

Abstract Submitted
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Observations of the Urban Boundary Layer Using Autonomous Vehicles¹ JAMEY JACOB, VICTORIA NATALIE, JAMES BRENNER, KYLE HICKMAN, Oklahoma State University — As advanced aerial mobility (AAM) operations become a reality and navigate in both rural areas and cities, there is a better need to understand, observe, and report on the state of the Earth's Planetary Boundary Layer (PBL) and Urban Boundary Layer (UBL) required for safe navigation. Much of the current understanding of the PBL/UBL structures is limited to numerical predictions with limited scales and insufficient wind tunnel and ground/low altitude weather station validation, thus not providing substantiative information for of the high Re BL regime. Using sensors such as ultrasonic anemometers mounted to robotic aircraft more cohesive measurements are taken to provide improved observations in building wakes within the UBL. Comparisons are made with numerical models within an urban landscape. Through field experimentation optimized flight paths and measurement methods can be developed. These methods are valuable for creating a normalized PBL/UBL observations process that can improve wind and weather forecasting and improve climate models. In addition, experiments are conducted in the wakes of wind turbines to evaluate the impact of terrain on turbine in flow and the resulting, including wake interactions between wind turbine farms and associated surrounding structures.

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