High Resolution Profiler Measurements of Shear Flow within Seagrass Beds of Coastal Virginia

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Seagrass Ecosystem:

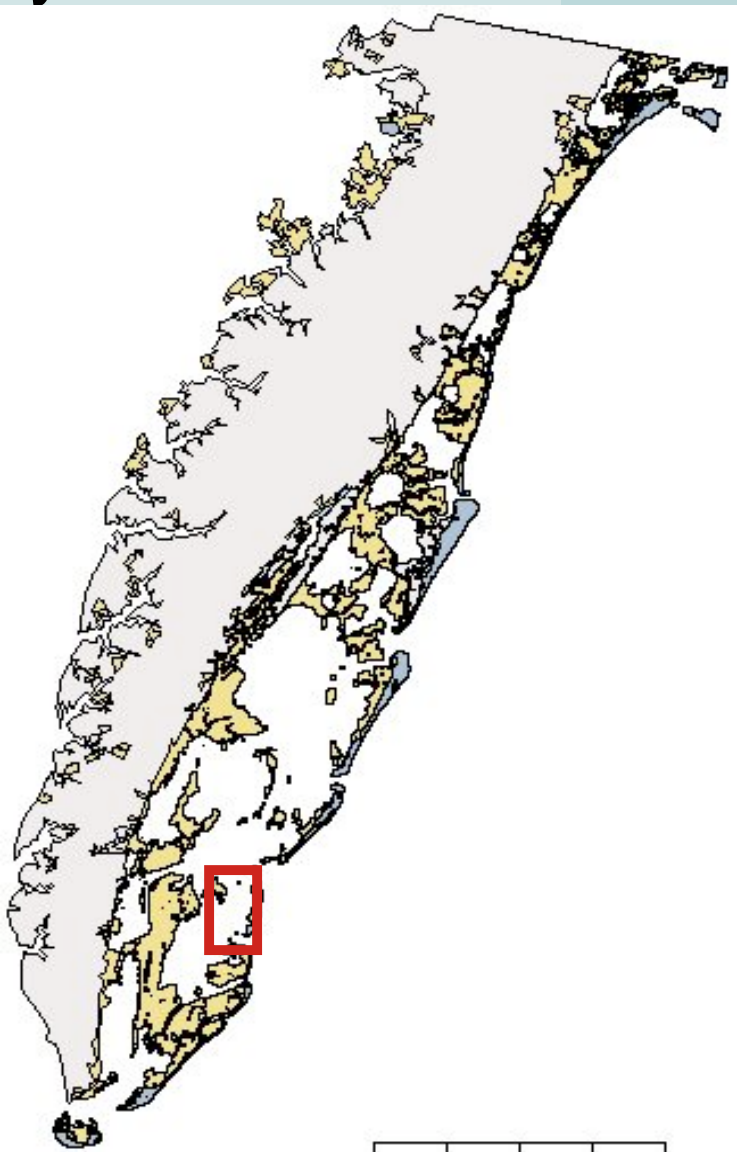
- Highly productive systems
- In danger due to disease and eutrophication
- Rely on light and local nutrient availability
- Provide structure

Questions:

- How does topographic structure of the benthos alter flow structure seagrass beds?
- Does the topographic variability of the benthic community control local suspended sediment concentration?

