



BOREAS RSS-03 Imagery and Snapshots from a Helicopter-Mounted Video Camera

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Documentation Revision Date: 2017-09-13

Data Set Version: 2

Summary

This data set provides images of boreal forests in central Canada collected over numerous tower and auxiliary sites during the BOREAS Intensive Field Campaigns (IFCs) in the Northern (NSA) and Southern Study Areas (SSA). The images were acquired by helicopter with VHS video cameras during the green-up, peak, and senescent stages of the growing season from May-September of 1994. These snapshots were generated from VHS imagery and converted to .jpg format.

There are 163 images in .jpg format with this data set.



Figure 1. Image of an Aspen auxiliary site in the BOREAS Southern Study Area (SSA). The image was taken September 9th, 1994.

Citation

Walthall, C.L., and S. Loechel. 2017. BOREAS RSS-03 Imagery and Snapshots from a Helicopter-Mounted Video Camera. ORNL DAAC, Oak Ridge, Tennessee, USA. <https://doi.org/10.3334/ORNLDAAC/289>

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1. Data Set Overview

This data set provides images of boreal forests in central Canada collected over numerous tower and auxiliary sites during the BOREAS campaign in the Northern (NSA) and Southern Study Areas (SSA). The images were acquired in all three Intensive Field Campaigns (IFCs) during the green-up, peak, and senescent stages of the growing season from May-September of 1994.

The BOREAS Remote Sensing Science (RSS)-RSS-03 team collected the images with two VHS video cameras mounted on a helicopter platform, and video single-frame "snapshots" were processed to the still images.

Project: Boreas

The Boreal Ecosystem-Atmosphere Study was a large-scale international interdisciplinary experiment in the boreal forests of central Canada. Its focus was improving our understanding of the exchanges of radiative energy, sensible heat, water, CO₂ and trace gases between the boreal forest and the lower atmosphere. A primary objective of BOREAS was to collect the data needed to improve computer simulation models of the important processes controlling these exchanges so that scientists can anticipate the effects of global change, principally altered temperature and precipitation patterns, on the biome.

Related data sets

Deering, D.W., and T.F. Eck. 1999. BOREAS RSS-01 PARABOLA SSA Surface Reflectance and Transmittance Data. ORNL DAAC, Oak Ridge, Tennessee, USA. <http://dx.doi.org/10.3334/ORNLDAAC/286>

Irons, J.R., and P.W. Dabney. 2000. BOREAS RSS-02 Level-1b ASAS Image Data: At-sensor Radiance in BSQ Format. ORNL DAAC, Oak Ridge, Tennessee, USA. <http://dx.doi.org/10.3334/ORNLDAAC/562>

Walthall, C.L., and S. Loechel. 1998. BOREAS RSS-03 Reflectance Measured from a Helicopter-Mounted SE-590. ORNL DAAC, Oak Ridge, Tennessee, USA. <http://dx.doi.org/10.3334/ORNLDAAC/291>

Walthall, C.L., and S. Loechel. 1998. BOREAS RSS-03 Reflections Measured from a Helicopter-Mounted Barnes MMR. ORNL DAAC, Oak Ridge, Tennessee, USA. <http://dx.doi.org/10.3334/ORNLDAAC/290>

Walthall, C.L., and S. Loechel. 1999. BOREAS RSS-03 Atmospheric Conditions from a Helicopter-Mounted Sunphotometer. ORNL DAAC, Oak Ridge, Tennessee, USA. <http://dx.doi.org/10.3334/ORNLDAAC/288>

Miller, J., D.R. Peddle, and J. Freemantle. 1998. BOREAS RSS-19 1994 Seasonal Understory Reflectance Data. ORNL DAAC, Oak Ridge, Tennessee, USA. <http://dx.doi.org/10.3334/ORNLDAAC/304>

Leroy, M. and F.-M. Breon. 1999. BOREAS RSS-20 POLDER Helicopter-Mounted Measurements of Surface BRDF. ORNL DAAC, Oak Ridge, Tennessee, USA. <http://dx.doi.org/10.3334/ORNLDAAC/306>

Related publications

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

Sellers, P., F. Hall, and K.F. Huemmrich. 1996. Boreal Ecosystem-Atmosphere Study: 1994 Operations. NASA BOREAS Report (OPS DOC 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. 1997. Boreal Ecosystem-Atmosphere Study: 1996 Operations. NASA BOREAS Report (OPS DOC 96).

