

Analysis of Sand Thickness at Condado, Puerto Rico for BU ERDC: Heidi Wadman & Jesse McNinch SAJ: Kelly Legault



BLUF:

- 1. Does the volume of transport-relevant sediment (sand) vary in the alongshore direction?**
 - A. Is this variation significant enough to impact shoreline stability?
- 2. Can natural variations in alongshore sand volume be incorporated into CMS and used to improve nourishment efforts?**
 - A. What is the minimum critical volume of sediment necessary to:
 - I. Stabilize the beach at San Juan/Condado?
 - II. Allow it to be in dynamic equilibrium with the forcing environment?
- 3. Was there significant offshore transport of sand during Hurricane Maria?**
 - A. Was there a change in sediment volume preserved offshore of the outer reef?

Challenge/Objectives

- Map volume of nearshore/offshore sand (FY17)
- Incorporate sediment variability into CMS (??)
- Revise nourishment strategy to incorporate sand vulnerability (??)



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District/Other USACE PDT Members

Heidi Wadman, ERDC-CHL
Jesse McNinch, ERDC-CHL
Kelly Legault, SAJ
Alfredo Torruella, UPR-San Juan

Stakeholders/Partners

Ms. Ashleigh Fountain, SAJ
Dr. Miguel Canals, UPR-Mayaguez
Dr. Sylvia Rodriguez, UPR-Mayaguez
Mr. Ernesto Diaz, DNER

Leveraging/Collaborative Opportunities

- UPR (vessel support and hydrodynamic measurements)
- CARICOOS boundary condition support
- CMS modeling support



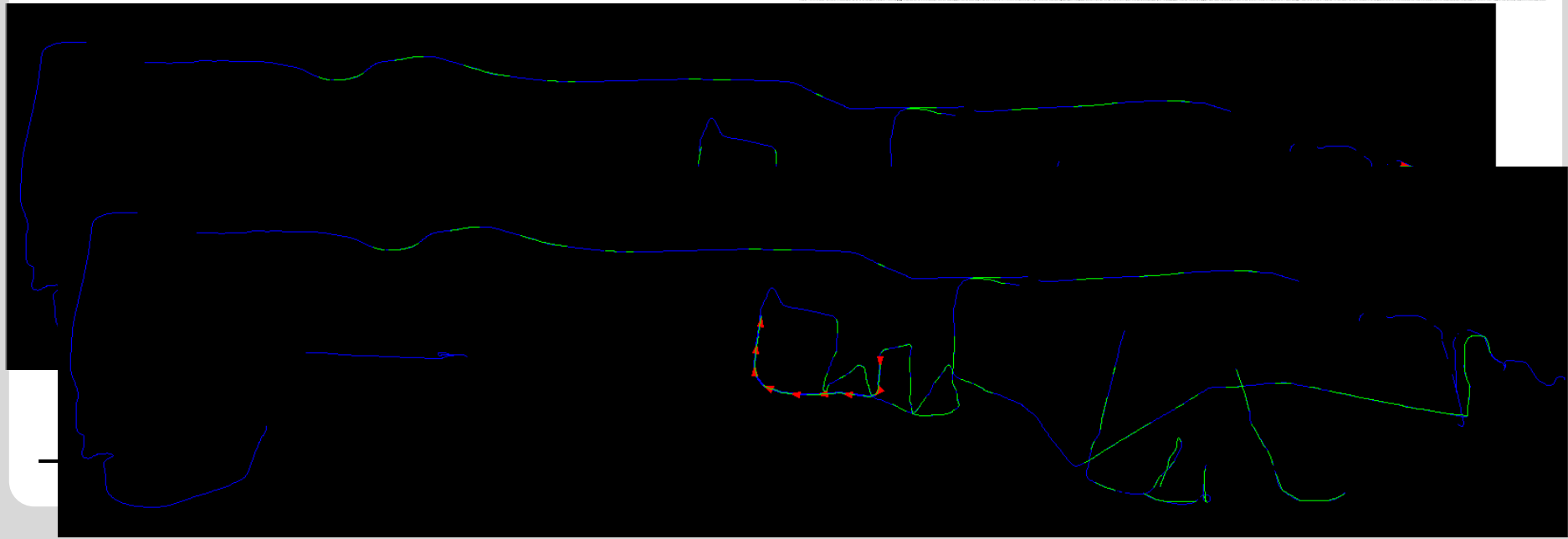
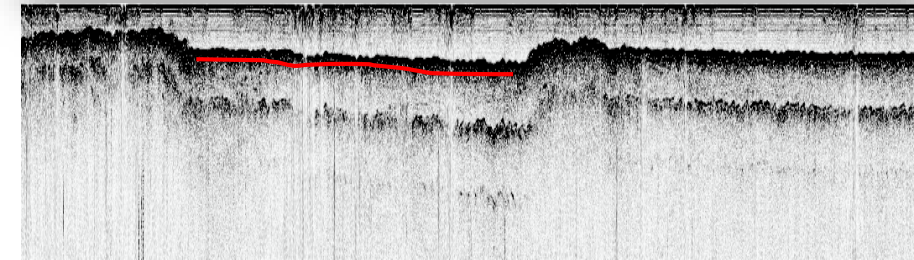
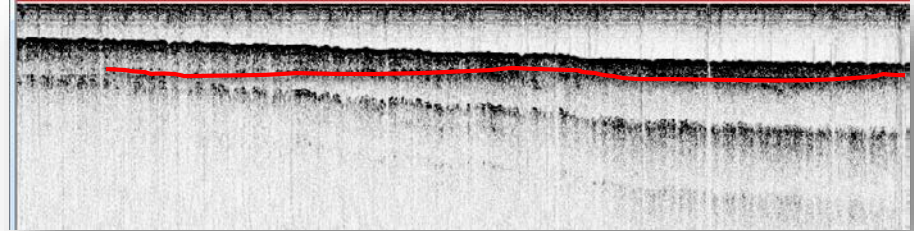
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Accomplishments/Deliverables

