DUNEX and My Internship at the FRF: Summer and Fall of 2021

Connor Geis

Advisory Committee: Dr. Joanne Halls, Dr. Narcisa Pricope, Dr. Joe Long

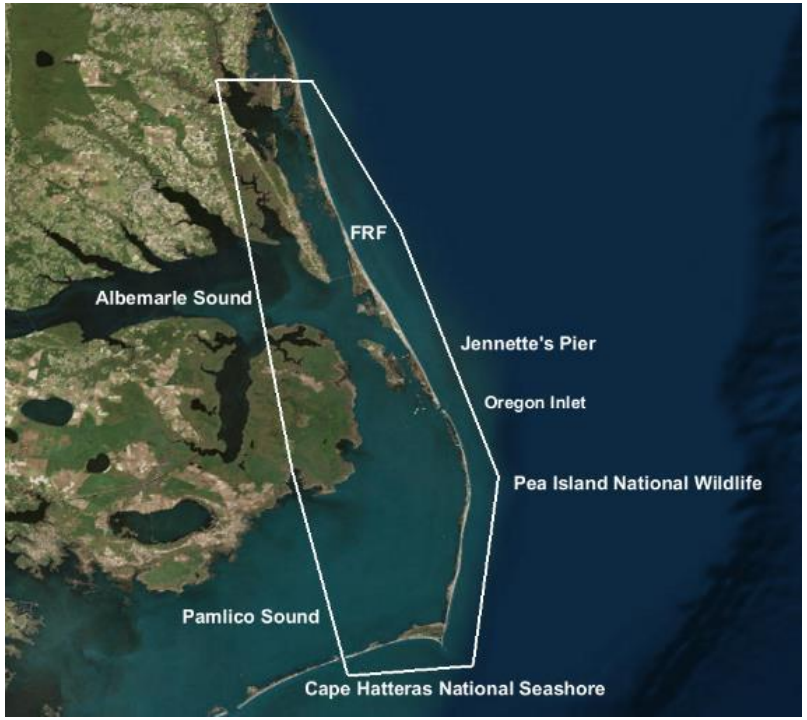
Fall 2021

UNCW

DUNEX - During Nearshore Event eXperiment

Location: Army Corps of Engineer's Field Research Facility (FRF) and other locations along the Outer Banks of North Carolina

Mission: Improve the ability to collect beach data during storms, so that researchers will be able to examine interactions and responses as a storm is underway, and improve future predictions.



Coastalreview.org

DUNEX

Large field experiment undertaken by researchers from wide range of public agencies and academic institutions.

Experiment I worked on utilized a mix of *in situ* and remote sensing techniques to continuously record changes in bed elevation as a result of swash motions.

Use pressure/velocity sensors to validate Mini-argus and Lidar data

My Role - Field Support

Primary Duties: Program, deploy and support the operation of pressure and velocity sensors in the swash zone.

Additional Duties: Assist with subaerial and nearshore sediment surveys, terrestrial Lidar scans, and provide support to researchers at the FRF as needed.

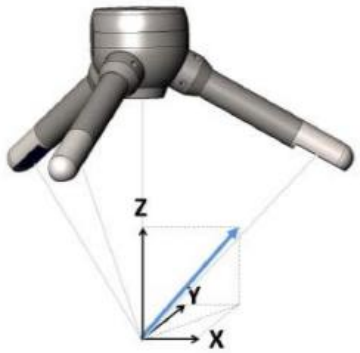
Sensor Programming

9 Seabird SBE50 Pressure Sensors

9 Nordtek Vectrino Velocimeters

Each set of sensors was programmed using their proprietary software

Set an appropriate sampling rate, voltage range, parameters and calibration coefficients

