

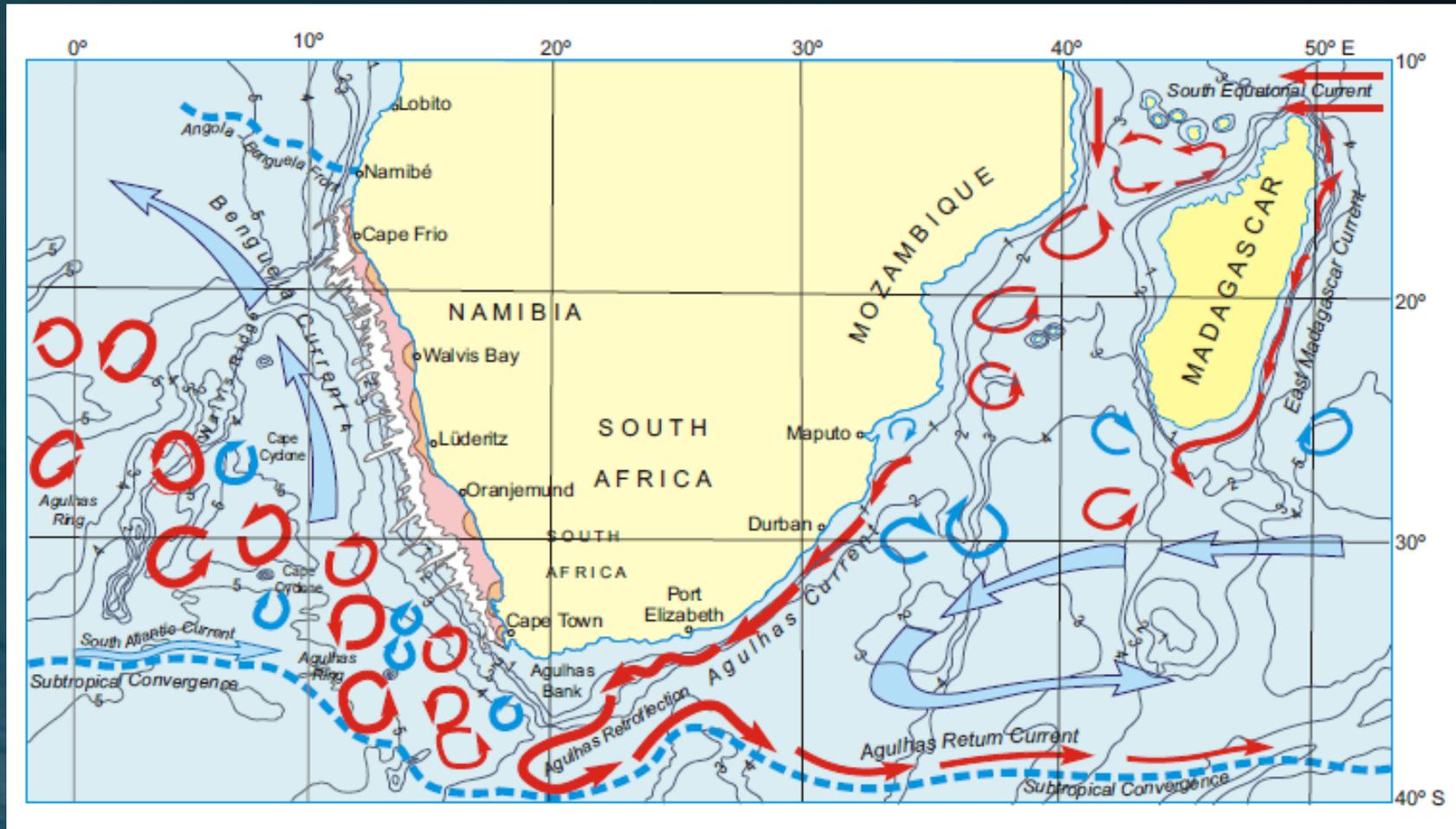
# High resolution Argo profiling in a Western Boundary Current

