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Identification of the Fortnightly Wave Observed Along the Northern Coast of the Gulf of Guinea

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ABSTRACT

Numerical calculations of coastally trapped wave modes along the northern coast of the Gulf of Guinea using representative bottom topography and continuous stratification on a β -plane were carried out to identify the observed fortnightly propagating coastal wave. Results showed that the propagation speed of the observed wave (approximately 53 cm s^{-1} for sea level and 54 cm s^{-1} for sea surface temperature) is close to that of the second mode (64 cm s^{-1}) and no other. Off the shelf this mode has a baroclinic structure, having considerable amplitude at 2 km depth. Ray theory calculations indicate that if, as is likely, the observed wave were generated on the shelf, a vertically standing modal structure with large amplitude at 2 km depth is not possible. Therefore, no coastally trapped vertically standing wave modes are consistent with the observed wave. Consequently, it is most likely that the wave is a vertically propagating coastally trapped wave as has been observed recently in other contexts. There is some evidence suggesting that the wave is generated by the nonlinear interaction of the M_2 and S_2 tides due to bottom friction on the wide shelf in the northeastern corner of the Gulf.

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