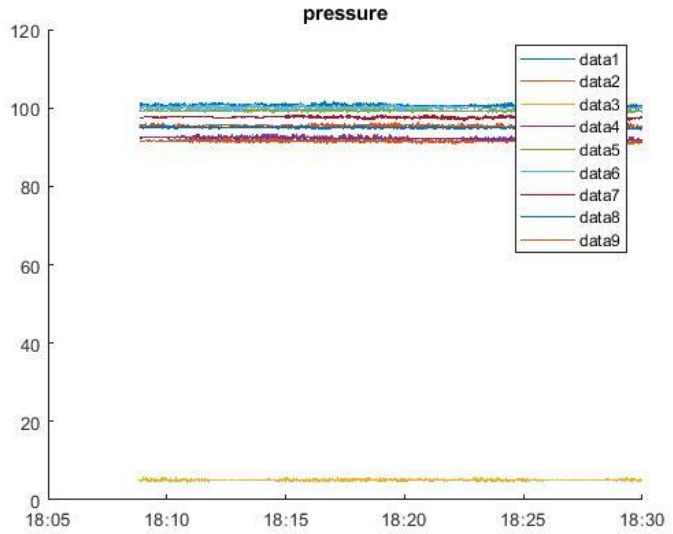


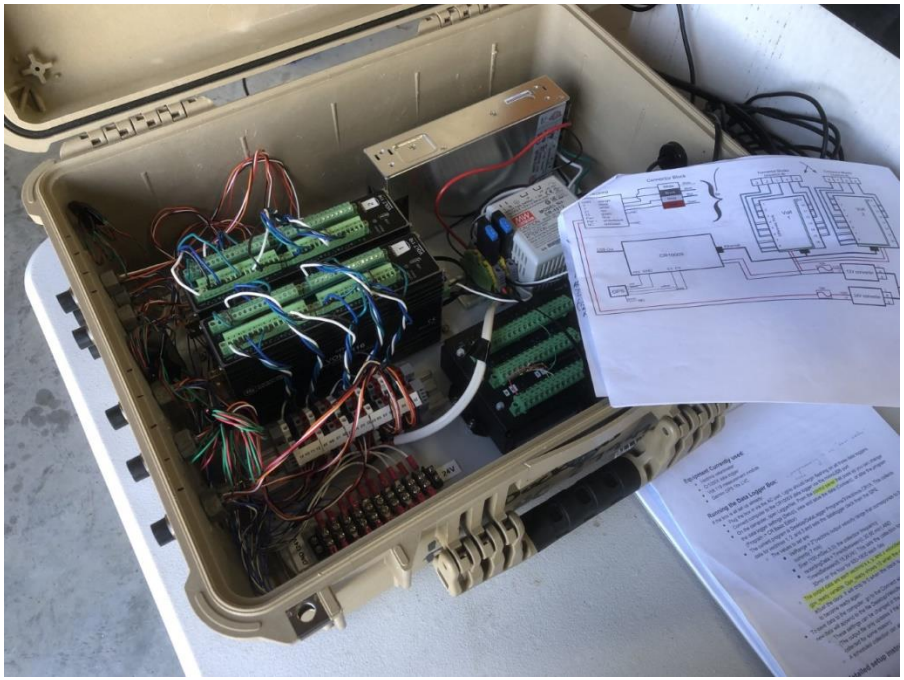
Sensor Programming

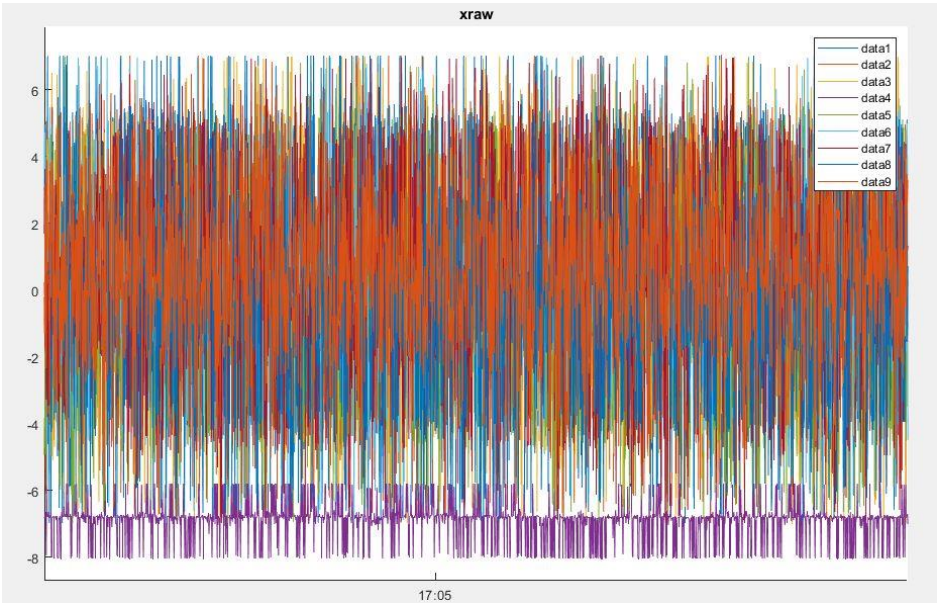
Data collection programs using Campbell Scientifics LoggerNet software

