

Abstract Submitted
for the TSS21 Meeting of
The American Physical Society

Measurement of Small-Scale Surface Velocity and Turbulent Kinetic Energy Dissipation Rates Using Infrared Imaging¹ SHELBY METOYER, MOHAMMAD BARZEGAR, DAREK BOGUCKI, Texas AM UniversityCorpus Christi, BRIAN HAUS, MINGMING SHAO, University of Miami — Short-range infrared (IR) observations of ocean surface reveal complicated spatially varying and evolving structures. Here we present an approach to use spatially correlated time series IR images, over a time scale of one-tenth of a second, of the water surface to derive underlying surface velocity and turbulence fields. The approach here was tested in a laboratory using grid-generated turbulence and a heater assembly. The technique was compared with in situ measurements to validate our IR-derived remote measurements. The IR-measured turbulent kinetic energy (TKE) dissipation rates were consistent with in situ-measured dissipation using a vertical microstructure profiler (VMP). We used measurements of the gradient of the velocity field to calculate TKE dissipation rates at the surface. Our future work seeks to expand the accuracy, resolution, and capability of such measurements by use of a deep convolutional neural network (DCNN). The DCNN will be trained with a direct numerical simulation (DNS) of the water surface and compared with our previous results.

¹This work was supported by the Gulf of Mexico Research Initiative grant and the National Science Foundation Grant 1434670.

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Date submitted: 19 Mar 2021

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