Field measurements of turbulence at tidal energy sites

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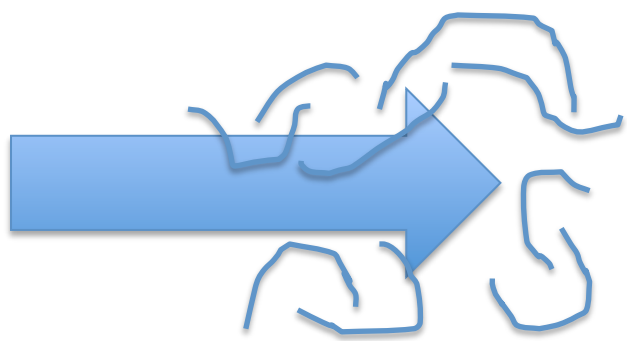
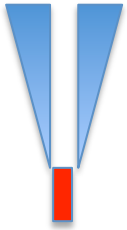
What do we want to know?

- Turbulence intensity, $I_u = \frac{\sigma_u}{\langle u \rangle}$
- Turbulence spectra, $TKE(f)$
- Extreme values, u_{max}



What can we measure?

- Acoustic Doppler Current Profilers (ADCP)
  - Temporal noise
  - Spatial aliasing

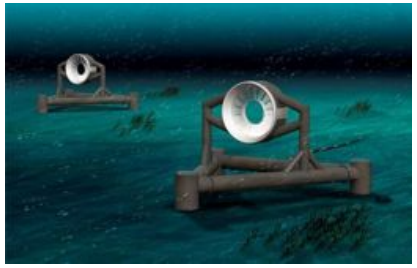


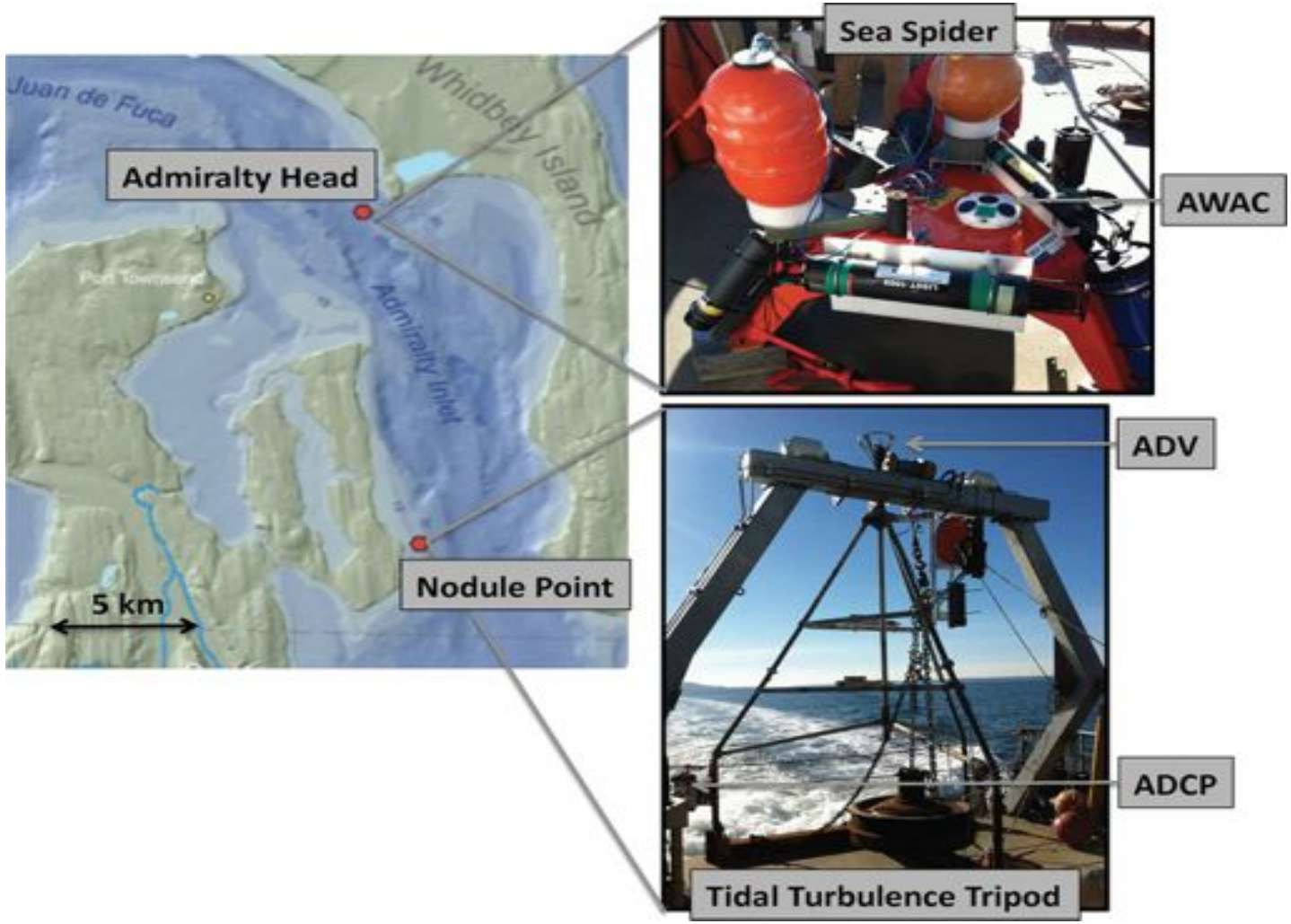
- Acoustic Doppler Velocimeters (ADVs)