Sellers, P. J., F. G. Hall, R. D. Kelly, A. Black, D. Baldocchi, J. Berry, M. Ryan, K. J. Ranson, P. M. Crill, D. P. Lettenmaier, H. Margolis, J. Cihlar, J. Newcomer, D. Fitzjarrald, P. G. Jarvis, S. T. Gower, D. Halliwell, D. Williams, B. Goodison, D. E. Wickland, and F. E. Guertin. 1997. BOREAS in 1997: Experiment Overview, Scientific Results and Future Directions. *Journal of Geophysical Research* 102 (D24): 28,731-28,770.

2. Data Characteristics

Spatial Coverage: Central Canada, in the BOREAS Northern (NSA) and Southern Study Areas (SSA). The NSA is west of Thompson, Manitoba. The SSA is north of Prince Albert, Saskatchewan.

Spatial Resolution: The spatial resolution for the imagery was somewhat variable based on the altitude of the helicopter, tree height, and ground cover. Helicopter altitude was usually 300-m above ground level.

Temporal Coverage: 1994-05-31 to 1994-09-16

Temporal Resolution: Daily

Study Area: (All latitude and longitude given in decimal degrees)

Site	Westernmost Longitude	Easternmost Longitude	Northernmost Latitude	Southernmost Latitude
Boreal forests of central Canada (Northern and Southern study areas of the BOREAS project)	-106.1978	-97.485659	56.00339	53.62889

Data file information

There are 163 images in .jpg format with this data set. The files are named according to the date, study area, and site.

Where:

YY-MM-DD = date,

ssa or **nsa** (**ssa** = southern study area and **nsa** = northern study area) = study area,

site abbreviation (refer to the companion file),

flxtr for fluxtower or **aux#** = auxillary site and number (followed by a number for some files),

For example: **94-05-31_ssa-ojp-flxtr_1.jpg**

Photo from May 31, 1994 from the ssa (Southern Study Area), ojp (Old Jack Pine), fluxtower 1.

Table 1. The helicopter visited all of the NSA and SSA tower and category-1 auxiliary sites. Each site listed below was observed at least once during the 1994 campaign. The coordinates in the table are based on the North American Datum of 1983 (NAD83).

Site ID	Operational Grid ID	Longitude	Latitude	UTM Easting	UTM Northing	UTM Zone
SSA Flux Tower Sites						
SSA-FEN	F0L9T	104.61798	53.80206	525159.8	5961567	13
SSA-OBS	G8I4T	105.11779	53.98717	492276.5	5982101	13
SSA-OJP	G2L3T	104.69203	53.91634	520227.7	5974258	13
SSA-YJP	F8L6T	104.64529	53.87581	523320.2	5969763	13
SSA-9OA	C3B7T	106.19779	53.62889	420790.5	5942900	13
SSA-9YA	D0H4T	105.32314	53.65601	478644.1	5945299	13
NSA Flux Tower Sites						
NSA-OBS	T3R8T	98.48139	55.88007	532444.5	6192853	14
NSA-OJP	T7Q8T	98.62396	55.92842	523496.2	6198176	14
NSA-YJP	T8S9T	98.28706	55.89575	544583.9	6194707	14
NSA-BVP	T4U6T	98.02747	55.84225	560900.6	6188951	14
NSA-FEN	T7S1T	98.42072	55.91481	536207.9	6196750	14
SSA Auxiliary Sites						

