PROJECT MONITORING:
OBTAINING REAL-TIME ENGINEERING DATA VIA NEARSHORE VIDEO IMAGERY

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WEDA
PACIFIC ANNUAL MEETING• OCTOBER 23-25, 2018
COASTAL & HYDRAULICS LABORATORY
ERDC

INTRODUCTION

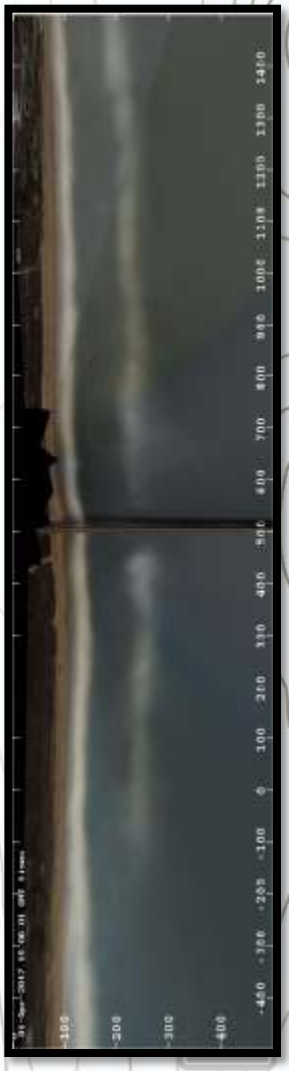
COASTAL IMAGERY IS A PROVEN METHOD TO QUANTIFY NEARSHORE PROCESSES

- Shoreline/sandbar positions
- Bathymetry/ topography
- Currents
- Wave runup
- Inlet navigability
- Coastal infrastructure condition

ARGUS: LEADER IN COASTAL IMAGING

- Argus camera tower in operation at CHL-Duck since 1987
- Applications + Data Products (above) developed over 30 years by OSU/CHL

CAN BE A VALUABLE TOOL FOR MONITORING DISTRICT BEACH PROJECTS



INTRODUCTION

HOWEVER DISTRICT ARGUS UTILIZATION IS NOT WIDESPREAD

INFRASTRUCTURE

- Towers impractical to install
- Stations require indoor space, network, power

SPECIALIZED EXPERTISE

- Data not easily accessible
- Photogrammetry/Coding experience required for converting imagery→ useful engineering information

CURRENT USE (NWP + SPL)

- Install, operation + data analysis contracted out (OSU, NWRA)
- Engineering information provided in quarterly reports
- Limits emergency response monitoring
- No real time access to data

MANY SHORT-TERM SMALL PROJECTS (COST >> BENEFIT)

MINI-ARGUS

REDUCE INFRASTRUCTURE BARRIER TO ENTRY

MINI – ARGUS SYSTEM

- Cost efficient (<$6000)
- Utilizes same architecture as the Argus
- Remotely accessible, autonomous data collect/send
- Self – contained, rapid deployment

INITIAL + CONTINUED DEVELOPMENT VIA COASTAL IMAGING RESEARCH NETWORK (CIRN)

SYSTEM HARDWARE

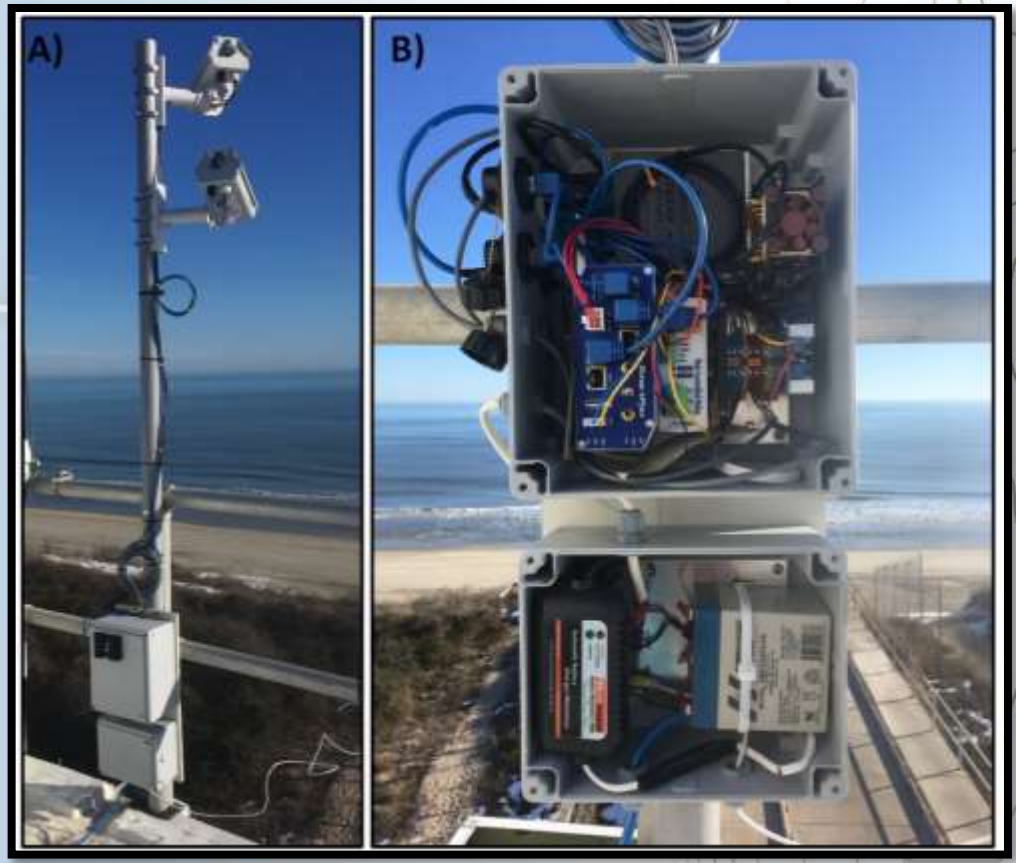
INTERNAL COMPONENTS

- 2x Cameras (PointGrey Blackfly GigE 5 MP)
- ODROID XU4 Computer Processor
- 500 GB Solid State Drive (USB 3.0)
- GigE Network Switch (5 Port, Jumbo Packets)
- Web-Controlled Relay Switch
- B+B SmartWorx SmartFlex Industrial LTE Router

