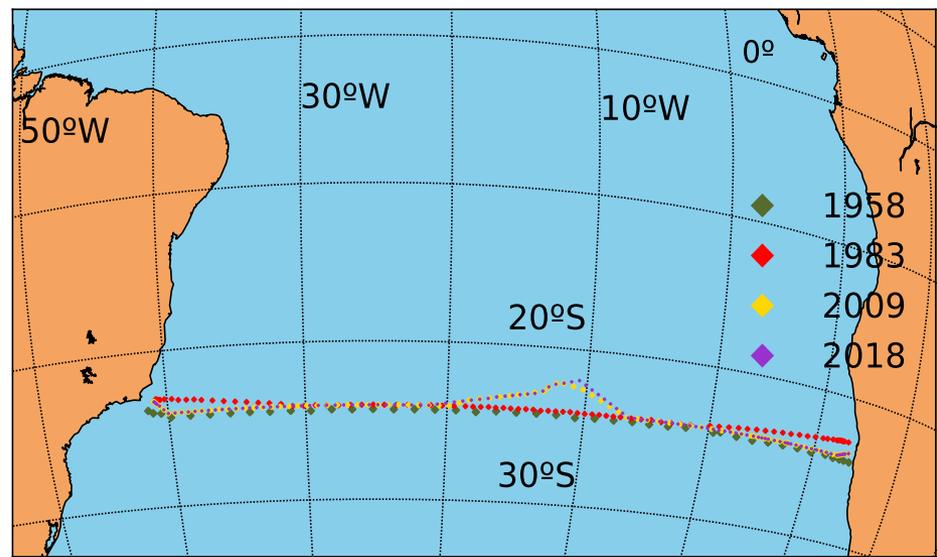


# Salinity - Oxygen Indices for Climate variability in the South Atlantic

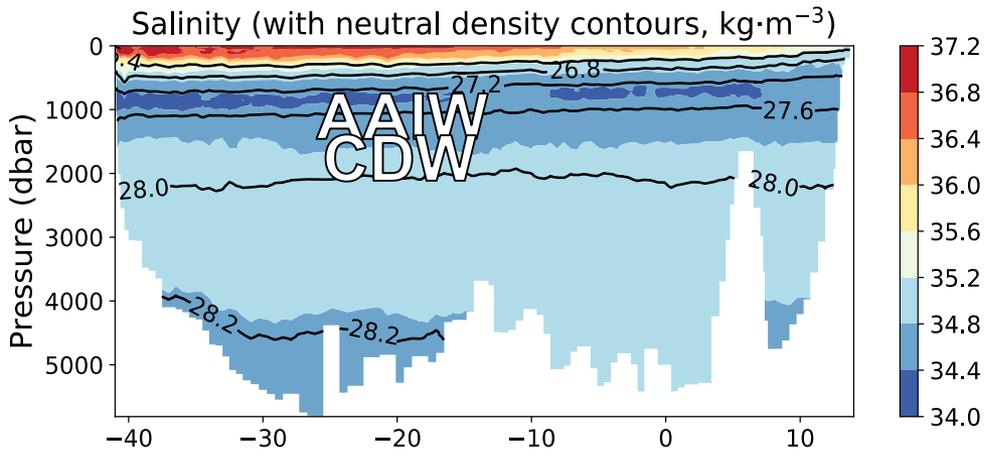
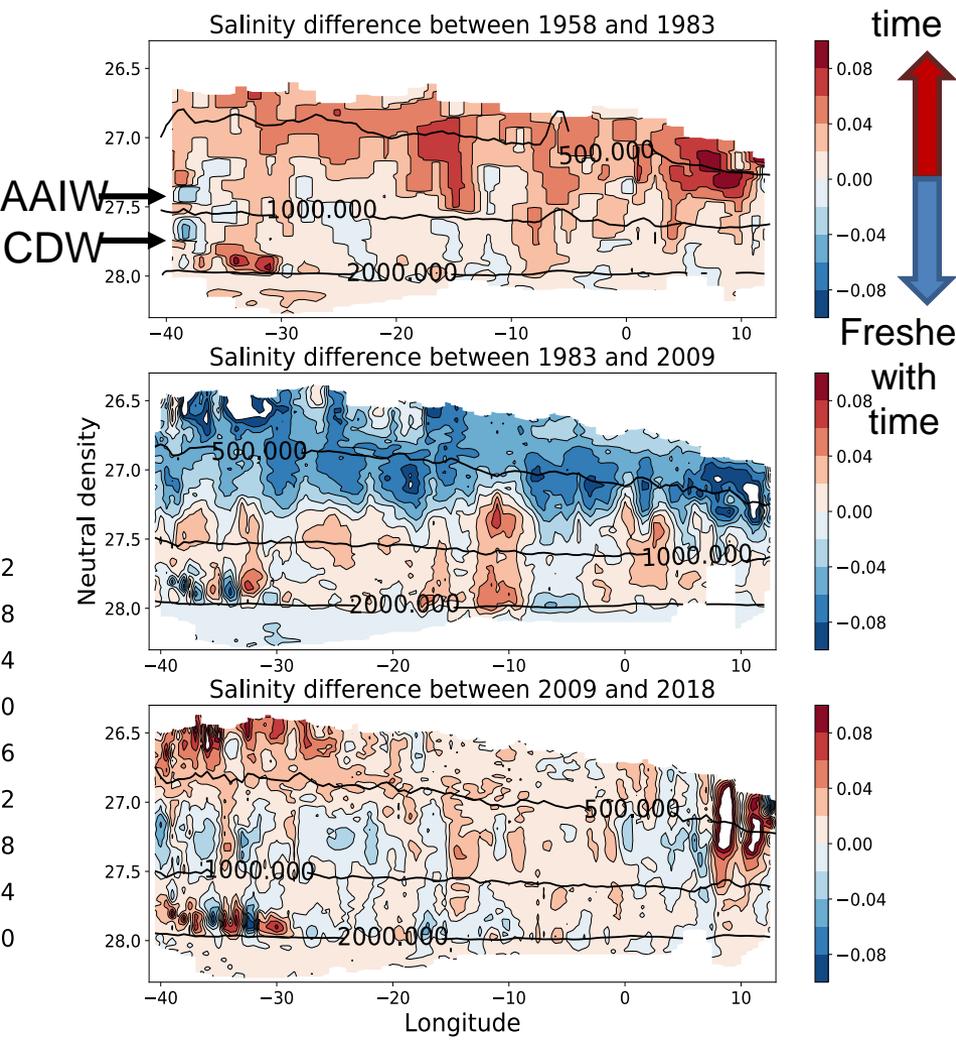
CRISTIAN FLORINDO-LOPEZ<sup>1</sup>, ELAINE MCDONAGH<sup>1,2</sup>, BRIAN KING<sup>1</sup>,  
LOUIS CLEMENT<sup>1</sup>, GERARD MCCARTHY<sup>3</sup>, MARIA PAZ CHIDICHIMO<sup>4</sup>,  
SABRINA SPEICH<sup>5</sup>, JOHANNES KARSTENSEN<sup>6</sup>

- (1) NOC
- (2) NORCE, Bjerknes Centre, Bergen
- (3) Maynooth University
- (4) CONICET
- (5) LMD
- (6) GEOMAR

