CABO CANOPY-LEVEL SPECTRA FROM FOREST SITES

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March 15th, 2024

GENERAL INFORMATION:

I. Citation:
Anna L. Crofts, Christine I.B. Wallis, Sabine St-Jean, Sabrina Demers-Thibeault, Deep Inamdar, J. Pablo Arroyo-Mora, Margaret Kalacska, Etienne Lalibert and Mark Vellend. CABO Canopy-Level Spectra from Forest Sites. Data set. Available online [http://ecosis.org] from the Ecological Spectral Information System (EcoSIS)

II. Description of dataset: This EcoSIS submission contains data used in the manuscript "Linking aerial hyperspectral data to canopy tree biodiversity: an examination of the spectral variation hypothesis" accepted for publication in Ecological Monographs. Methodology concerning spectral, field-based, and trait data collection and processing are detailed within the manuscript, as well as, within the EcoSIS metadata and within a published protocol (DOI: **10.17504/protocols.io.q26g7rn23vwz/v2**).

ACCESS INFORATION:

III. License: Creative Commons Attribution (cc-by)

DATA AND FILE OVERVIEW:

IV. File list:
1. CABO_forests_spectra_BD_metadata.csv
2. CABO_forests_spectra_BD_dataset.csv
3. CABO_forests_plot_metadata.csv
4. CABO_forests_plot_vegetation_dataset.csv
5. CABO_forests_plot_envr_dataset.csv
6. CABO_forests_species_mean_traits.csv

VARIABLE DESCRIPTION

CABO_forests_spectra_BD_metadata.csv	
spectra_BD_id	Unique identifier for each spectral point contained within the dataset (joins with CABO_forests_spectra_BD_dataset.csv)
site	The study site the spectral data was acquired (Categorical; 2 levels: Mont Mégantic = MtMeg-1 and Mont-St-Bruno = MSB-forest-crew)
plot_id	Unique numeric identifier for each plot (joins with CABO_forests_plot_metadata.csv, CABO_forests_plot_vegetation_dataset.csv, and CABO_forests_plot_envr_dataset.csv)
plot_field_id	Unique text identifier for each plot (joins with CABO_forests_plot_metadata.csv, CABO_forests_plot_vegetation_dataset.csv, and CABO_forests_plot_envr_dataset.csv)
instrument_model	Imaging spectrometer used to acquire spectral data (Categorical; 2 levels: CASI-1500 and SASI-640)
instrument_manufacturer	The company that manufactured the imaging specrometers used
instrument_type	The type of imaging spectrometer used to acquire the spectral data (Categorical; 2 levels: CASI-1500 = VNIR_pushbroom and SASI-640 = SWIR_pushbroom)
acquisition_method	The unit in which the spectral data was acquired, here all spectral data are at the pixel-level
sample_platform	The platform type on which the imaging spectrometers were mounted, here it is an aircraft
sample_platform_details	The sample_platform specifics, here it is a Twin Otter fixed-wing aircraft.
flightline	The flightline name associated with the spectral data (Categorical; 11 levels)
acquisition_date	The date the spectral data was acquired (DateTime; DD/MM/YYYY)
x	The projected latitude of the spectral data, unit is meters (m)
y	The projected longitude of the spectral data, unit is meters (m)

xy_projection_ESPG	The coordinate system (ESPG) used for the spectral data (i.e., 'x' and 'y').
spectra_measurement_quantity	The type of spectra data, here Continuum Removed Reflectance
spectra_measurement_ units	The units the spectral data is expressed as, here Band Depth
spectra_processing_ averaged	Describes whether the spectral data is averaged (Boolean; not averaged = NO, averaged = YES)
spectra_processing_ interpolated	Describes whether the spectral data was interpolated between channels (Boolean; not interpolated = NO, interpolated = YES)
spectra_processing_ resampled	Describes whether the spectral data is resampled (Boolean; not resampled = NO, resampled = YES)
spectra_processing_ information_details	Briefly describes how the spectral data was post-processed
theme	The context in which the spectral data was applied, here it is ecology
ecosystem_type	The type of ecosystem the spectral data was acquired over, here it is forest ecosystems
project	The title of the project that the spectral data was applied, here CABO_QC_Forests_SVH
organization	The name of the research organization which conducted the study, here CABO
author	The authors that created the dataset, here Crofts et al.
contact	The contact email for the maintainer of the dataset
associated_DOI	The doi of associated R scripts

CABO_forests_spectra_BD_dataset.csv

spectral_BD_id	Unique identifier for each spectral point contained within the dataset (joins with CABO_forests_spectra_BD_metadata.csv)
454.2	The band depth value at wavelength 454.2 nm

	(NA values represent wavelengths sampled by one but not sampled by the other imaging spectrometer; CASI-1500: 454.2 – 1059.08, SASI-640: 972.5 – 2412.5)
…	
2412.5	The band depth value at wavelength 2412.5 nm (NA values represent wavelengths sampled by one but not sampled by the other imaging spectrometer; CASI-1500: 454.2 – 1059.08, SASI-640: 972.5 – 2412.5)
CABO_forests_plot_metadata.csv	
site	See variable descriptions above (joins with CABO_forests_spectra_BD_metadata.csv, CABO_forests_plot_vegetation_dataset.csv, and CABO_forests_plot_envr_dataset.csv)
…	
plot_field_id	
plot_lat	The latitude of plot centers
plot_long	The longitude of plot centers
plot_horizontal_accuracy_m	The horizontal accuracy of plot locations, unit is meters (m)
plot_projection_ESPG	The coordinate system (ESPG) used for the plot locations (i.e., 'plot_lat' and 'plot_long')
plot_shape	The shape of plots, here it is circular
plot_radius	The radius of plots
vegetation_survey	Describes whether the vegetation within plots was surveyed (Boolean; not surveyed = NO, surveyed = YES)
vegetation_survey_date	The date that the vegetation survey was conducted (DateTime; YYYY-MM-DD)
vegetation_survey_quantify	The level of vegetation survey data, here it is Plot-level Relative Abundance as Viewed from Above