EXTERNAL COMPONENTS

- Lightening Protection
  - 8ft Fiberglass Pole (3” diameter)
  - Grounding wire/rods
- Hoseclamp to existing structures
- Watertight enclosures (Pelco, Stahlin)
- Input: Standard 120-240 V AC Power
- 6 AHr 12V Lead-Acid Battery
  - 4 hours operation w/o AC
  - Battery maintainer (Not charger)
- Average Draw 1.3 A, max 1.7 A

More Detailed Information: Design and Deployment of Mini-Argus Systems for Rapid Coastal Imaging (ERDC Publication)



SYSTEM OPERATION

COMPLETELY AUTONOMOUS OPERATION

EVERY DAY:

- Powered 6 am – 6 pm

EVERY HOUR:

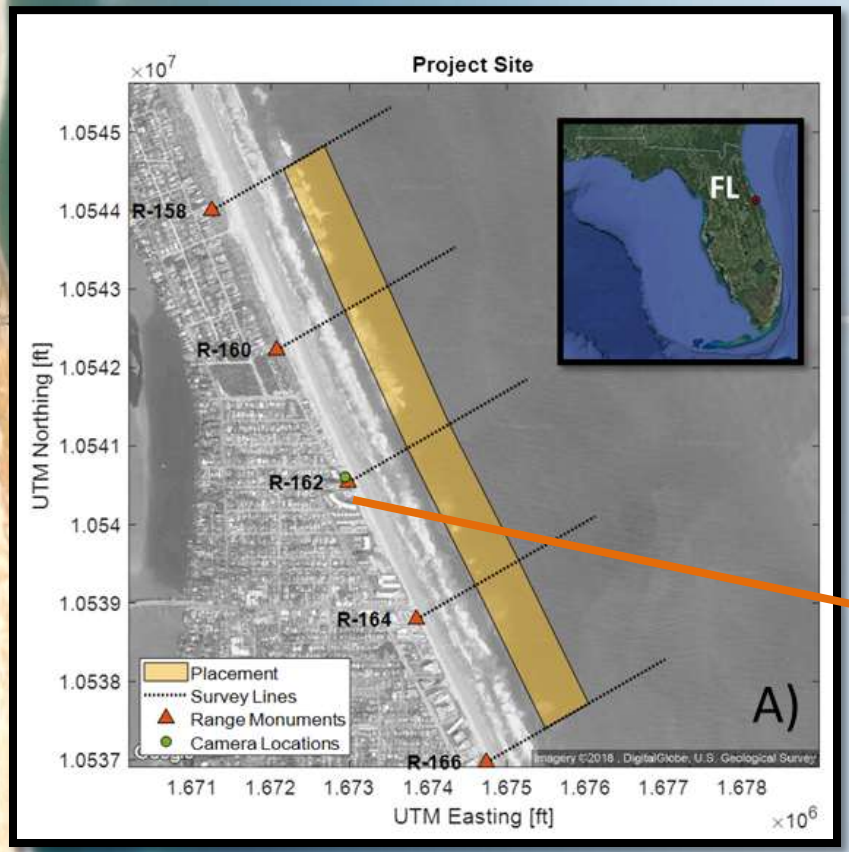
- Collects imagery @ 2Hz for 10 min
  - Saves Image Products
- Collects Pixel Timestacks @ 2Hz for 10 min
  - Saves Pixel Timestacks
- Data pulled by CHL and saved to external server

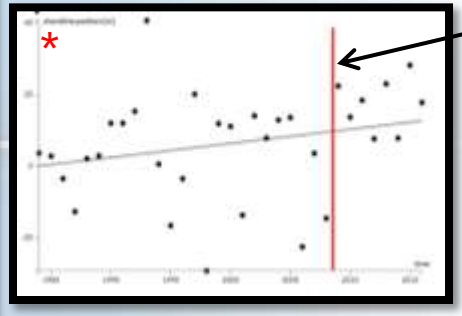
IMAGE PRODUCTS

Pilot project

USACE JACKSONVILLE DISTRICT
NEW SMYRNA BEACH, FL

- Nearshore berm placement
  - August 2018-October 2018
- 500,000 cy from Ponce de Leon Inlet





