Welcome to OEB 203R. In this course we will discuss recent advances in the application of remote sensing measurement technologies in ecological research.

Weekly seminar: Wednesdays 3:00-5:45 pm EST (meeting links can be found under the Zoom tab on the course website)

January 27th Introduction: the changing nature of ecology

The recognition that the earthâ€™s ecosystems are changing at an unprecedented rates, magnitudes, and spatial extents due to human activities is leading to important shifts in the way that ecological research is being conducted. In this course we will examine how a variety of remote sensing technologies are being increasingly employed in different forms of ecological research.

February 3rd Topic 1: Fundamentals of Ecological Remote Sensing

Primary Readings:

Jensen_1983_biophysical_remote_sensing.pdf

Chambers_etal_2007_RS_of_tropical_forests.pdf

February 10th Topic 2: Biodiversity (vegetation composition, species richness)

Primary Readings:

Roberts_etal_1998.pdf

Carlson_etal_2007_Hyperspectral_RS_Canopy_biodiversity.pdf

February 17th Biodiversity cont.d (measuring plant functional traits))

Primary Readings:

Ustin_etal_2009_Foliar_information_from_ImagingSpectrometry copy.pdf

Asner_Martin_NewPhyt_2011.pdf

March 5th: Vegetation structure (canopy height, above-ground biomass, foliage profiles)

Primary Reading:

Davies_etal_2017.pdf

March 10th: Vegetation structure (canopy height, above-ground biomass, foliage profiles) cont.d

Primary Reading:

Drake_etal_2002_canopy structure and biomass in a neotropical rainforest.pdf

Optional Reading:

Goetz_Dubayah_2011_measuring and monitoring forest carbon stocks.pdf

March 22nd: Measuring Ecosystem Productivity from space

Damm_etal_2015_SIF_GPP_RSE.pdf

Background reading on chlorophyll fluorescence:

van der Tol_2009.pdf

April 2nd: Animal Ecology: assessing animal abundance from space

Primary Reading:

Hollings_etal_2018.pdf

Supplementary Reading: recent article on using satellite imagery and deep learning to census African elephants:

Duporge_etal_2021.pdf

April 7th: Animal Ecology: assessing animal abundance from space cont.d

Guirado_etal_2019.pdf

April 14th: Remote Sensing of Canopy Nitrogen Content

Main paper: Knyazikhin_etal_2012_rs_foliarN.pdf

Background: Ollinger_etal_2008.pdf (in particular, the "Canopy Remote Sensing" sub-section of the Methods).

Response to Knyazikhin et al: Townsend_etal_2013_Response_to_Knyazikhin.pdf

Reply by Knyazikhin et al: Knyazikhin_etal_2013_Reply_to_Townsend.pdf

Future Topics

Animal Movements

Habitat & Land-Cover Mapping

Vegetation Dynamics (canopy phenology, forest growth, mortality and disturbance)

Plant Water Stress

Ecosystem & Land Surface Temperatures