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Mbulelo Makhetha  
Isabelle Ansorge  
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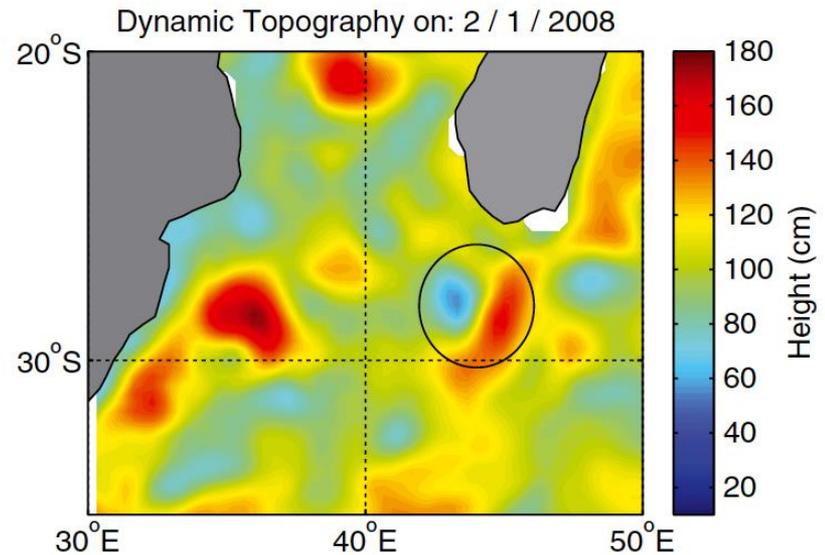
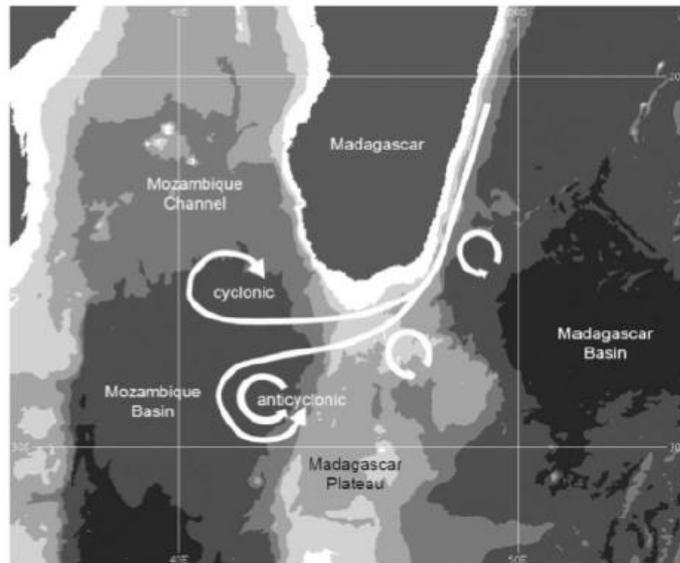
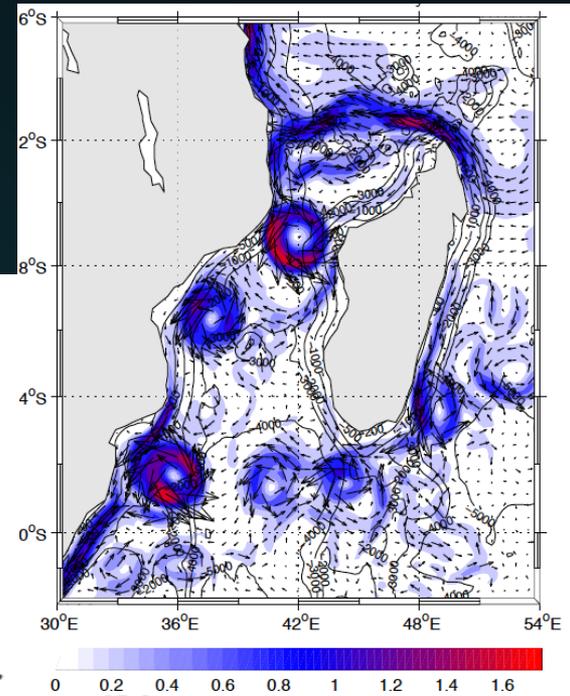
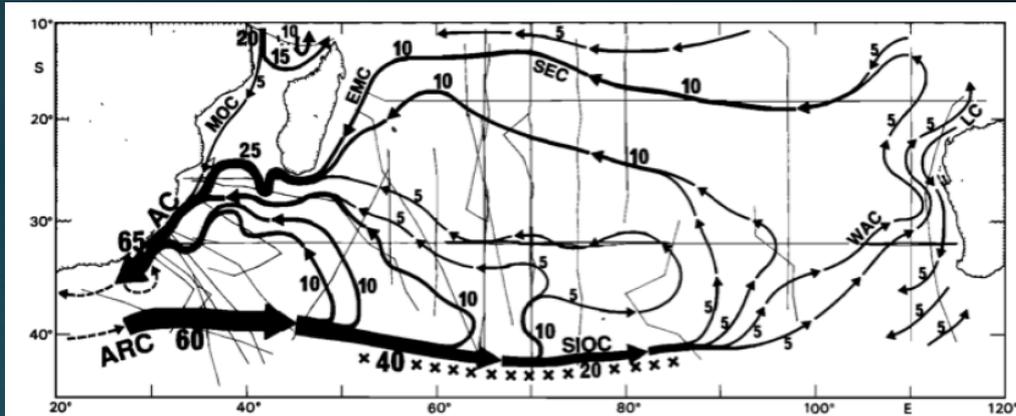
Tamaryn.Morris@weathersa.co.za



