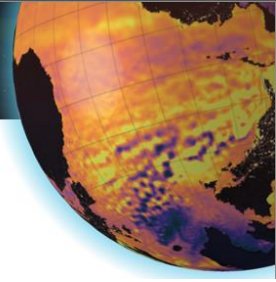


20 years of monitoring the Brazil Current along the NOAA-AX97 High-Density XBT line: in situ observations and Ocean Forecasting and Analysis Systems assessment

The Brazil Current (BC) is the Western Boundary Current that closes the South Atlantic Subtropical Gyre. It is characterized by a warm and saline flow extending to approximately 500 m depth, and plays an important role in transporting heat, mass, and nutrients to high latitudes along the South American continental margin. Around 23°S, the BC presents strong interaction of the flow with bathymetric features, coastal upwelling, eddy variability and recirculation gyres. The NOAA AX97 High Density XBT transect (hereafter AX97) is the longest sustained monitoring system of the BC active today, with nearly 20 years of observational data. It represents a partnership of two universities (UFRJ and FURG), the Brazilian Navy and NOAA/AOML. AX97 has a bimonthly sampling with 99 cruises already executed, and 4603 XBTs launched between Rio de Janeiro and the Trindade Island. The main goal of this work is to assess the structure, location, and variability of the BC in both eddy permitting and eddy resolving Ocean Forecast and Analysis Systems (OFAS). In this work, 81 AX97 transects were evaluated against six OFAS datasets: three with higher resolution (1/12°) - HYCOM/NCODA GOF3.1; Mercator GLORYS12V1; and the Bluelink ReANalysis BRAN - and three with lower resolution (1/4°) - Mercator GLORYS2v4; ECMWF ORAS5; and the CMCC C-GLORSv5. The AX97 volume transport was estimated by calculating the southward geostrophic velocity, integrating it between the sea surface and the depth of 500 m and between the longitudes of 41° W and 39° W, the region where the observed flow is concentrated. The OFAS volume transport was calculated integrating the output southward velocities between the same limits of integration. After analyzing the main structure of BC and comparing the OFAS against observations along the AX97 reference transect, it was observed that GLORYS12V1 exhibited the least intense transport among the three high-resolution models. However, it still overestimated the BC by approximately 1.5 Sverdrup (Sv). Among the lower-resolution models, CGLO closely approximated the observed transport, with less than 1 Sv of difference. Nonetheless, GLOR4 also yielded results that were near that observed at AX97. This study is part of a long-term strategy to enhance the understanding of the dynamics and impacts of the oceans along the Brazilian continental margin. The goal is to use the OceanPredict



framework to assess and evaluate all available OFAS along the AX97, analyzing their ability to capture mesoscale extreme events.

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