Repeated hydrographic cruises at 24°S over 60 years

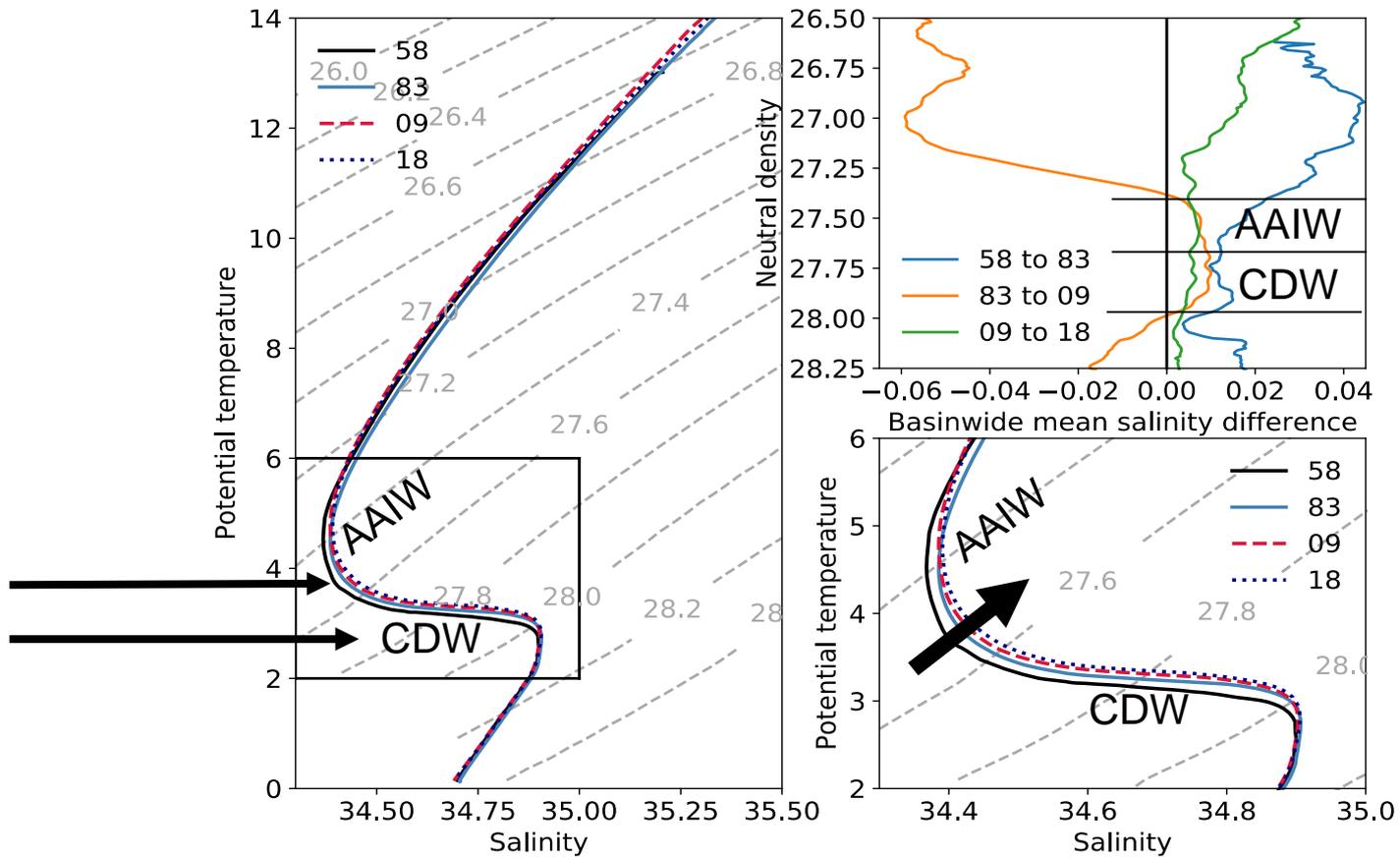


**Decadal Salinity Changes on neutral density surfaces**



AAIW: Antarctic Intermediate Water  
CDW: Circumpolar Deep Water

**AAIW and CDW getting warmer and saltier with time**



**AAIW and CDW getting warmer and saltier with time**

# The relationship between Apparent Oxygen Utilisation and salinity at the AAIW

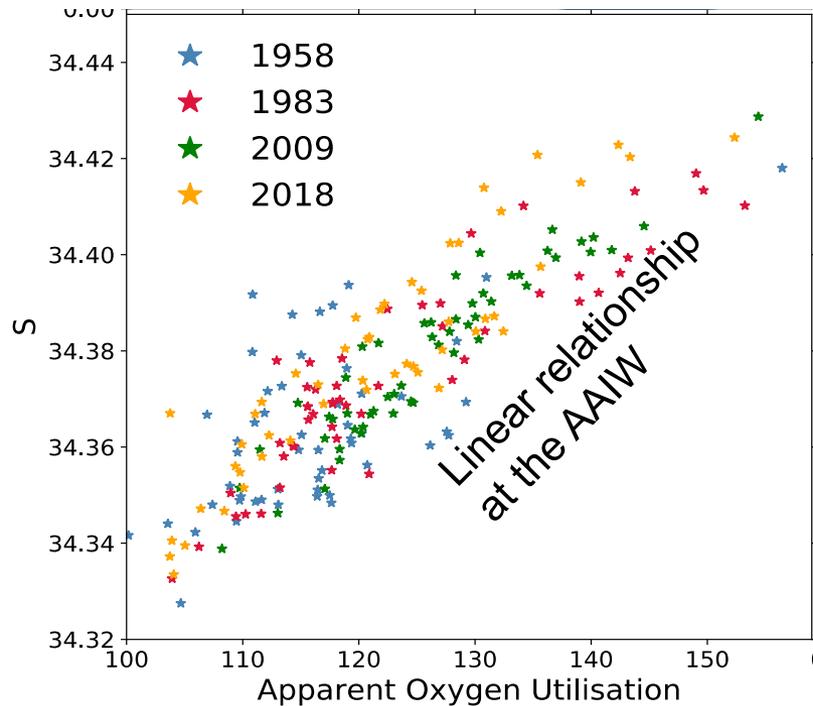
Apparent Oxygen Utilisation (AOU) = Oxygen saturation – Observed Oxygen

- AOU → indicator of age (older water = higher AOU)