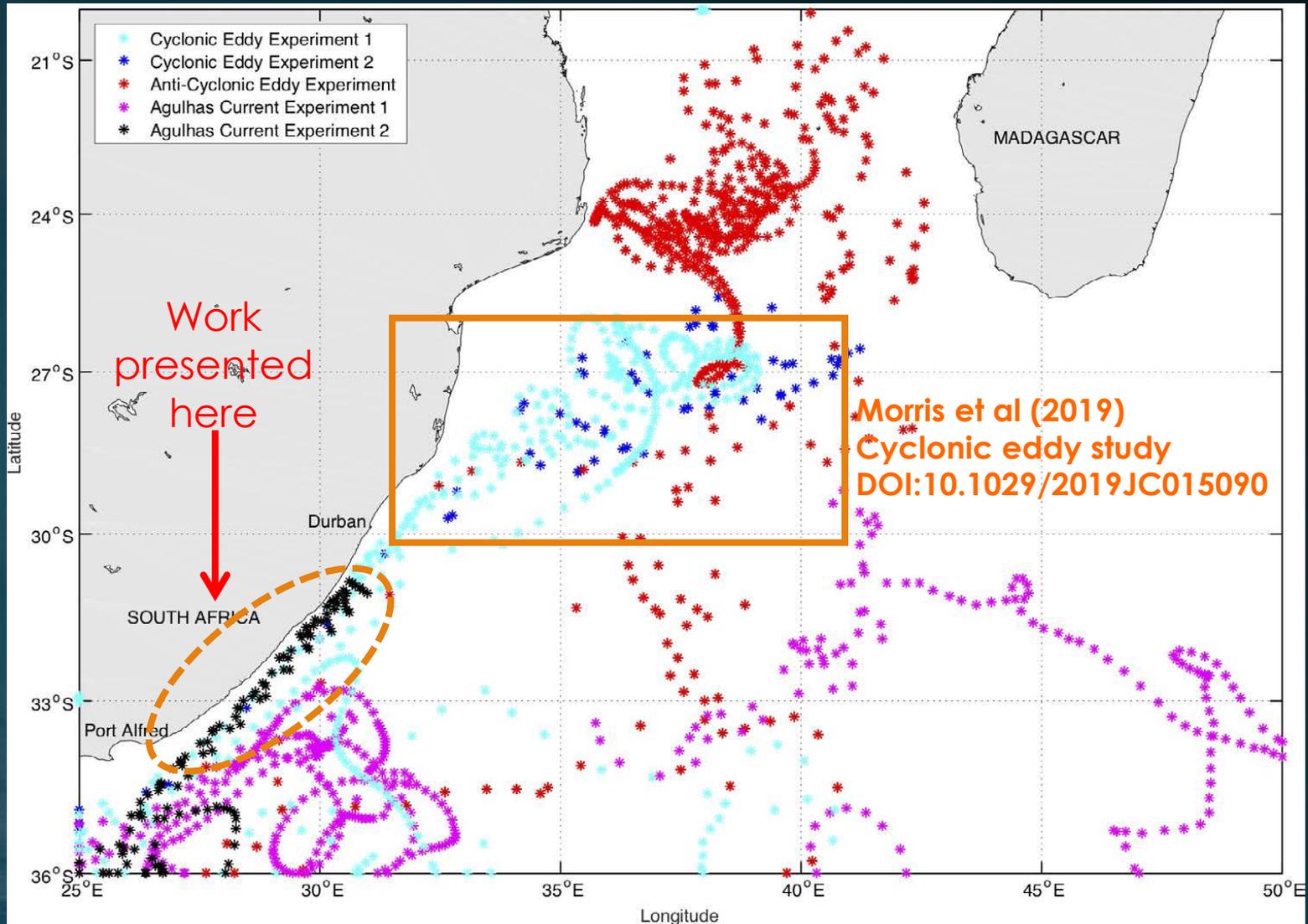
# The Greater Agulhas Current System



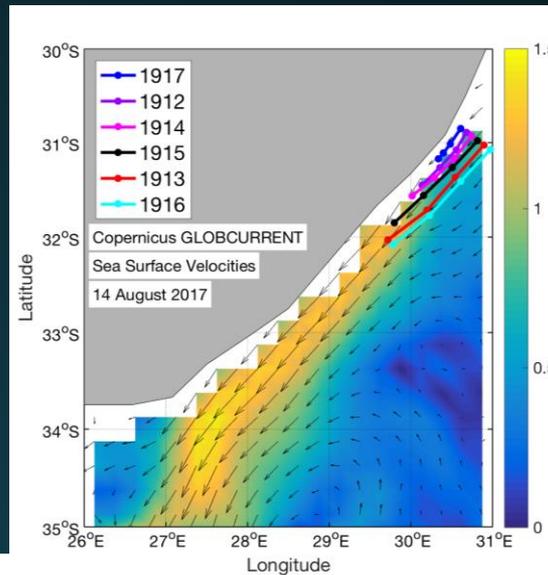
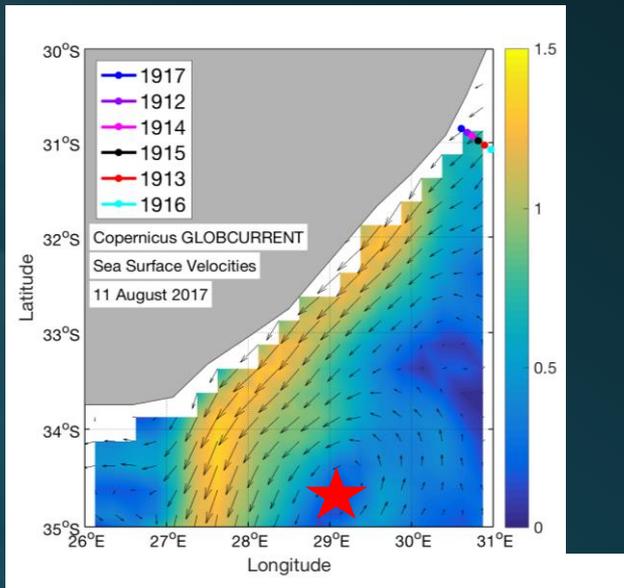
# Source Waters



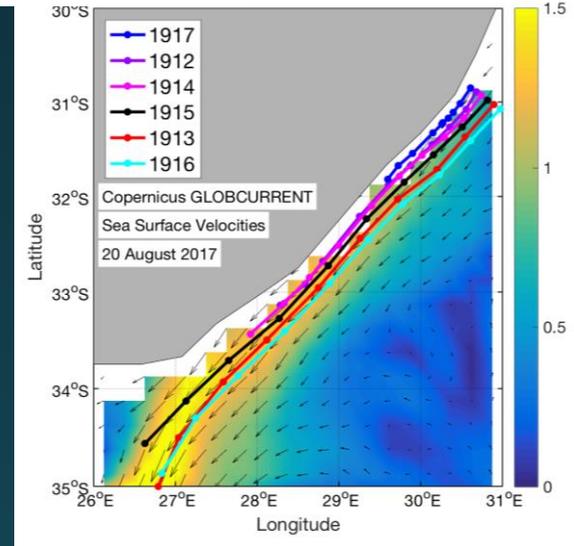
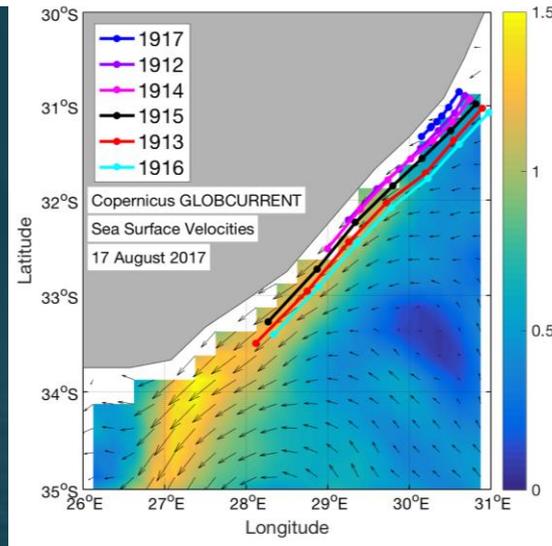
# How to investigate this turbulence using Argo floats?



