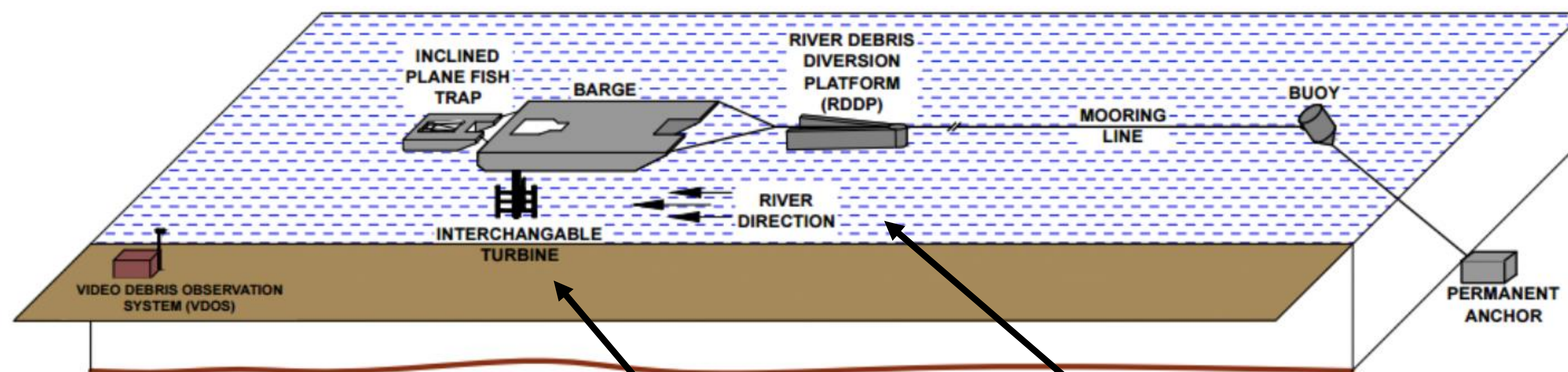
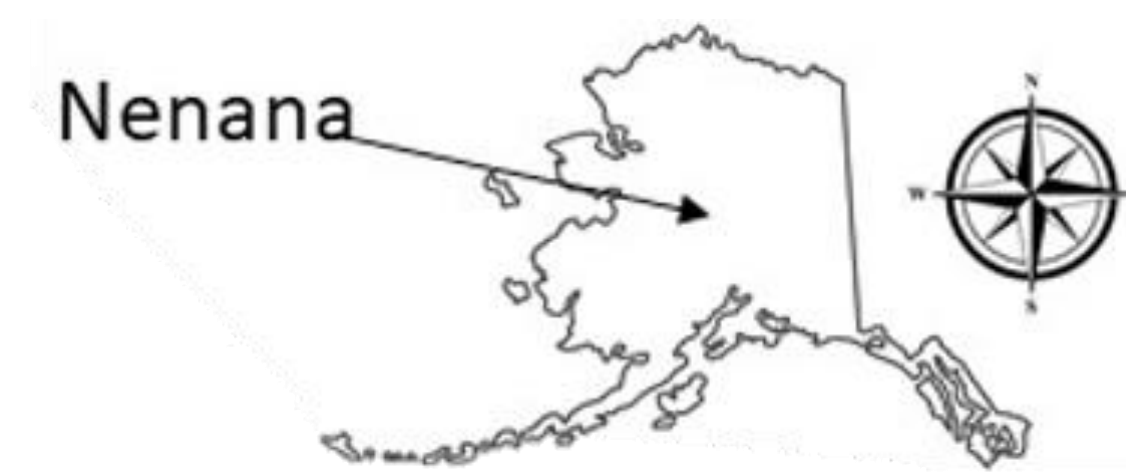


Introduction

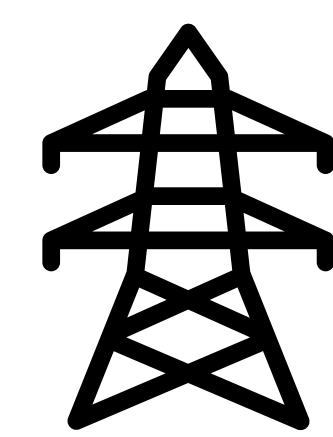
Many remote communities in Alaska have significant hydrokinetic resources. However, the remote locations make collecting large amounts of resource data challenging and costly. Through accurately up-sampling hourly ADCP data, we are seeking ways to faithfully reproduce annual energy estimates for velocity time series with high enough temporal resolution to be useful for grid-modeling tools.