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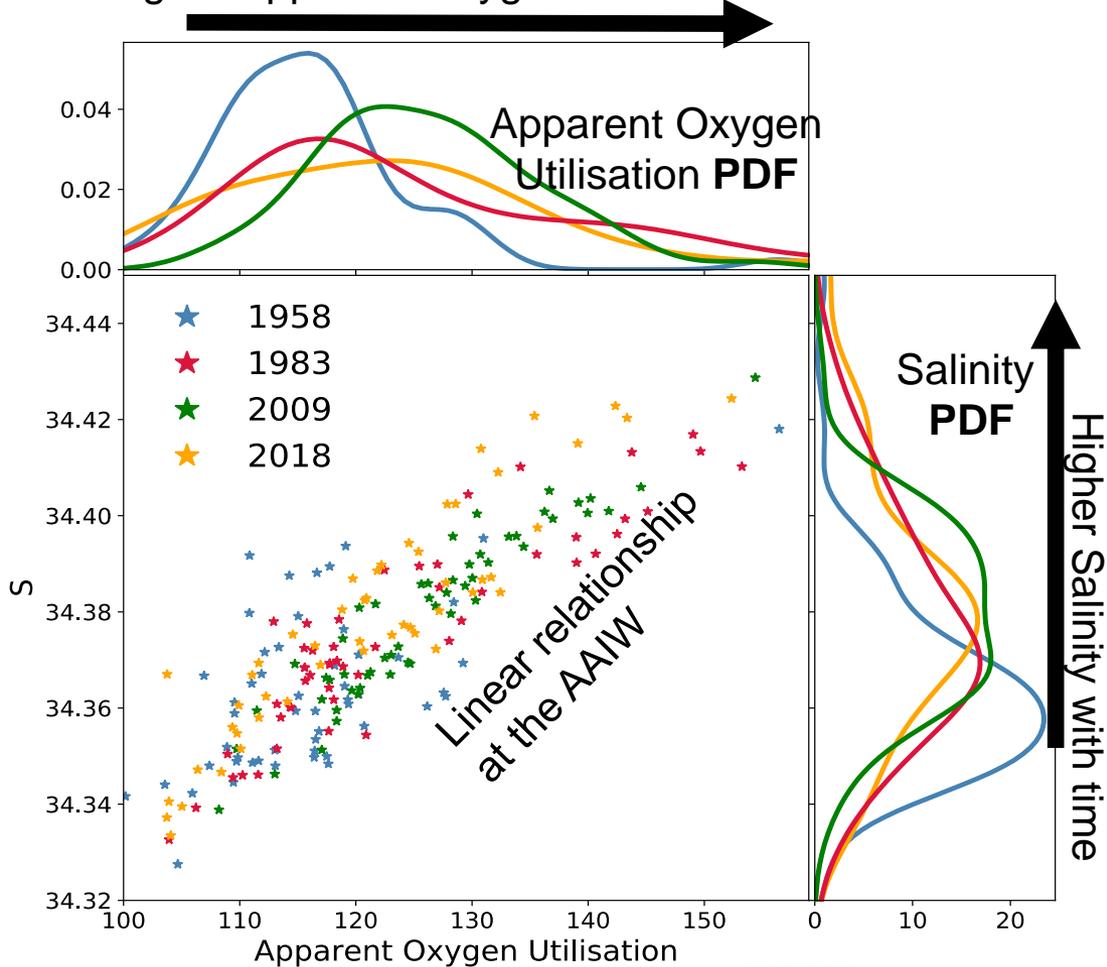


# The relationship between Apparent Oxygen Utilisation and salinity at the AAIW

Apparent Oxygen Utilisation (AOU) = Oxygen saturation – Observed Oxygen

- AOU → indicator of age (older water = higher AOU)

Higher Apparent Oxygen Utilisation with time



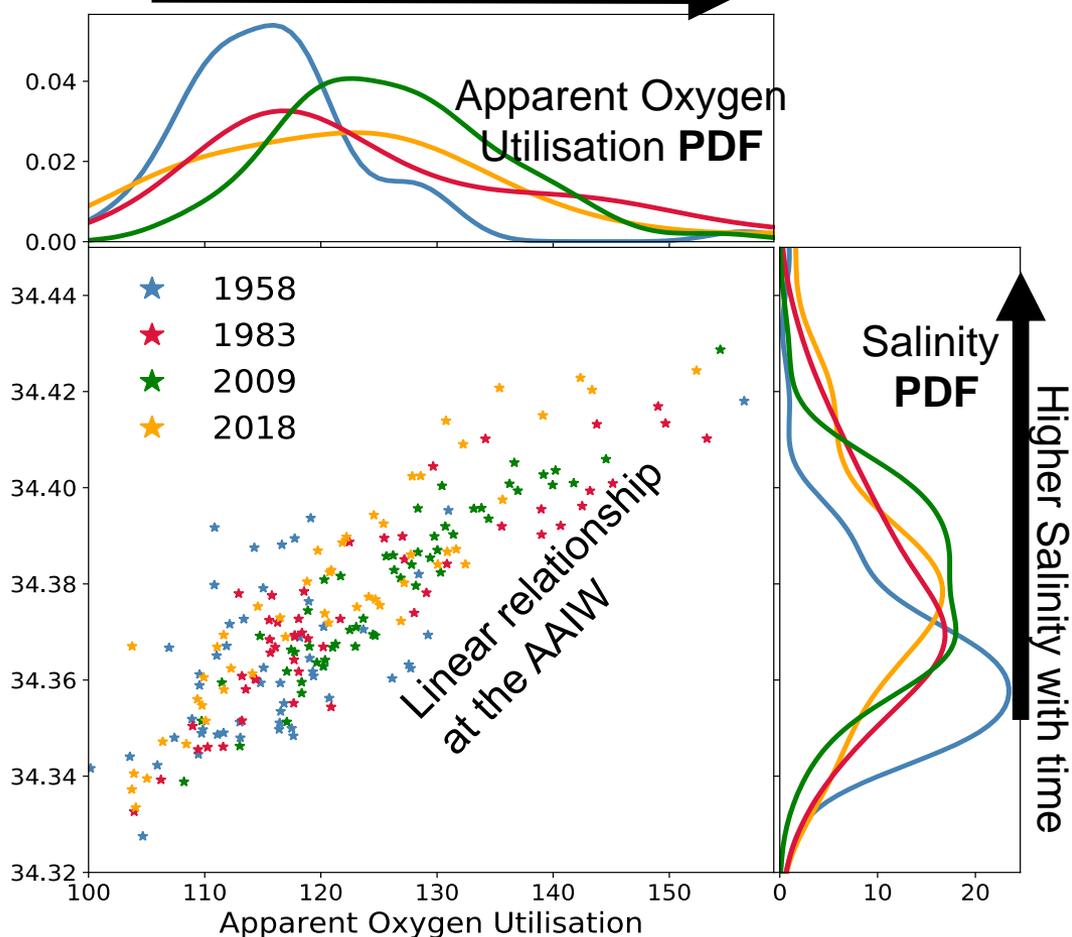
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Apparent Oxygen Utilisation (AOU) = Oxygen saturation – Observed Oxygen

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Higher Apparent Oxygen Utilisation with time