RSM Practices Begin

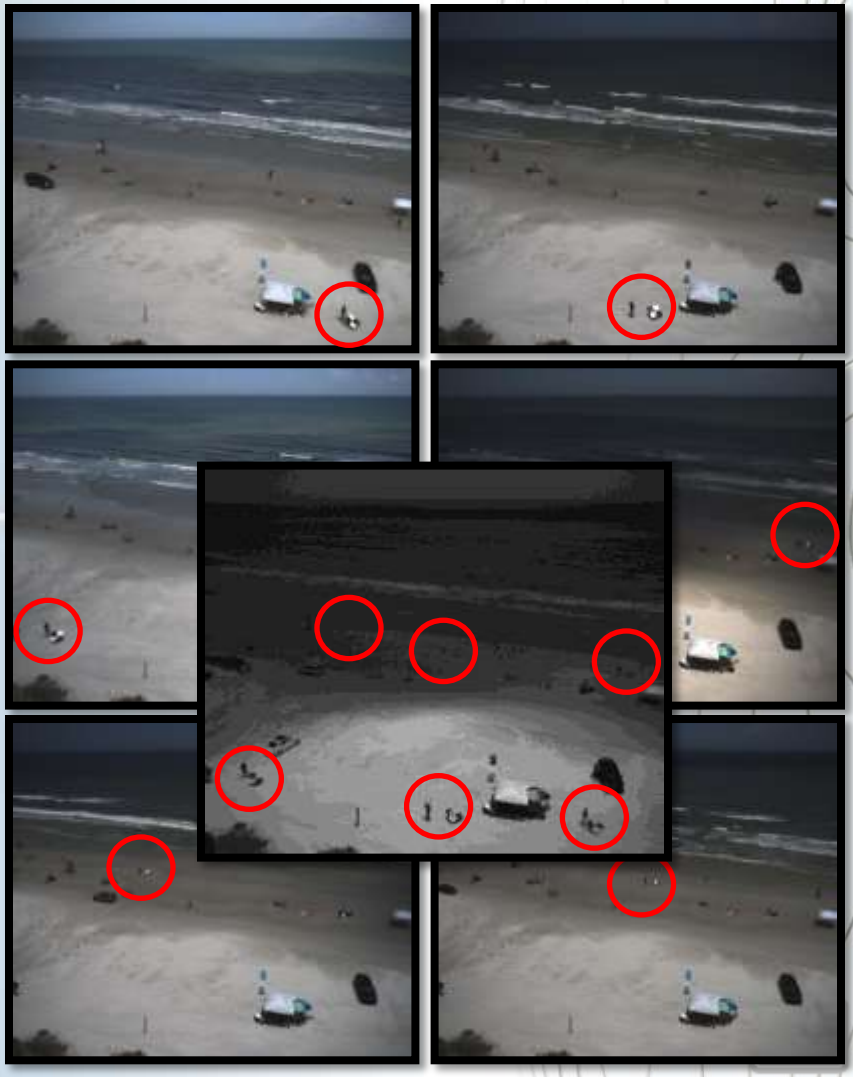
*http://aqua-monitor.appspot.com/?datasets=shoreline

INSTALLATION

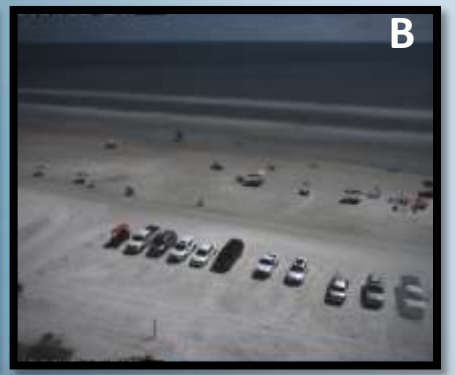
2 ERDC-CHL EMPLOYEES

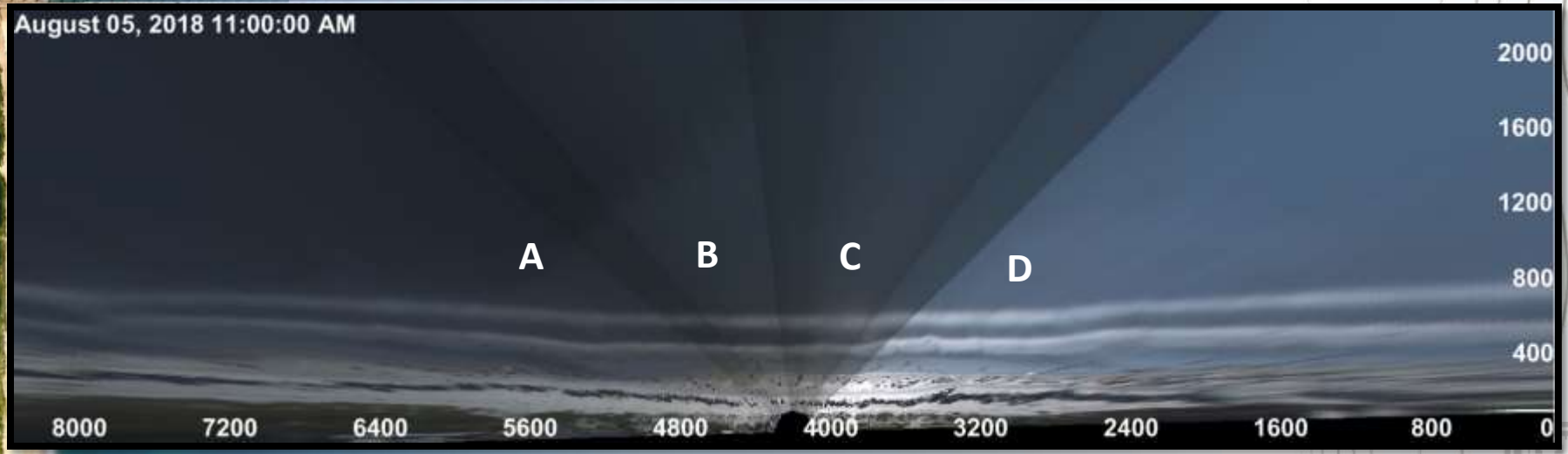
3 UNITS (6 CAMERAS)

