

Abstract Submitted  
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**A Comparison of Turbulence within and above a Mature Corn Canopy to that of a Model Canopy.**<sup>1</sup> W. ZHU, R. VAN HOUT, J. KATZ, L. LUZNIK, H.-S. KANG, C. MENEVEAU — The turbulent flow structure within and above a mature corn canopy and a wind tunnel model canopy were measured using PIV. The Taylor scale Reynolds numbers ranged from 2000 to 3000 in the field, and from 500 to 800 in the tunnel. Measurements were performed at elevations ranging between 0.7 to 2.2 canopy heights. The model mean velocity profile was matched with the field data using variable screens. However, there were significant differences in Reynolds stress at the canopy height. In the field data we combine spatial and time series to obtain spectra ranging six decades of wave numbers, with an inertial range spanning three orders of magnitude. Using dissipation estimates for scaling, the laboratory and field data collapse onto a single curve that agrees with sonic anemometer data in the field, and hot-wire data in the laboratory. Quadrant-Hole analysis was used to study the flow during ejection and sweep events. Conditionally sampled momentum flux, transverse vorticity magnitude and dissipation rate reveal that sweep events dominate below and around canopy height, while ejections take over well above the canopy. Close to the canopy, especially for field data, quadrant one events contribute significantly to the mean vorticity magnitude and dissipation rate.

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