SSA-9BS	D0H6S	105.29534	53.64877	480508.7	5944263	13
SSA-9BS	G2I4S	105.13964	53.93021	490831.4	5975766	13
SSA-9BS	G2L7S	104.63785	53.90349	523793.6	5972844	13
SSA-9BS	G6K8S	104.759	53.94446	515847.9	5977147	13
SSA-9BS	G9I4S	105.11805	53.99877	492291.2	5983169	13
SSA-9JP	F5I6P	105.11175	53.86608	492651.3	5968627	13
SSA-9JP	F7J0P	105.05115	53.88336	496667	5970323	13
SSA-9JP	F7J1P	105.03226	53.88211	497879.4	5970406	13
SSA-9JP	G1K9P	104.74812	53.9088	516546.7	5973405	13
SSA-9JP	G4K8P	104.76401	53.91883	515499.1	5974517	13
SSA-9JP	G7K8P	104.77148	53.95882	514994.2	5978964	13
SSA-9JP	G8L6P	104.63755	53.96558	523778	5979753	13
SSA-9JP	G9L0P	104.73779	53.97576	517197.7	5980856	13
SSA-9JP	I2I8P	105.05107	54.11181	496661.4	5995963	13
SSA-ASP	B9B7A	106.18693	53.59098	421469.8	5938447	13
SSA-ASP	D6H4A	105.31546	53.70828	479177.5	5951112	13
SSA-ASP	D6L9A	104.6388	53.66879	523864	5946733	13
SSA-ASP	D9G4A	105.46929	53.74019	469047.1	5954718	13
SSA-MIX	D9I1M	105.20643	53.7254	486379.7	5952990	13
SSA-MIX	F1N0M	104.533	53.80594	530753.7	5962032	13
SSA-MIX	G4I3M	105.14246	53.9375	490677.3	5976355	13
SSA-CLR	FRSHCL	104.69194	53.91639	520205.2	5974269	13
NSA Auxiliary Sites						
NSA-9BS	S8W0S	97.84024	55.76824	572761.9	6180895	14
NSA-9BS	T0P7S	98.82345	55.88371	511043.9	6193151	14
NSA-9BS	T0P8S	98.80225	55.88351	512370.1	6193132	14
NSA-9BS	T0W1S	97.80937	55.78239	574671.7	6182502	14
NSA-9BS	T3U9S	97.98339	55.83083	563679.1	6187719	14
NSA-9BS	T4U8S	97.99325	55.83913	563048.2	6188633	14
NSA-9BS	T4U9S	97.98364	55.83455	563657.5	6188133	14
NSA-9BS	T5Q7S	98.64022	55.9161	522487.2	6196801	14
NSA-9BS	T6R5S	98.51865	55.90802	530092	6195947	14
NSA-9BS	T6T6S	98.18658	55.87968	550887.9	6192988	14
NSA-9BS	T7R9S	98.44877	55.91506	534454.5	6196764	14
NSA-9BS	T7T3S	98.22621	55.89358	548391.8	6194506	14
NSA-9BS	T8S4S	98.37111	55.91689	539306.4	6197009	14
NSA-9BS	U5W5S	97.70986	55.9061	580655.5	6196381	14
NSA-9BS	U6W5S	97.70281	55.91021	581087.8	6196847	14

NSA-9JP	99O9P	99.03952	55.88173	497527.8	6192918	14
NSA-9JP	Q3V3P	98.02473	55.55712	561517.9	6157222	14
NSA-9JP	T7S9P	98.30037	55.89486	543752.4	6194599	14
NSA-9JP	T8Q9P	98.6105	55.93219	524334.5	6198601	14
NSA-9JP	T8S9P	98.28385	55.90456	544774.3	6195689	14
NSA-9JP	T8T1P	98.26269	55.90539	546096.3	6195795	14
NSA-9JP	T9Q8P	98.59568	55.93737	525257.1	6199183	14
NSA-9OA	T2Q6A	98.67479	55.88691	520342	6193541	14
NSA-ASP	P7V1A	98.07478	55.50253	558442.1	6151104	14
NSA-ASP	Q3V2A	98.02635	55.56227	561407.9	6157794	14
NSA-ASP	R8V8A	97.8926	55.67779	569638.4	6170775	14
NSA-ASP	S9P3A	98.87621	55.88576	507743.3	6193372	14
NSA-ASP	T4U5A	98.04329	55.84757	559901.6	6189528	14
NSA-ASP	T8S4A	98.37041	55.91856	539348.3	6197195	14
NSA-ASP	V5X7A	97.48565	55.97396	594506.1	6204217	14
NSA-ASP	W0Y5A	97.3355	56.00339	603796.6	6207707	14
NSA-MIX	Q1V2M	98.03769	55.54568	560718.3	6155937	14
NSA-MIX	T0P5M	98.85662	55.88911	508967.7	6193747	14

3. Application and Derivation

The imagery was taken to capture visual conditions at the site during data collection that could then later be referred to as necessary when processing the data to aid in quality assessment. The imagery was taken from the helicopter platform simultaneous with radiometric ground measurements and sunphotometer measurements from the same platform.

4. Quality Assessment

The camera field of view is unknown. BOREAS Information System (BORIS) staff viewed some of the JPEG imagery to verify data format.