- Other options

Admiralty Inlet measurements

Thomson et al, JOE, in press





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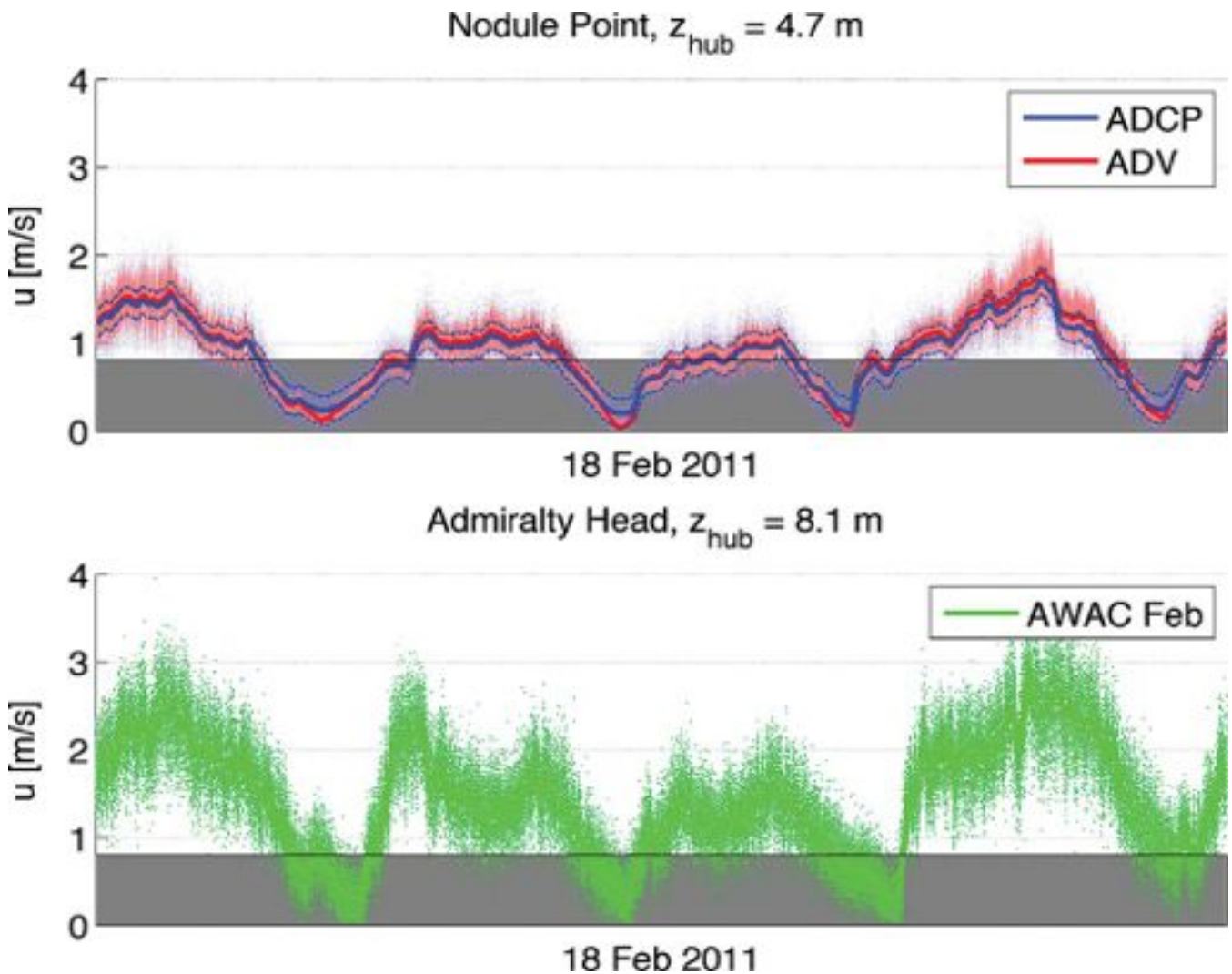
Raw time series



