Integrated airborne and field studies of productivity in UNL’s carbon sequestration plots


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1. Introduction
Our goal is to assess productivity and stress using a variety of methods, including airborne imaging spectrometry and fluorometry validated by both ground and canopy-level measurements.

2. Site and Methods
- The Carbon Sequestration Plots (CSP 1-3) are located south of Mead, NE and are part of the University of Nebraska’s Eastern Nebraska Research and Extension Center (ENREC).
- The no-till managed fields rotate between maize and soybean every two years and were monitored over the 2017 maize growing season.
- Airborne measurements were taken approximately every two weeks with an imaging fluorometer (AisaIBIS) and an imaging spectrometer (AisaKESTREL).
- Ground and canopy-level measurements included spectrometry (Ocean Optics and ASD), fluorometry (D-Flux), eddy covariance fluxes, green LAI, and gas exchange light curves (LI-COR).

3. Collaborative Field Work
Our research complements other established research programs at the very well-characterized Carbon Sequestration Plots in a collaborative effort to create an extensive, multi-scale dataset addressing productivity and stress.

4. Canopy-level Monitoring
CALMIT and other research groups work together to provide continuous canopy-level characterization of the plots through the growing season.

5. Airborne
CALMIT maintains a Piper Saratoga equipped with an AisaKESTREL spectrometer and an AisaIBIS fluorometer for high spatial and spectral resolution imaging of the fields.

6. Conclusions
- Measurements from each scale show similar trends in canopy development.
- CALMIT’s airborne research adds to established programs in the Carbon Sequestration Plots and provides spatially extensive time series data from irrigated and rainfed maize/soybean rotation fields.
- The good agreement between airborne and field-derived data is promising, and indicates a strong influence of green canopy structure on the optical signals.
- We are currently processing the airborne fluorescence data to evaluate the structural and physiological controls over the fluorescence signal.

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