# Agulhas Current MOCCA floats



Six MOCCA floats  
~ 10 nm apart  
Daily profiling  
1000 m park depth  
1000 m profile depth



\* No  
meanders \*  
(in flow of  
current)

# Agulhas Current MOCCA floats

15 days  
 $0.39 \pm 0.39$  m/s

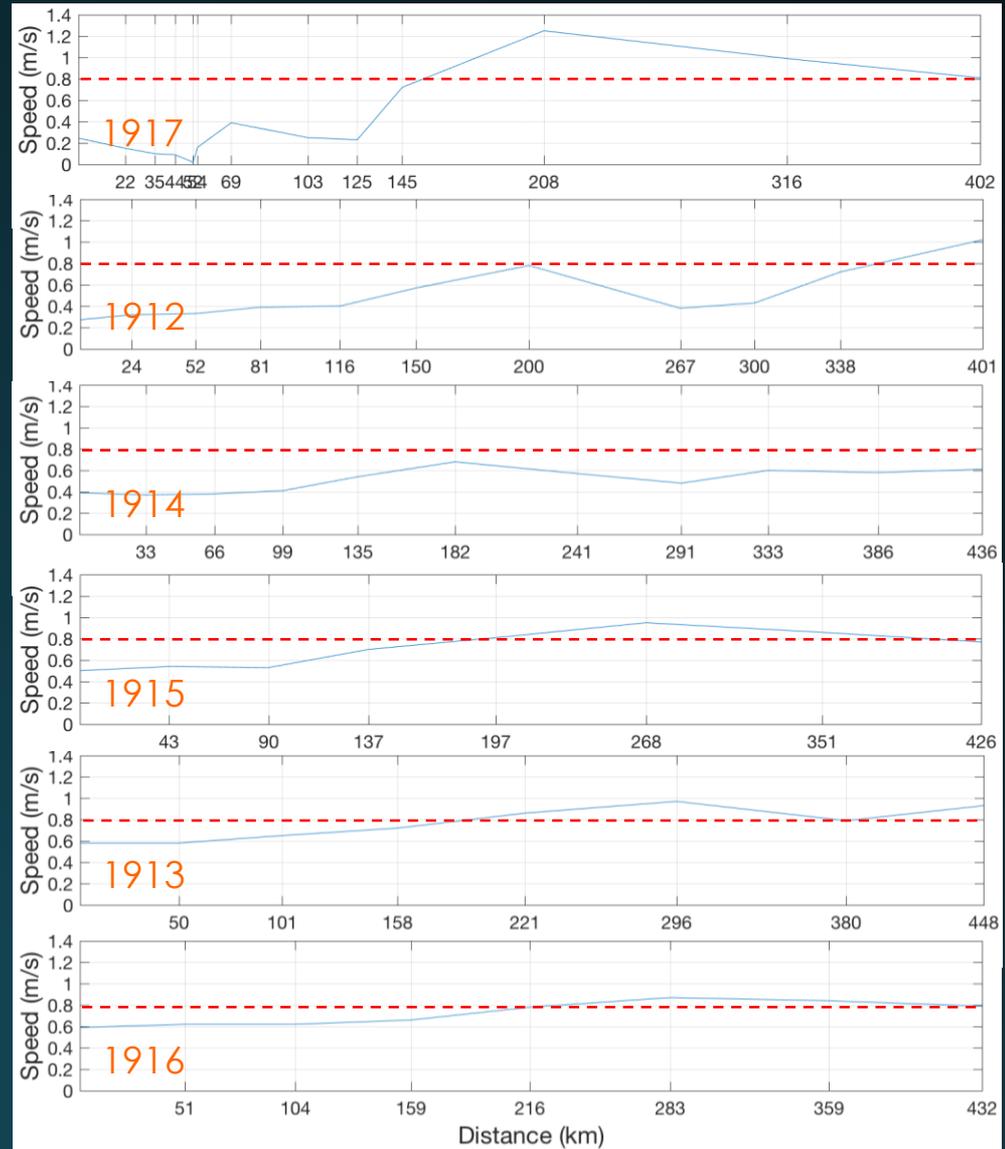
13 days  
 $0.47 \pm 0.26$  m/s

13 days  
 $0.47 \pm 0.17$  m/s

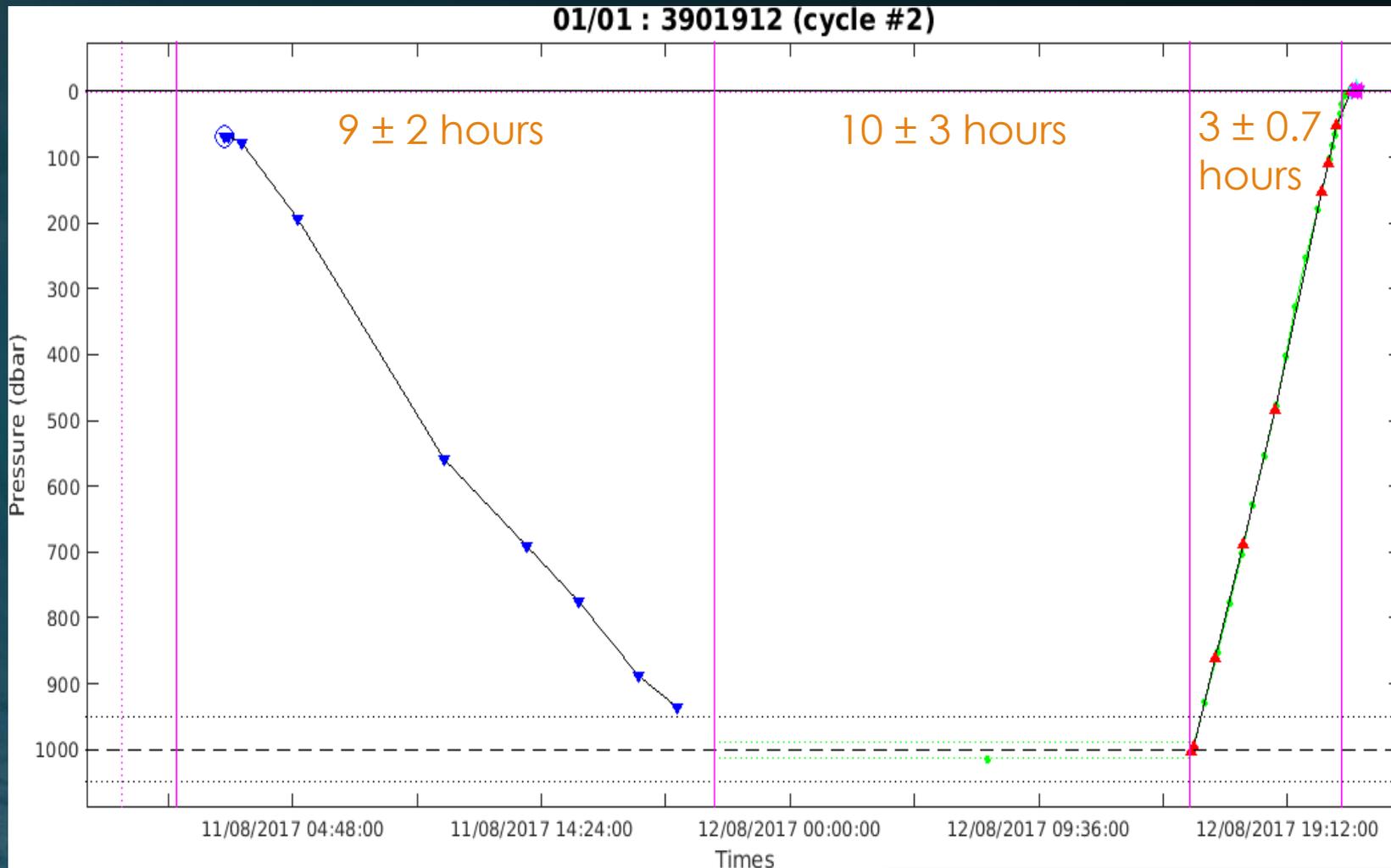
10 days  
 $0.64 \pm 0.28$  m/s

10 days  
 $0.68 \pm 0.28$  m/s

10 days  
 $0.64 \pm 0.25$  m/s



# Agulhas Current MOCCA floats



Calculations courtesy of  
Andrea Garcia Juan  
(Euro-Argo ERIC)

