



## Littoral Zone Remote Sensing Group

### Utilizing new technology to solve challenging coastal oceanographic observation problems.

The Littoral Zone Remote Sensing Group focuses on the technology development, sensor assessment, and data collection and analysis of coastal remote sensing products in support of basic and applied civil and military coastal problems. We are working to synthesize across a broad range of remote-sensing methodologies and approaches to better understand nearshore physical processes and their impact on the morphologic evolution of the coast.

### Problem

As computing power grows and numerical models of coastal evolution become more advanced, the need for spatially and temporally dense coastal morphodynamic data sets to ground-truth, develop, and initiate those models, has also grown. Remote sensing technologies (e.g. lidar, imagery, radar, etc) offer a solution, as they can provide continuous observations of the beach and nearshore over wide areas at high spatial resolution during adverse conditions when in-situ observations are un-safe or ineffective. These new technologies also present new challenges, as they often (1) only observe a proxy for the desired physical process; (2) require precise geoposition information and corrections to ensure their accuracy; and (3) can be affected by variations in environmental conditions. We aim to determine how this technology can be most effectively exploited in the coastal zone to provide critical geospatial intelligence that both better protects our nation's coastal communities during natural disasters, as well as improves the battlespace awareness of our troops abroad in advance of military landing operations.

### Technology

Recent R&D research at CHL's Field Research Facility (FRF) over the last five years has led to the development of new observational techniques that utilize remotely sensed data to quantify littoral zone processes. These technologies include:

- **CLARIS: Coastal Lidar And Radar Imaging System** - a mobile surveying platform from which terrestrial lidar data and X-Band radar data can be collected during calm and storm conditions, providing data on beach topography and sandbar morphology.
- **Automated Continuous Dune Lidar System** - an automated terrestrial lidar system that is mounted above the dune on the FRF property and provides simultaneous, hourly, observations of 3D beach elevations, wave runup, and inner-surf zone waves.
- **sUAS Littoral Zone Mapping System** – an inexpensive approach to utilize small Unmanned Aerial Systems (sUAS) to map sub-surface water depths, beach topography, and surf-zone wave breaking. This effort marks the transition of R&D technology long-used by the nearshore research community to understand the littoral zone to an inexpensive solution that will allow district field engineers or the warfighter to rapidly map large stretches of coastline in advance of coastal storms or military operations.

### Benefit

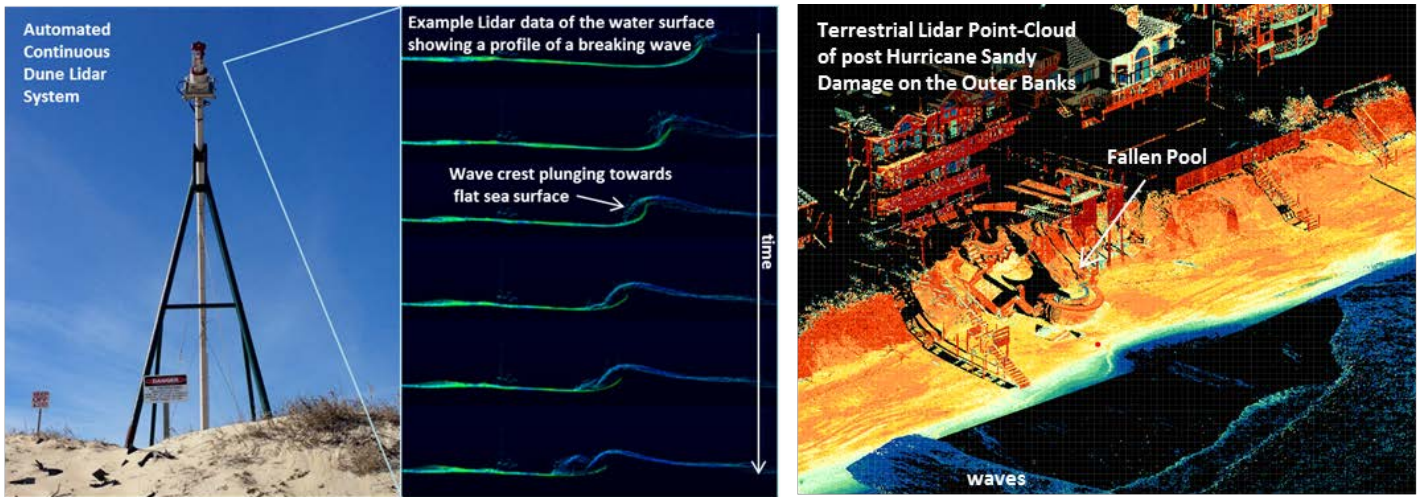
- **CLARIS** - provides spatially dense, morphodynamic data along large stretches of coastline which are used in support of a variety of research topics important to the Corps, including: improving storm-driven erosion prediction metrics through the inclusion of up-to-date antecedent conditions, researching large-scale coastal evolution, and evaluating coastal morphodynamic model performance.
- **Automated Continuous Dune Lidar System** – this system is the first of its kind in the world to be continuously deployed in a coastal setting and will provide critical data for CHL's coastal processes modelers and the rest of the scientific nearshore community. It is also an integral part of the coastal modeling testbed initiative at the FRF, providing real-time model validation for wave runup and shoreline wave height predictions.