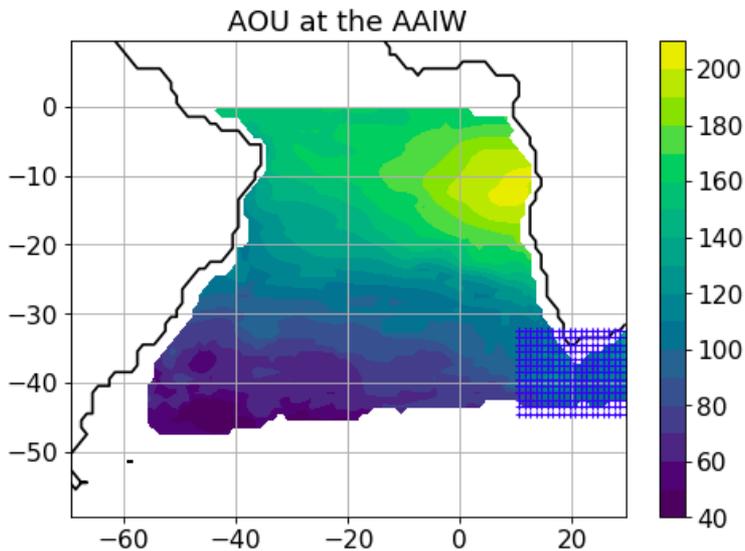
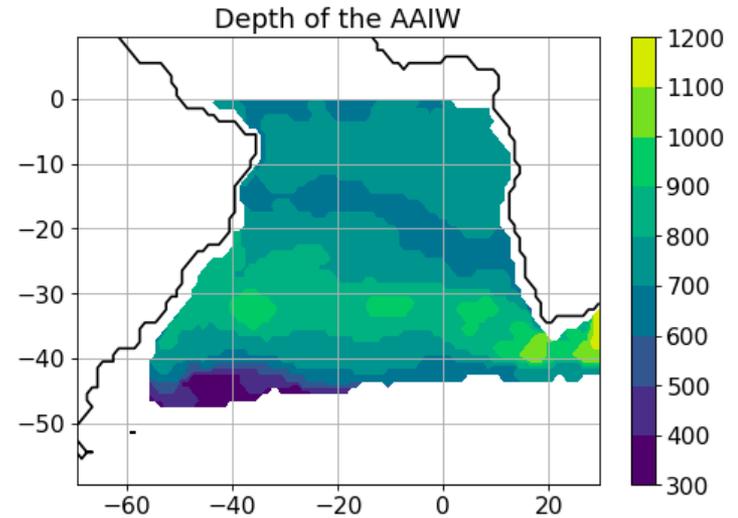
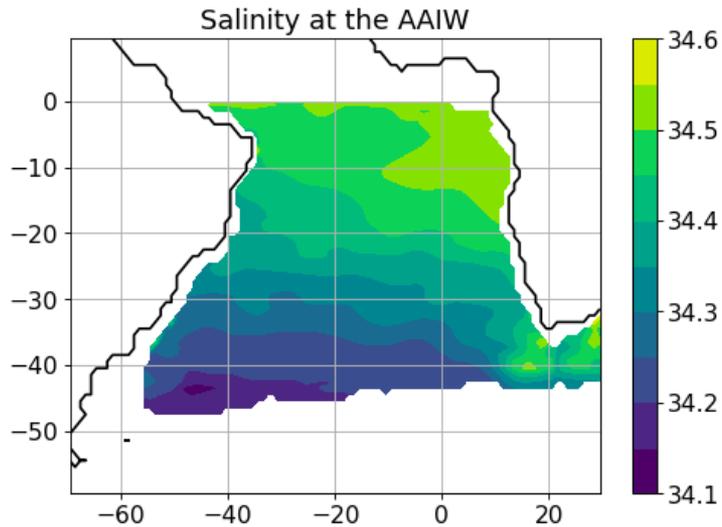
→ **An Index for climate variability**



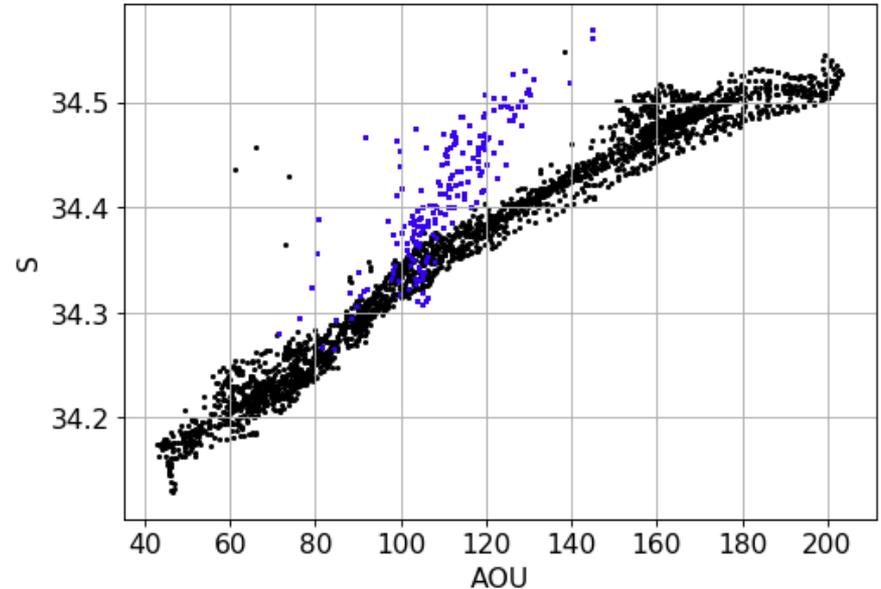
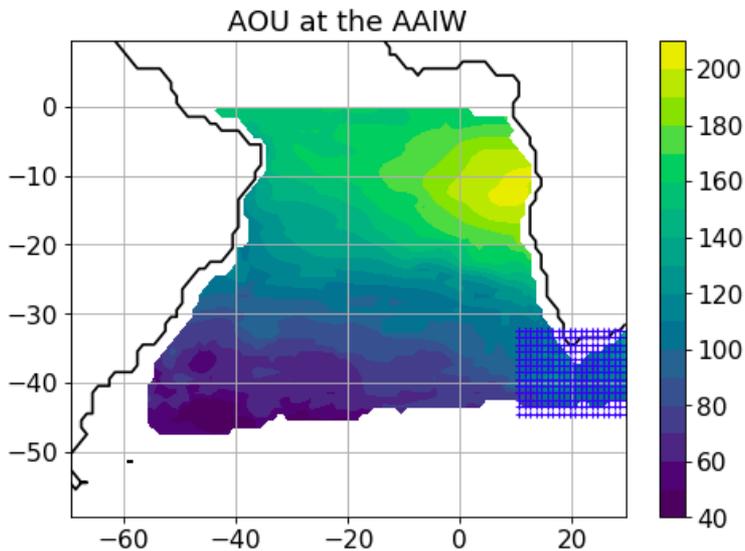
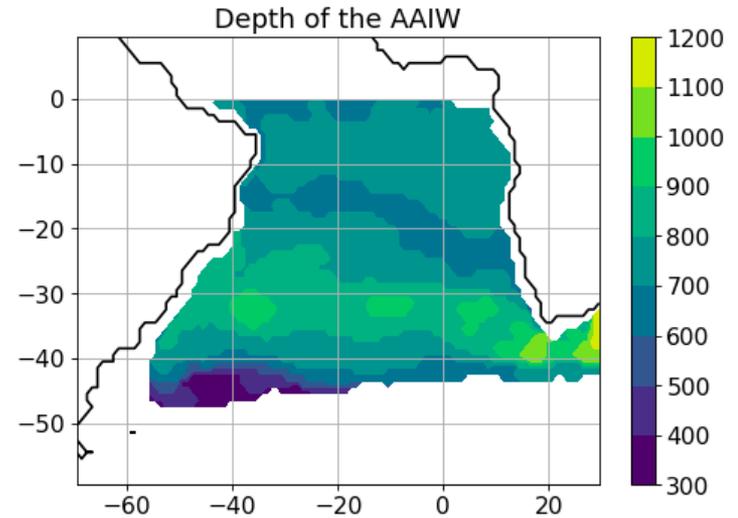
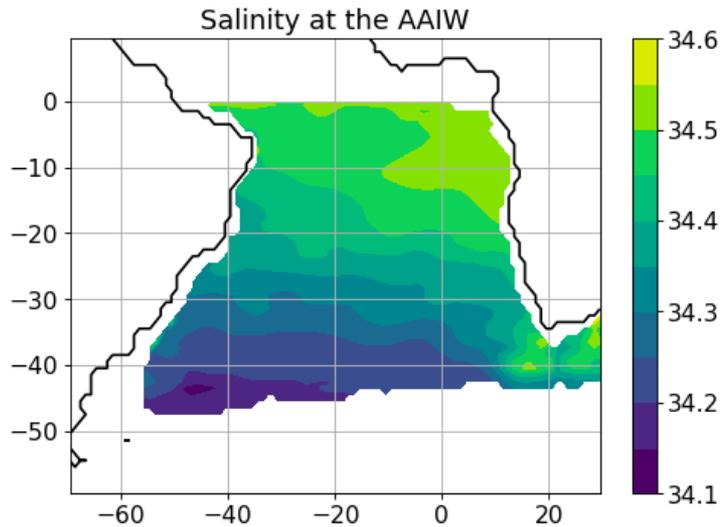
AAIW:  
Salinity correlated  
with AOU  
↓  
**Index of Indian Ocean Influence**

