

On the imaging of rip currents in marine radars

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Previously, we have observed rip currents and the shedding of rip current eddies using “wave-averaged” image time series from a shore-based marine radar (Haller et al., 2014). In the present work, we will analyze the radar imaging mechanism for nearshore rip currents. We will examine the changes in the equilibrium wind-wave spectrum induced by rip currents using an idealized rip flow model we developed previously. The wave action balance modeling follows closely the work of Lyzenga (2010). However, we intend to extend the analysis to two-dimensions. One question we are asking is whether the model can explain the strong dependence of the radar imaging on wind direction, as was observed in the field. In addition, we will examine the role of short-scale wave breaking in the imaging of rips. Finally, the model will also be tested with an idealized flow field representing rip current shed eddies.