NGEE Arctic Leaf Spectral Reflectance and Transmittance, Barrow, Alaska, 2014-2016

Record_id: NGA032

Review and follow the current NGEE Data and Fair-Use Policies prior to using these data (http://ngee-arctic.ornl.gov/content/ngee-arctic-data-management-policies-and-plans).

Summary:

Measurements of full-spectrum (i.e. 350-2500nm) leaf spectral reflectance of Arctic plant species. Data were collected in Barrow, Alaska during the 2014-2016 period.

Please use this citation to reference the data.

Shawn Serbin, Wil Lieberman-Cribbin, Kim Ely, Alistair Rogers. 2019. NGEE Arctic Leaf Spectral Reflectance and Transmittance, Barrow, Alaska, 2014-2016. Next Generation Ecosystem Experiments Arctic Data Collection, Oak Ridge National Laboratory, U.S. Department of Energy, Oak Ridge, Tennessee, USA. Dataset accessed on [insert_date] at https://doi.org/10.5440/1437044.

Associated publication

Alistair Rogers, Shawn P. Serbin, Kim S. Ely, Stan D. Wullschleger. 2019. Terrestrial biosphere models may overestimate Arctic CO2 assimilation if they do not account for decreased quantum yield and convexity at low temperature. New Phytologist.. https://doi.org/10.1111/nph.15750

Associated datasets

Alistair Rogers, Kim Ely, Shawn Serbin, Stefanie Lasota, Wil Lieberman-Cribbin. 2017. Leaf Mass Area, Leaf Carbon and Nitrogen Content, Barrow, Alaska, 2012-2016. Next Generation Ecosystem Experiments Arctic Data Collection, Oak Ridge National Laboratory, U.S. Department of Energy, Oak Ridge, Tennessee, USA. https://doi.org/10.5440/1336812.

Alistair Rogers, Stefanie Lasota, Kim Ely, Shawn Serbin, Victoria Sloan, Ingrid Slette, Jennifer Liebig. 2018. Leaf Chlorophyll and Total Carotenoid Content, Barrow, Alaska, 2013-2015. Next Generation Ecosystem Experiments Arctic Data Collection, Oak Ridge National Laboratory, U.S. Department of Energy, Oak Ridge, Tennessee, USA. https://doi.org/10.5440/1429875.

Alistair Rogers, Kim Ely, Shawn Serbin. 2019. Leaf Photosynthetic Parameters: Quantum Yield, Convexity, Respiration, Gross CO2 Assimilation Rate and Raw Gas Exchange Data, Barrow, Alaska, 2016. Next Generation Ecosystem Experiments Arctic Data Collection, Oak Ridge

National Laboratory, U.S. Department of Energy, Oak Ridge, Tennessee, USA. https://doi.org/10.5440/1482338.

Alistair Rogers, Kim Ely, Shawn Serbin. 2017. Leaf Photosynthetic Parameters Vcmax and Jmax and Supporting Gas Exchange Data, Barrow, Alaska, 2012-2016. Next Generation Ecosystem Experiments Arctic Data Collection, Oak Ridge National Laboratory, U.S. Department of Energy, Oak Ridge, Tennessee, USA. https://doi.org/10.5440/1336809.

Data Characteristics

Point of contact for data	Shawn P. Serbin, sserbin@bnl.gov, +1 631-344-3165
Location	Barrow Environmental Observatory, Utqiagvik (Barrow), AK, USA
Latitude	71.275N
Longitude	156.641W
Altitude	5-10 m ASL
Missing data	-9999

Data Files

Data files

- NGEE-Arctic_Barrow_2014_HR1024i_Leaf_Spectral_Reflectance.csv
- NGEE-Arctic_Barrow_2014_HR1024i_Leaf_Spectral_Reflectance.xlsx
- NGEE-Arctic_Barrow_2015_HR1024i_Leaf_Spectral_Reflectance.csv
- NGEE-Arctic_Barrow_2015_HR1024i_Leaf_Spectral_Reflectance.xlsx
- NGEE-Arctic_Barrow_2015_HR1024i_Leaf_Spectral_Transmittance.csv
- NGEE-Arctic_Barrow_2015_HR1024i_Leaf_Spectral_Transmittance.xlsx
- NGEE-Arctic_Barrow_2016_HR1024i_Leaf_Spectral_Reflectance.csv
- NGEE-Arctic_Barrow_2016_HR1024i_Leaf_Spectral_Reflectance.xlsx