Increased salinity & AOU  
over time since 1958  
↓  
• **Circulation Change**  
• **Increased Indian Ocean Influence**

# AOU – S climatology (GLODAPv2)



# AOU – S climatology (GLODAPv2)



# A new South Atlantic network of oxygen-sensor floats



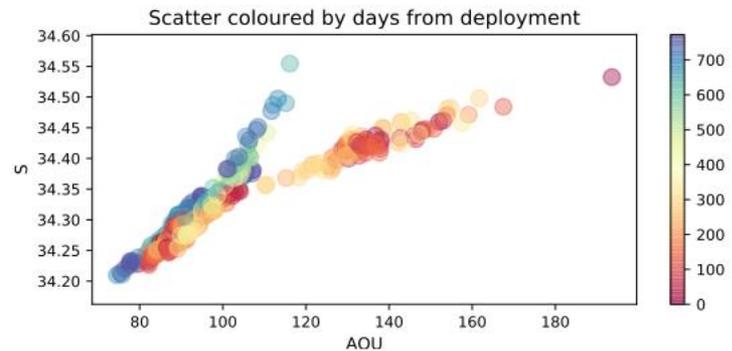
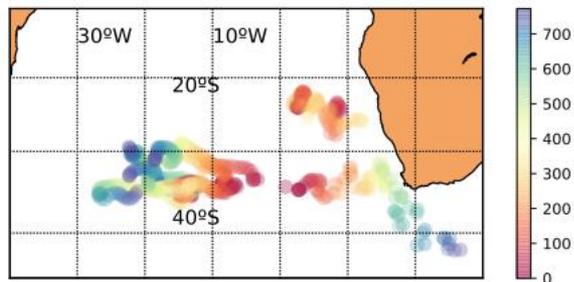
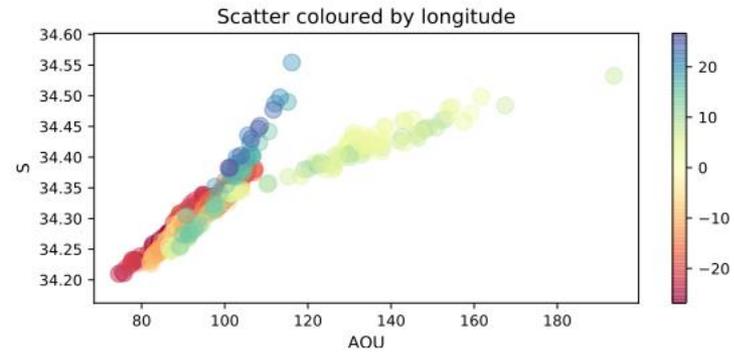
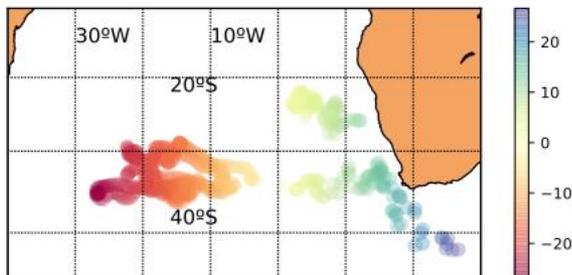
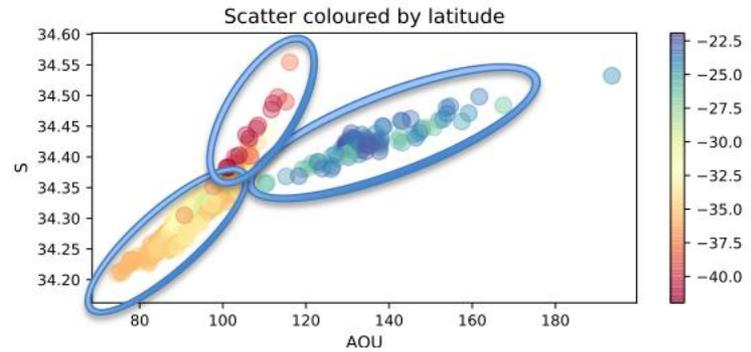
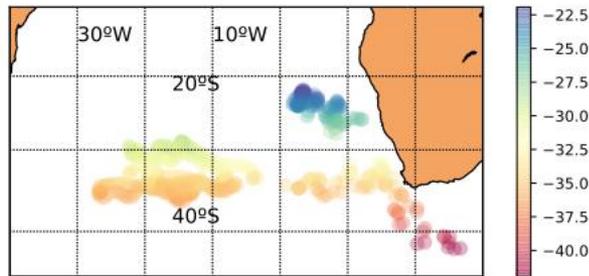
➔ *Increasing space & time resolution of index*

6 NAVIS/oxygen floats deployed Jan 2017  
from AtlantOS cruise MSM 060 at 35°S  
2 NAVIS/oxygen and 2 APEX/oxygen floats  
deployed Mar/Apr 2018 from JC159