JULY 24-25, 2018
1 DAY INSTALL
1 DAY GCPS (GPS-RTK)

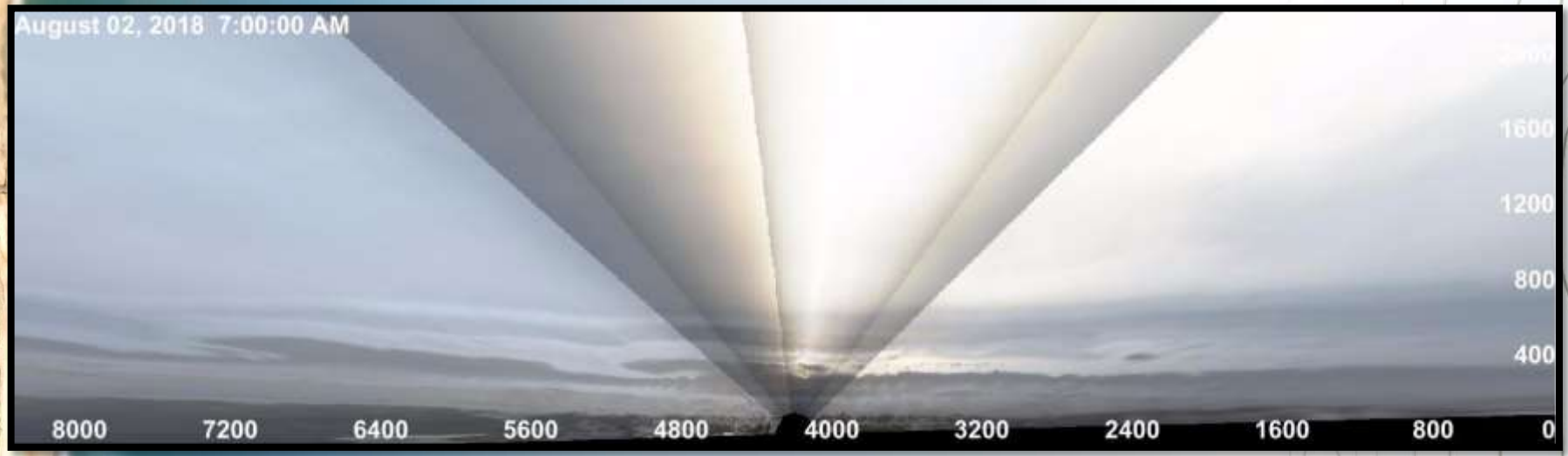


EXAMPLE IMAGERY



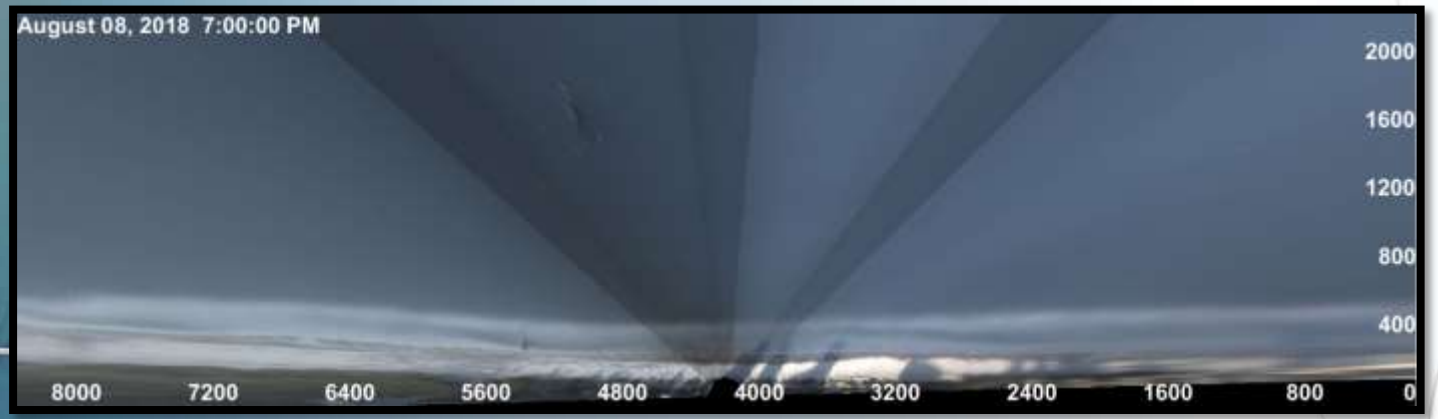


PROJECT EVOLUTION