Retrieves data from data logger and write to segmented files

Troubleshooting



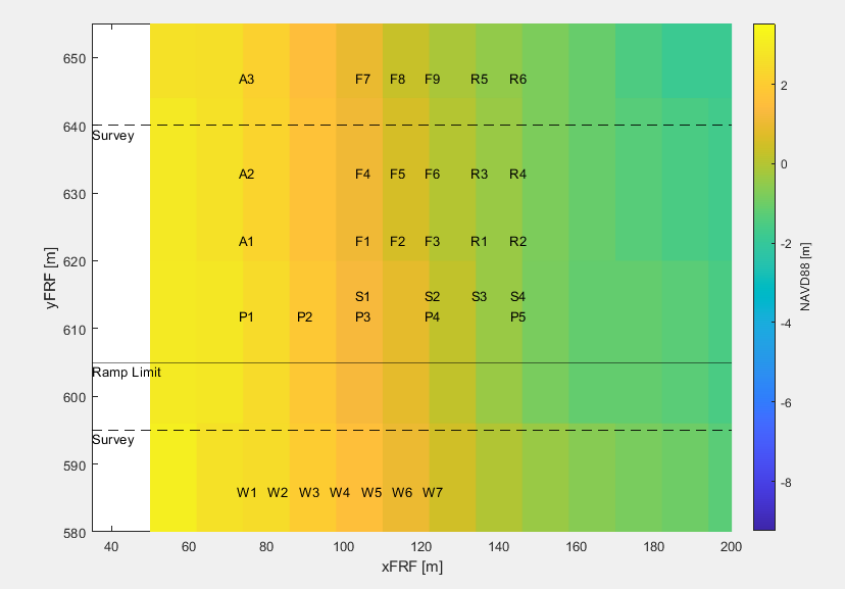




Pipe Insertion

Pipes jetted into the swash zone at set GPS coordinates using:

- Anthony Forklift
- A high powered water pump
- Fire hose
- Hand tools



Sensor Insertion – August 31st

1. Cross shore trenches dug between pipes from seaward instrument location to dune toe
2. Steel cable run from pipe to pipe and instrument cables zip tied to the steel cable
3. Cable buried at 1-meter depth
4. Instrument cassettes placed on pipes
5. Cable run up over dune to data collection trailer

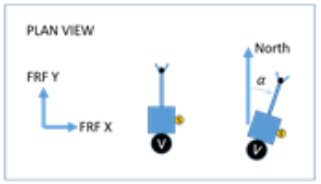
The Moment of Truth

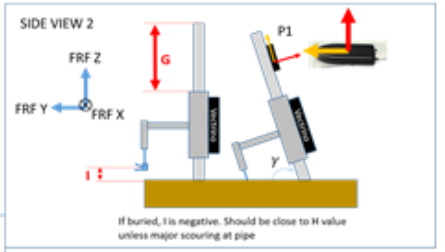
The team plugged the instrument cables into their respective data logger boxes.

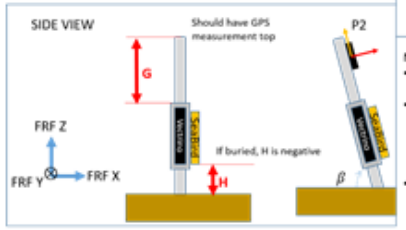
The data collection programs were then ported over to computers in the trailer and initialized after some troubleshooting. Success!

Daily Measurements and Adjustments

DAILY MEASUREMENTS







Note:

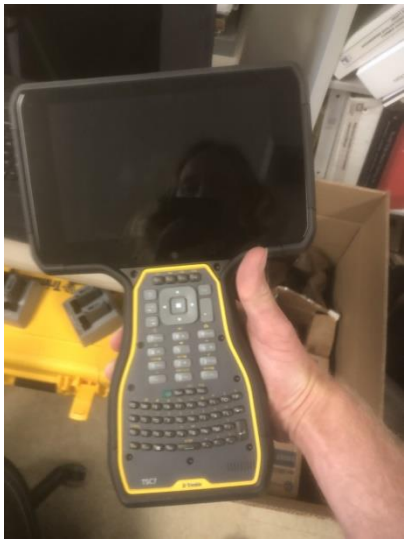
- Each sensor measured/adjusted every day at low tides. Take compass out and log for each sensor at two orientations
- Compass should be calibrated, turned on, and logging. For each station, place compass against channel so pointy end is upwards and 'Logger' is facing you. Hold for 30-60 sec still for each position. Always do P1 first then P2, mark time on sheet when done. Compass operation on back of sheet.
- Sensor should be adjusted if vectrino head (H,I) are less than 6 cm or greater than 16 cm. Should be adjusted so vectrino head (I) is 6 cm above bed.

