Satellite altimetry transport estimates of the AMOC along the RAPID 26N mooring array

Q: Can satellites replace mooring arrays?

A: Yes, but with some caveats…

- Using geostrophic principles, satellite altimetry can be used to directly estimate MOC transport at lower frequency signal (10 months >),
- This method allows us to measure the MOC transport at other latitudes,
- We can reconstruct MOC backwards in time from historical data

- Not so great for higher frequency signals,
- Cannot capture the western boundary current

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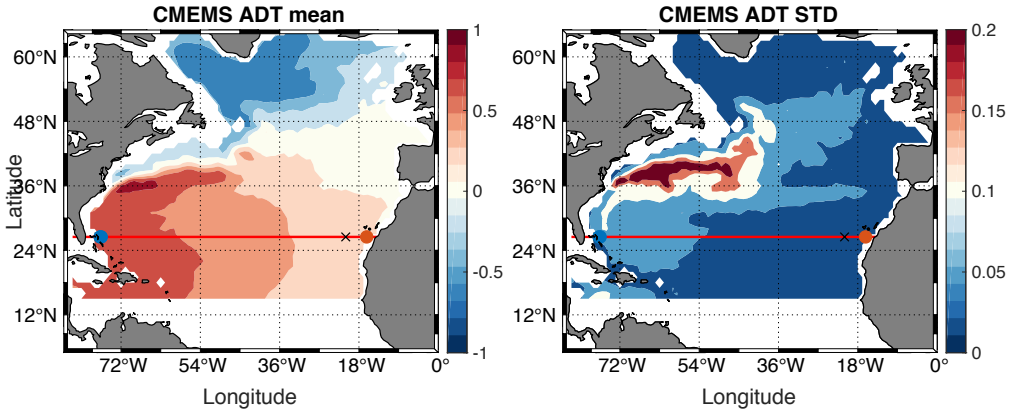
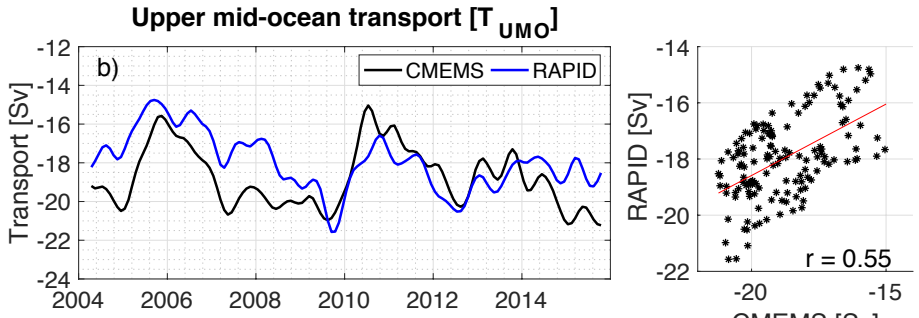
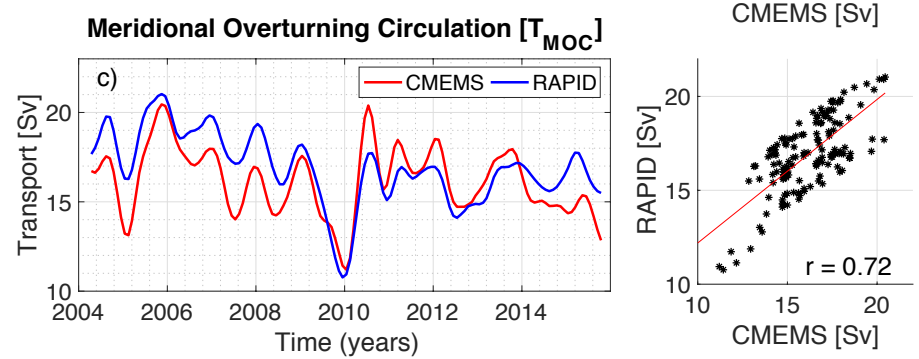
Reproduction of the MOC at 26˚N







Here the MOC transport is defined as the sum of the following components:

$$T_{MOC} = T_{Gulf\ Stream} + T_{Ekman} + T_{upper\ mid\text{-}ocean}$$

Florida Straits cable

ERA5 Wind stress

Satellite Altimetry

Acquired from existing datasets

New method developed in this study using absolute dynamic topography (ADT) and principles of geostrophy:

$$T_u = \frac{sg}{f}[\eta_E - \eta_W] * H1$$

Where H1 (1100m) is layer thickness, η is ADT, g is gravity and s is a scale factor.

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