Tanana River Test Site

Tanana River Test Site (TRTS): The TRTS is located in Nenana Alaska, 55 miles away from UAF. Data from this test site will be used to test the accurate prediction of power generated from a current energy converter (CEC) knowing the river velocity, generator efficiency and the moment of inertia of the CEC.



Electrical Power



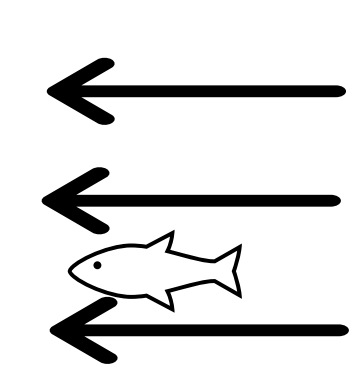
$P = IV$
I- current
V- voltage

Mechanical Power



$P = I\omega^2$
I- Moment of Inertia
 ω - angular velocity

Available power



$P = \frac{1}{2} \rho v^3 A$
 ρ - density
 v - water velocity
 A - Swept area of CEC

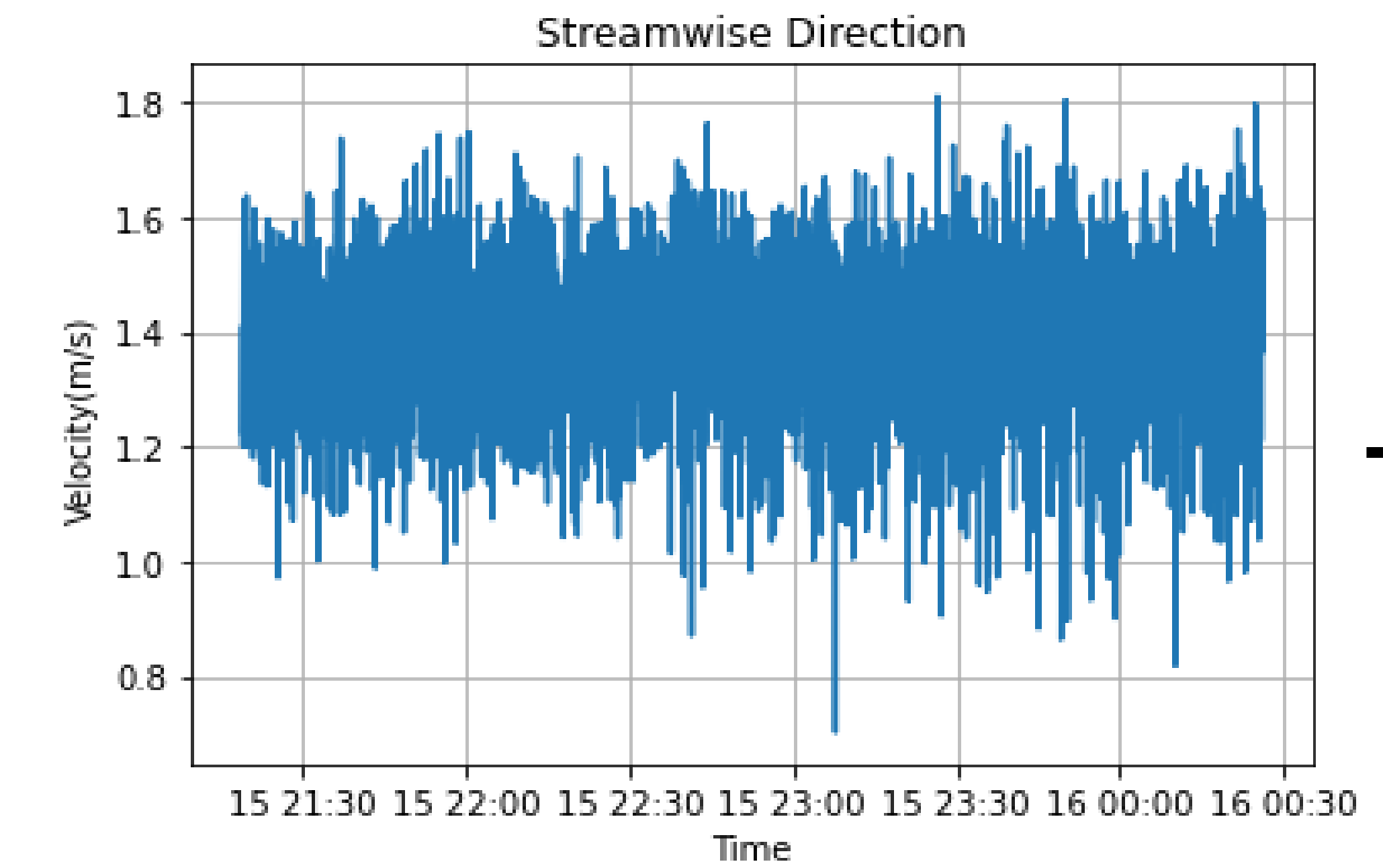
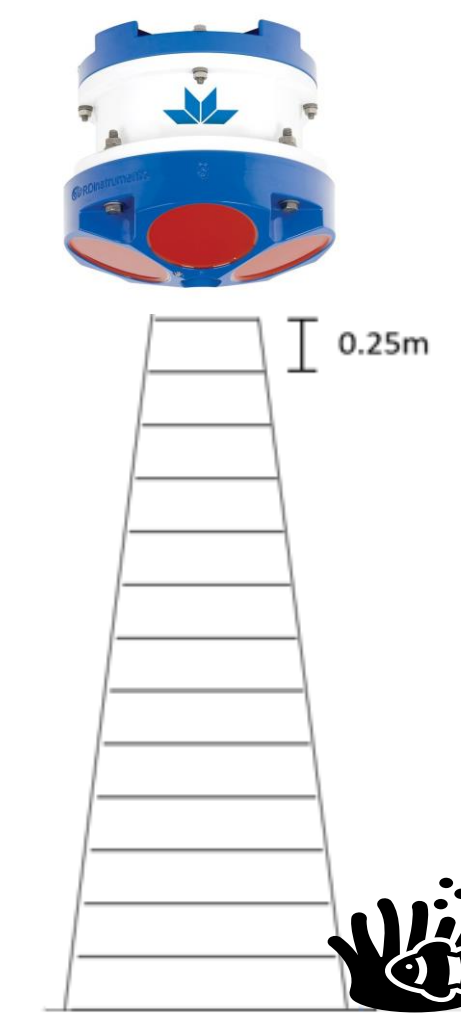
References

