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The increase in anthropogenic emissions to the atmosphere has been implicated in changes of some
climatic phenomena in the coupled Earth system, including the Atlantic Meridional Overturning
Circulation (AMOC). The Tropical Atlantic is a key region for the AMOC, since the North Brazil
Current (NBC) transports the largest amount of heat to the North Atlantic, either through its mean
flow, or through the NBC retroflection eddies. This study aims to assess the changes to the AMOC
and NBC eddies in a CMIP5 future scenario, through climate modelling based on ocean dynamical
downscaling with the Regional Ocean Modelling System (ROMS), using output from two CMIP5
experiments (Historical and RCP8.5) of the Brazilian Earth System Model (BESM). The grid was
set for the 25°S-25°N and 60°W-30°E domain, the experiments were simulated for 20 years each
(Historical: 1986-2005, RCP8.5: 2081-2100), with daily outputs. To identify and track the ocean
eddies, an automated algorithm (TRACK) was applied to Sea Surface Height anomalies. When
compared with time series and vertical profiles of ocean salinity and temperature from PIRATA
buoys, the ROMS Historical experiment simulates these variables very well, especially the
temperature. The AMOC simulated by ROMS presented a very accurate vertical structure, and its

index presented mean transports of 16.9 Sv (Historical) and 13.8 Sv (RCP8.5), suggesting an 18%
weakening in the future climate. Wavelet analysis showed that this weakening of the AMOC index
peaks at both the six months and the four years periods. The NBC eddies simulated by the ROMS
experiments were present predominantly in the austral summer, with very little decrease of eddies
frequency in the RCP8.5 scenario, when compared to the changes found for AMOC. These results
show that the NBC eddies can play a major role in the thermohaline circulation, by maintaining the
transport even under a weakening AMOC tendency.
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