Gabriel
Cerveira
Federal University of Maranhão
Cláudia Parise, Federal University of Maranhão
Adilson Machado, Federal University of Maranhão
Luciano Pezzi, National Institute for Space Research
Kevin Hodges, University of Reading
Ronald de Souza, National Institute for Space Research
Oral
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.
Presentation file
cerveira-presentation.pdf
Meeting name
PIRATA-24/TAV Meeting
Download to PDF