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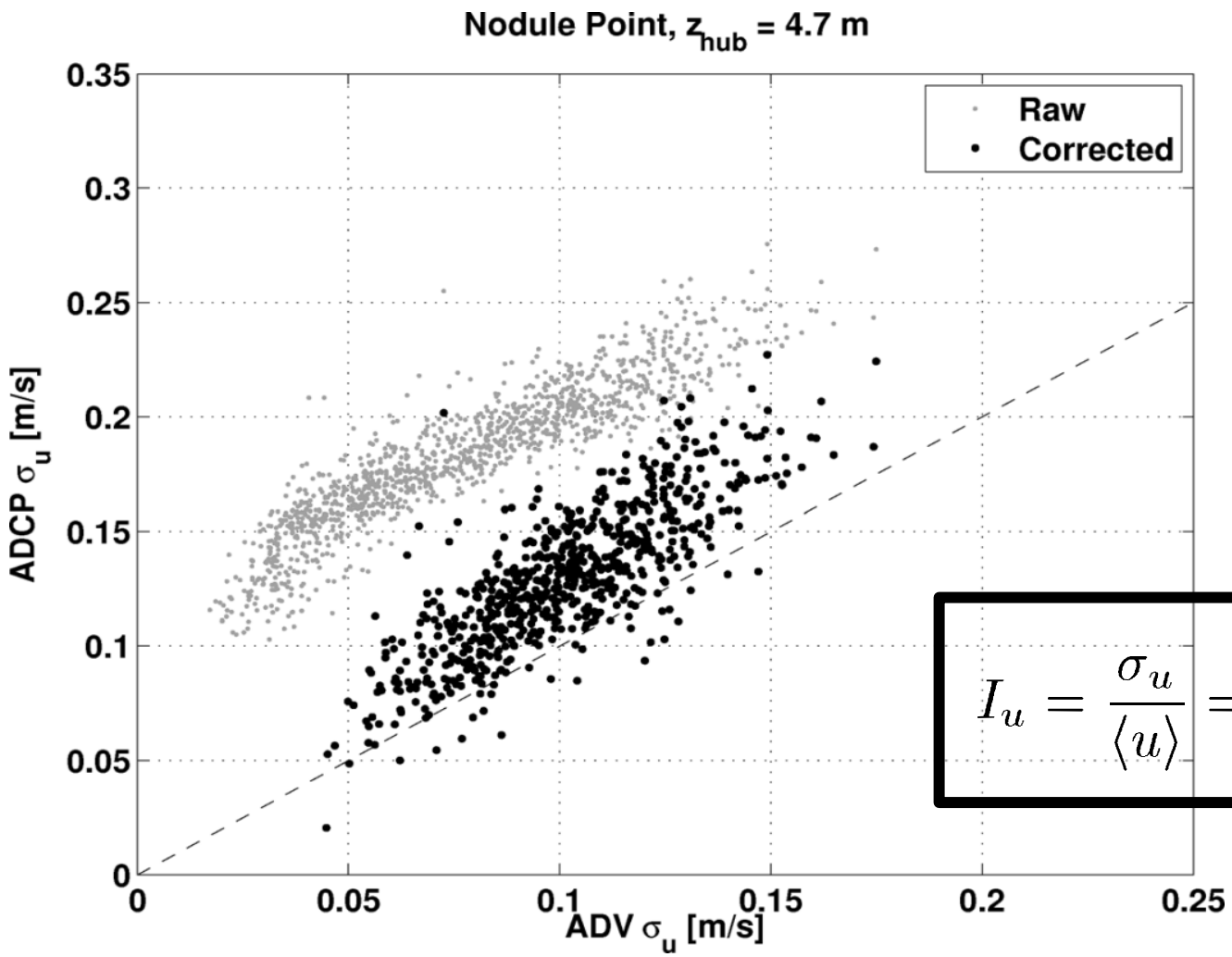
ADCP vs ADV: std dev of currents



$$I_u = \frac{\sigma_u}{\langle u \rangle} = \frac{\sqrt{\langle u'^2 \rangle - n^2}}{\bar{u}}$$

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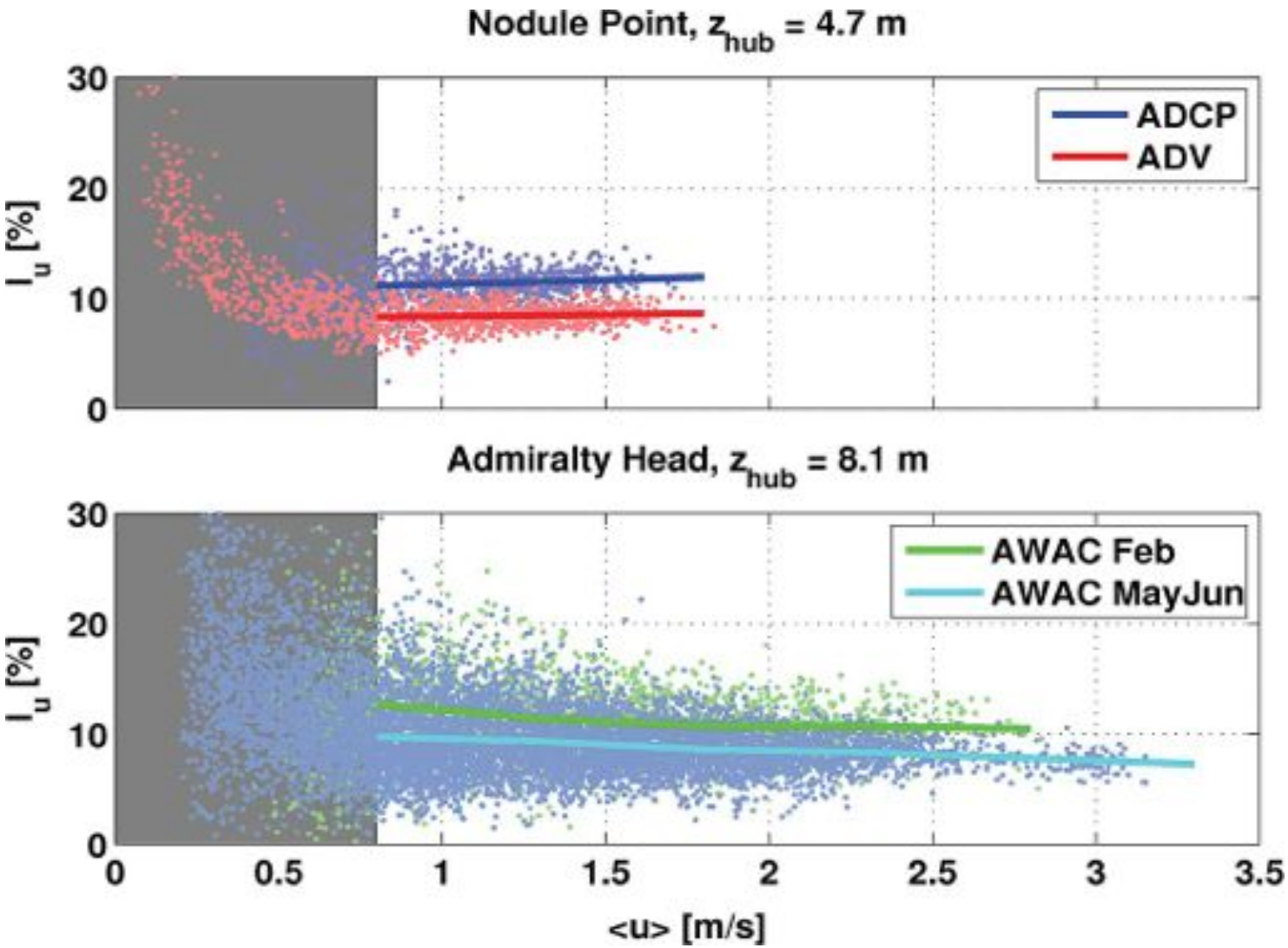
Turbulence intensities



