

Mapping phase-resolved wave breaking and currents in the surf-zone during extreme conditions using arrays of ‘microSWIFT’ drifters

EJ Rainville, Jim Thomson, Melissa Moulton, Morteza Derakhti, Christie Hegermiller

September 30, 2021

Abstract

Many coastal regions are heavily impacted by hurricanes and other large storm events, which can drive erosion, inundation, and damage to coastal infrastructure and communities. Measurement of high-energy wave events is difficult and historically there are few measurements during these conditions. As part of DUNEX (DURING Nearshore Event eXperiment) in October 2021, arrays of ten to fifty small drifters (microSWIFTs) were deployed using a helicopter and pier-based launcher during a large range of wave conditions. The drifters are outfitted with a GPS unit and an IMU and record position, velocity, accelerations, and rotations that are used to map individual breaking events and circulation. The arrays were designed to enable reconstruction of phase-resolved wave fields on the scales of a few wavelengths (alongshore) and throughout the surf zone (cross-shore). The wave breaking maps from the drifters are then compared with video imagery to determine the scale of each breaking wave (i.e., crest-length and duration). These drifter measurements will also be used to validate, force and compare to both phase-averaged (COAWST) and phase-resolved (NHWAVE) wave models. In particular, we plan to use these measurements to further investigate the accuracy of wave breaking parameterizations in phase-averaged models.

1 Introduction

This is the introduction.

2 Methods

This is a section about methods.

3 Results

This is a section about the results of the project.

4 Discussion

This is a section to discuss the results.

5 Conclusions

This is a section for the conclusions.