- Sand volume spatial variability:
 - Horizontal: most extensive in western Condado
 - Vertical: <2 ft to 10 ft+; thickest in western Condado
- Beach sand mapped/sampled offshore of outer reef (water depths > 75 ft)

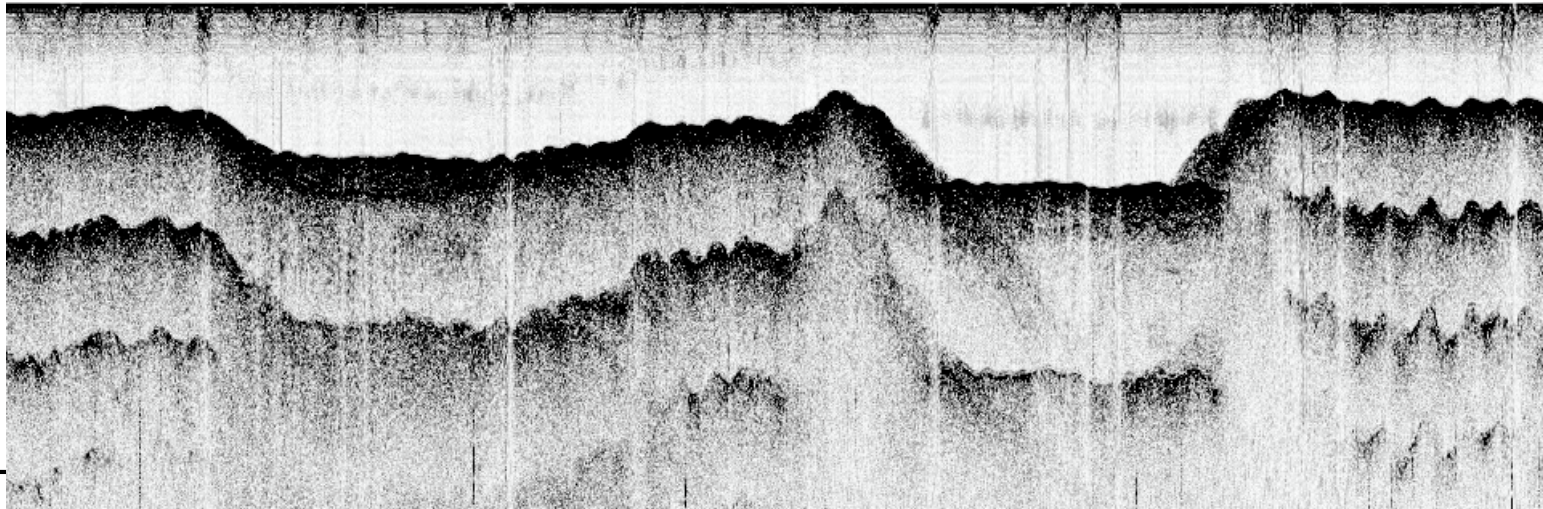


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Accomplishments/Deliverables

- Mapped channels from inner to outer reef
- Volume change along outer reef post-Hurricane Maria?
- Revise beach nourishment strategy to incorporate sand vulnerability post-nourishment (>??)



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Challenges/Lessons

- **Data coverage sufficient to characterize alongshore variability in sand volume:** (1) nearshore, (2) offshore of outer reef, & (3) shoaled region of San Juan Harbor.
- **Significantly more sand preserved along western edge of Condado**
 - Suggests region more amiable for nourishment?
- **Hurricane Maria:** Potentially moved sediment offshore, out of coastal littoral cell. Implications for future beach nourishment vulnerability.



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How is this project benefiting the USACE and Nation?

Potential to reduce costs for nourishment projects by more accurately determining the:

- (1) minimum volume of sediment needed to stabilize the beach (variable)
- (2) optimal placement strategy to reduce sediment loss
- (3) reduce deleterious effects of nourishment being lost and/or transported offshore

Collaborate with SAJ & UPR on San Juan Harbor Study:

- (1) Quantified volume of shoal in San Juan Harbor
- (2) Characterize the nature of the sediment to be borrowed.

POTENTIAL: Examine impact of Hurricane Maria on nearshore sediment volumes/shoreline stability:

- (1) Need to correlate shoreline change pre/post storm to shoreline volume
- (2) Quantify change in post-storm sediment volume (1) nearshore & (2) offshore of outer reef
- (3) CMS – able to recreate variable shoreline erosion/sand transport?