Sensor	Date/Time UTC	Prior G	Prior H	Prior I	Adj G	Adj H	Adj I	Time of Compass Measurements.
1								
2								
3								
4								
5								
6								
7								
8								
9								

Subaerial Sediment Sample

Took part in sediment surveys using the Trimble R12 GNSS and TSC7 Controller

Sediment collected weekly and quarterly at predefined GPS points spaced at 3 meter intervals on FRF survey lines



Nearshore Sediment Sample

LARC is used 1-3 times per week to conduct continuous topographic and bathymetric surveys along defined cross shore transects

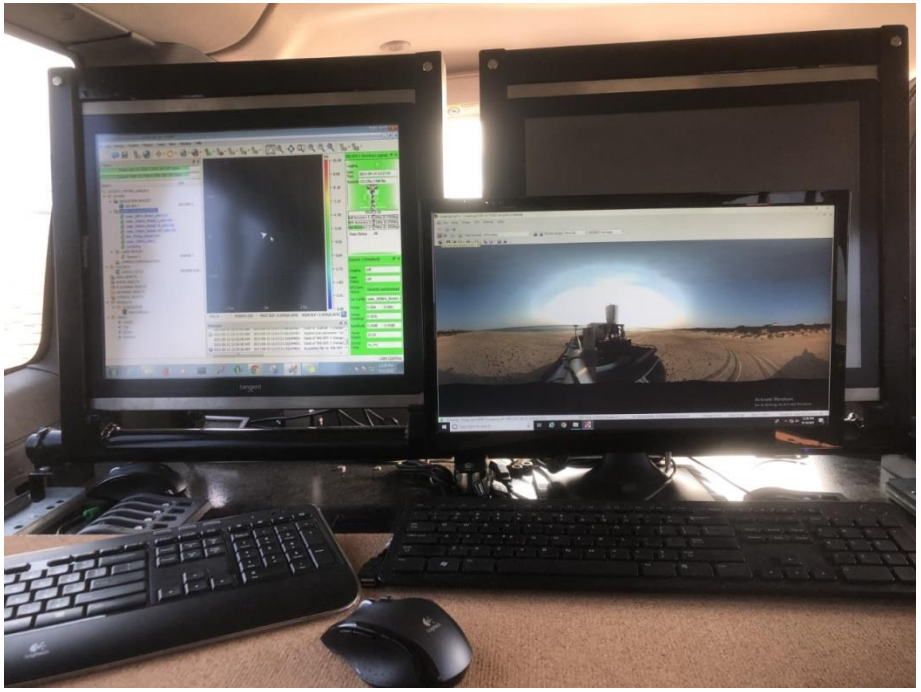
Once a week it is used to conduct a sediment survey in the surf zone at predefined waypoints along FRF survey lines and a larger quarterly sample is performed 4 times per year

CLARIS – Coastal Lidar and Radar Imaging System

Mobile terrestrial lidar platform used for measuring elevation changes in the coastal environment.

CLARIS consists of:

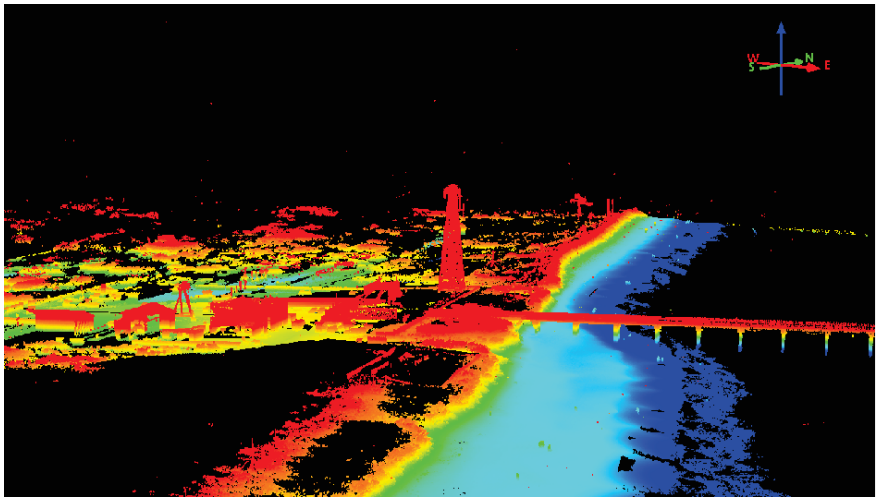
- A Riegel VZ-2000 lidar scanner mounted to a Chevrolet Express 3500 passenger van.
- IX-Blue ATLANS-C inertial navigation system (INS) with an integrated inertial measurement unit (IMU)
- Wheel-mounted distance measurement instrument (DMI)
- Global Navigation Satellite System (GNSS) antennas
- LadyBug3 camera system