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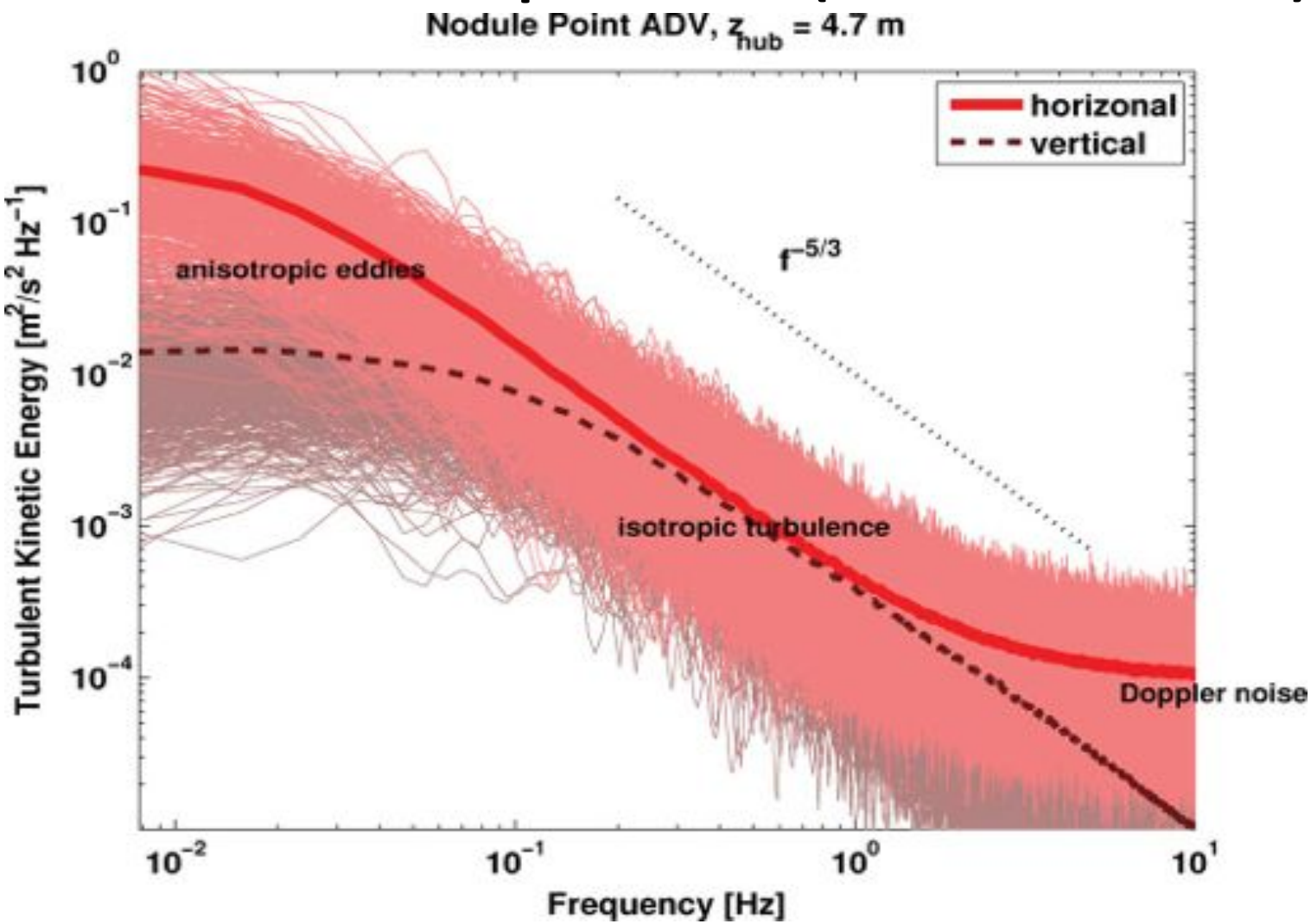
Turbulence spectra (time scales)