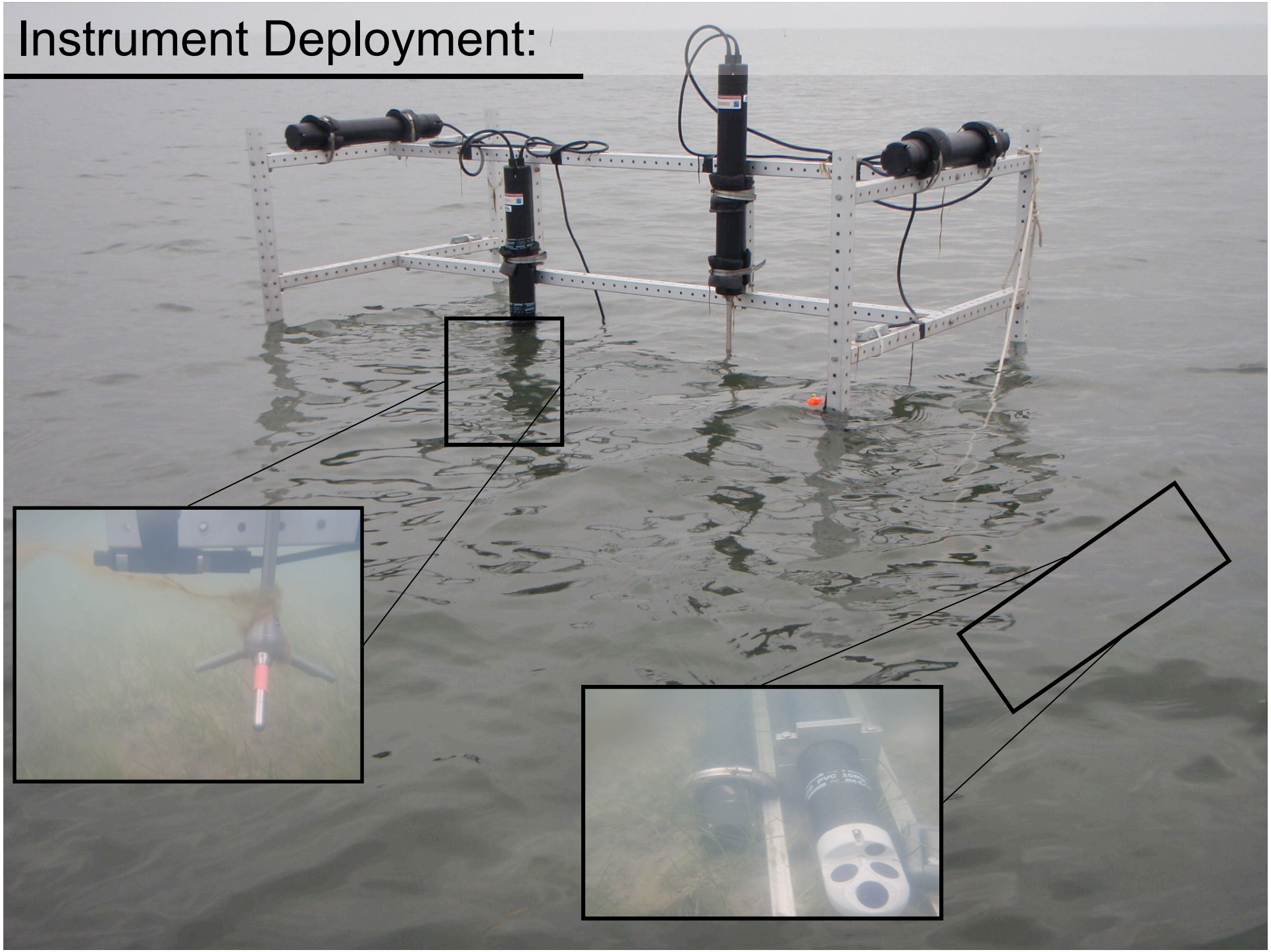
Site Description:

- Virginia Lagoon and Estuary Systems:
  - Shallow water; 2 m
  - With and without seagrass species *Zostera marina*
- Seagrass:
  - Blades average 30 cm in summer, max 50 cm
  - Flexible canopy
  - Density 400 shoots/m^2



From VCR LTER web site

Instrument Deployment:



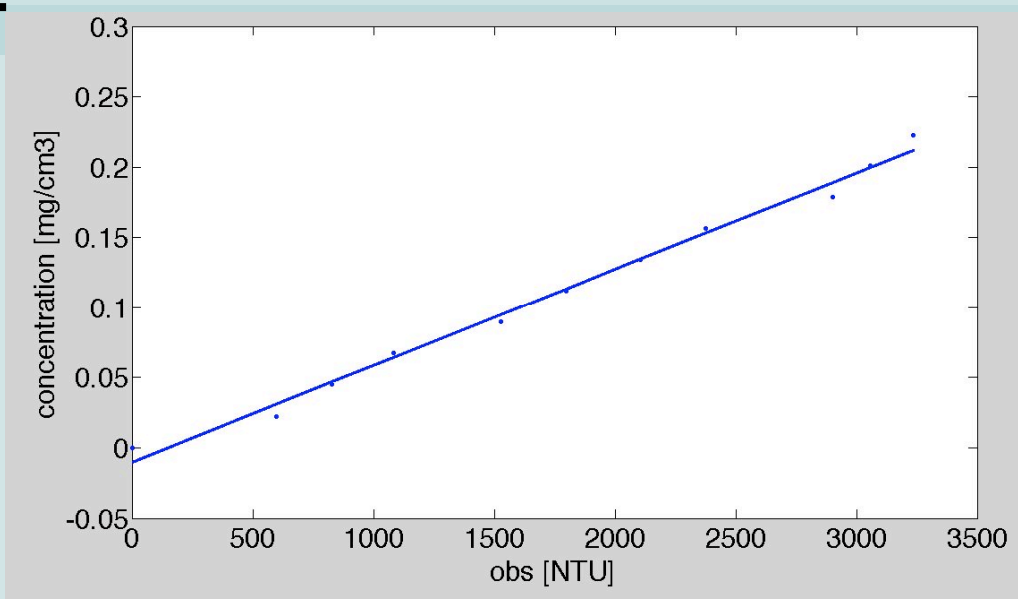
Data Analysis:

- Output Vector:
  - Tides
  - Velocity:

$$U=\sqrt{(u^2+v^2)}$$

  - Reynolds Stress:

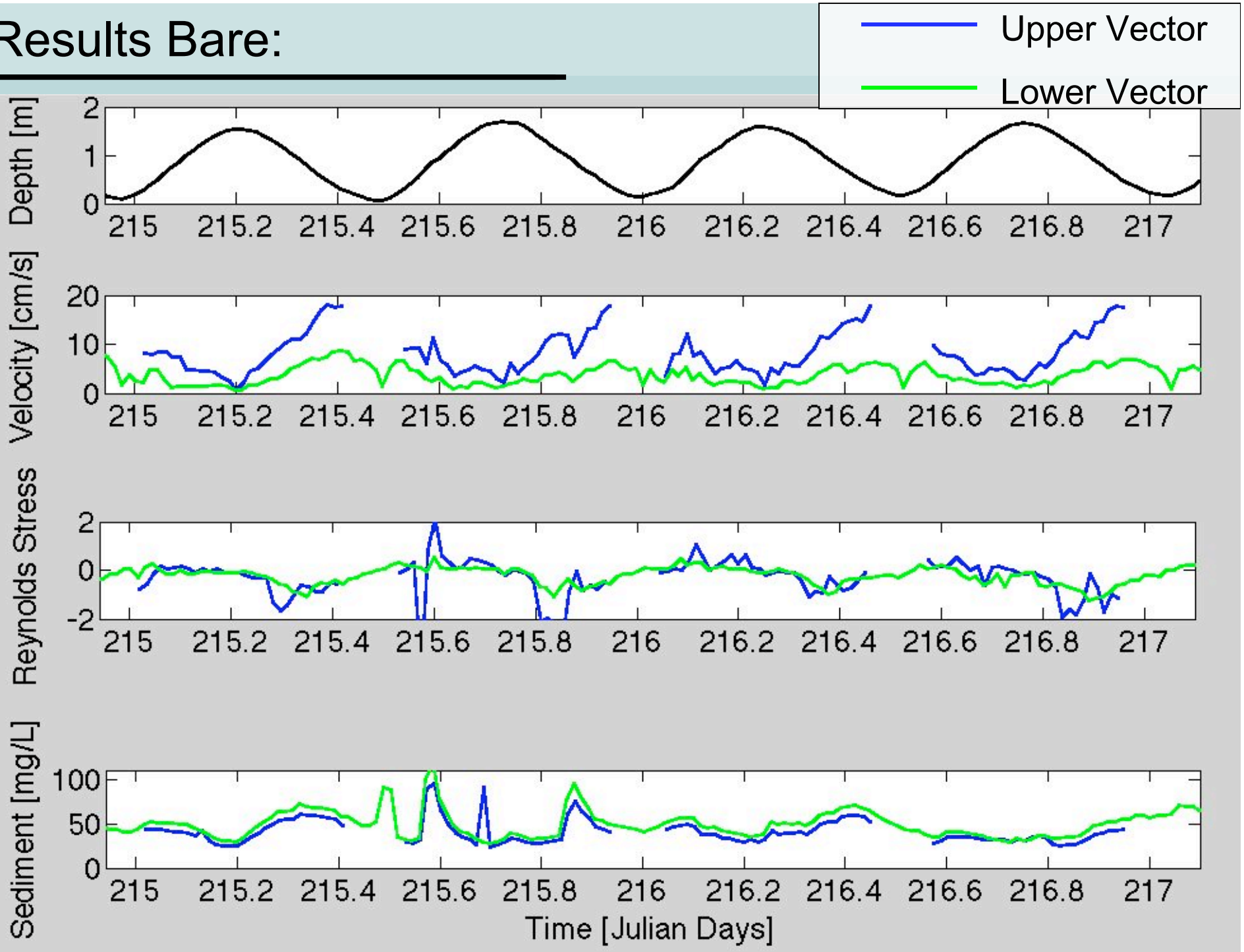