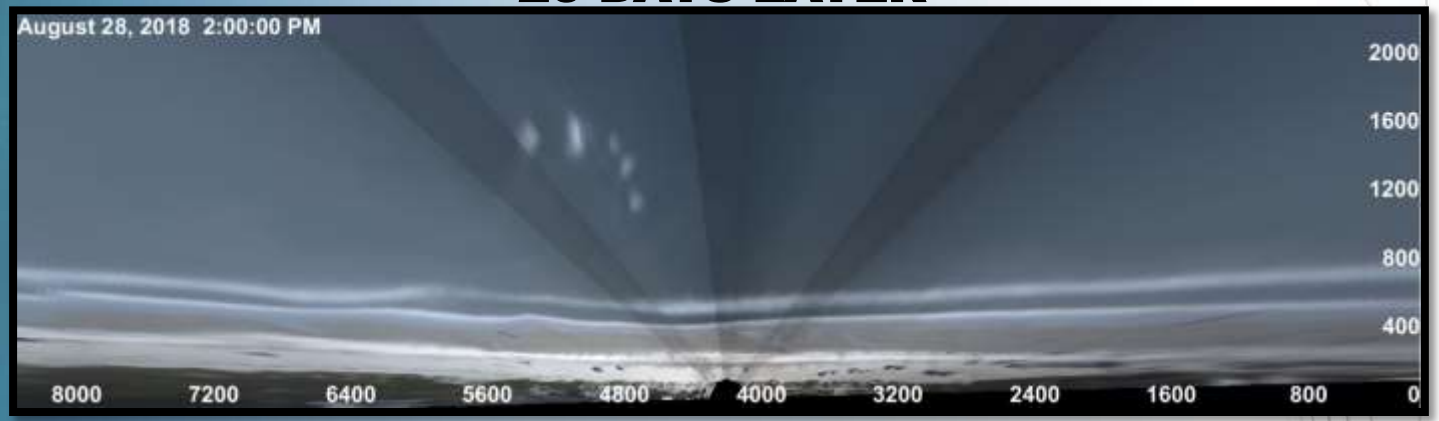


PROJECT EVENTS

PROJECT START



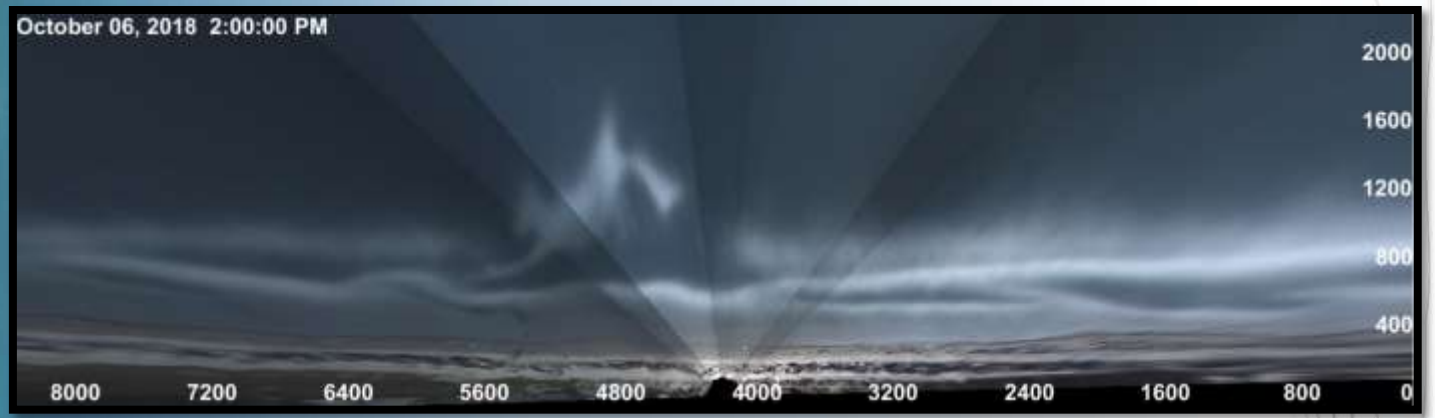
20 DAYS LATER



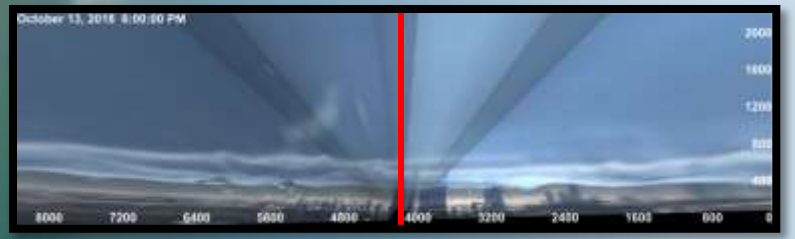
PROJECT EVENTS

