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Wave Dissipation Through Vegetation

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Motivation

to develop techniques and guidance to describe wave dissipation by natural features that complement traditional coastal protection and maximize ecological benefits

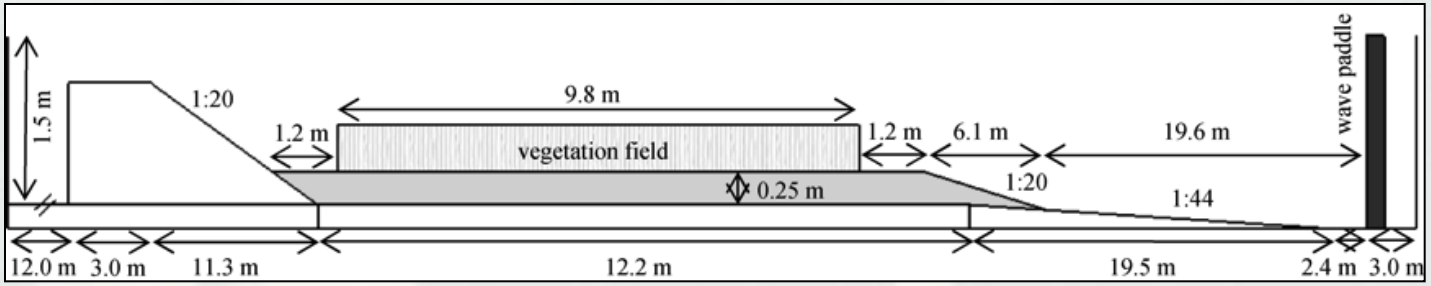
Laboratory Experiments

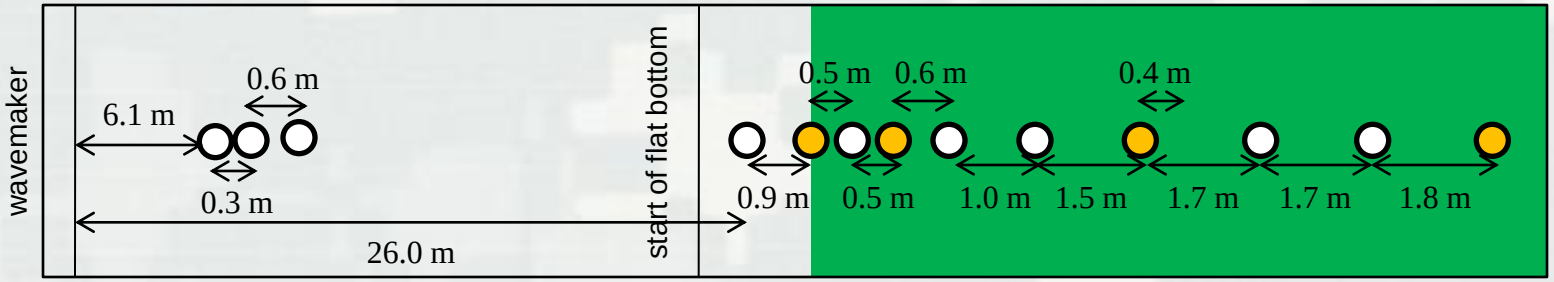
- demonstrate and quantify the wave attenuation potential of coastal vegetation
  - phase 1 – idealized vegetation
  - phase 2 – live vegetation
- varied forcing conditions to investigate the effects of water depth, wave height and peak period
- interested in smooth cordgrass (*Spartina alterniflora*)
  - dominant emergent grass species along Atlantic and Gulf of Mexico tidal marshes
  - grows 0.6 – 2.1 m tall with flat leaf-blades

Source: http://plants.usda.gov

Flume Setup

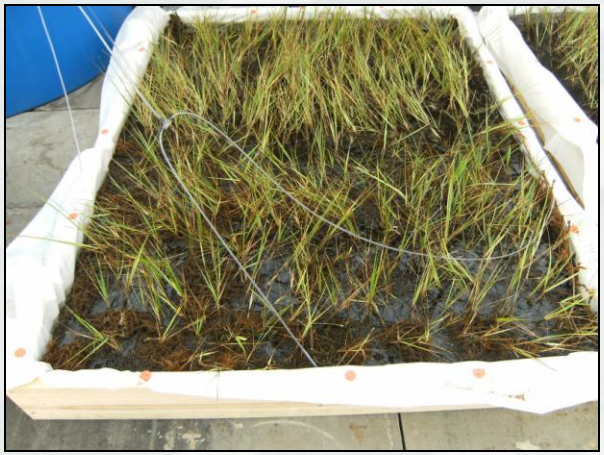
- 1.5-m wave flume onsite
- 9.8-m vegetation field
- 13 single-wire capacitance wave gauges
- 4 ADVs paired with wave gauges

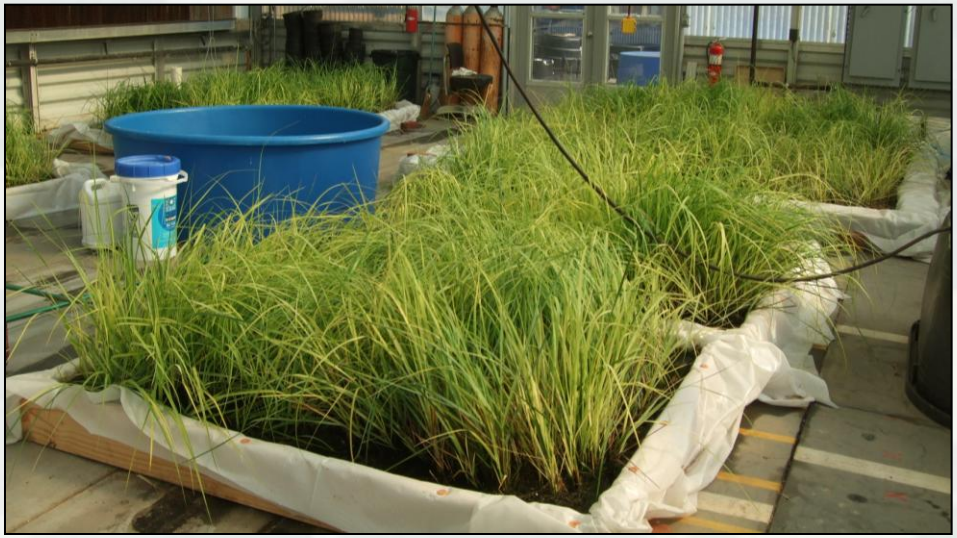




Vegetation

- Idealized
  - polyolefin tubing (“shrink tubing”)
    - flexible
    - able to remain upright
    - modulus of elasticity similar and diameter similar to literature values
  - 6.4 mm diameter and 41.5 cm stem length
  - 100, 200, and 400 stems/m^2
- Live *Spartina alterniflora*
  - grown onsite in coir mats using hydroponics





Trends in Wave Attenuation

- Wave attenuation was found to:
  - increase with stem density
  - decrease with deeper water
  - slightly increase with larger wave heights
  - no discernible trend with respect to peak wave period

Collaboration and Future Products

- ongoing collaboration with DOER
  - Wetland Sediment Migration (D. Bryant)
  - FY14 experiments
- Update to STWAVE numerical model for application in wetlands
- Improved guidance
  - Coastal Engineering Manual
  - input to Coastal Planning and Coastal Engineering Prospect classes
- Publications
  - tech notes, reports, journal papers, conferences

Questions?