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Investigation of the intra-annual variability of the North Equatorial Counter Current/ North Brazil Current eddies and of the instability waves of the North Tropical Atlantic Ocean using satellite altimetry and Empirical Mode Decomposition

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The intra-annual variability of the tropical Atlantic Ocean north of the Equator is investigated with satellite altimetry mean sea level anomalies (SLA) data, and with an algorithm based on Empirical Mode Decomposition method. Two regions of high variability are identified:
The first region, between 3°N-12°N, is characterized by the presence of westward propagating eddies linked to the North Brazil Current retroflection in the vicinity of the Brazilian coast. They show a strong annual cycle. Our EMD algorithm points out that this signal is frequency modulated shifting from large lengthscale structures in October to smaller ones in March. Consequently, the number of 'eddies' per year can be aliased, according to the time and location of sampling, and can impact the percentage they explain of the inter-hemispheric exchange of mass and heat associated with the meridional overturning circulation's upper limb. A scenario concerning this dynamics is proposed.
The second region reveals the presence of westward propagating instability waves centered north of the Equator (3°N-7°N) between 50°W-10°W. These instability waves are also frequency modulated and show a strong seasonal cycle with maximum amplitude around August.