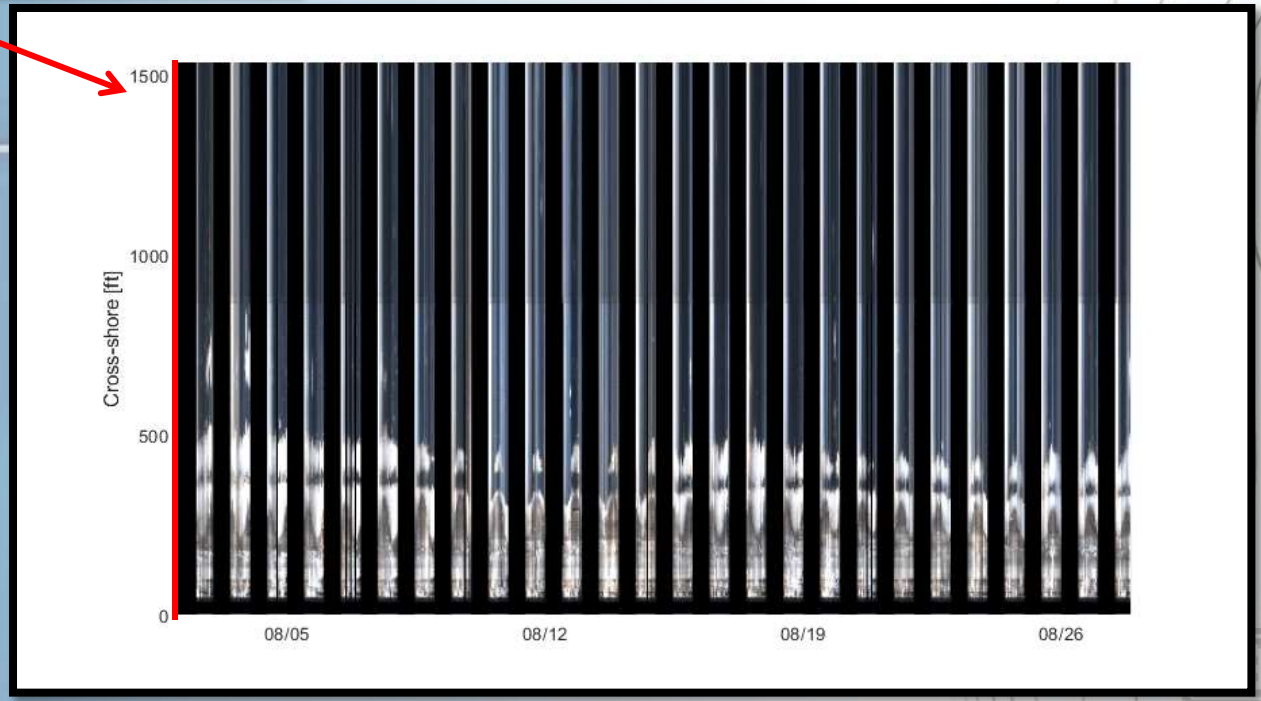
HURRICANE FLORENCE

HURRICANE MICHAEL



SHORELINE POSITION





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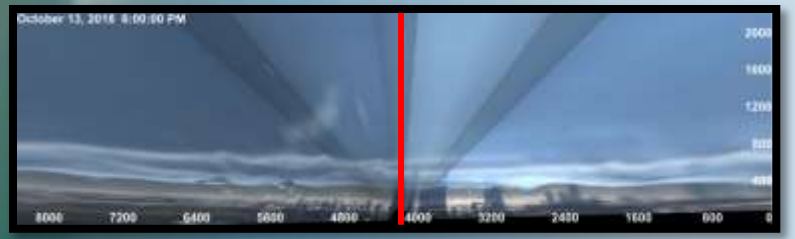
