

COMPREHENSIVE TURBULENCE MEASUREMENTS AT EARLY-MARKET U.S. TIDAL ENERGY SITES

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As the tidal energy sector begins to commercialize, there is increasing awareness of the need for accurate measurements of resource details. In particular, resource measurements that conform to International Electrotechnical Commission standards are needed to have confidence in power production estimates, and to obtain project financing. Additionally, accurate measurements of turbulence and waves are needed to accurately estimate fatigue loads and device lifetimes. With U.S. Department of Energy support, the National Renewable Energy Lab (NREL) has recently completed a methodology for identifying—and a preliminary ranking of—sites that are likely to see early deployments of tidal energy devices. Building on this work, NREL and the Pacific Northwest National Lab are performing detailed resource assessments at top-ranking sites. Here we present measurement data from the Western Passage of Maine, including turbulence measurements from the tidal turbulence mooring system. This system utilizes acoustic Doppler velocimeters mounted on a compliant mooring to measure the turbulent inflow; independent measurements of mooring motion are utilized to remove mooring motion from the measured velocity signal. Spectra of the motion-corrected velocity measurements are consistent with measurements from stationary platforms, which gives confidence to the approach. These publicly available measurements will be valuable to tidal energy project developers interested in the details of this site, device developers interested in estimating device fatigue lifetimes at similar sites, and for refining numerical model performance of tidal channels.

ACKNOWLEDGEMENTS

This work was funded by the U.S. Department of Energy, Office of Energy Efficiency & Renewable Energy, Water Power Technology Office under contract number DE-AC36-08G028308 to the National Renewable Energy Lab, and contract number DE-AC05-76RL01830 to Pacific Northwest National Laboratory.