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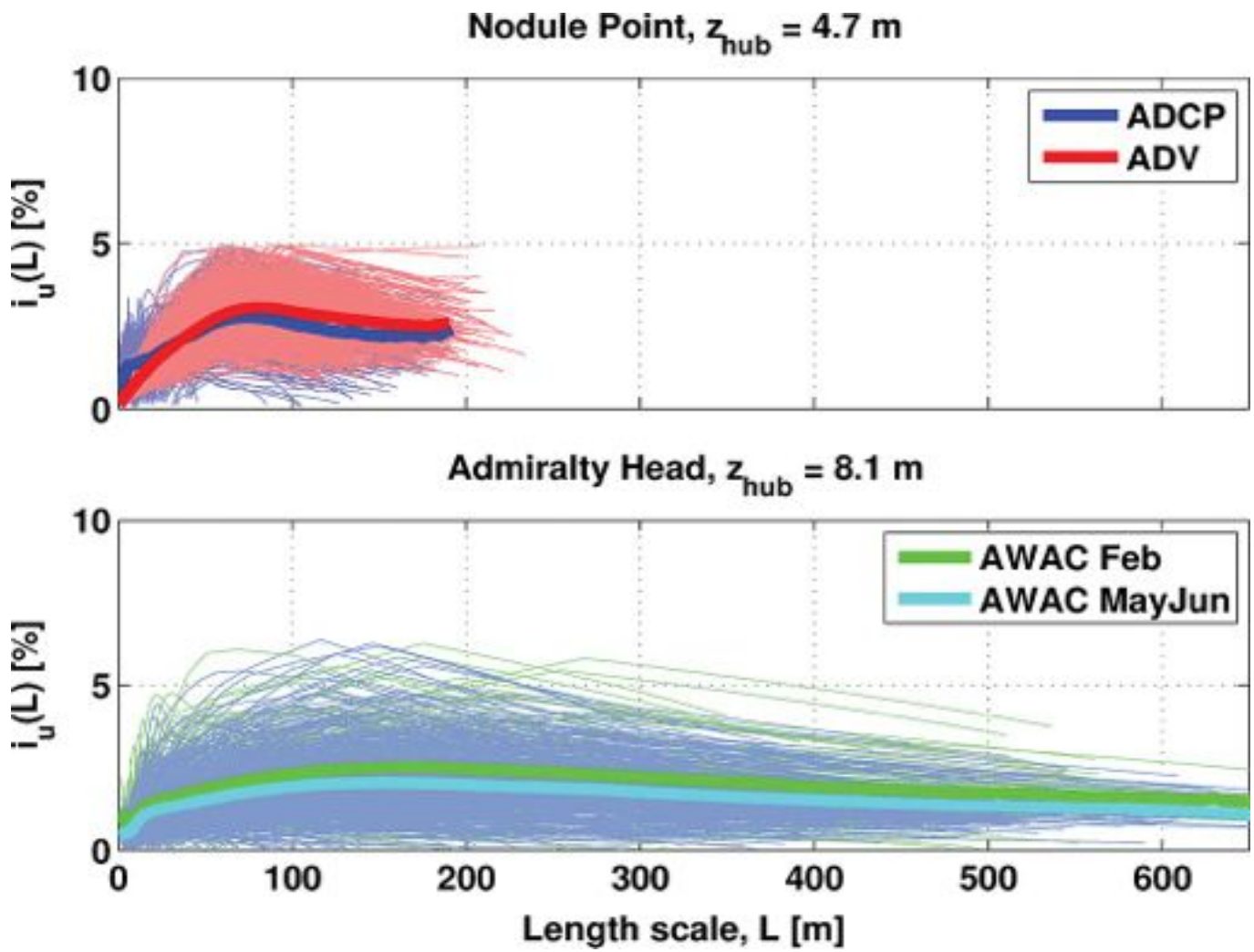
Fractional intensity (length scales)



$$L = \frac{\bar{u}}{f}$$

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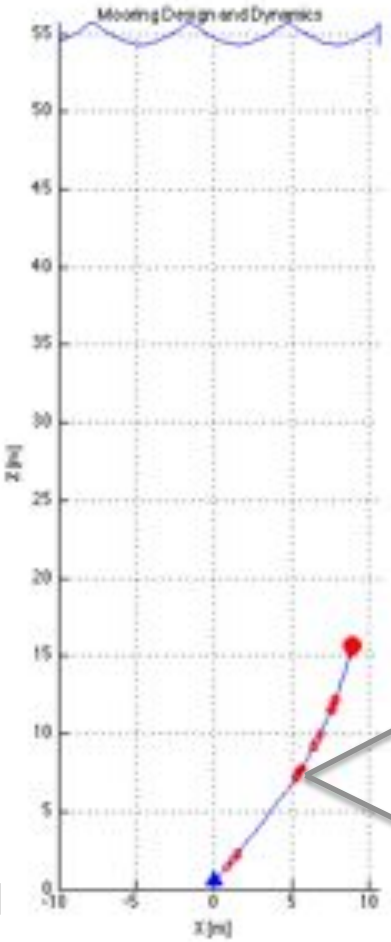
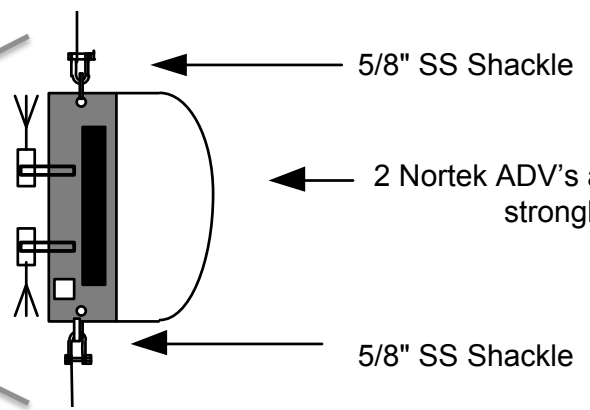
Now what?
Tidal Turbulence Mooring