$$\overline{u'w'}$$



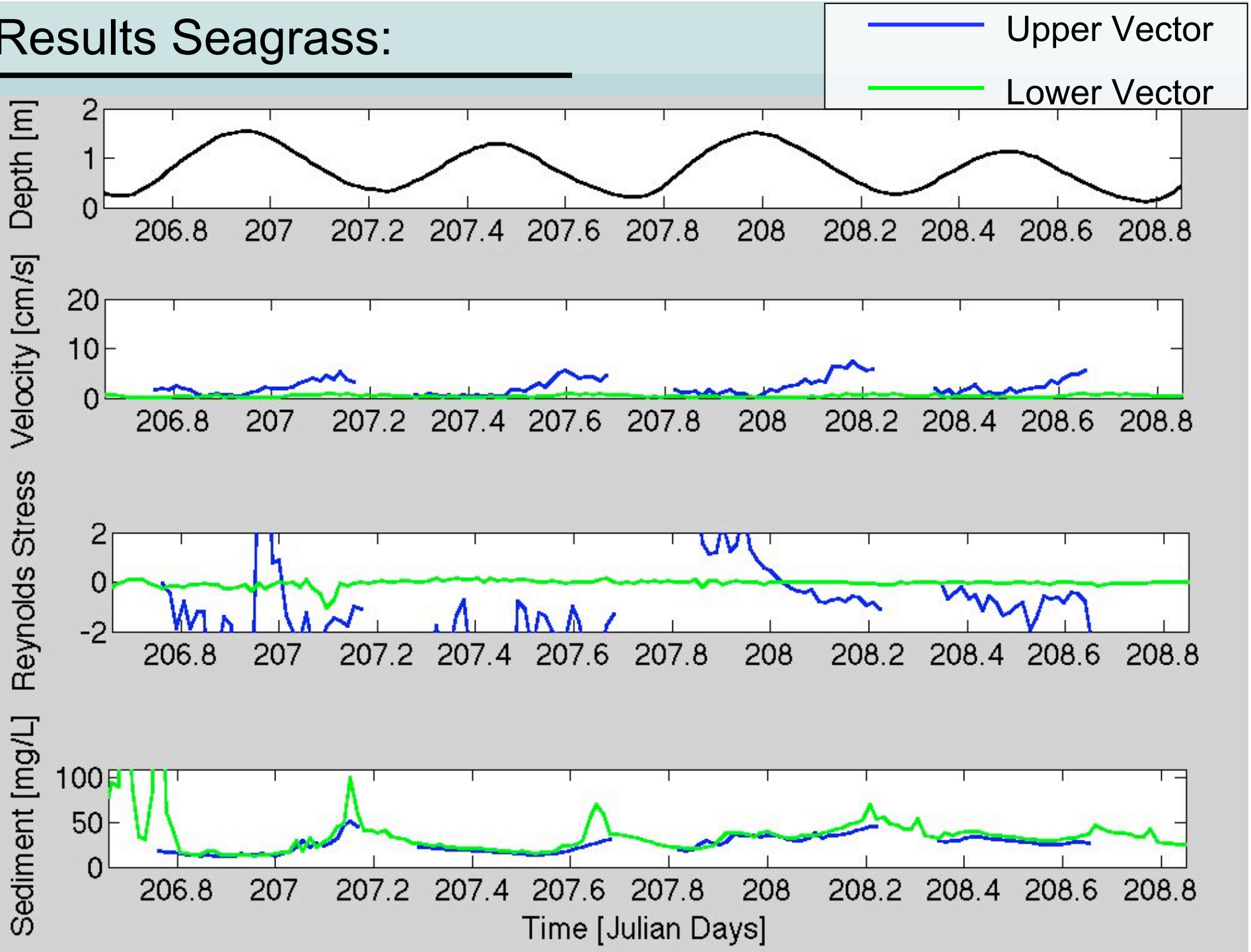
- Output OBS:
  - Sediment concentration

