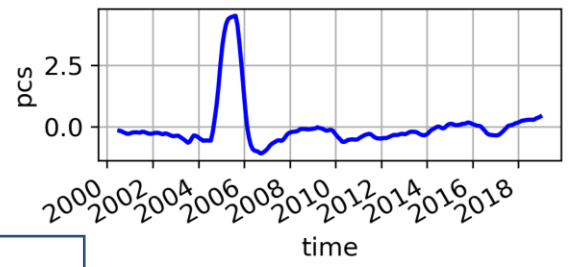
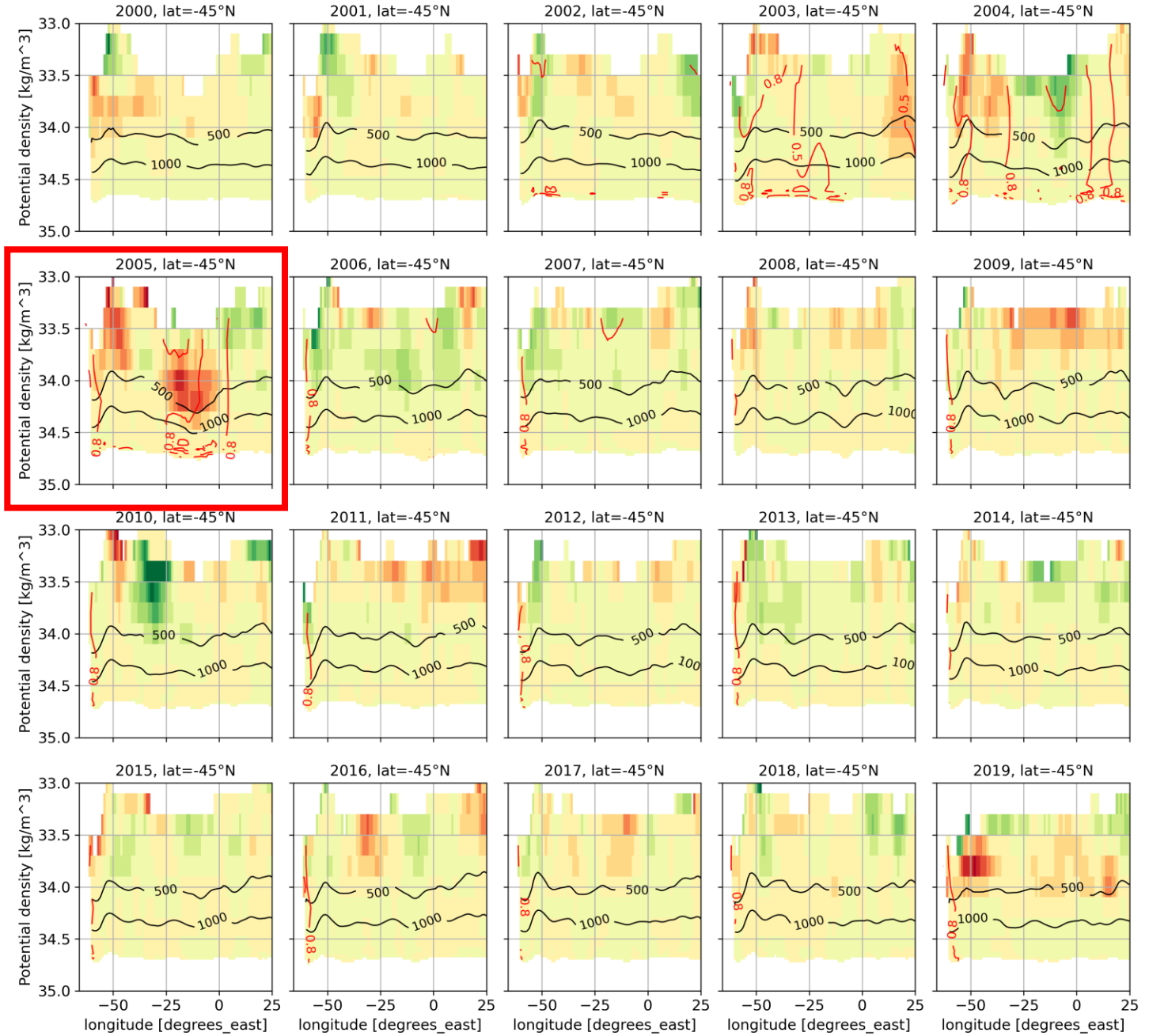
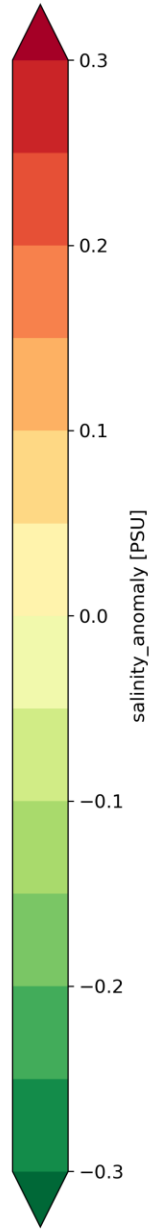
SALINITY

45°S section









Annual mean salinity anomaly

BACK

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