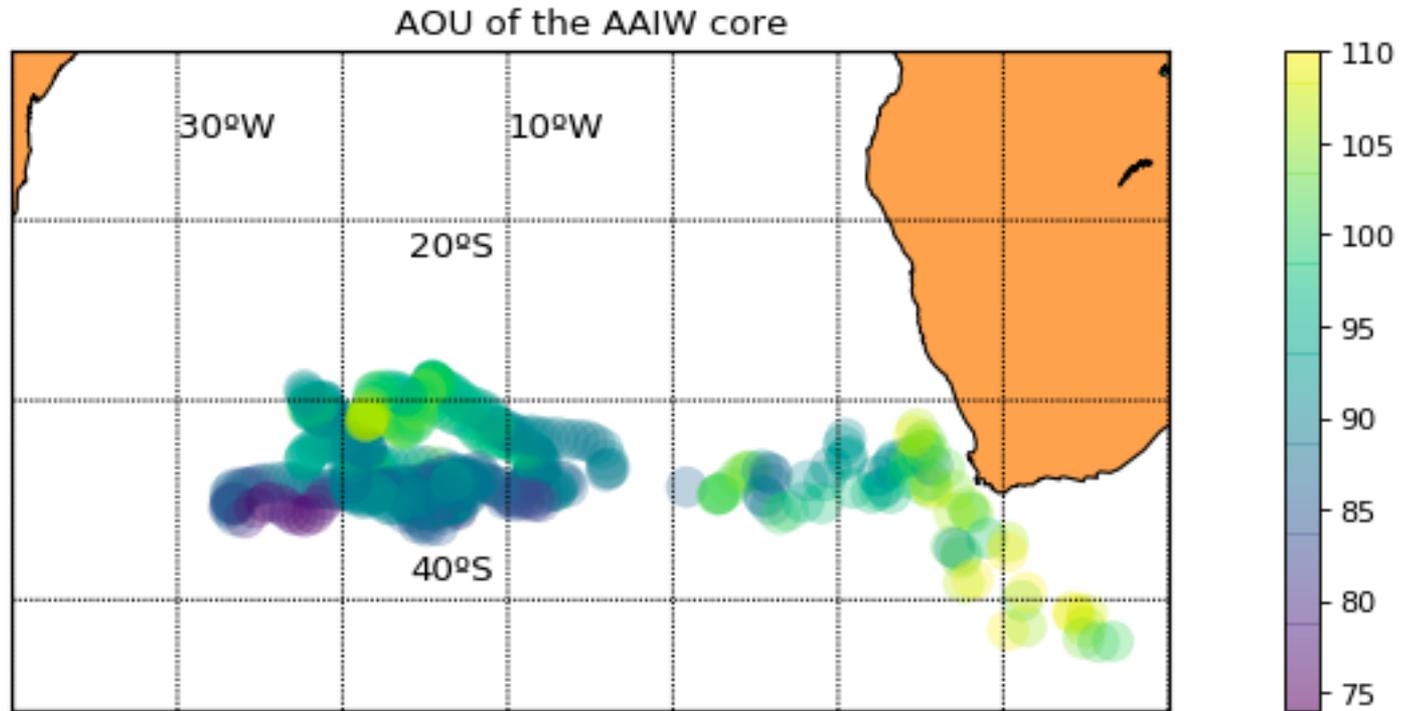
**Informing understanding of  
salinity – AOU relationship**  
Seasonal to interannual timescales  
Spatial variability of the relationship



