README for Multi-temporal Airborne Hyperspectral Reflectance Data from the Nature Conservancy Long-term Prairie Restoration Site in Wood River, NE

Short name: AEHYPWRNE1M

Long name: Airborne Hyperspectral Reflectance, Wood River, Nebraska, Multi-Day 1 m V001

DOI: 10.5067/Community/Airborne/AEHYPWRNE1M.001

Data collection date: August 23, 2017, June 27, 2018, August 24, 2018, and October 16, 2018

Data collection place: Wood River, NE, USA

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Ecosystem type: Long-term restored prairie (experimental plots)

Funding source: NASA/NSF Dimensions of Biodiversity Program

Funding source grant number: DEB-1342872 to J. Cavender-Bares and DEB-1342823 to John A. Gamon.

Imaging spectrometer: AisaKESTREL (Specim, Oulu, Finland) pushbroom sensor

Collection:

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Center for Applications of Remote Sensing, Department of Geography, Oklahoma State University, Stillwater, OK 74078, USA

Department of Earth and Atmospheric Sciences, University of Alberta, Edmonton, AB T6G 2E3, Canada

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Nebraska Director of Science, The Nature Conservancy, Aurora, NE 68818, USA

Department of Ecology, Evolution and Behavior, University of Minnesota, Saint Paul, MN 55108, USA

Measurement quantity: Reflectance (canopy)

Descriptive metrics:

Coordinate system: UTM, zone 14N, WGS 84

Total volume: 2GB

File format(s) and number of files: 8 files: 4 *.dat files and 4 *.hdf files

Number of bands: 178

Wavelength range: 397 – 1004 nm

Processing level: radiometric correction, geometric correction, atmospheric correction

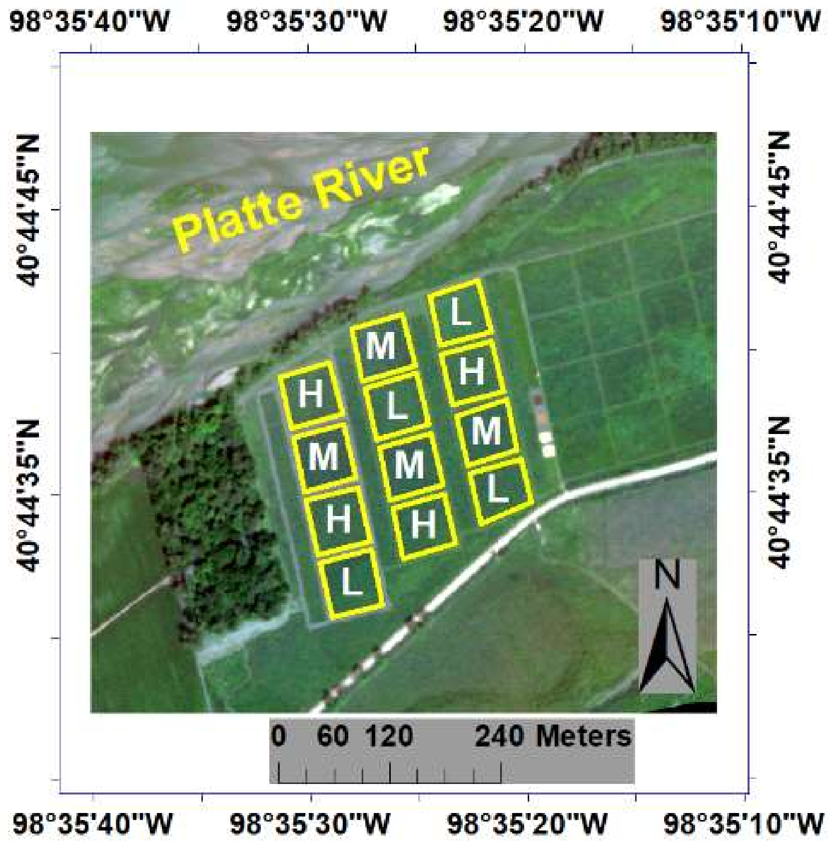
IMAGE INFORMATION

The project was conducted at a site near Wood River, Nebraska, and is part of a long-term prairie restoration and biodiversity study led by the Nature Conservancy. One paper has been published, and a book chapter is "in press." A manuscript that is "in review" is likely to be accepted once all remaining reviewer concerns are remedied. The only remaining issue to hold up publication would be data archiving; the journal (*Ecological Applications*) requires a DOI from a public archive prior to publication.

Monitoring biodiversity is a difficult task, traditionally requiring extensive field surveys, which are limited in their ability to sample over large regions. Given the gaps in our knowledge of global biodiversity and plant functional trait patterns, along with the field sampling challenges, efficient and effective methods for evaluating biodiversity over large areas are needed. Recently, there have been several calls for a "global biodiversity monitoring system." Remote sensing, when coupled with field-based information and socio-ecological data, can be considered as a tool for understanding different aspects of biodiversity within and across different ecosystems, potentially greatly extending our ability to assess biodiversity beyond that of a single plot or landscape.

A critical aspect of remote sensing of biodiversity that has been overlooked in many studies is the temporal dynamics of plant communities (or phenology). Although previous remote sensing studies have investigated related multi-temporal aspects of vegetation—including productivity, or the effects of seasonal change on distinguishing plant functional types and leaf traits—to our knowledge, very few studies have examined the capability of remote sensing to assess biodiversity over time or across seasons. Instead, studies involving remote sensing of biodiversity are typically limited to data captured at one point in time, often arbitrarily determined by the period of data availability. The lack of attention to multi-temporal effects in remote sensing of biodiversity is undoubtedly due to the challenge of repeated field sampling, and partly due to the central role of airborne sampling in current experimental studies of biodiversity, both of which can be very expensive and time consuming. Given annual and inter-annual variation in environmental factors (such as temperature and precipitation), changes in management practices (such as fire, grazing, and mowing), and successional change, understanding how remote detection of plant biodiversity varies through time is essential and long overdue.

The project collected multi-temporal airborne hyperspectral data and asked how our ability to detect grassland biodiversity using airborne remote sensing varies over time and if we can develop an operational sampling method to evaluate such temporal effects. Overall, this effort aligns well with our long-term goal of developing a regional biodiversity monitoring platform as part of a global monitoring system through integrating spatial, spectral, and temporal scales for assessing plant diversity.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Platte River
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