Abstract Submitted
for the DFD20 Meeting of
The American Physical Society

Experimental Assessment of Multi-Rotor Downwash Interaction
JAMES BRENNER, KYLE HICKMAN, JAMEY JACOB, Oklahoma State University — As the usage of small multi-rotor unmanned aircraft systems (UAS) continues to grow there is a need to understand the complex flow and its interactions with the propellers and the UAS airframe. This is particularly important to understand the interactions of the inflow and downwash with sensors mounted on the structure, such as chemical, thermodynamic, or wind sensors where interactions may contaminate the measurements. This effort maps the in-flow around a multirotor using multiple techniques including PIV, flow visualization, and sonic anemometers. These experiments determine the effectiveness of sensors onboard multi-UAV for atmosphere measurements. The study includes a single rotor analysis to isolate the effects of a single rotor plan proceeded by investigation of double and quad rotor systems. The rotors are placed in an open-jet wind tunnel to allow for the flow visualization without boundary layer interference. The resulting data is compared to the inflight data and tower mounted sensors to validate the experimental results. *Supported by the NSF NRI 2.0 program under grant 1925147.

James Brenner
Oklahoma State University

Date submitted: 10 Aug 2020 Electronic form version 1.4