Surface



Seabed

- Get ADVs farther above seabed
- Potential for mooring 'blow down'
- Potential for anchor drag
- Potential for motion contamination



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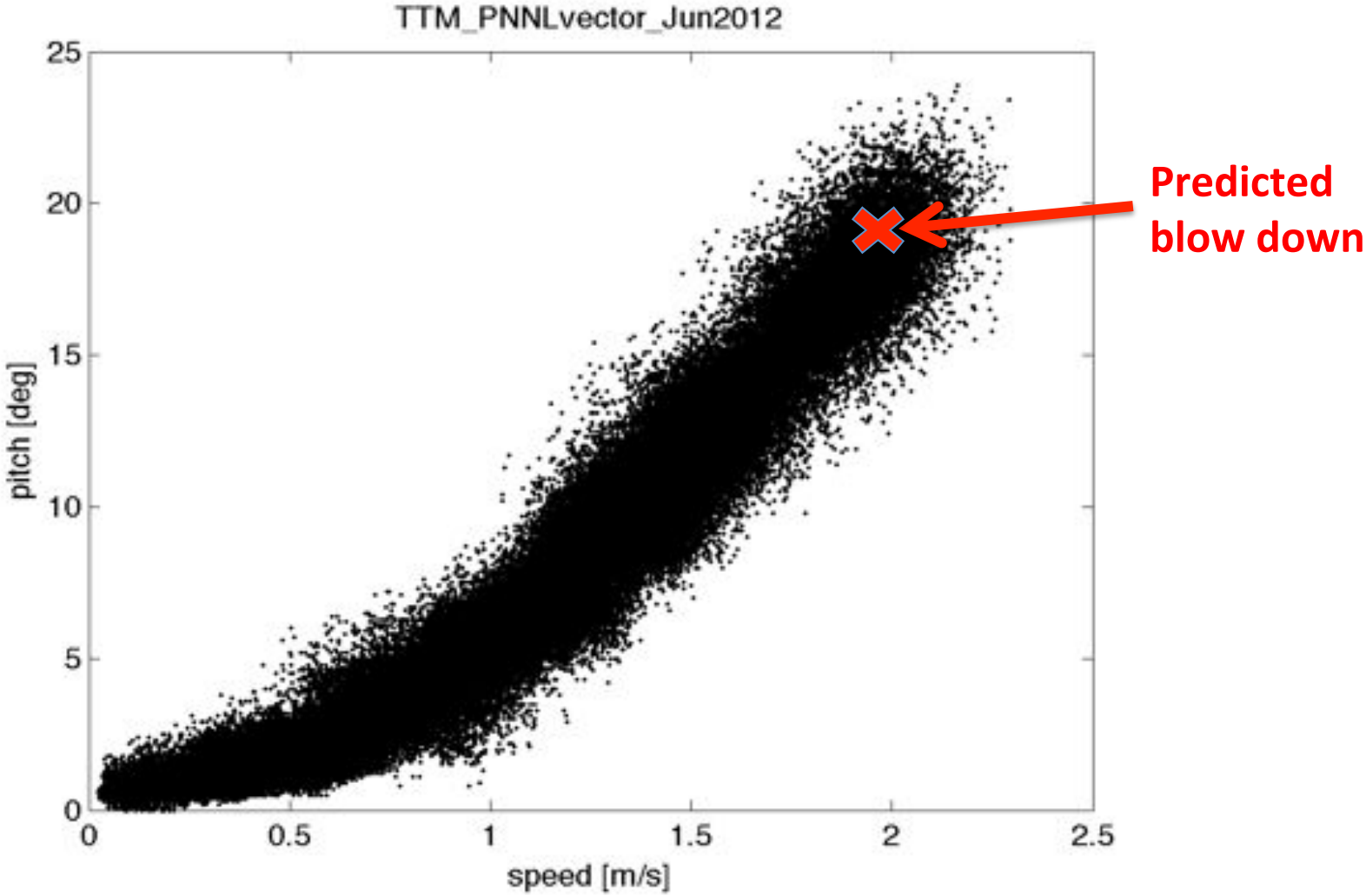
Mooring results (preliminary)



