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# Surfzone eddies in strong alongshore currents: Forced or Instabilities?


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**MSB 114**

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**3:00-3:30 pm Coffee Hour**
**3:30-4:30 pm Seminar**

## Abstract


Beaches throughout the United States are chronically impacted by poor water quality, making swimmers sick and affecting coastal economies. Beach crab and clam larvae must traverse the surfzone as juveniles and again upon settling. The cross-shore transport, dispersal, and dilution of pollution, larvae or other tracers (e.g., sediment) are strongly influenced by surfzone 2D turbulent eddies, which have length-scales > the water depth. Our group's results regarding surfzone eddy-induced mixing learned from dye, drifter, theory, and modeling will be reviewed - however the dominant mechanisms of surfzone eddy generation are still uncertain. Surfzone eddies are generated either from a shear-instability of the alongshore current ("shear-waves"), from finite-crest length breaking of individual waves, or from alongshore gradients in wave-group forcing, which all have distinct length-scales. Observations of surfzone eddies from the SandyDuck experiment are compared to funwaveC model simulations. Finite-crest length breaking induces energy at larger frequencies and wave numbers than a steady-forced nonlinear shallow water equation model. The relative contributions of shear instabilities and finite-crest length breaking on the vorticity dynamics are examined. The vorticity injection length-scale is maximum at scales of ~20 m, indicating that individual wave breaking as opposed to wave group forcing dominant vorticity generation. The results will have implications for understanding evolution of surfzone tracers (whether fecal indicator bacteria, sediment, or larvae) and therefore human and ecosystem (rocky interdial, coral reef, or beach face) health Future research directions connecting the surfzone to regions farther offshore will be discussed.


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