Abstract Submitted
for the DFD14 Meeting of
The American Physical Society

On the measurement of turbulence with unmanned aerial vehicles[1] BRANDON WITTE, MICHAEL THAMANN, SEAN BAILEY, University of Kentucky — We address the challenge of taking the novel approach of using highly instrumented and autonomous unmanned aerial vehicles (UAVs) to spatially interrogate the atmospheric boundary layer's turbulent flow structure over a wide range of length scales. This approach will introduce new capabilities not available in contemporary micro-meteorological measurement techniques: the ability to spatially sample the flow field over a wide range of spatial scales; a reduced reliance on assumptions regarding the temporal evolution of the turbulence; the ability to measure in a wide range of boundary conditions and distance from the earth's surface; the ability to gather many boundary layer thicknesses of data during brief periods of statistical quasi-stationarity; and the ability to acquire data where and when it is needed. We describe recent progress made in developing purpose-built airframes, integrating sensors into those airframes, and developing data analysis techniques to isolate the atmospheric turbulence from the measured velocity signal.

[1]This research is supported by NASA Kentucky Award NNX10AL96H and NSF Award CBET-1351411

Sean Bailey
University of Kentucky

Date submitted: 01 Aug 2014 Electronic form version 1.4