- **sUAS Littoral Zone Mapping System** - this system will ultimately provide a way to provide up-to-date information on the current state and morphology of the coastal zone – information critical for planning military landings or predicting coastal inundation and damage from extreme storms.

## Status

- **CLARIS** – new vehicle platform, higher resolution lidar and radar system upgrades planned for FY16.
- **Automated Continuous Dune Lidar System** – data are available now @ [http://navigation.usace.army.mil/CHL\\_Viewer/FRF/](http://navigation.usace.army.mil/CHL_Viewer/FRF/)
- **sUAS Littoral Zone Mapping System** – system is in development and is scheduled for DEMO to military personnel in FY18.

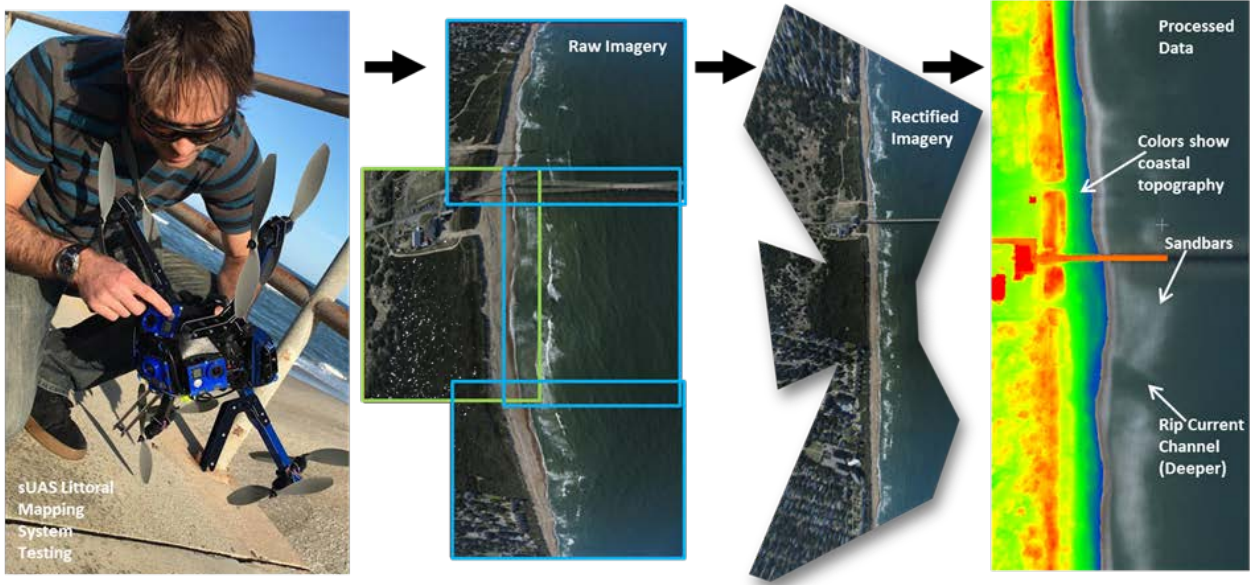
## Image and Caption



Top Left:  
Image of the automated continuous dune lidar system and example of data

Top Right:  
example of topographic lidar data collected with CLARIS

Bottom Row:  
example of sUAS platform and data product examples



## ERDC Points of Contact

Questions about products in development by the Littoral Zone Remote Sensing Group?

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