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# Sea Surface Salinity signature of tropical Atlantic interannual modes

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Interannual climate variability in the tropical Atlantic is dominated by two internal modes: an equatorial and a meridional mode. The equatorial mode is partly responsible for sea surface temperature (SST) anomalies observed in boreal summer in the Gulf of Guinea. The meridional mode peaks in boreal spring as an inter-hemispheric SST fluctuation. Previous studies show that these modes affect the migration of the inter tropical convergence zone which drives regional precipitation.
In this study, we extracted the Sea Surface Salinity (SSS) signature of these modes from in situ data. The results indicate strong SSS anomalies in the equatorial, north west and south east tropical Atlantic related to the equatorial mode. Moreover, the results also indicate the existence of a meridional SSS dipole in the equatorial region, strong SSS anomalies in north and south tropical Atlantic and in runoff regions, related to the meridional mode.
Using a mixed-layer salt budget in a realistic model, we investigated the oceanic and/or atmospheric processes responsible for this signature:
For the equatorial mode, both fresh water flux and horizontal advection explain the observed signature in the north equatorial region, but in the south equatorial region, the signature is explained by the combined contribution of total (horizontal and vertical) advection and vertical diffusion.
For the meridional mode, changes in fresh water flux explain the observed equatorial dipole while the signature in runoff regions is explained by the total advection.
In the north west and south east tropical Atlantic, only horizontal advection is important for explaining the signature of these two modes.