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- J. B. Johnson, H. Toniolo, A. C. Seitz, J. Schmid, P. Duvoyn, and A. Hydrokinetic, "Characterization of the Tanana River at Nenana, Alaska, to Determine the Important Factors Affecting Site Selection, Deployment, and Operation of Hydrokinetic Devices to Generate Power Prepared by," no. March, 2013.
- Contact: eabrowning@alaska.edu

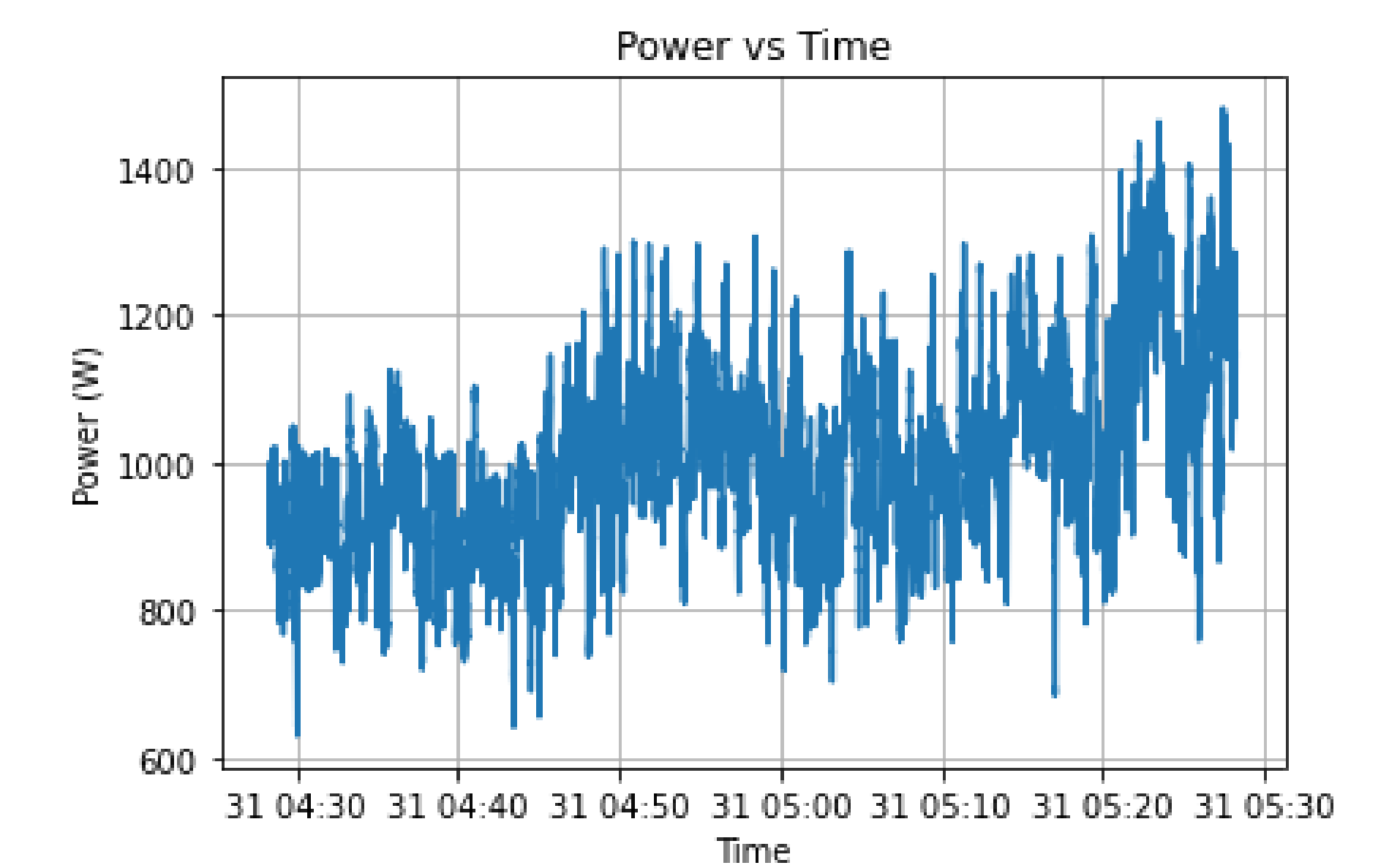
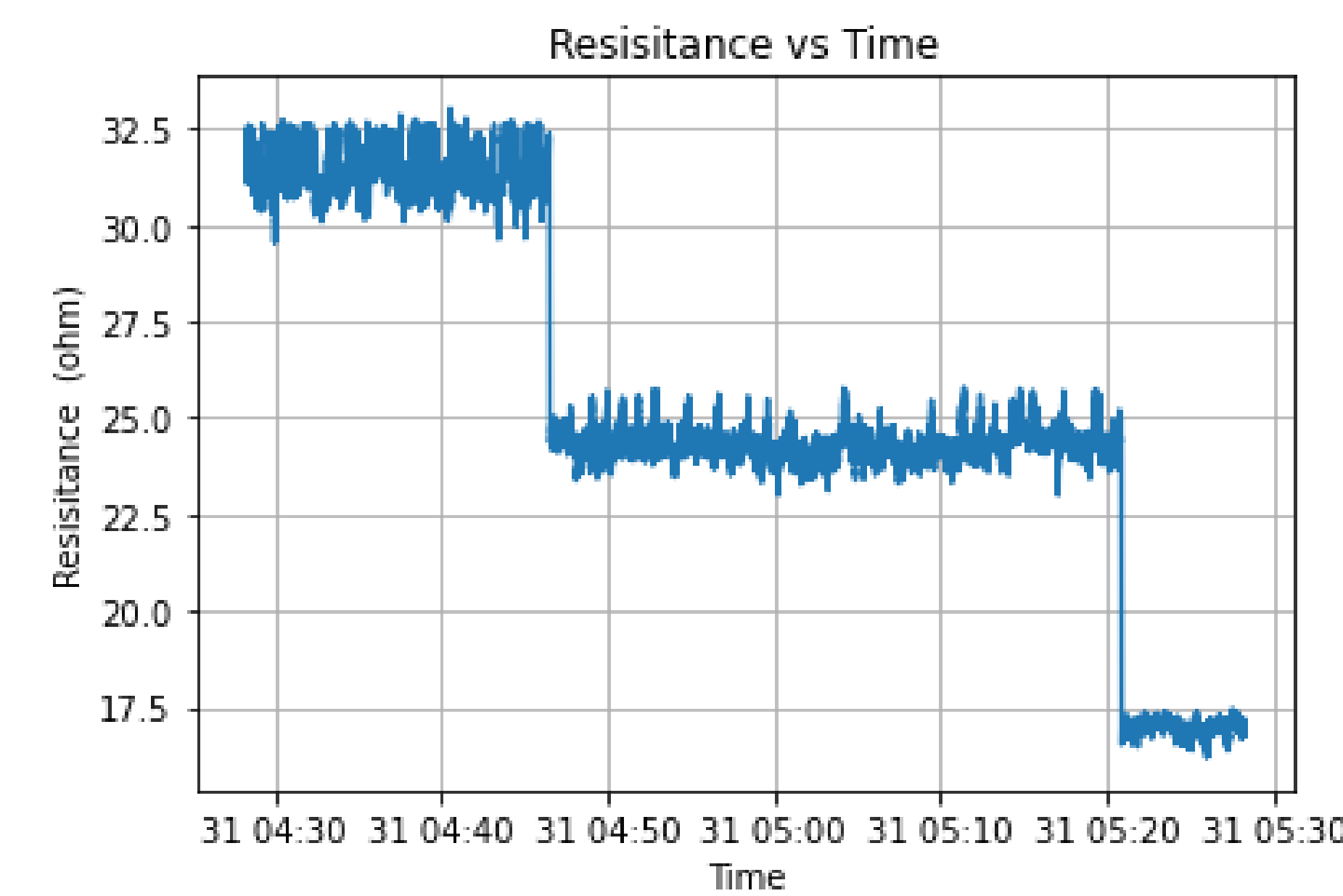
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Available Power

