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STATEMENT OF PURPOSE:

Quantifying wave motion and shape in the surf-zone during breaking has been an ongoing challenge for oceanographers, and is particularly important for predicting the direction and magnitude of sediment transport, and the resultant coastal erosion and accretion. Established data collection methods use either optical (video) imagery of the sea surface, or acoustic and pressure sensors at discrete locations in the surf-zone. Video data can either be analyzed in 2D or 3D. The former inaccurately resolves 3D features and the latter requires extensive computation, whereas in-situ point measurements sacrifice spatial resolution and therefore cannot resolve the complex wave shapes that occur during breaking. Light Distance and Ranging (LiDAR) emits collimated beams of laser energy, which hits the water surface and returns to the instrument - called the two-way travel time. Using the speed of light, the known orientation and location of the instrument, the two-way travel time can be converted to spatial coordinates for each returned laser pulse. A laser scan results in a point cloud of individual measurements, which enables 3D observations of the moving water surface during wave propagation and breaking. This dataset presents some of the first 3D visualizations of waves in the natural environment from laser scanning.

DESCRIPTION OF DATA SETS:

The data set presented is point cloud data and analyses derived thereof collected by a Velodyne HDL-32E LiDAR scanner system on April 04, 2017 at US Army Corps of Engineers Field Research Facility in Duck, NC. The instruments involved in collection were mounted on the Coastal Research Amphibious Buggy (CRAB) and collected data in the surf zone (within 200 meters of the shoreline). Coincident video imagery was collected with a GoPro video camera. This dataset is authorized for use by Dr. Katherine Brodie, lead Principal Investigator on the project 'New Field Measurements and Parameterizations to Predict Wave Breaking Type and Shape from Environmental Forcing' funded by the U.S. Army Engineer Research and Development Center's Military Engineering Basic Research Program.