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We identify and analyze tropical instability waves (TIWs) in the equatorial Atlantic Ocean during 2010–2018 using satellite-derived observations of sea surface salinity (SSS), sea surface temperature (SST), sea level anomaly, and Argo profiles. In particular, the weekly 50-km resolution SSS time series from the climate change initiative project provides an unprecedented opportunity to observe the salinity structure at a scale closer to the SST scale. We examine the relative contributions of SSS and SST to the horizontal surface density gradient on seasonal and interannual time scales and how they contribute to the TIW properties and energetics. For the central Atlantic TIWs, the maximum of the SST contribution
to the density anomaly lags the SSS one by approximately one month. Argo vertical profiles indicate that temperature and salinity both significantly contribute to TIW-related density anomalies. In May–June, salinity contributes to 50% of the perturbation potential energy in the top 60 m, and between 30% and 45% from July to September. While variations in SST appear to be related to dynamic processes, the interannual variability of SSS is also influenced by precipitations. However, the two leading modes of variability in the region (Atlantic Meridional and Zonal modes) do not well explain at 1°N these interannual variations.
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