



# iAtlantic

INTEGRATED ASSESSMENT OF ATLANTIC  
MARINE ECOSYSTEMS IN SPACE AND TIME

## Gravest Empirical Mode to be used by Inverted Echo Sounders in order to determine the zonal flows in the South Atlantic

### iAtlantic 2021 General Assembly

*Melania Cubas Armas, Ángela Mosquera Giménez, Pedro Vélez-Belchí, Cristina Arumí-Planas, Rosa Balbín Chamorro, Verónica Caínzos, Luis Cana Cascallar, Oscar Chic Giménez, Mikhail Emelianov Kolomitski, María del Carmen García Martínez, Luis García Weil, Diana Grisolia Santos, Carmen Gordo Rojas, Alonso Hernández Guerra, Nina Hoareau, Francisco Machín Jiménez, María de los Ángeles Marrero Díaz, Antonio Martínez Marrero, José Luis Pelegrí Llopert, María Dolores Pérez-Hernández, Ángel Rodríguez Santana, Elena Roget Armengol, Joaquín Salvador Castiella, Daniel Santana-Toscano, Carine Simon, Elena Tel, Manuel Vargas Yañez, Montserrat Vidal Barcelona and Álvaro Viúdez Lomba*

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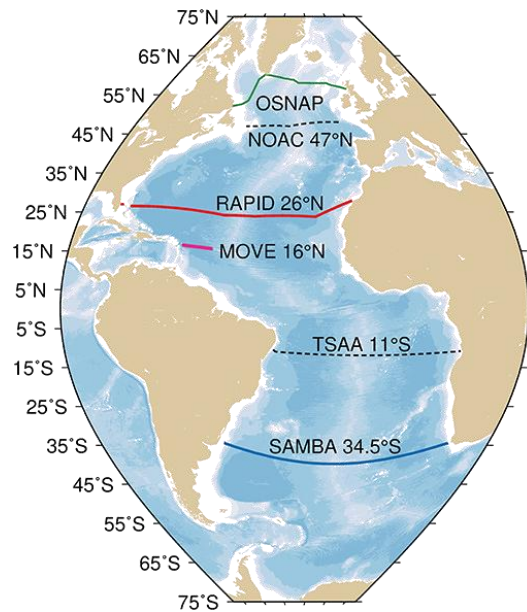
- What did we get globally?
- How are our empirical relationships?
- How does our GEM look like?

## Future work

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# What do we want to achieve?

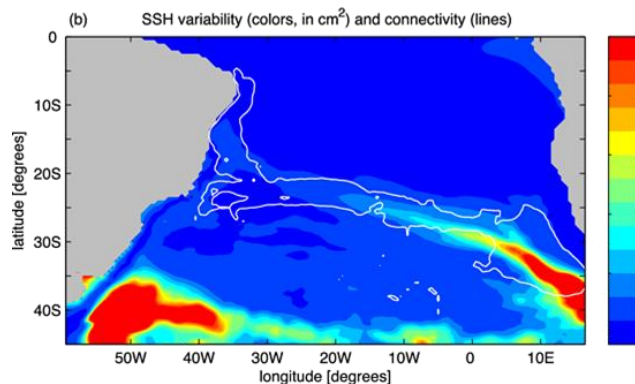
- *In situ* measurements of the South Atlantic's Meridional Overturning Circulation:
  - South Atlantic MOC Basin-wide Array (SAMBA).
  - Tropical South Atlantic Array (TSAA).



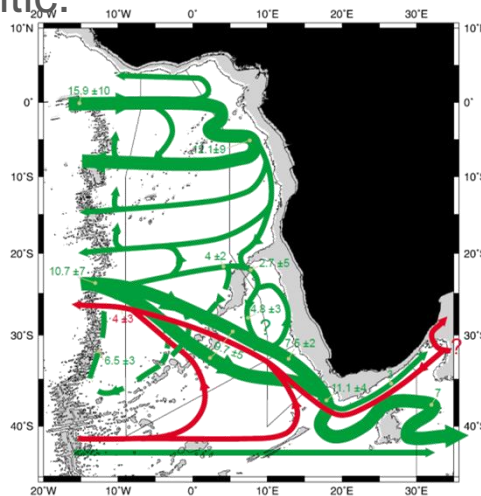
Observing arrays in the Atlantic with AMOC transport estimates (Frajka-Williams *et al.*, 2019).

# What do we want to achieve?

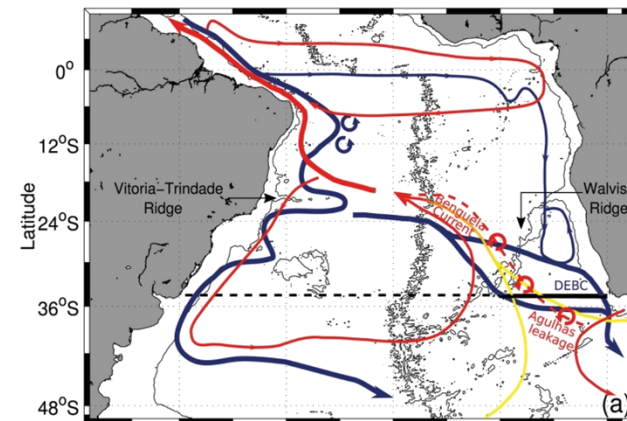
- Zonal flow in the South Atlantic



Map of sea surface height variability in the OFES model (van Sebille *et al.*, 2012).