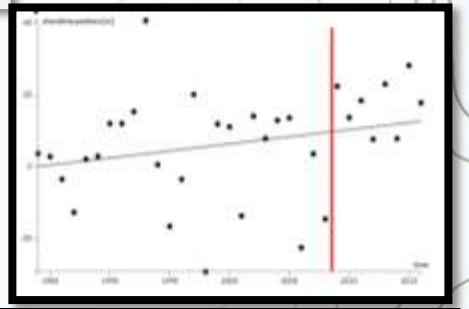
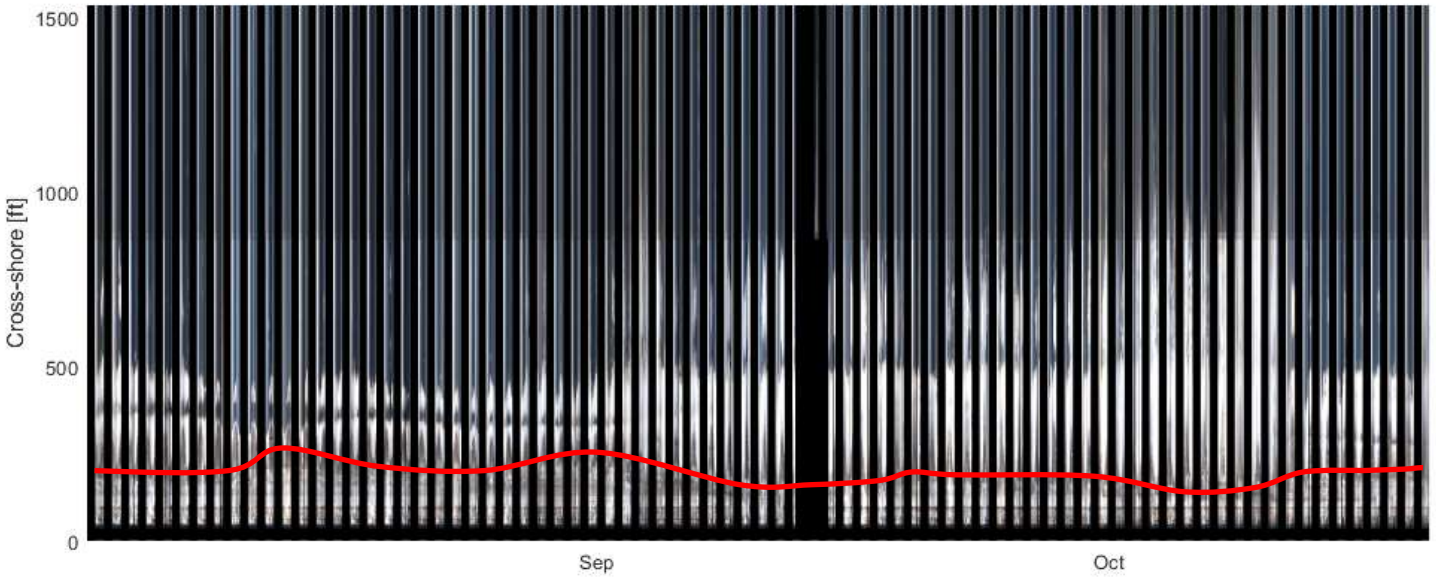
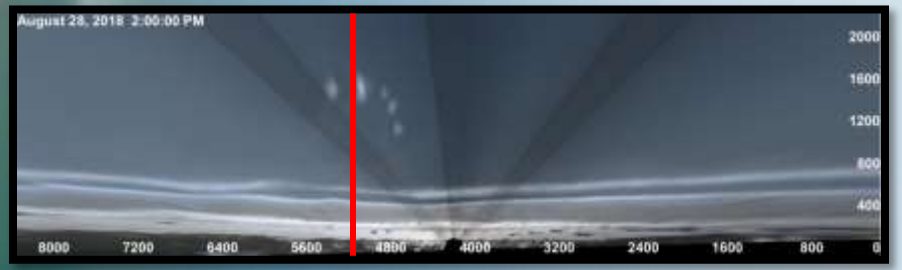
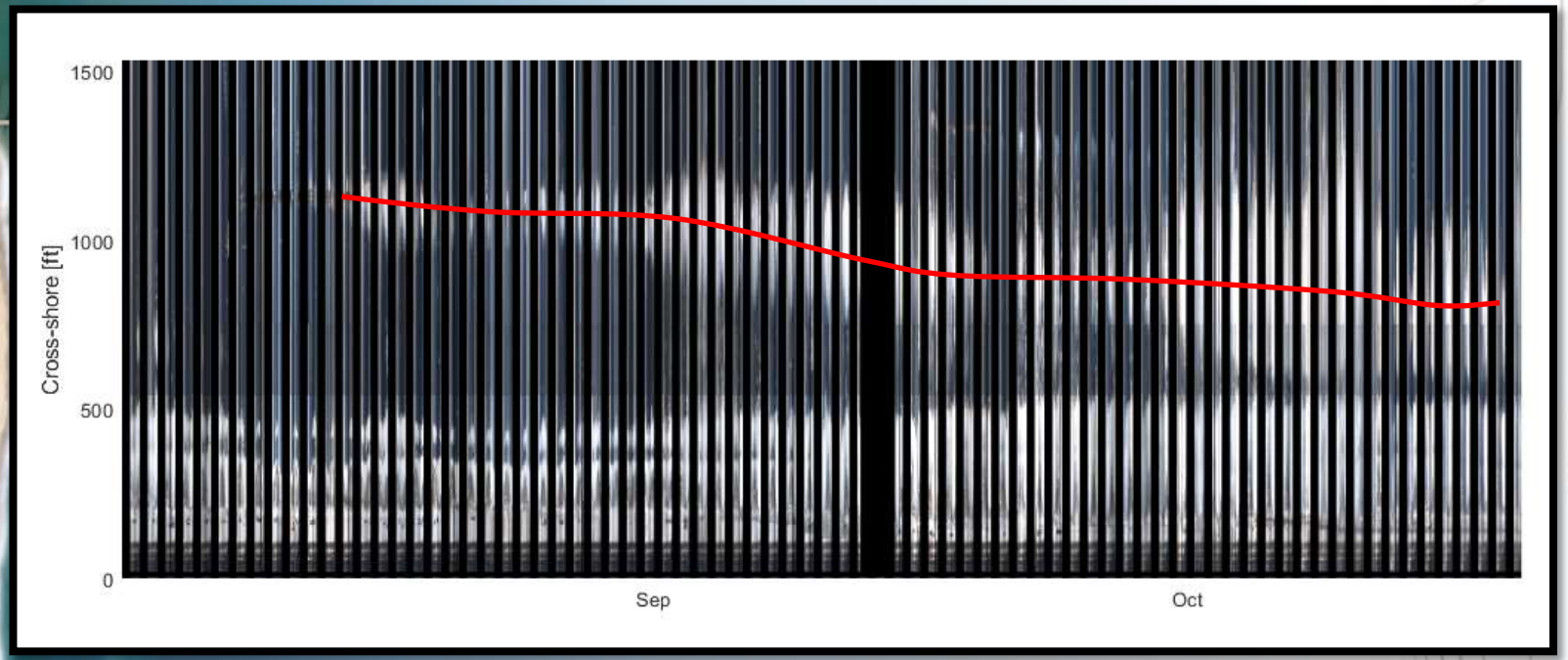