Acoustic Doppler Current Profiler (ADCP) Barge mounted at the TRTS:



Electrical Power



Correlations / Conclusions

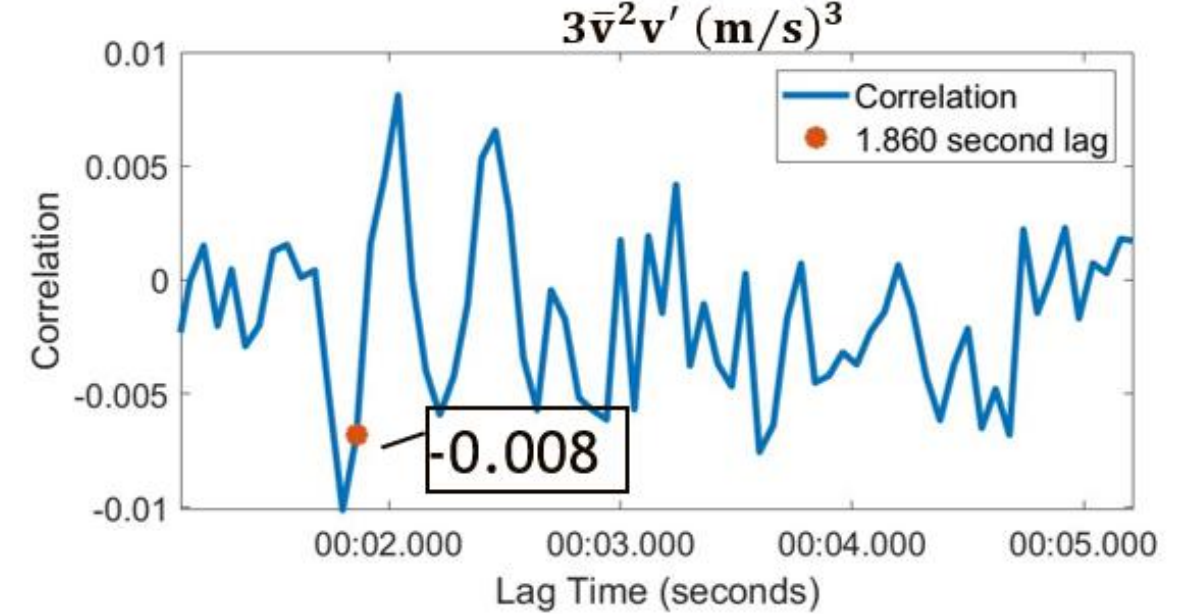
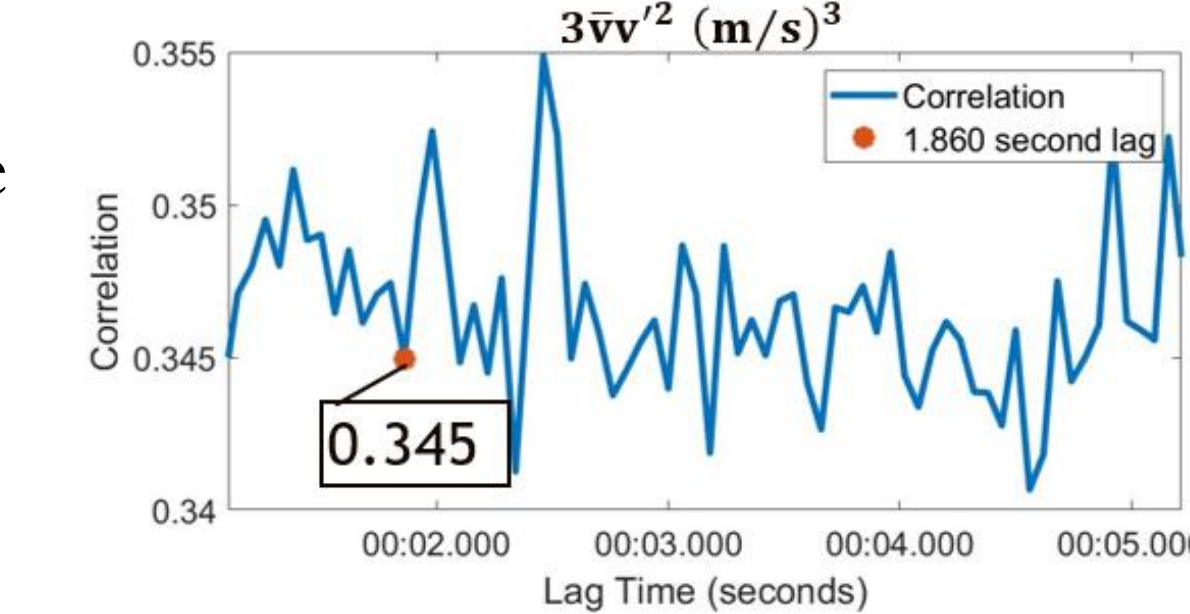
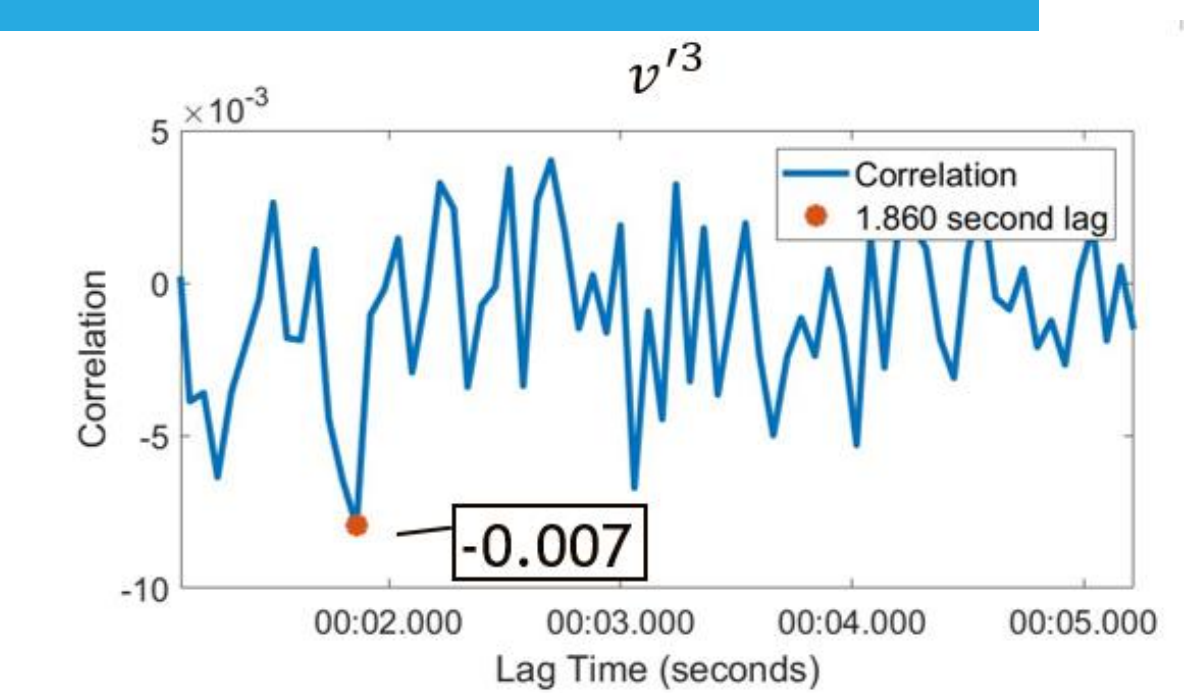
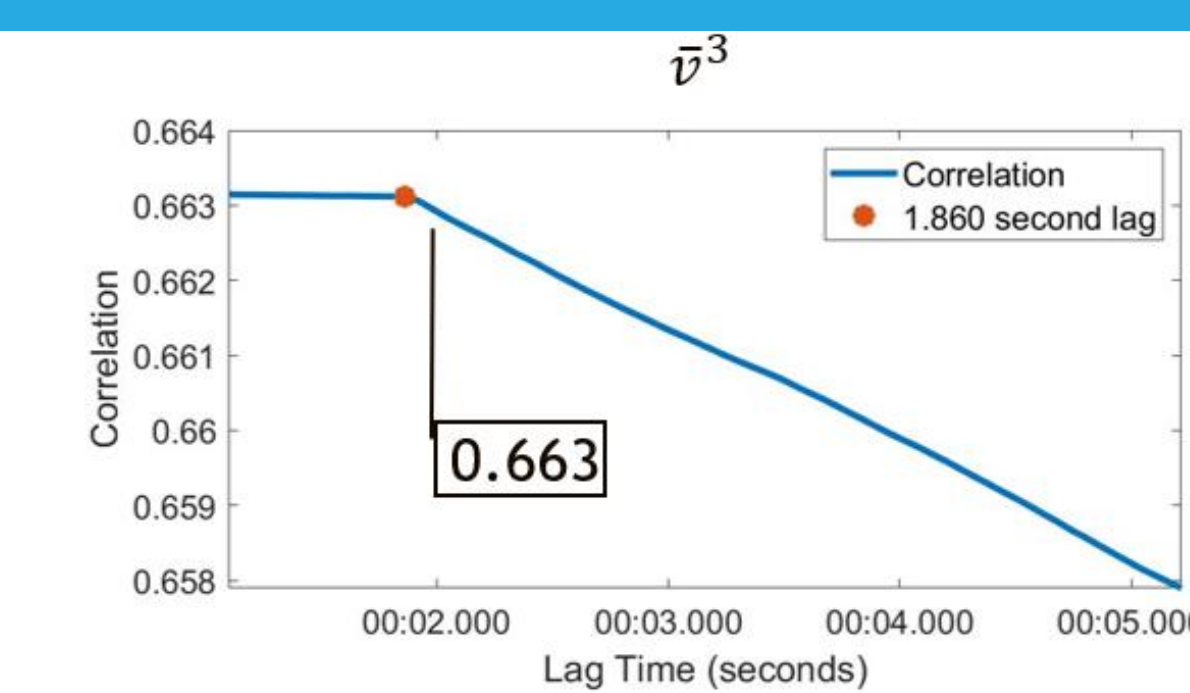
$$Power = \frac{1}{2} \rho (\bar{v}^3 + 3\bar{v}^2 v' + 3\bar{v} v'^2 + v'^3) A$$

Conclusion:

- Turbulence is not the main contributor to variance in electrical data.

Still to test:

- How is power generation related to inertia of the current energy converter?



Funding Sources

This work is supported by the U.S. Department of Energy Office of Science, Office of Energy Efficiency and Renewable Energy, Water Power Technology Office under the grant number #DE-EE0009445 and, #DE-EE0008389