# Agulhas Current MOCCA floats

Coastal

15 days  
 $0.39 \pm 0.39$  m/s

Inshore of  
 Agulhas Current

13 days  
 $0.47 \pm 0.26$  m/s

Inshore of  
 Agulhas Current

13 days  
 $0.47 \pm 0.17$  m/s

Inshore of  
 Agulhas Current  
 Core

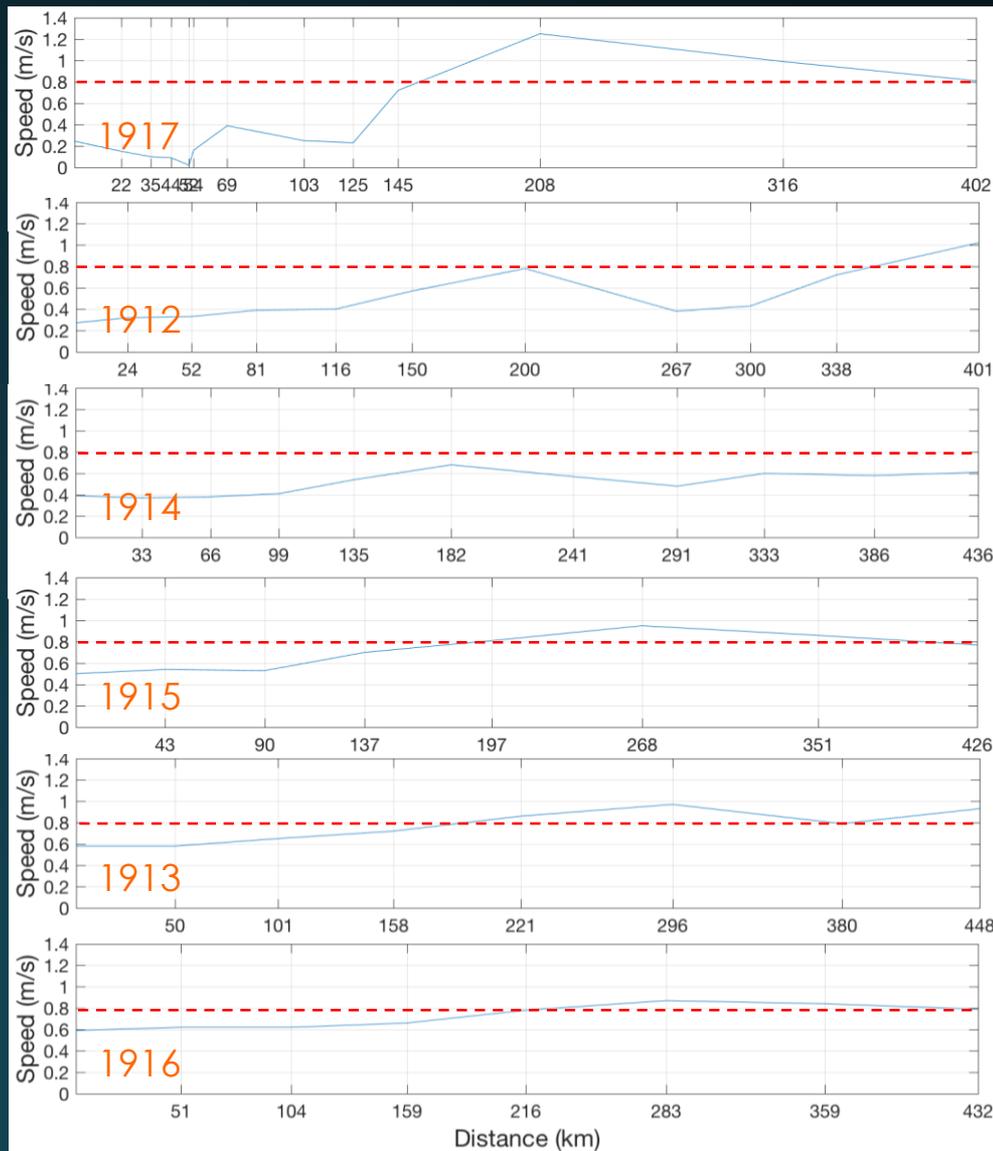
10 days  
 $0.64 \pm 0.28$  m/s