Calibration data for the Spectralon Reflectance Standard used

- 99AA10-0614-0826 SRS-99-020.txt

The following zip files contain raw data and some processing by-products

- raw_NGEE-Arctic_2014_Barrow_Leaf_Spectra.zip
- raw_NGEE-Arctic_2015_Barrow_Leaf_Biochemistry_Spectra.zip
- raw_NGEE-Arctic_2015_Barrow_Leaf_Chlorophyll_Spectra.zip
- raw_NGEE-Arctic_2015_Barrow_Leaf_GasExchange_Spectra.zip
- raw_NGEE-Arctic_2016_Barrow_Leaf_Gas_Exchange_Spectra.zip

Documentation files

User guidance document
nga_032_user_guide_barrow_spectral_reflectance.pdf

Documentation is included in 'data description' tab of Excel data file, and references within.

Data Dictionary

Representative Example Data File:

column_name	units/format	Description
Site		Barrow, Alaska
Sample_Date	yyyy-mm-dd	Date data were collected
Spectra_Name		Spectra file name
BNL_Barcode		Sample barcode with BNL prefix
Sample_Barcode		Sample tracking barcode. Use this to link with associated datasets (e.g. leaf chemistry, gas exchange)
USDA_Species_Code		USDA plant species code. http://plants.usda.gov/java/
Instrument		Manufacturer and model of spectroradiometer used
Foreoptic		Radiometerically calibrated fiber optic (when applicable) and foreoptic used (where applicable). LC_RP_Pro = Prototype updated SVC leaf clip / reflectance probe
Collection_Units	W/m2/nm/sr	Raw_DN (digital number) OR Radiance (W/m2/nm/sr)
Spectra_Units	percent	The percent reflectance of the sample from 0 to 100%
Spectra_Type		Leaf, canopy, integrating sphere
Reflectance_Type or Transmittance_type		Relative OR Absolute. Relative = ratio of sample to white reference, Absolute = the same as relative but corrected for the white reference radiance at each wavelength
White_Reference_Standard		Serial number of Labsphere reflectance standard used
Spectral_Resolution	nanometers	Spectral resolution in nanometers

column_name	units/format	Description
Interpolation_Method		Linear = linear interpolation from 1024 channles to 1nm wavelengths. Spline = spline interpolation from 1024 channles to 1nm wavelengths
Overlap_Handling		Removed = removed detector overlap region.
Overlap_Removal		When removal occurred. During_Collection = when sample was measured. Post_Processing = Removed during post processing step
Overlap_Matching_Type		Reflectance = matched between detectors based on reflectance data. Radiance = matched between detectors based on sample radiance data
Wave_350 to Wave_2500	percent	Percent reflectance value (0-100) for each interpolated wavelength

Example Data Record:

NGEE-Arctic_Barrow_2016_HR1024i_Leaf_Spectral_Reflectance.xlsx

Note: not all wavelengths shown in example.

Site	Sample_Date	Spectra_Name	BNL_Barcode	Sample_Barcode					
	USDA_Species_Code	Instrument	Foreoptic	Collection_Units					
	Spectra_Units	Spectra_Type	Reflectance_Type	White_Reference_Standard					
	Spectral_Resolution	Interpolation_Method	Overlap_Handling	Overlap_Removal					
	Overlap_Matching_Type	Wave_350	Wave_351	Wave_352	Wave_353				
	Wave_354	Wave_355	Wave_356	Wave_357	Wave_358	Wave_359			
	Wave_360	Wave_361	Wave_362	Wave_363	Wave_364				
Barrow (Utqiaġvik) Environmental Observatory			20160709	BNL1818	BNL1818				
	1818	ERAN6	SVC_HR-1024i	Fiber_1_LC_RP_Pro	Radiance				
	Percent_Reflectance_0_100	Leaf	Absolute	99AA10-0614-0827	SRS-99-020				
	1nm	Linear	Removed	Post_processing	Radiance	4.543333333	4.08		
	3.53	2.373333333	0.61	2.470714286	3.347	3.433	2.313	1.901	
	1.893571429	1.279285714	1.909333333	2.812666667	2.676				

Data Acquisition Materials and Methods

Analytical Tool

R and the R-FieldSpectra processing code (https://github.com/serbinsh/R-FieldSpectra). Additional R processing scripts

Instrumentation	SVC HR-1024i Spectroradiometer, w/ SVC reflectance probe
Data collection	As described in Serbin et al., 2019
Data analysis	As described in Serbin et al., 2019

References

Serbin et al, 2019

Data Center Contact:

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Data Access: