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The Angola Current and its seasonal variability as observed at 11°S

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The eastern boundary circulation off the coast of Angola has been described only sparsely to date. The region off Angola, which connects the equatorial Atlantic and the Angola-Benguela upwelling regime, is of particular interest to understand the relative importance of transient equatorial versus local forcing of the observed variability in the coastal upwelling region.
For the first time multi-year velocity observations of the Angola Current at 11°S are available. From July 2013 to November 2015 a bottom shield equipped with an ADCP had been deployed at 500m water depth, accompanied by a mooring sitting on the 1200m-isobath with an ADCP being installed at 500m depth. Both upward-looking instruments measured the current speed up to about 50m below the sea surface. During the deployment period the Angola Current was characterized by a weak southward mean flow of 5-8 cm/s at 50m depth (slightly stronger at the in-shore mooring position), with the southward current penetrating down to about 200m depth.
The alongshore velocity component reveals a pronounced seasonal variability. It is dominated by 120-day, semi-annual, and annual oscillations with distinct baroclinic structures. Here we apply a reduced gravity model of the tropical Atlantic for the first five baroclinic modes forced with interannually varying wind stress to investigate the seasonal variability along the equatorial and coastal waveguides. In the equatorial Atlantic the 120-day, semi-annual, and annual oscillations are associated with resonant basin modes of the 1st, 2nd, and 4th baroclinic mode, respectively. These basin modes are composed of equatorial Kelvin and Rossby waves as well as coastally trapped waves. The reduced gravity model is further used to study the respective role of the remote equatorial forcing, more specifically the influence of equatorial basin modes via coastally trapped waves, and the local forcing for the observed seasonal variability and associated baroclinic structure of the Angola Current at 11°S.