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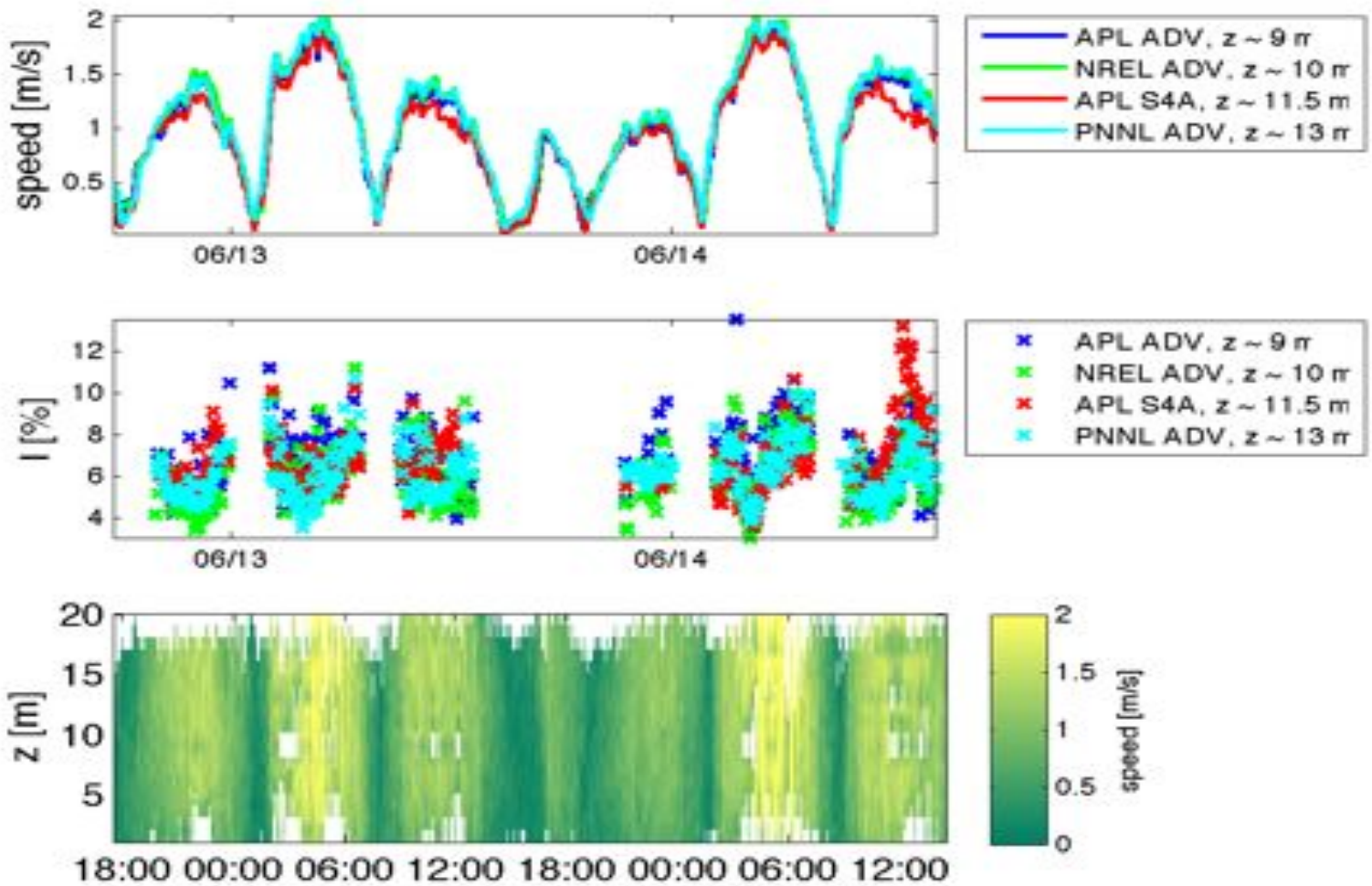

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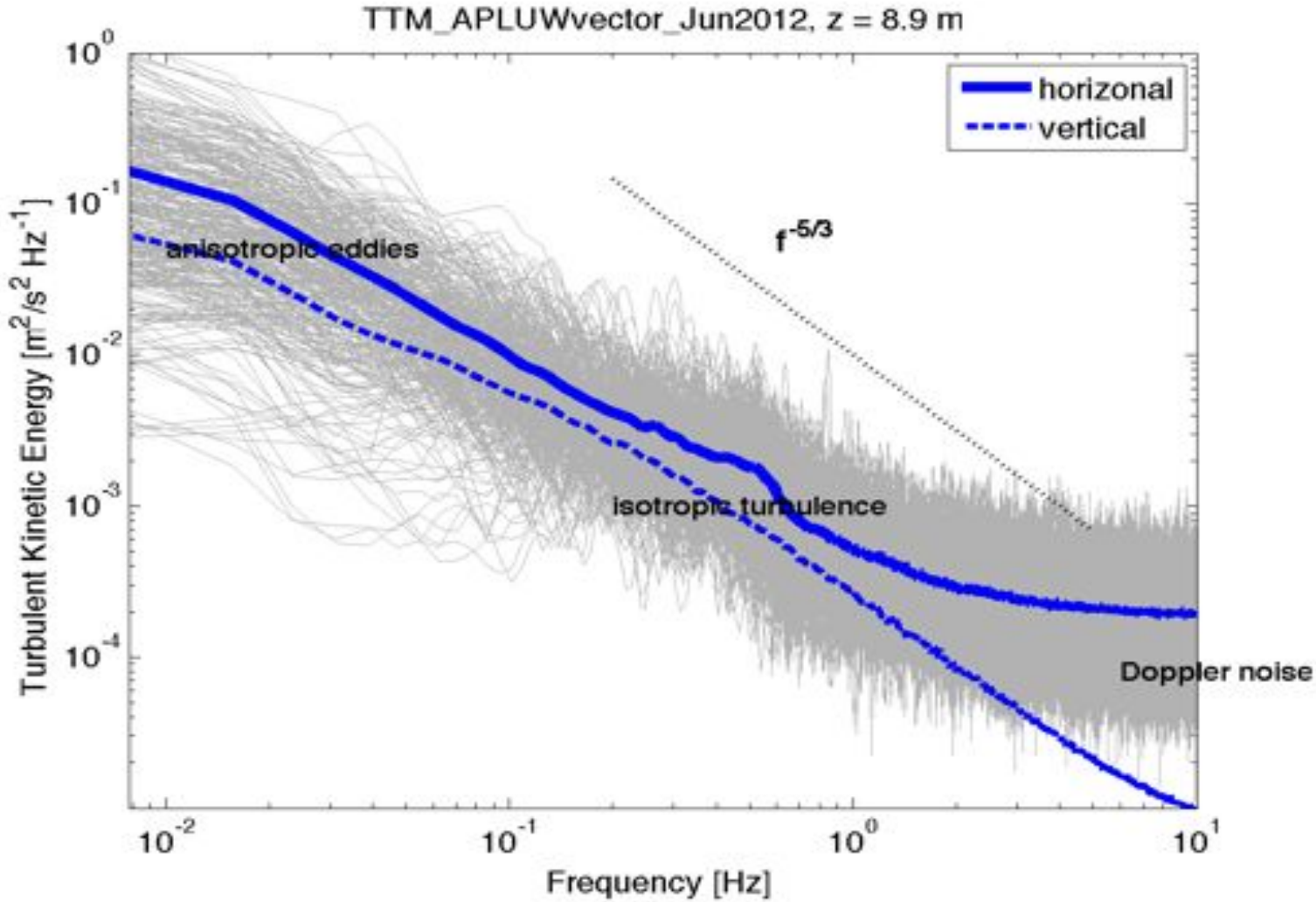