Agulhas Current  
 Core

10 days  
 $0.68 \pm 0.28$  m/s

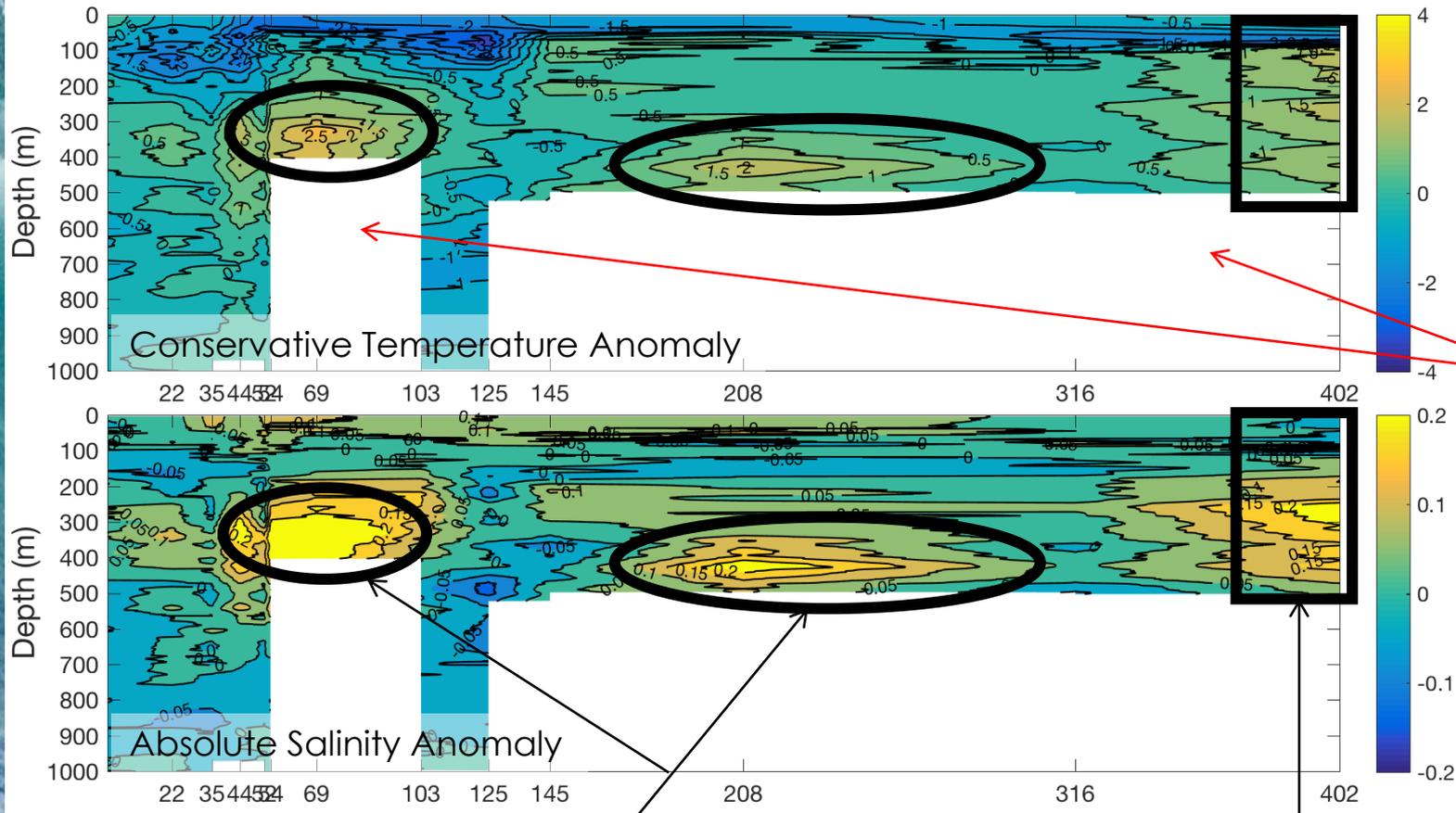
Offshore of  
 Agulhas Current  
 Core

10 days  
 $0.64 \pm 0.25$  m/s



# Agulhas Current MOCCA floats Anomalies

1917 - Coastal



Method:  
CTD on  
deployment  
subtract  
float profiles  
(best one?)