5. Data Acquisition, Materials, and Methods

BOREAS was a large-scale international interdisciplinary experiment in the boreal forests of central Canada. Images were collected from two helicopter video cameras of numerous flux tower and auxiliary sites (some of these sites were located within the tower sites) during the BOREAS campaign in the NSA and SSA (Sellers et al., 1995). The data were collected during the green-up, peak, and senescent stages of the growing season. Observations were made during all three BOREAS 1994 IFCs from May to September of 1994.

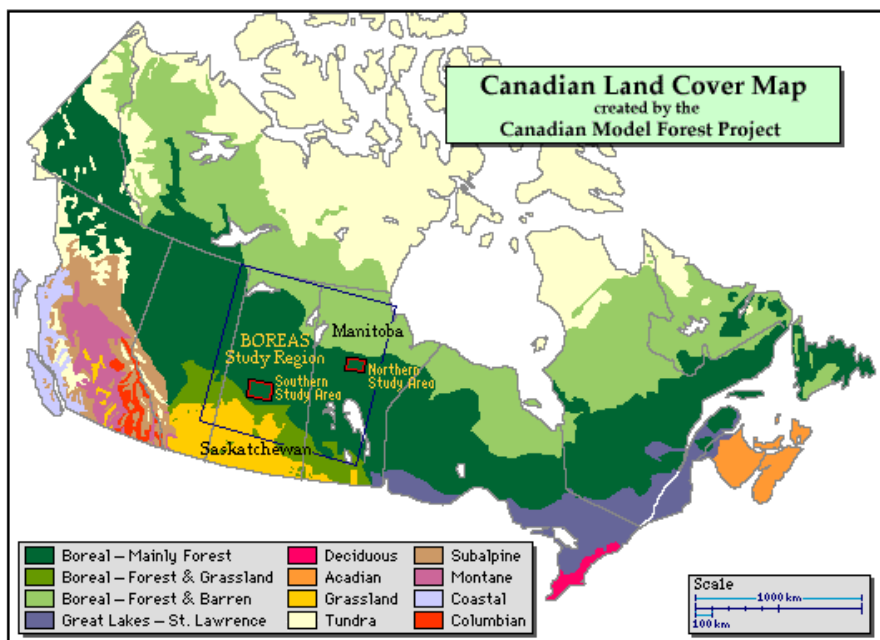


Figure 2. Map showing the BOREAS study areas in central Canada.

Video imagery was taken with color VHS video cameras mounted on a helicopter platform at BOREAS sites simultaneous with radiometric ground measurements and sunphotometer measurements from the same platform. The video cameras were operated continuously during data collection. The still frames were digitized from the video tapes as representative views of the sites.

