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Evaluation of Low-Cost Multi-Hole Probes for Atmospheric Boundary Layer Investigation SOLMOZ AZARTASH-NAMIN, JAMEY JACOB, Oklahoma State University, CALEB CANTER, SEAN BAILEY, University of Kentucky, CLOUD-MAP TEAM — Low-cost multi-hole probes (MHPs) for atmospheric boundary layer (ABL) studies are investigated. Probes are designed using rapid prototyping methods through FDM, SLA, and other techniques for evaluation through calibration testing and comparison with probes manufactured through more traditional methods. Each probe is tested and validated to develop calibration curves and PIV is used to examine the flow field around the probe during both attached and separated conditions. Standard non-nulling calibration and data reduction methods were used showing performance characteristics of each probe. Impact of probe tip geometry and internal duct arrangements are examined. Multiple geometries, including hemispherical and pyramid, as well as multiple sizes are evaluated for both accuracy and sensitivity. Of the two primary geometric designs evaluated, the hemisphere 5HPs produced the most symmetric calibration curves with linearity between $\pm 25^{\circ}$. Further issues related to optimized probe designs, manufacturing quality consistency, and sensor development are discussed. A custom weather data sensor package has been developed for flight testing in ABL studies and preliminary results are presented. Supported in part by National Science Foundation award numbers 1351411 and 1539070.

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