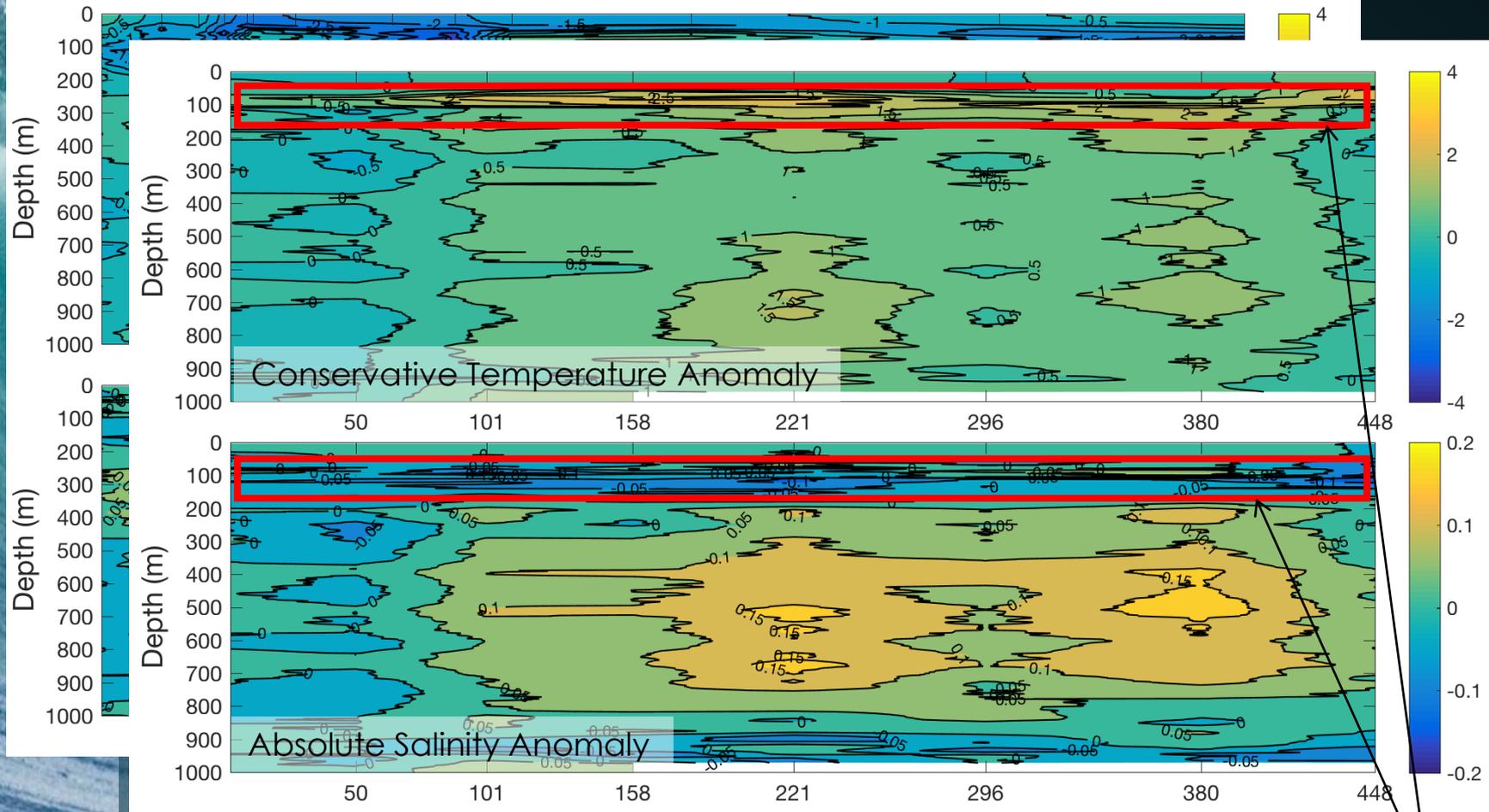
Float  
"grounded"

Shelf-edge dynamics?  
(not upwelling given warmer  
waters)

Interaction of anti-  
cyclonic eddy to the  
south and intensifying  
Agulhas Current

# Agulhas Current MOCCA floats Anomalies

1913 - Core



Initial negative

Then positive anomalies subsurface

Warm, fresh layer at 100 m

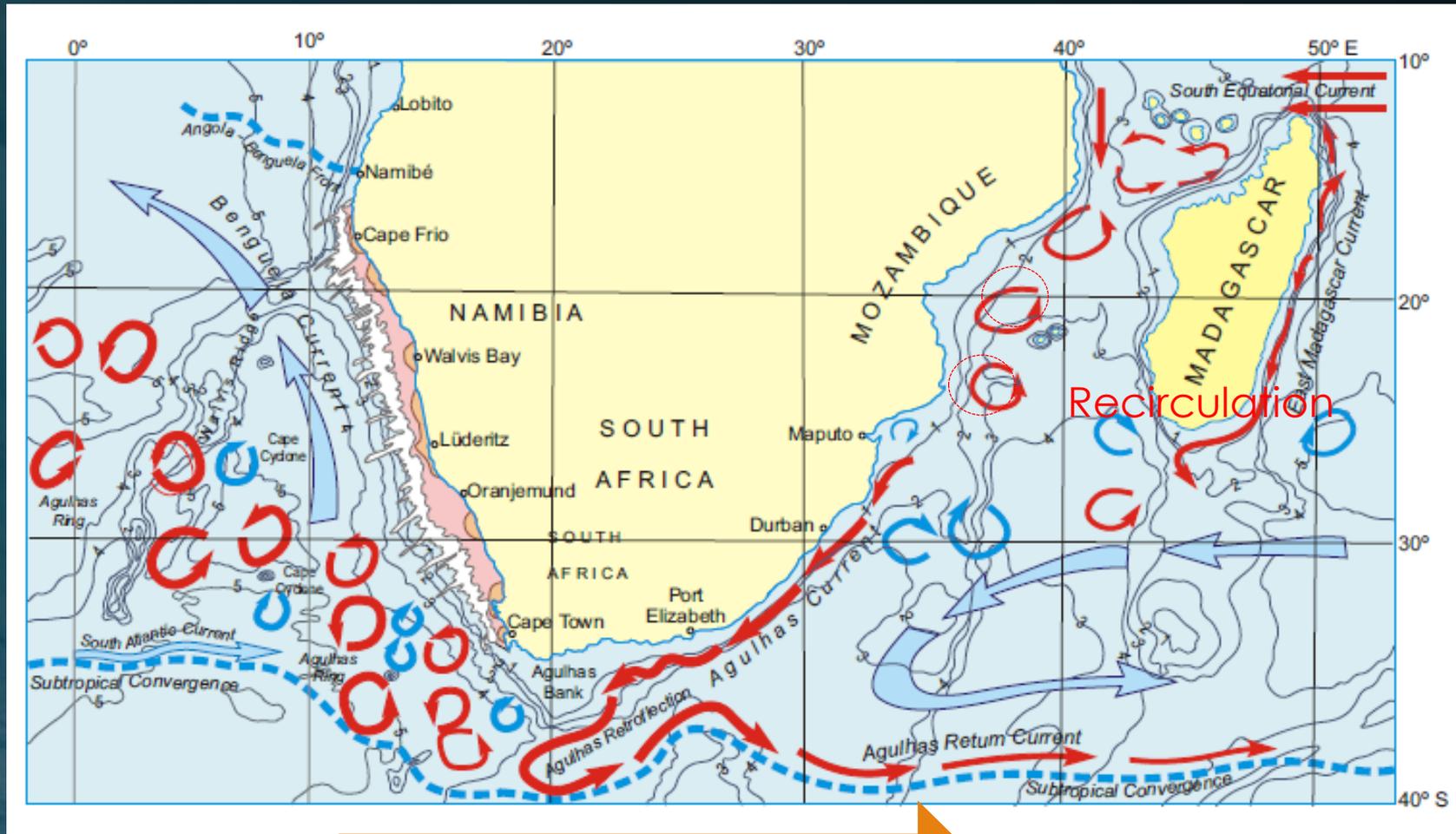
Mixing?