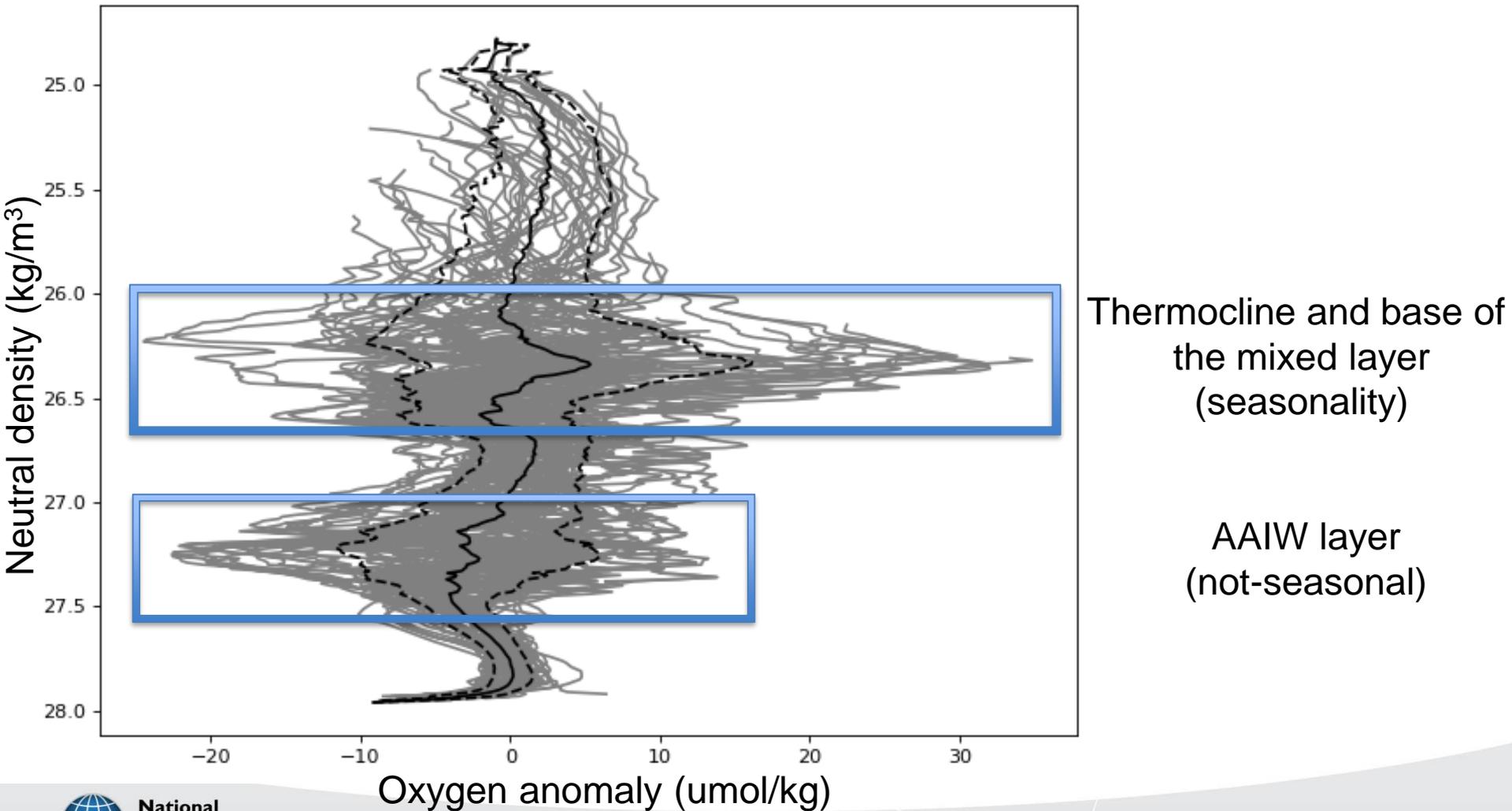
# AOU – S index from the floats



# Indications of time-dependent variability

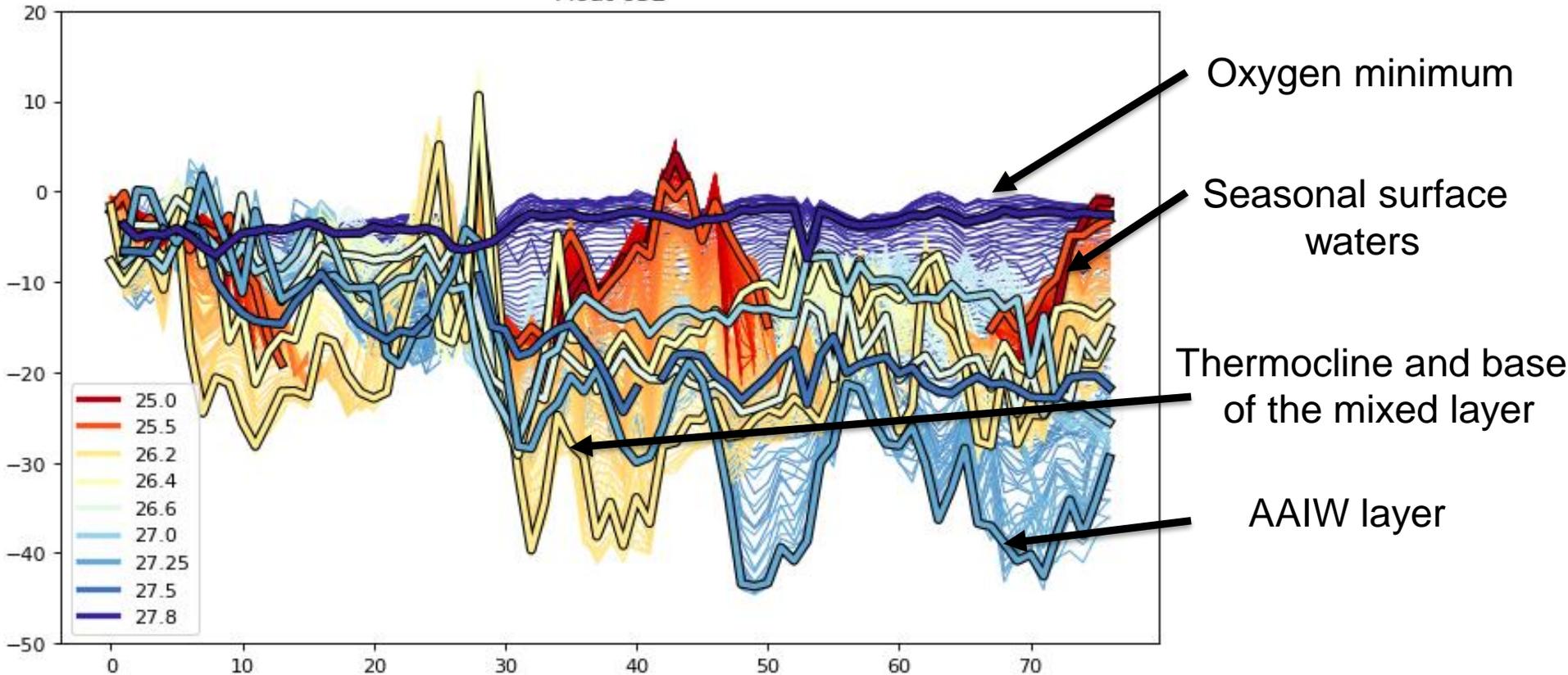


# Oxygen anomalies from float – CTD profiles

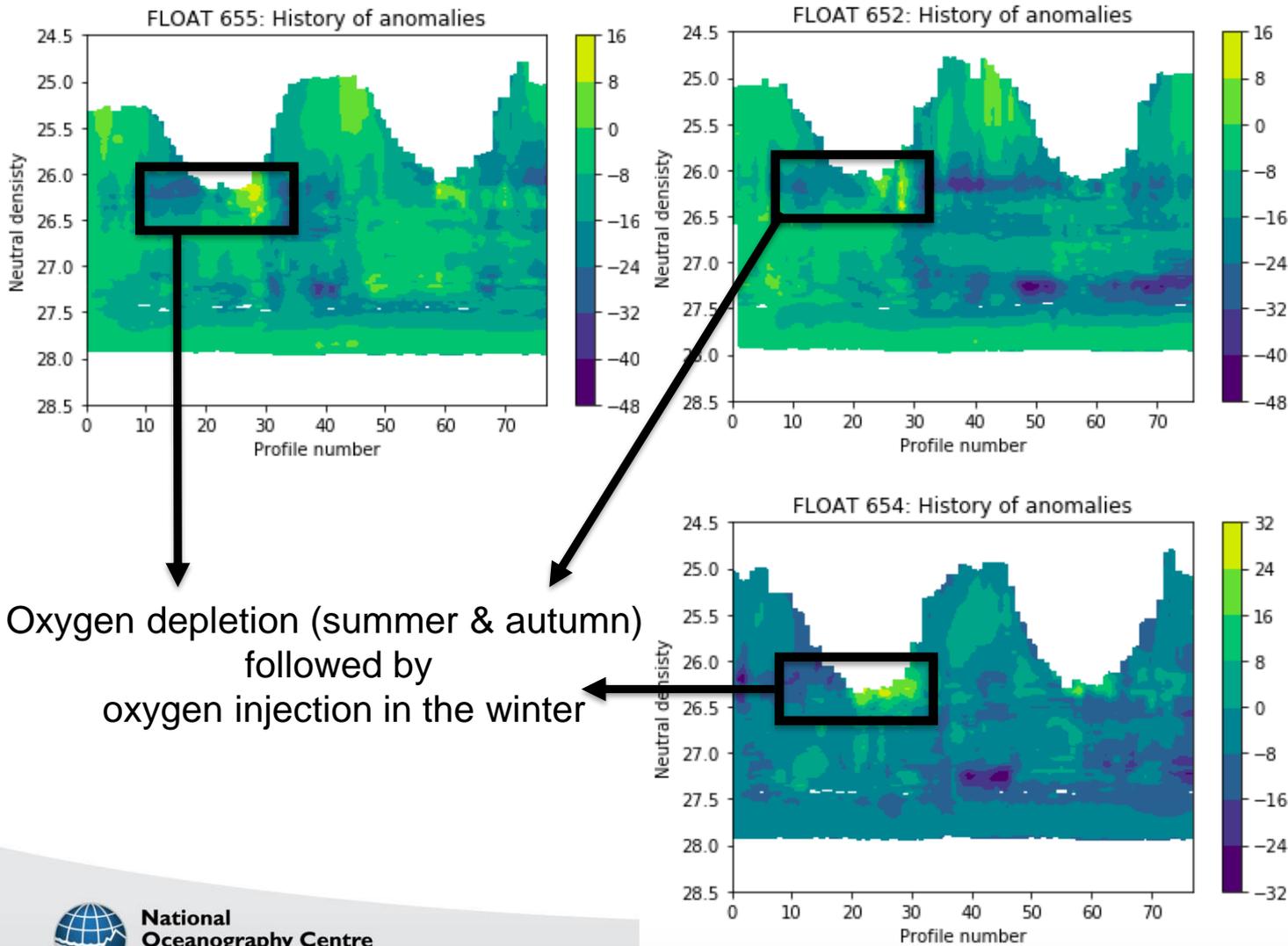


# Evolution of the oxygen changes at different density levels

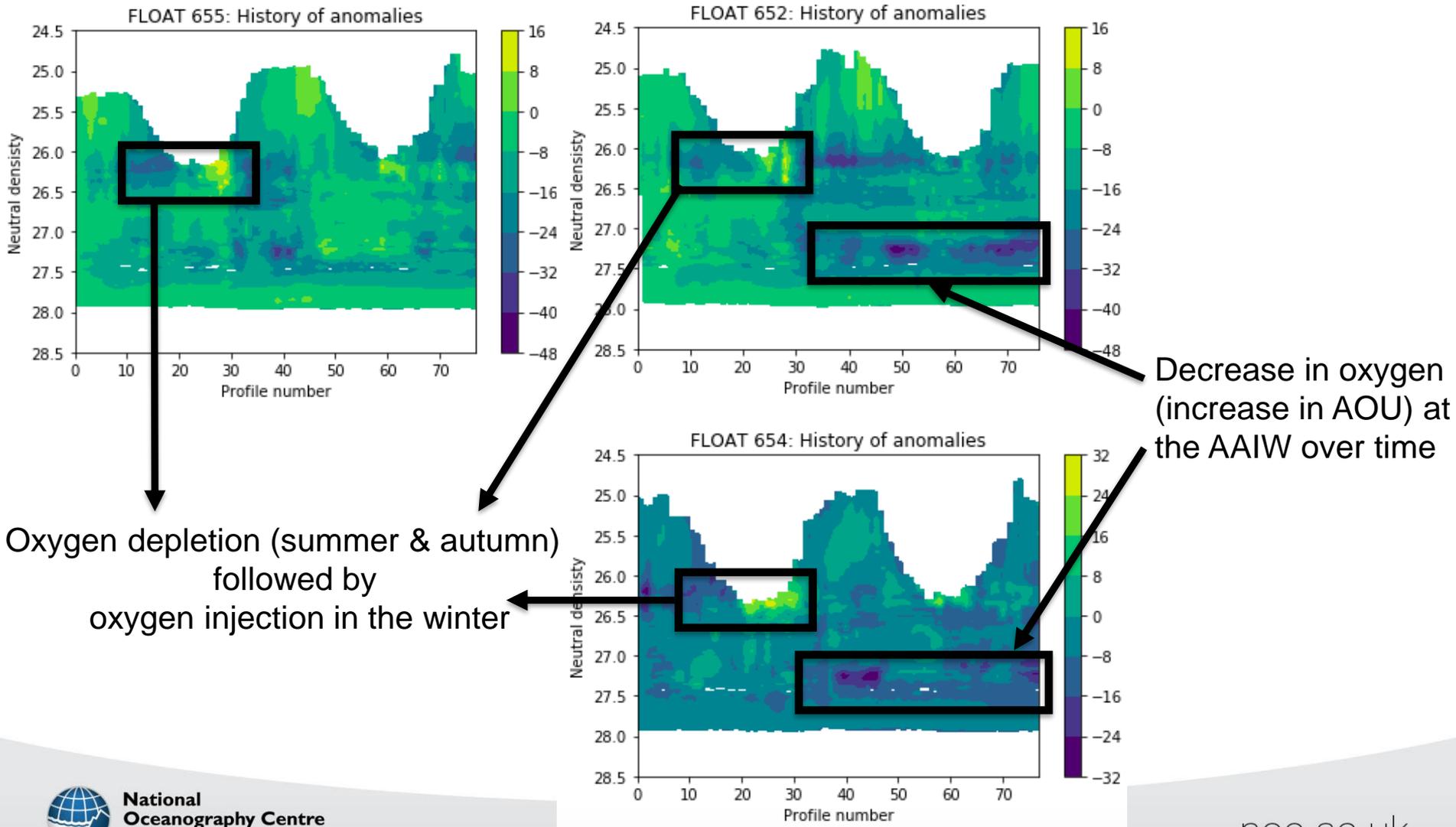
Float 652



# Evolution of the oxygen differences in the full water column



# Evolution of the oxygen differences in the full water column



# Next...

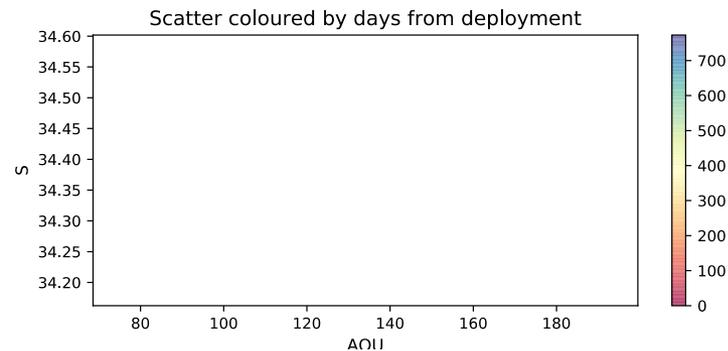
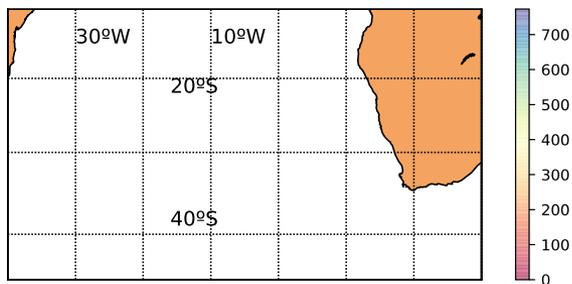
