ERDC
ENGINEER RESEARCH & DEVELOPMENT CENTER

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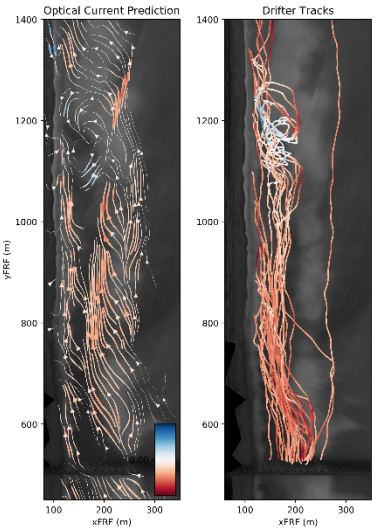
Optical Current Measurements from remotely sensed data (FY21)

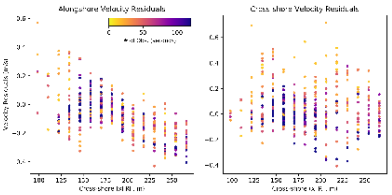
Background:

During development, nearshore numerical models are tested over selected, oftentimes limited validation cases (generally due to data access limitations – cost or access). During the development process, model parameterizations may be inadvertently over fit to these limited instances. By leveraging existing data collection at the FRF and automating evaluation from the Coastal Model Test Bed, the associated cost of validation data drops significantly and the breadth of validation increases substantially. Circulation models are driven by local wave conditions and/or larger scale (continental shelf) flow features. The number of traditional *in-situ* observations needed to capture these complex spacio/temporal circulation patterns (e.g. bathymetrically controlled or transient rip currents, or large scale gyres, etc.) is generally infeasible. This work is focused on capturing these complex circulation patterns by tracing the relic foam generated by breaking waves through remotely sensed video imagery.



Approach:

- Develop a quantifiable method to measure currents in the surfzone.
- Average the imagery across timescales greater than individual wave sets.
- Track foam generated during each set to capture "average" surface flow conditions using optical flow methods.
- Quantify accuracy of newly developed method by deploying surface drifters across the surf-zone that utilize cellphones (measuring GPS, IMU data) in waterproof housings.



Technical Advancements:

The products from this work will develop a quantifiable method to measure surface currents in the surf-zone with a journal paper and assess uncertainty and error into the method. The method will be incorporated into relevant operational workflows to assess model skill in resolving complex flow patterns for the Coastal Model Test Bed (CMTB).

Payoff:

Products from this work can be used across various research and coastal monitoring projects. Research applications include CMTB model validation, data assimilation techniques, nearshore processes morphology research supporting the CSHORE model suite. Transition applications include coastal monitoring where using camera imagery (e.g. UAS, imagery towers, CoastSnap – citizen science stations).

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