Abstract Submitted
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LES of Langmuir supercells under constant crosswind tidal forcing[1] RACHEL WALKER, JIE ZHANG, MARIO JUHA, University of South Florida, CHESTER GOSCH, Old Dominion University, ANDRES TEJADA-MARTINEZ, University of South Florida — We report on the impact of a crosswind tidal current on Langmuir supercells (LSCs) in shallow water computed via LES. LSCs consist of parallel counter rotating vortices engulfing the water column in unstratified conditions. These cells have been observed in shallow continental shelf regions of ∼15 meters depth during the passage of storms. The cells are aligned roughly in the wind direction and are generated by the interaction of the wind-driven shear current with the Stokes drift velocity induced by surface gravity waves. Without tides, LES reveals that the typical crosswind width of a LSC is ∼4 times the water column depth (H). Under a relatively weak crosswind tidal current (weaker than the downwind current), the constant crosswind tidal forcing applied causes a merging of cells leading to cells of width ∼8H. The opposite occurs under a crosswind tidal current stronger than the downwind current as the constant crosswind tidal force is able to break up the LSCs giving rise to smaller scale cells with different turbulent structure than that associated with LSC. Statistics of the turbulence during strong and weak crosswind tides will be contrasted and implications of an oscillating crosswind tidal force will be discussed.

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