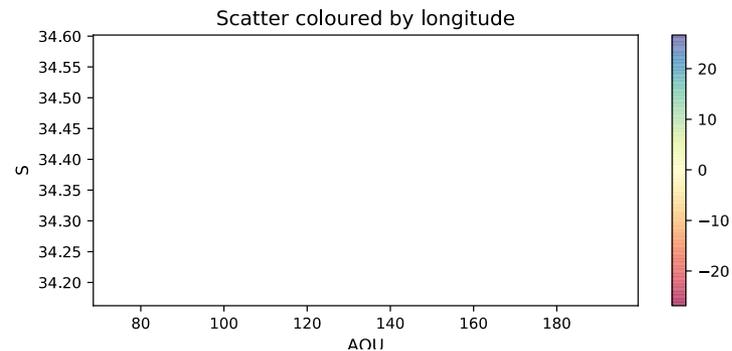
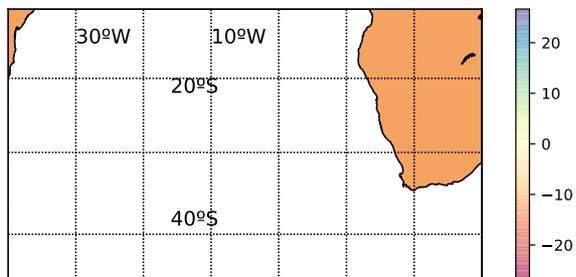
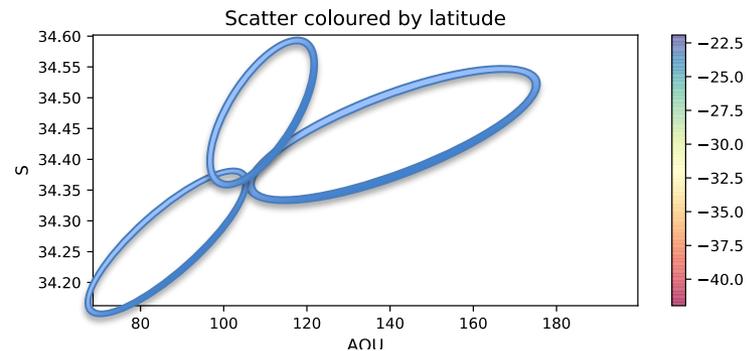
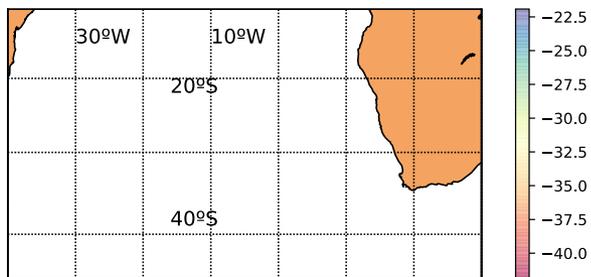
- Early analysis shows that the changes in the AAIW are significant (larger than spatial variability)
- We will use the climatology to account for space-induced variability and account for time related change only
- We will quantify this change and further investigate seasonal variability and spatial differences between the floats





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# AOU – S index from the floats



# AOU – S index from the floats

