



[DAAC Home](#) > [Get Data](#) > [Field Campaigns](#) > [Boreal Ecosystem-Atmosphere Study \(BOREAS\)](#) > [User guide](#)

# BOREAS RSS-19 1994 SEASONAL UNDERSTORY REFLECTANCE DATA

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### Summary:

One objective of BOREAS is to further the understanding of the spectral bi-directional reflectance of typical boreal ecosystem stands in the visible/near-infrared regime. An essential input for any canopy BRDF model is an accurate estimate of the average understory reflectance, both for sunlit and shaded conditions. These variables can be expected to vary seasonally because of species-dependent differences in the phenological cycle of foliar display. In response to these requirements, the average understory reflectance for the flux tower sites of both the NSA (Thompson, Manitoba) and the SSA (Candle Lake, Saskatchewan) Study Areas (NSA and SSA) was observed throughout the year 1994 during five field campaigns. This was done by measuring the nadir reflectance (400 to 850 nm) of sunlit and shaded understory (vegetation and snow cover) along a surveyed LAI transect line (Chen, RSS-07) at each site near solar noon and documenting a average site reflectance. Comparisons between sites reveal differences in the green and infrared regions of the spectra, because of the differing species in the understory for each site. Temporal (seasonal) variation for each site was also observed, indicating the changing flora mixtures and changing spectral signatures as the understory matures during the growing season.

A guide document which includes more information about this data set can be found at [http://daac.ornl.gov/daacdata/boreas/RSS/und\\_refl/comp/RSS19\\_Undstry\\_refl.txt](http://daac.ornl.gov/daacdata/boreas/RSS/und_refl/comp/RSS19_Undstry_refl.txt).

ORNL DAAC maintains information on the entire [BOREAS Project](#).

### Data Citation

Cite this data set as follows:

Miller, J., D. R. Peddle, and J. Freemantle. 1998. BOREAS RSS-19 1994 Seasonal Understory Reflectance Data. Data set. Available on-line [<http://www.daac.ornl.gov>] from Oak Ridge National Laboratory Distributed Active Archive Center, Oak Ridge National Laboratory, Oak Ridge, Tennessee, U.S.A. doi:10.3334/ORNLDAAC/304.

### References:

Chen, J. and J. Cihlar. 1994. Canadian Centre for Remote Sensing, Private Communication.

Chen, J.M., P.M. Rich, S.T. Gower, J.M. Norman, and S.Plummer. 1997. Leaf Area Index of Boreal Forests: Theory, techniques, and measurements. *Journal of Geophysical Research*, BOREAS Special Issue, 102, 29429-29443.

Miller, J.R., H.P. White, J.M. Chen, D.R. Peddle, G. McDermid, R.A. Fournier, P. Shepherd, I. Rubinstein, J. Freemantle, R. Soffer, and E. LeDrew. 1997. Seasonal Change in Understory Reflectance of Boreal Forests and Influence on Canopy Vegetation Indices, *Journal of Geophysical Research*, BOREAS Special Issue, 102.

Milton, E.J. 1989. On the suitability of Kodak neutral test cards as reflectance standards. *International Journal of Remote Sensing*, Vol. 10.

Observer's Handbook 1994. Editor: Roy I. Bishop, The Royal Astronomical Society of Canada.

Peddle, D.R., H.P. White, R.J. Soffer, J.R. Miller, and E.F. LeDrew. 1995. Reflectance Processing of Field Spectrometer Data in BOREAS. *Proceedings: 17th Canadian Symposium on Remote Sensing*, pp. 189-194, Saskatoon, Sask..

Sellers, P. and F. Hall. 1994. Boreal Ecosystem-Atmosphere Study: Experiment Plan. Version 1994-3.0, NASA BOREAS Report (EXPLAN 94).

Sellers, P. and F. Hall. 1996. Boreal Ecosystem-Atmosphere Study: Experiment Plan. Version 1996-2.0, NASA BOREAS Report (EXPLAN 96).

Sellers, P., F. Hall and K.F. Huemmrich. 1996. Boreal Ecosystem- Atmosphere Study: 1994 Operations. NASA BOREAS Report (OPS DOC 94).

Sellers, P., F. Hall and K.F. Huemmrich. 1997. Boreal Ecosystem- Atmosphere Study: 1996 Operations. NASA BOREAS Report (OPS DOC 96).

Sellers, P., F. Hall, H. Margolis, B. Kelly, D. Baldocchi, G. den Hartog, J. Cihlar, M.G. Ryan, B. Goodison, P. Crill, K.J. Ranson, D. Lettenmaier, and D.E. Wickland. 1995. The boreal ecosystem-atmosphere study (BOREAS): an overview and early results from the 1994 field year. Bulletin of the American Meteorological Society. 76(9):1549-1577.

Sellers, P. and F. Hall. 1997. BOREAS Overview Paper. JGR Special Issue.

Soffer, R.J., J.W. Harron, J.R. Miller. 1995. Characterization of Kodak Grey Cards as Reflectance Reference Panels in Support of BOREAS Field Activities. Proceedings: 17th Canadian Symposium on Remote Sensing, pp. 357-362, Saskatoon, Sask.

White, H.P., J.R. Miller, J. Chen, D.R. Peddle. 1995. Seasonal Change in Mean Understory Reflectance for BOREAS Sites: Preliminary Results., Proceedings: 17th Canadian Symposium on Remote Sensing, pp. 182-187, Saskatoon, Sask.

## Data Format:

For information on Parameter/Variable Names, Variable Description/Definition, Units of Measurement, and Data File Format see this companion file [http://daac.ornl.gov/daacdata/boreas/RSS/und\\_refl/comp/und\\_refl.def](http://daac.ornl.gov/daacdata/boreas/RSS/und_refl/comp/und_refl.def)

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### Document Curator:

[uso@www.daac.ornl.gov](mailto:uso@www.daac.ornl.gov)

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[Search for Data](#)  
[Field Campaigns](#)  
[Land Validation](#)  
[Regional/Global](#)  
[Model Archive](#)

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[Data Scope and Acceptance](#)  
[Data Authorship Policy](#)  
[Data Publication Timeline](#)  
[Detailed Submission Guidelines](#)

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[Best Practices](#)  
[Data Management Plan](#)  
[How-to's](#)

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[MODIS](#)  
[THREDDS](#)  
[SDAT](#)  
[Daymet](#)  
[CARVE Data Viewer](#)  
[Soil Moisture Visualizer](#)  
[Land - Water Checker](#)

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