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Do the Atlantic climate modes impact the ventilation of the eastern tropical North Atlantic oxygen minimum zones?

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Oxygen minimum zones (OMZs) exist in the upwelling regions of the eastern tropical Atlantic and Pacific at intermediate depth. They are a consequence of high biological productivity in combination with weak ventilation. The flow fields in the tropical Atlantic is characterized by Latitudinally Alternating Zonal Jets (LAZJs) with a large vertical scale. It has been suggested that LAZJs play an important role for the ventilation of the OMZ as eastward currents advect oxygen-rich waters from the western boundary towards the OMZ. In the Eastern Tropical North Atlantic (ETNA), the eastward flowing North Equatorial Undercurrent and North Equatorial Countercurrent (NECC) provide the main oxygen supply into the OMZ.
Variability in the strength and location of the LAZJs is associated with oxygen variability in the ETNA OMZ. We here want to address the question whether the variability in the zonal current field can be partly attributed to the large-scale climate modes of the tropical Atlantic, namely the Atlantic zonal and meridional mode. An influence of these modes on the NECC has been found in previous studies. For the analysis we are using the output of a global ocean circulation model, in which a 1/10° nest covering the tropical Atlantic is embedded into a global 1/2° model, as well as reanalysis products and satellite data. The zonal current field and oxygen distribution from the high resolution model is compared to observational data. The location and intensity of the current bands during positive and negative phases of the Atlantic climate modes are compared by focusing on individual events and via composite analysis. Based on the results, the potential impact of the Atlantic climate modes on the ventilation of the ETNA OMZ is discussed.