# Agulhas Current MOCCA floats

What next?

- Identify anomalies and potential interactions with shelf / slope of the east coast of South Africa
- Volume, heat and salt transport of this snap-shot of the Agulhas Current study
- What implications will this and continued studies have on dynamics such as rainfall, the Thermohaline Circulation and the AMOC?

# Finally, where does this water go...



ACC and Frontal Zones

# Finally, where does this water go...

Region	High-Resolution floats (n=16)*	Standard mission floats (n=132)**
Return Current	18.75 %	51 %
Return Current and recirculates	18.75 %	9 %
South Atlantic	25 %	15 %
<b>Southern Ocean</b>	<b>37.5 %</b>	<b>12 %</b>
Undetermined	-	13 %

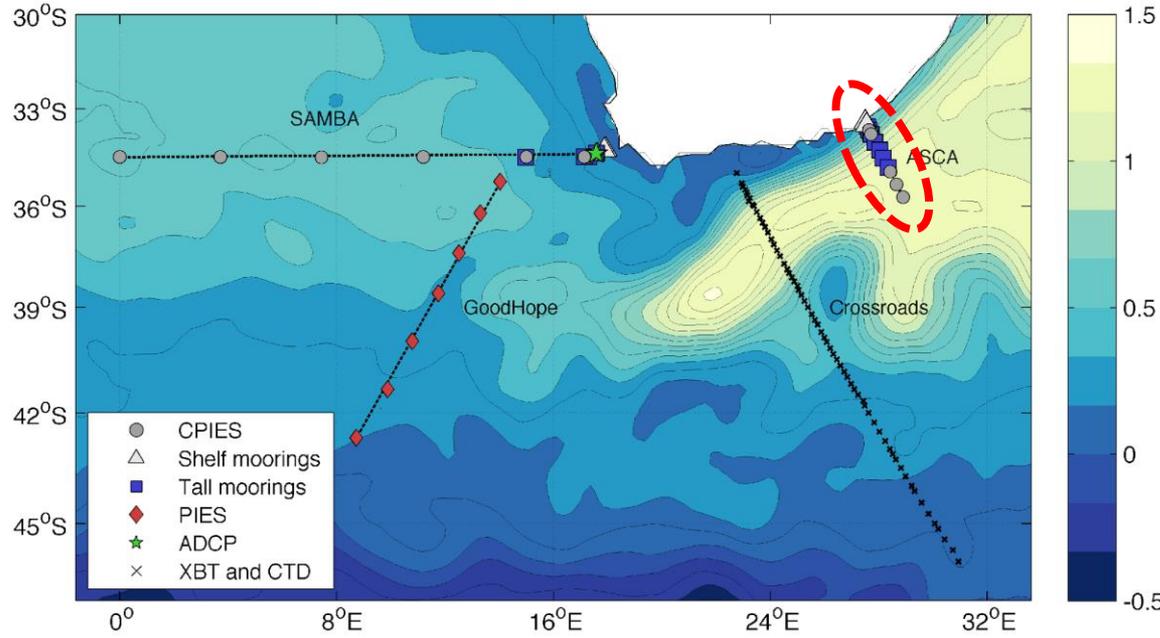
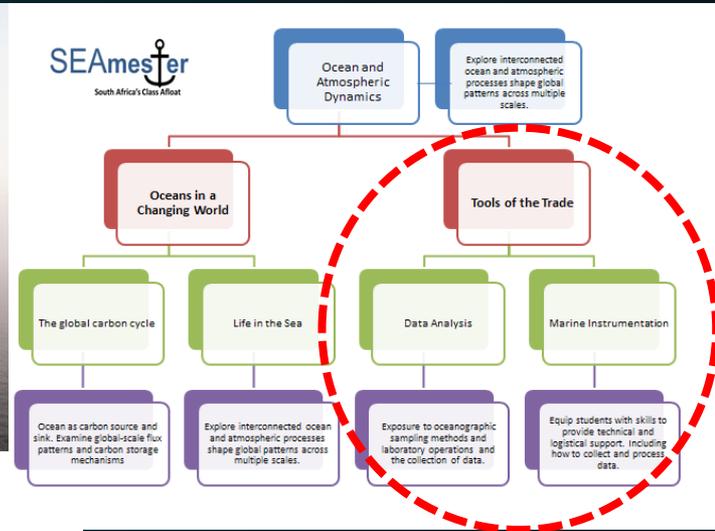
\* Park depths 300-650 m, profile from 1000 m, daily and five-daily profiling

\*\* As of end 2017

**Argo2020:** Manage floats in regions of increased turbulence (eddies, WBC) but increasing profiling frequency, thus allowing for additional measurements. Potentially also shallower park depths to “capture” features.

7th Euro-Argo Science Meeting: 22-23 October 2019, Athens, Greece

# Future deployment options in the Agulhas Current: SEAmester



7th Euro-Argo Science Meeting: 22-23 October 2019, Athens, Greece



# Acknowledgements

Master, crew and scientific team onboard the Research Vessel *Algoa* for the Transkei 2017 cruise where floats were deployed and validation CTD casts undertaken

Department of Oceanography, University of Cape Town, the South African Environmental Observation Network and the South African Weather Service for funding for this, and associated, work

MOCCA project has received funding from the European Maritime and Fisheries Fund (EMFF) under grant agreement No EASME/EMFF/2015/1.2.1.1/SI2.709624



Co-funded by the European  
Maritime and Fisheries Fund