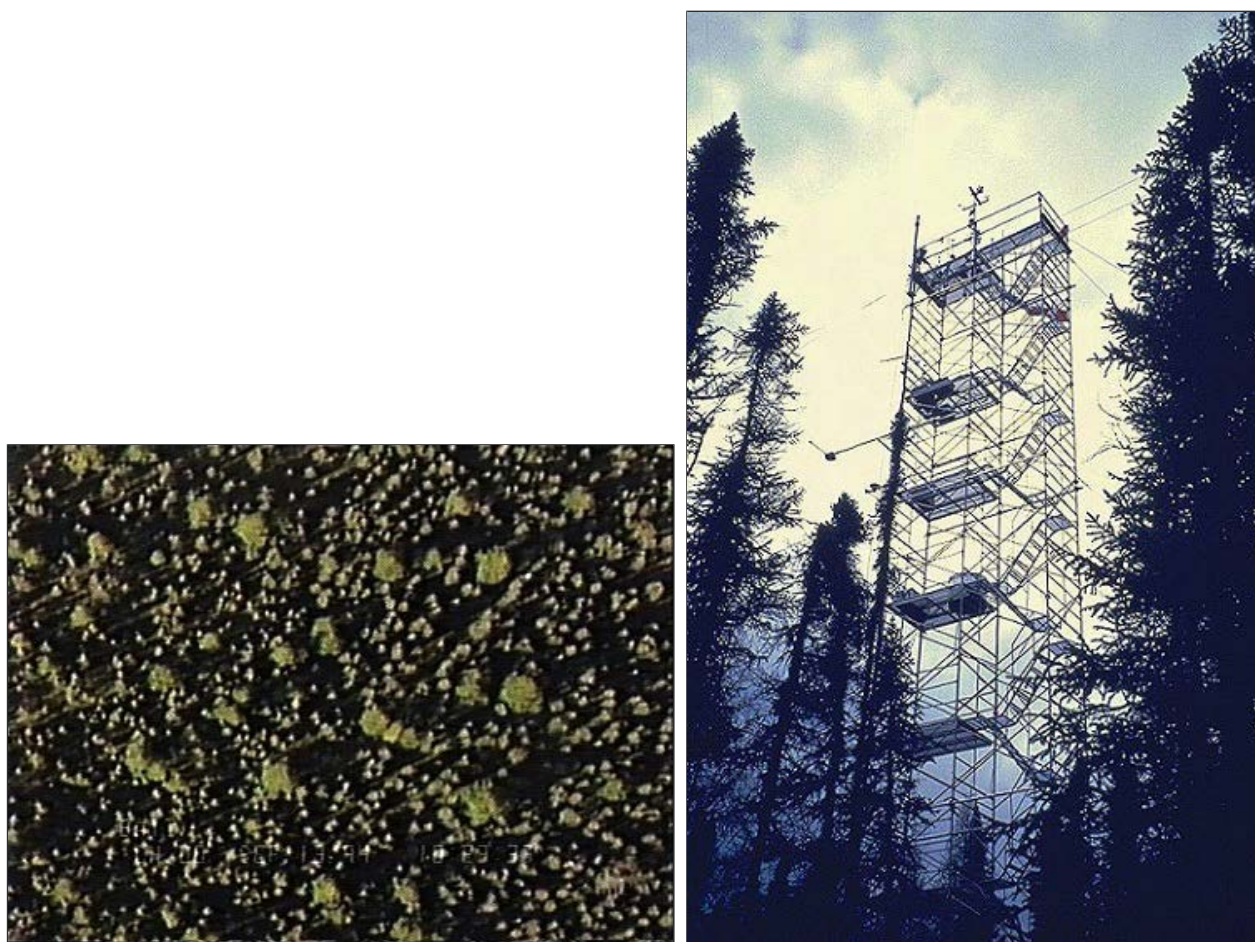


Figure 3. The image on the left was taken from the helicopter over the SSA Old Black Spruce Site (OBS) flux tower site September 13, 1994. The right image is the fluxtower at the SSA OBS site.

The instrumentation used was designed and developed at the National Aeronautics and Space Administration (NASA) Goddard Space Flight Center (GSFC). In general, the helicopter was flown during relatively clear days when possible. Data collection was attempted during conditions of highest possible solar elevation (Walthall et al., 1996).

Two video cameras were used in the system. One video camera was bore-sighted with the main instruments on the pointable platform, and the other was next to the 70-mm photographic camera set to view nadir only. All observations were usually at 300-m above ground level (AGL). During IFC-1, a video camera with an operator-controlled electronic zoom and focus system was used. During IFC-2 and IFC-3, this lens was replaced with the same type of lens used with the nadir-looking camera. These lenses had a manual focus and a 20- to 80-mm zoom range, which was set at 30 to 35 mm. Multiple observations were captured from the video at sites where the cover changed significantly during the scan time; this was determined subjectively by the operator (Walthall et al., 1996). The spatial resolution for the imagery was somewhat variable based on the altitude of the helicopter, tree height, and ground cover. Helicopter altitude was usually 300-m above ground level.

The video snapshots were generated on a Power Macintosh PC 8500/220 using a VHS video player and Avid VideoShop 3.0.2. The images were then converted from PICT format to JPEG for universal accessibility.

6. Data Access

These data are available through the Oak Ridge National Laboratory (ORNL) Distributed Active Archive Center (DAAC).

[BOREAS RSS-03 Imagery and Snapshots from a Helicopter-Mounted Video Camera](#)

Contact for Data Center Access Information:

- E-mail: uso@daac.ornl.gov
- Telephone: +1 (865) 241-3952

7. References

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.

Walthall, C., D.L. Williams, B. Markham, J. Kalshoven, and R. Nelson. 1996. Development and present configuration of the NASA GSFC/WFF helicopter-based remote sensing system. *International Geosciences and Remote Sensing Symposium (IGARSS) Spring 1996, Lincoln, Nebraska*.

8. Data Set Revisions

This revision represents a re-packaging of the previously published data set

Walthall, C.L., and S. Loebel. 1999. BOREAS RSS-03 Imagery and Snapshots from a Helicopter-Mounted Video Camera. ORNL DAAC, Oak Ridge, Tennessee, USA. <https://doi.org/10.3334/ORNLDAAC/289>



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