





New insight of the West Tropical Atlantic Circulation based on 25 years of satellite altimetry, PIRATA data and GLORYS ocean reanalysis

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Motivation

- → Use of altimetric data and GLORYS12V1 reanalysis to understand the relationship between the surface currents in the tropical Atlantic western boundary at the seasonal and interannual timescales, and propose an updated schematic map for the seasonal circulation.
- → Investigate the influence of the wind on the seasonal variability of the currents, and the Atlantic Climate Modes on the interannual variability of these currents.



Data

- → Altimeter-derived geostrophic currents from CMEMS (monthly dafa from 1993 to 2017, spatial resolution: 0.25°).
- → GLORYS12V1 currents reanalysis from CMEMS (daily and monthly data from 1993 to 2018, spatial resolution: 1/12°).
- → 15 years of ADCP data from different cruises (PIRATA).
- → ERA5 wind velocity fields from ECMWF (monthly data from 1993 to 2018, spatial resolution: 0.25°).
- → Sea Surface Temperature OI v2 from NOAA (monthly data from 1993 to 2018, spatial resolution: 0.25°).



Results (1) : currents and their seasonal variabilities



Results (2) : synthesis and update of the seasonal circulation and the influence of the



Figure 6: currents strengths and the wind parameters

Results (3) : NECC seasonal variability at 38°W



Figure 7: monthly climatology of the NECC at 38°W

- Two branches of the NECC during the second part of the year and two northward migrations;
- First migration (June-November) associated with the migration of ITCZ; and second migration associated to the second zero line of the WSC;
- The NECC transport influenced by the WSC strength with 2 months time lag.



Figure 9: NECC transport and WSC strength at 38°W

Result (4)

Zonal transport

Results (4) : interannual variability of the currents



Year-to-year variability of the currents;

- NBC strength, north of the equator is correlated with the Atlantic Meridional Mode whereas south of the equator it is anticorrelated;
- The NECC further east of the basin is correlated with the ITCZ migrations.



Figure 11: relationship between the currents, the Atlantic Meridional Mode and the ITCZ

Results (5) : NECC transport interannual variability at 38°W



Figure 13: relationship between the NECC transport at 38°W and the Atlantic Modes

- Year-to-year variability of the NECC;
- Positive anomalies of the NECC transport linked to the warm events in the Atlantic Meridional Mode;
- Negative anomalies of the NECC transport associated to moderate/decreasing warm events in the Atlantic Zonal Mode.



Summary

 Three area of connections between the currents with seasonal pattern.

The strength of the NBC, NBCR, rNBC and NECC are influenced by the WSC strength.

 Bifurcation of the NBC betwseen 4°-6°N during September-October, and cyclonic circulation between 0°-5°N during spring.

 NBC influenced by the AMM and the NECC transport influenced by the AMM and the AZM..

Thanks for your attention