- Output Aquadopp:
  - Velocity variation with depth and time
  - Vertical velocity profiles

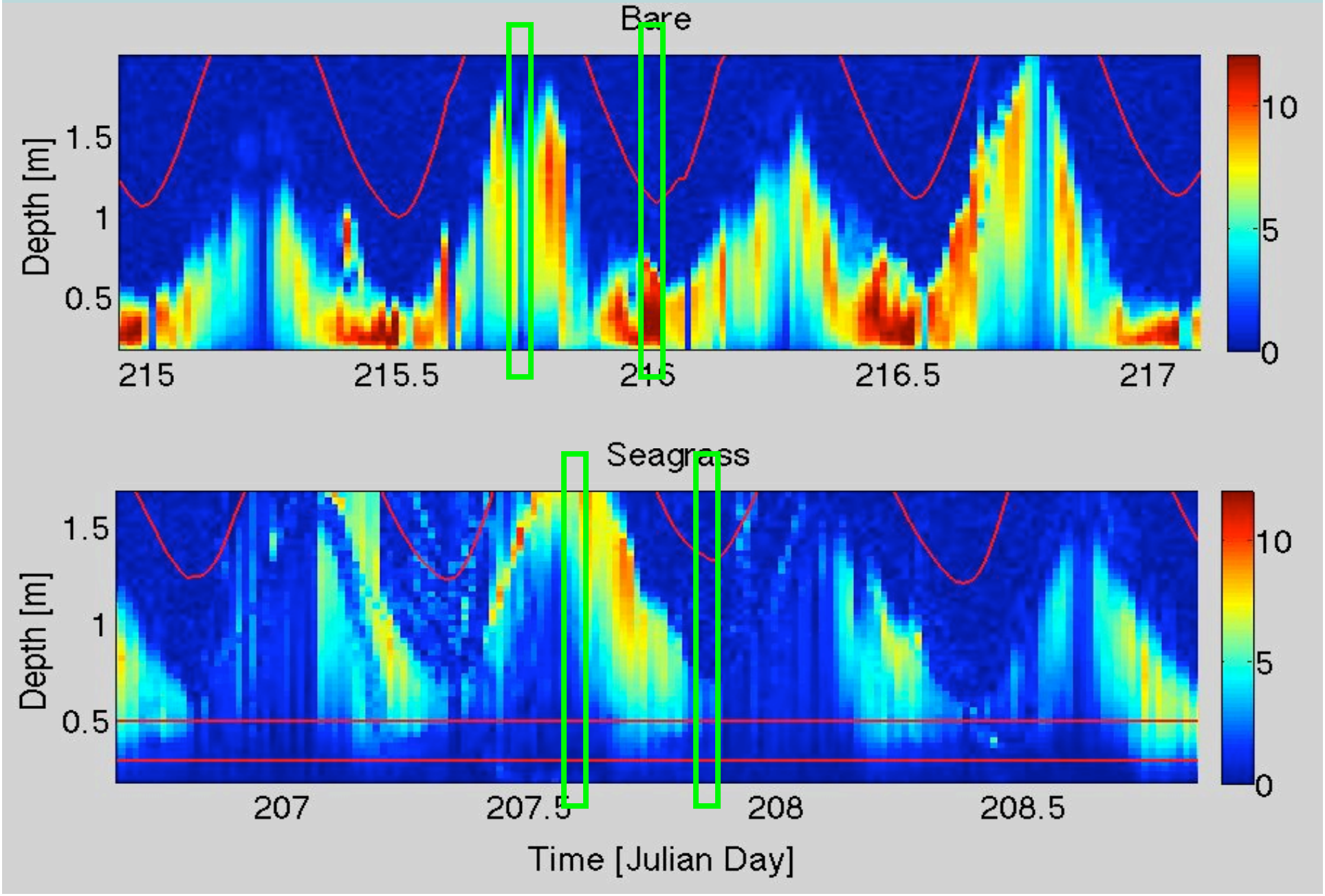
Results Bare:



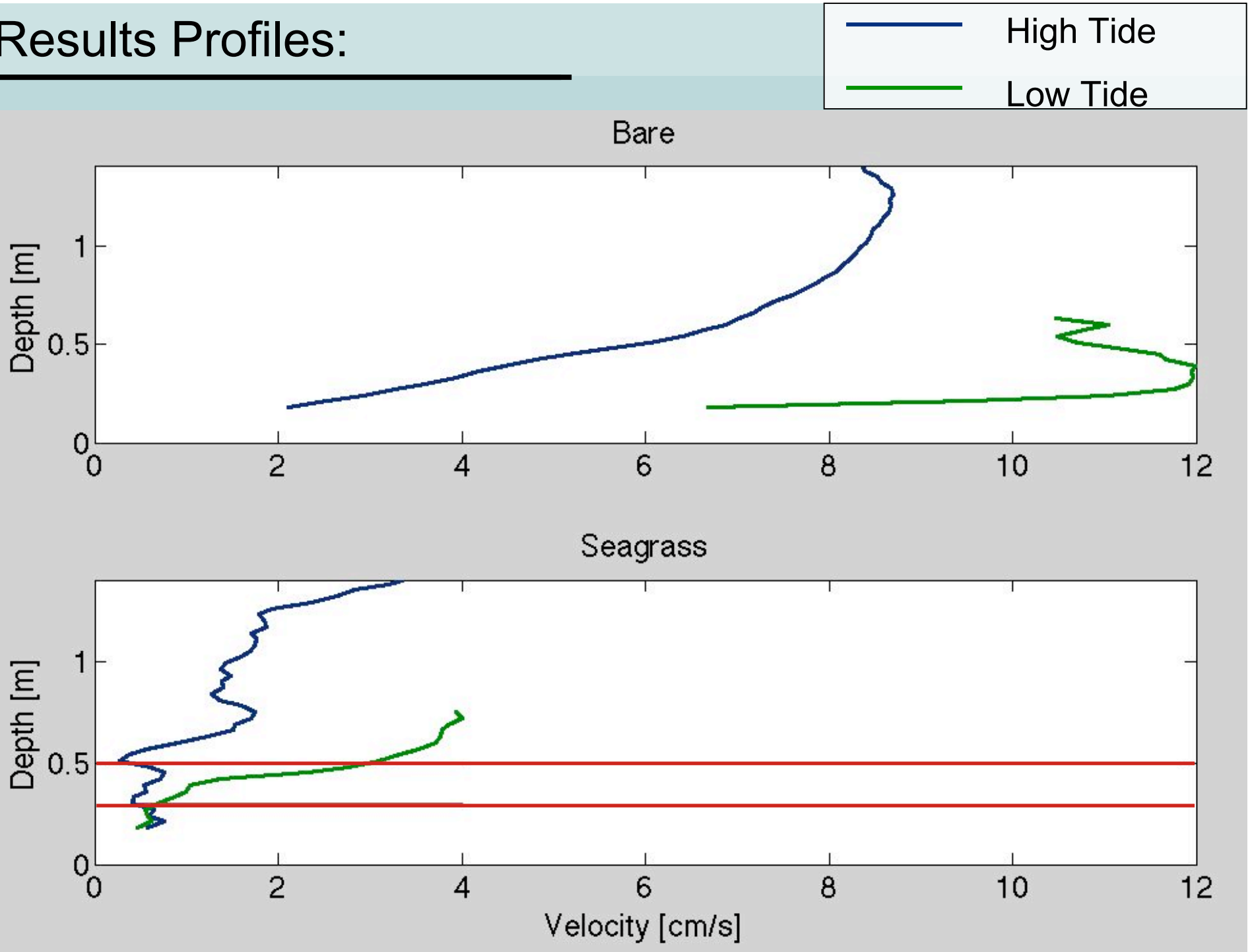
Results Seagrass:



Results Profiler:



Results Profiles:



Summary:

- Seagrass decrease flow velocities and lower suspended sediment concentrations
- Flow structure is altered in the presence of seagrass
- Higher velocities penetrate meadow at low tide
- Suspended sediment concentrations greater near bed and at low tide

Future Plans:

- Incorporate wave processing
- Sediment flux calculations
- Fluid retention times

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