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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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Satellite altimetry offers a mesoscale description of the ocean surface circulation worldwide since 1993. The Mercator Océan GLORYS12 reanalysis complement this description with a consistent 3-dimensional estimation of ocean physical parameters over the same period, with a reliability supported by the assimilation of available in-situ and satellite data. This information is used to revisit the ocean circulation description over the West Tropical Atlantic and in particular the seasonal and interannual variability of the western boundary current system from 20°S to 20°N connected to the tropical Atlantic basin scale circulation. PIRATA data since 2000 are used to validate the ocean reanalysis, and complement the description at depth of the main currents. The variability pattern and main characteristics of the North Brazil Undercurrent, the North Brazil Current and its Retroflexion (NBCR), and the connections with the Equatorial Undercurrents, the South and North Equatorial Currents (SEC/NEC) and CounterCurrents (NECC) show seasonal changes. Both of their main pattern and the associated mesoscale field are dominated by the seasonal regimes. This circulation is linked to the tropical Atlantic Climate variability and the coupled pattern of wind and ocean dynamics. In particular, we show that the interannual variability of NECC, depending on the NBCR and SEC/NEC water transport exhibits different branches in relation with Tropical Atlantic Zonal and Meridional Mode of variability.