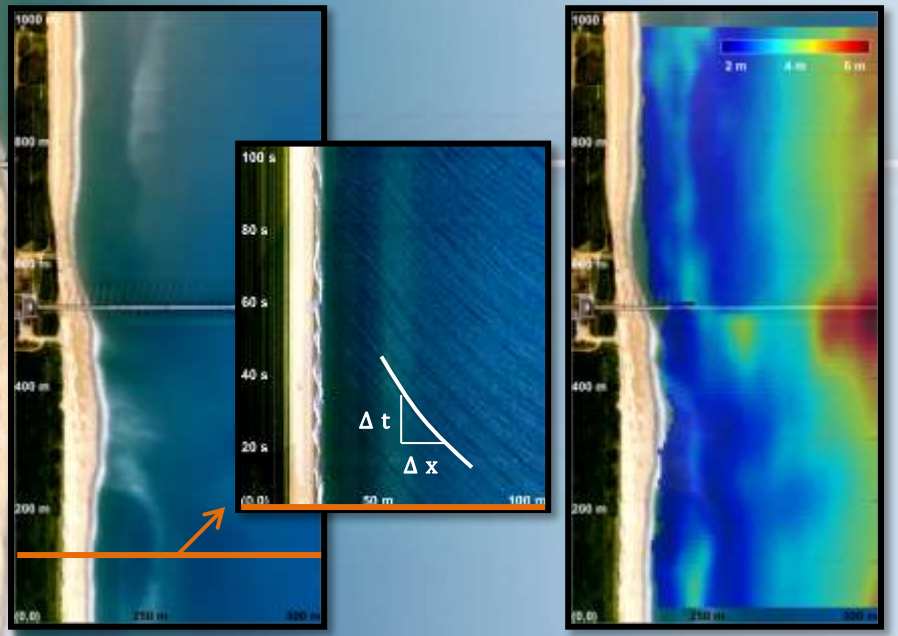
BERM POSITION



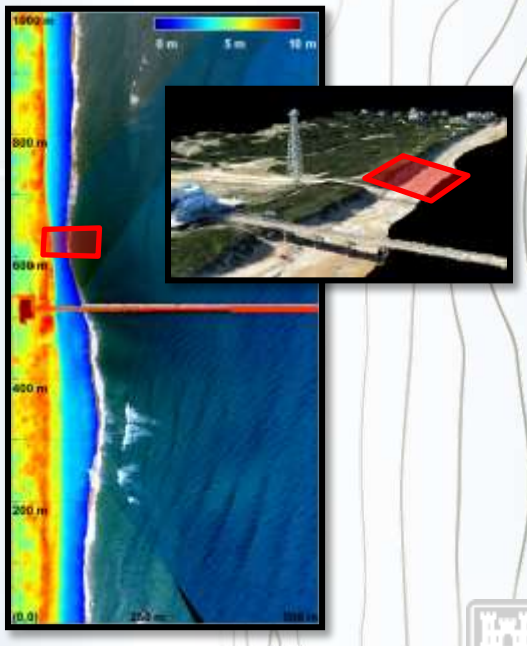


FUTURE: TOPO/BATHY

BATHYMETRY CURRENTLY RUNNING AT DUCK ARGUS TOWER



DEVELOPING TOPOGRAPHY FROM STEREO IMAGING

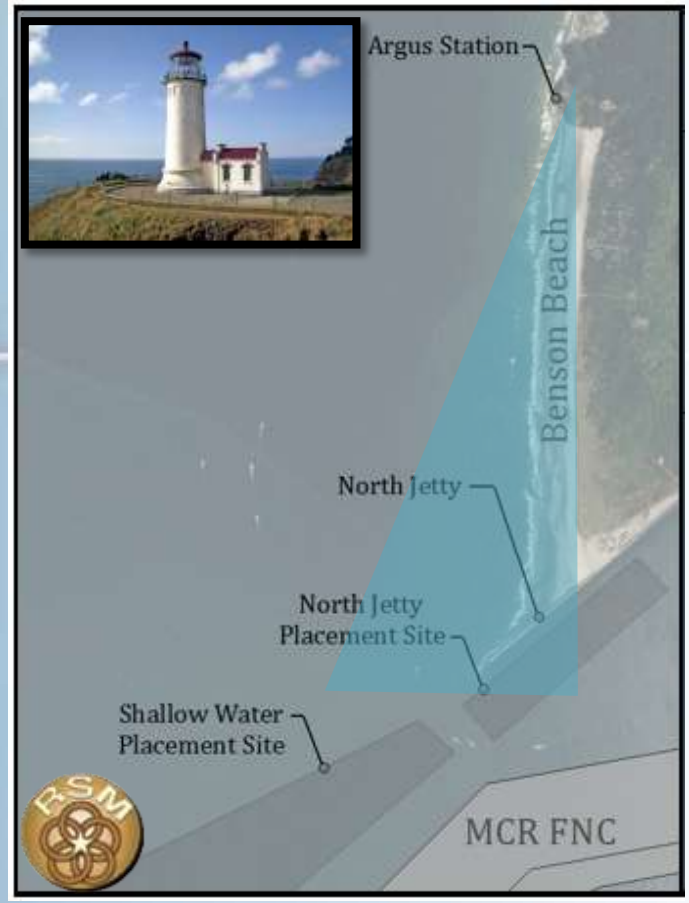


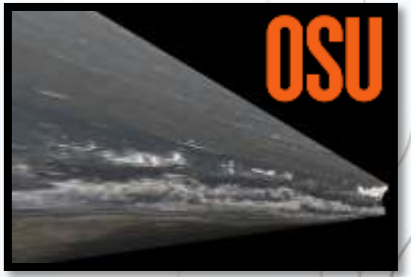
CURRENTLY COLLECTING REQUIRED DATA AT SAJ

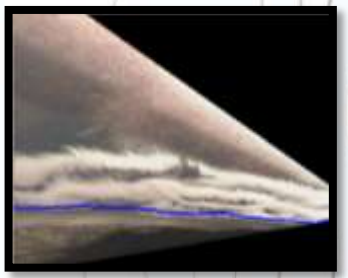
FUTURE: AUTOMATION

FY18 RSM
NWP, North Head Argus Station Engineering Products for Improved Regional Sediment Management

Provide automated data products to exploit Argus coastal imaging data for engineering information and support managing Mouth of Columbia River







Near Real Time

FUTURE VISION

TRANSITION AN END -TO -END DISTRICT PRODUCT

- Self-contained, rapid, and robust deployment
- Simple interface, not a priori knowledge of photogrammetry required
- Integration with real-time numerical model environments
- Near real-time access to imagery and derived engineering data via **public** website

hours

Imagery
Shoreline position
Bathymetry
Profiles
Volume Change

ADDITIONAL INFORMATION

TECHNICAL NOTE:

Design and Deployment of Mini-Argus Systems for Rapid Coastal Imaging

FACT SHEET:

Mini-Argus Nearshore Video Imaging:

Monitoring and Quantifying Beach Project Response from Coastal Imagery

CIRN:

https://github.com/Coastal-Imaging-Research-Network

INFORMATION + COLLABORATION:

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