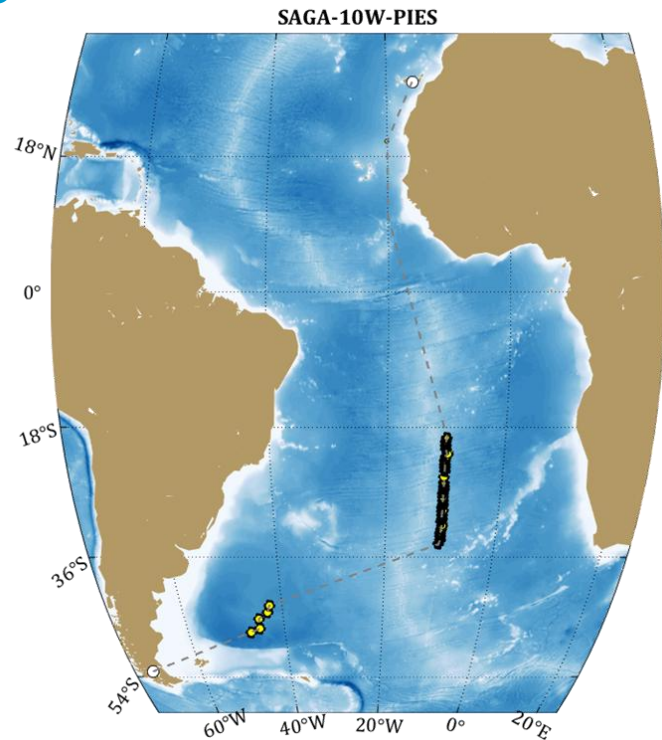
Schematic circulation of NADW (green) and UCDW (red) in the eastern South Atlantic (with the 3000m isobath) (Arhan *et al.*, 2003).



Schematic circulation of the upper/intermediate Meridional Overturning Circulation (MOC) limb is shown with red/yellow arrows, and the lower MOC limb in blue (Kersalé *et al.*, 2019).

# How are we going to achieve it?

- SAGA 10W (7<sup>th</sup> March to 15<sup>th</sup> April):
  - 4 PIES.
  - 3 Moorings.
  - 15 Argo Floats.
  - 37 CTD.



## What is a PIES?

- Pressure Inverted Echo Sounder:
  - Acoustic Transducer:
    - Acoustic pulse at programmable intervals.
    - The pulse travels back after reflection.
    - Total travel time of the signal.
  - Pressure Sensor:
    - Height of the water column.



A Pressure Inverted Echo Sounder (Wang *et al.*, 2012).

## What is a PIES?

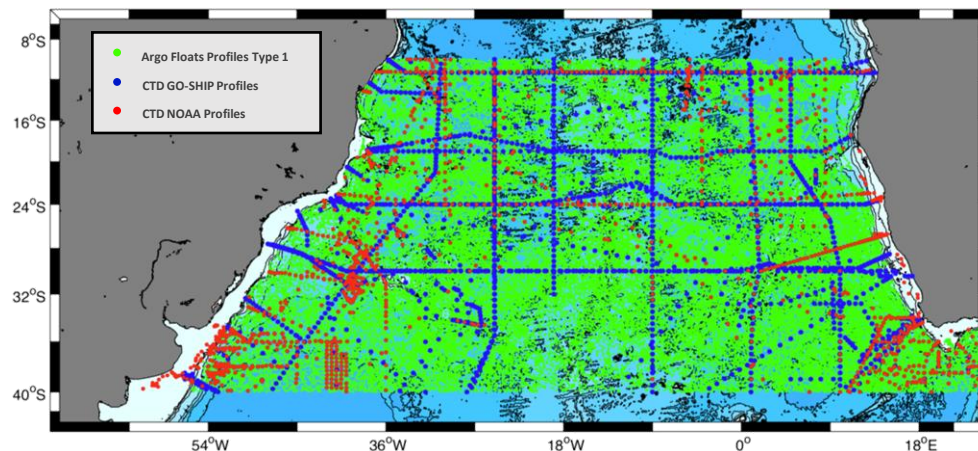
- Pressure Inverted Echo Sounder:
  - Estimate temperature and salinity profiles.
  - Determine the density of seawater.
  - Calculate the volume transport through a two PIES.
  - Retrieve the average water velocity.



A Pressure Inverted Echo Sounder (Wang *et al.*, 2012).

## What is a GEM?

- Gravest Empirical Mode:
  - Lookup table for hydrographic properties.
  - Empirical relationship between travel time and profiles of temperature and salinity.



CTD historical profiles from historical and Argo Floats (data up to 2019).



# What are our plans for the future?

- Update database:
  - Data of 2020.
  - Data from SAGA 10W.
- Recalculate GEM.
- Include ADT data.





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[www.iatlantic.eu](http://www.iatlantic.eu)



[i-atlantic@ed.ac.uk](mailto:i-atlantic@ed.ac.uk)

# Thank you!

*Pedro Vélez-Belchí*  
*[pedro.velez@ieo.es](mailto:pedro.velez@ieo.es)*



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