vegetation_survey_units	The units of the plot survey data, here it is percent (%)
tree_species_richness	The number of unique tree species observed (count)
trees_observed_n	The number of individual trees observed (count)
envr_predictors	The type of environmental predictor variables quantified, here it is Topographic Variables
envr_predictors_quantity	The level of environmental predictors, here it is Plot-level averages.
envr_predictors_information	The source of environmental predictor data, here it is Derived from DTM/TWI products
project	See variable descriptions above
…	
contact	
associated_DOI	The doi of associated protocol
associated_DOI_2	The doi of associated R scripts

CABO_forests_plot_vegetation_dataset.csv	
site	See variable descriptions above (joins with CABO_forests_spectra_BD_metadata.csv, CABO_forests_plot_metadata.csv, and CABO_forests_plot_envr_dataset.csv)
plot_id	
plot_field_id	
Abies.balsamea.. Linnaeus..Miller	The relative species abundance of *Abies balsamea*, unit is percent (%)
…	

Ulmus.rubra.Muhlenberg	The relative abundance of *Ulmus rubra*, unit is percent (%)

CABO_forests_plot_envr_dataset.csv	
site	See variable descriptions above (joins with CABO_forests_spectra_BD_metadata.csv, CABO_forests_plot_metadata.csv, and CABO_forests_plot_envr_dataset.csv)
plot_id	
plot_field_id	
elevation	The plot-level average elevation, unit is meters above sea level (m a.s.l.)
slope	The plot-level average slope, unit is in degrees (°)
roughness	The plot-level average surface roughness, unit is in meters (m)
northness	The plot-level average of the aspect expressed linearly as cos(aspect), where 1 is north and -1 is south
Eastness	The plot-level average of the aspect expressed linearly as sin(aspect), where 1 is east and -1 is west
TWI	The plot-level average of topographic wetness index, interpretation doesn't rely on its physical units (larger values = greater accumulation of water)

CABO_forests_species_mean_traits.csv	
scientific_name	The scientific name of species, 31 species observed (Joins with CABO_forests_plot_vegetation_dataset.csv)
trait_specific_leaf_ area_m2_kg	The species-average trait value of specific leaf area, unit is m^2kg^{-1}
trait_leaf_mass_ per_area_g_m2	The species-average trait value of leaf mass per area, unit is gm^{-2}
trait_leaf_dry_matter_ content_mg_g	The species-average trait value of leaf dry matter content, unit is mg g^{-1}
trait_actual_leaf_dry_ matter_content_perc	The species-average trait value of leaf dry matter content, unit is percent (%)

trait_leaf_water_content_mg_g	The species-average trait value of leaf water content, unit is mg g^{-1}
trait_leaf_relative_water_content_perc	The species-average trait value of leaf water content, unit is percent (%)
trait_equivalent_water_thickness_cm	The species-average trait value of leaf equivalent water thickness, unit is cm
count_samples_leaf	The number of individuals used to calculate species-average trait values for specific leaf area to equivalent water thickness (count)
trait_soluble_perc	The species-average trait value of foliar soluble cell component concentration, unit is percent (%)
trait_hemicellulose_perc	The species-average trait value of foliar hemicellulose concentration, unit is percent (%)
trait_cellulose_perc	The species-average trait value of foliar cellulose concentration, unit is percent (%)
trait_lignin_perc	The species-average trait value of foliar lignin concentration, unit is percent (%)
trait_recalcitrants_perc	The species-average trait value of foliar recalcitrant concentration, unit is percent (%)
trait_ndf_perc	The species-average trait value of neutral detergent fiber, unit is percent (%)
trait_adf_perc	The species-average trait value of acid detergent fiber, unit is percent (%)
trait_adl_perc	The species-average trait value of acid detergent lignin, unit is percent (%)
count_samples_CFRac	The number of individuals used to calculate species-average trait values for soluble cell components to acidic detergent fiber (count)
trait_chla_mg_g_disk_mass	The species-average trait value of chlorophyl a mass-based concentration, units are mg g^{-1}
trait_chlb_mg_g_disk_mass	The species-average trait value of chlorophyl b mass-based concentration, units are mg g^{-1}
trait_carot_mg_g_disk_mass	The species-average trait value of carotenoids mass-based concentration, units are mg g^{-1}

trait_chl_a_chl_b_ratio	The species-average trait value of the ratio of chlorophyl a to chlorophyl b
trait_chla_mg_m2_byLMA	The species-average trait value of chlorophyl a area-based concentration, units are mg m^{-2}
trait_chlb_mg_m2_byLMA	The species-average trait value of chlorophyl b area-based concentration, units are mg m^{-2}
count_samples_pig	The number of individuals used to calculate species-average trait values for mass-based chlorophyl a concentration to area-based chlorophyl b concentration (count)
trait_n_perc	The species-average trait value of leaf N concentration, unit is percent (%)
trait_c_perc	The species-average trait value of leaf C concentration, unit is percent (%)
count_samples_CN	The number of individuals used to calculate species-average trait values for leaf N concentration to leaf C concentration (count)