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Impacts and characteristics of the interannual Coastal Trapped Waves in the Angola-Benguela Upwelling System

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We investigate the role of Equatorial Kelvin Waves and subsequent remotely-forced Coastal Trapped Waves (CTW) on the phenology of the extreme Benguela Niño/Niña events occurring in the Angola-Benguela Upwelling System. Using model sensitivity experiments over the 1958-2008 period, we tracked propagations of remotely-forced CTW down to the Southern part of the Benguela Upwelling System (SBUS), where they account for 70% of the coastal interannual sea level, temperature and salinity anomalies. Surprisingly, sea level fluctuations in the SBUS peak $\sim$10 days before the sea level anomalies are detected north of the BUS, along the Angolan coast. To explain this apparent inconsistency, we decomposed the model coastal variability into individual CTW mode contributions and analyse their characteristics (forcings, amplitude, phase speed, and dissipation). Results show that north of NBUS (19°S), the coastal interannual variability is mainly dominated by the second and the third CTW modes, where their amplitude decreases due to dissipation. Southward, the interannual fluctuations are explained by the fast and weakly-dissipative first CTW mode. As higher-order CTW modes propagate slower than the first mode, the later impacts the coastal ocean variability in the BUS before, the second mode reaches the Angolan coast. Finally, our results also suggest the decadal modulation of the interannual variability off the coasts of south-west Africa is controlled by the change in the amplitude of the remote equatorial forcing.