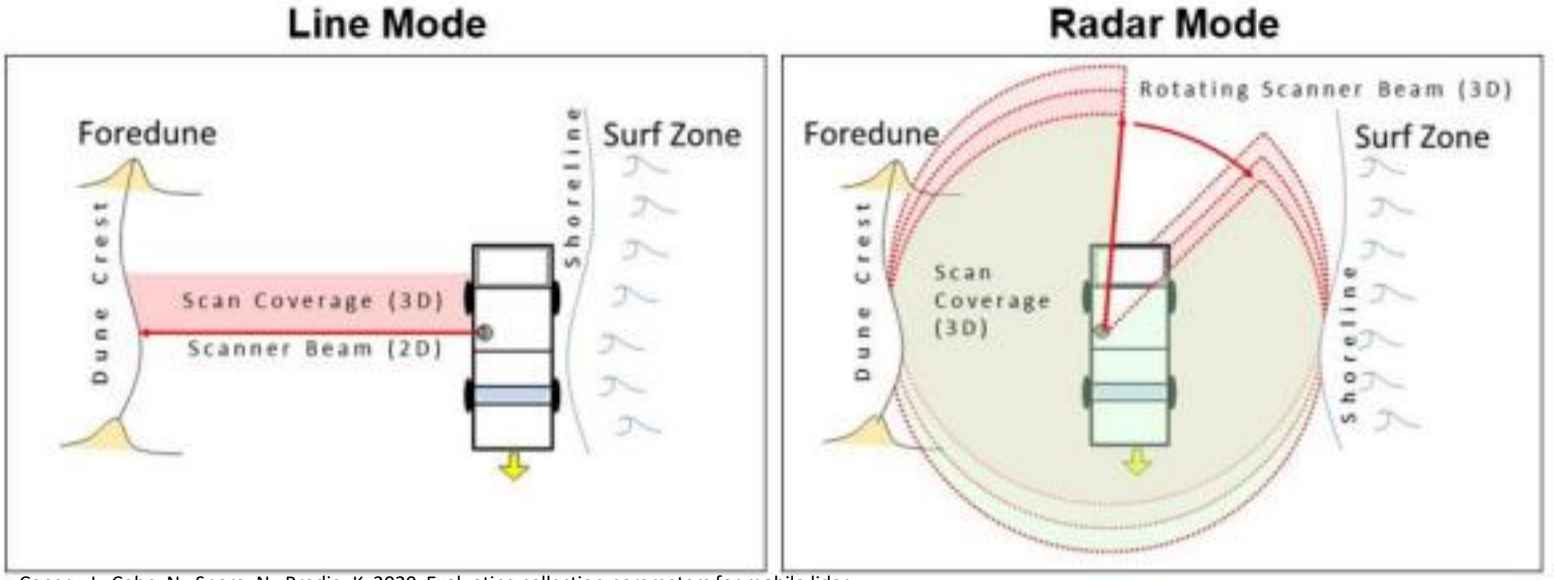
CLARIS – Coastal Lidar and Radar Imaging System

Took part in weekly surveys where I learned how to:

- Initialize the Laser, INS and IMU
- Operate RiSCAN, Ladybug SDK
- Segment and transfer files for post survey processing



Conery, I., Cohn, N., Spore, N., Brodie, K. 2020. Evaluating collection parameters for mobile lidar surveys in vegetated beach-dune settings.



Conery, I., Cohn, N., Spore, N., Brodie, K. 2020. Evaluating collection parameters for mobile lidar surveys in vegetated beach-dune settings.

Other Tasks

In addition to performing my regular duties, I also assisted with a variety of other tasks including:

- Dune Lidar maintenance
- Sediment coring
- SwarmDiver deployments
- Drifter buoy deployments
- Crawler deployments

DUNEX Closure – November 1st

After a solid Halloween Nor'Easter, DUNEX came to a close on November 1st. Over the next couple of weeks, the instruments were retrieved and finally on November 15th, the pipes and cables were removed from the beach.

Thank you. Questions?

https://arcg.is/1LbKGv