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Subseasonal Coastal Trapped Waves propagation in the Southeastern Atlantic and Pacific Oceans

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The objective of this study is to describe the Coastal Trapped Wave variability along the southwestern American and African continents at subseasonal timescales (<120 days). We aim at determining to which extent the alongshore current and sea level coastal variability can be accounted for by equatorially remote-forced or locally wind-forced CTW response. The methodology is based on the experimentation with twin regional model configurations of the South Eastern Pacific and the South Eastern Atlantic oceans. The estimation of free CTW modal structures and associated contribution to coastal variability allows to infer and compare the characteristics (magnitude, dissipation, scattering) of each CTW mode in the two systems, in order to explain their similarities and differences at subseasonal time scales as observed from altimetry. The modal structures of the four first free CTW modes are first derived from model mean stratification and topography, at all cross-shore sections along the South Western African and American continents. In the Humboldt Current system, the CTW structures are significantly more baroclinic than in the Benguela, due to steeper and deeper topographic slope along the Peruvian and Chilean coasts. We then developed a new methodology to estimate the CTW contributions to model pressure and alongshore currents. In both systems, the extracted modes of variability are shown to propagate at velocities close to the appropriate theoretical phase speeds. The summed-up contribution of the first three CTW modes account for ~60% of the subseasonal variance in along-shelf currents on the shelf and slope and ~80% of the coastal sea level variability. In the Atlantic southeastern basin, mode 2 carries a greater fraction of CTW energy than mode 1, while in the Pacific counterpart it is the inverse. Mode 1 and mode 2 contributions are not coherent in time and exhibits particular space-time characteristics. Numerical sensitivity experiments allow to quantify the respective contributions of the local atmospheric forcing versus the remote equatorial forcing to the subseasonal CTW propagations in both systems.