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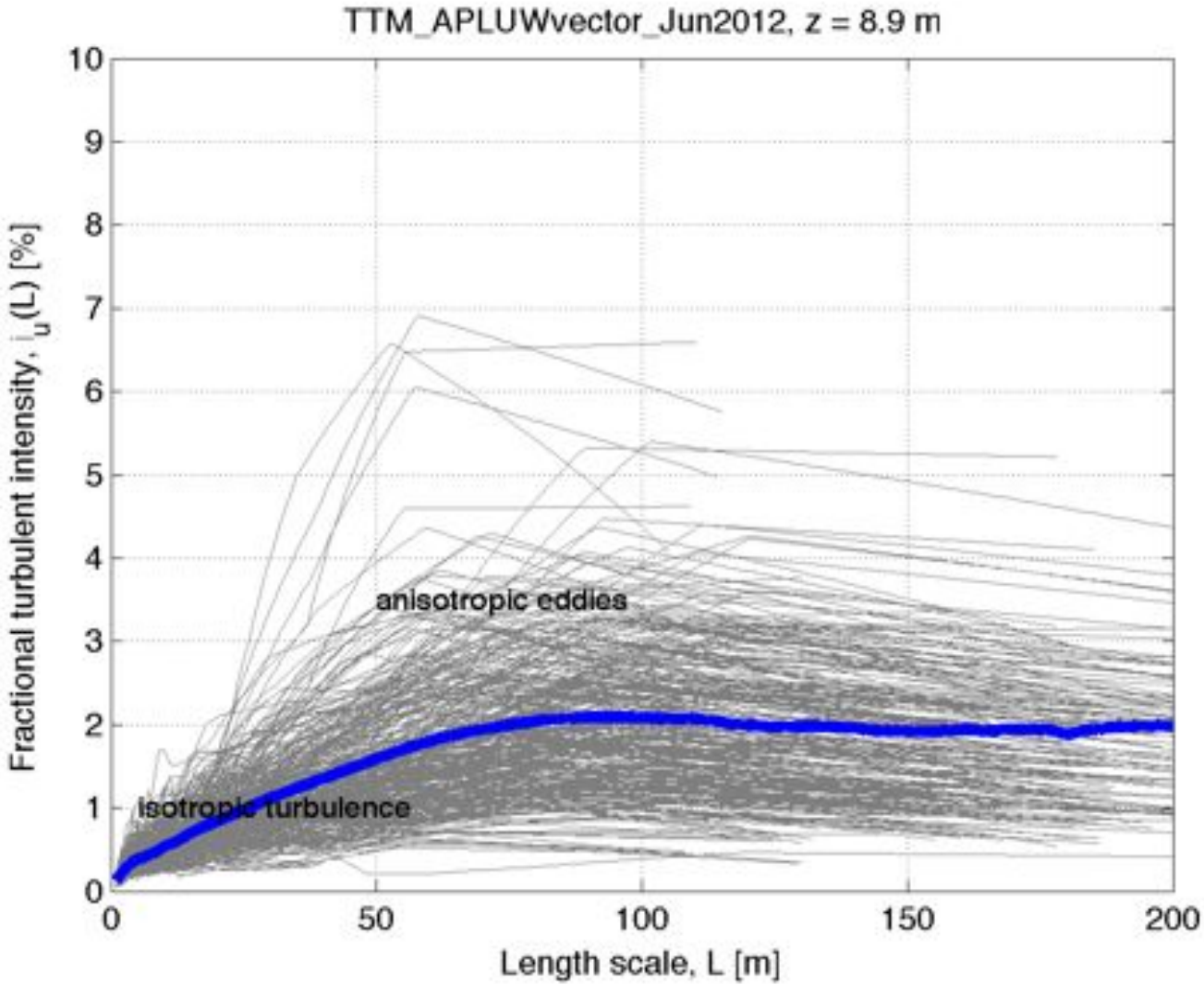
Mooring length scales (preliminary)



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Next steps

- Large scale bistatic Doppler ('uber' ADV)
- Wake measurements
- Coherence
- Frozen assumption (Taylor's hypothesis)
- **More sites!**

Arrays