



CLPX-Ground: Ground-Based Infrared Images of the LSOS Site, Version 1

USER GUIDE

How to Cite These Data

As a condition of using these data, you must include a citation:

Rowlands, A., R. Essery, and J. Pomeroy. 2005. *CLPX-Ground: Ground-Based Infrared Images of the LSOS Site, Version 1*. [Indicate subset used]. Boulder, Colorado USA. NASA National Snow and Ice Data Center Distributed Active Archive Center. <https://doi.org/10.5067/BYFK490NJTAD>. [Date Accessed].

FOR QUESTIONS ABOUT THESE DATA, CONTACT NSIDC@NSIDC.ORG

FOR CURRENT INFORMATION, VISIT <https://nsidc.org/data/NSIDC-0161>



National Snow and Ice Data Center

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1 DETAILED DATA DESCRIPTION

This data set presents sub-canopy digital thermograms (infrared images) from two pine sites and a small clearing at the CLPX Local Scale Observation Site (LSOS) in northern Colorado. The LSOS is a 0.8-ha study site located within the Fraser Intensive Study Area (ISA). The study area has flat topography with a uniform pine forest, a discontinuous pine forest, and a small clearing. Each digital thermogram is 120 x 120 pixels. The instrument was mounted on a tripod and obtained an image every 15 minutes from approximately 0730 until 1800 local time. The instrument was aimed at different scenes on different days, but consistently looked at the same scene throughout each day.

Meteorological data were collected in conjunction with some of these measurements (during IOP2). Meteorological parameters were temperature, albedo, short-wave radiation, long-wave radiation, and net radiation.

1.1 Format

Infrared images are presented as binary (`.dat`) files (IOP1 only) and Infrared Solutions formatted (`.ISI`) digital thermograms. Data are supplied in °C and Wm^{-2} . The spectral range is 8 to 12 μm .

Meteorological data are available as comma-separated ASCII files (`.csv`). Missing data are identified by "-999". The dense-pine and open-pine meteorological data files have the following column headers:

Year
Day
Time
TC1 (°C)
TC2 (°C)
TC3 (°C)
TC4 (°C)
Kup (Wm^{-2})
Kdown (Wm^{-2})
Knet (Wm^{-2})
Lnet (Wm^{-2})
Albedo
NetRad (open pine only) (Wm^{-2})
Lup (Wm^{-2})

Ldown (Wm-2)

DecDay

Where:

TC = Thermocouple

K = Short-wave radiation

L = Long-wave radiation

NetRad = Net Radiation

DecDay = Decimal Day

1.2 File and Directory Structure

Data are available via HTTPS in the following directory structure:

```
IOP1/  
  020218_raw/ (date of measurements: YYYYMMDD)  
  020219_raw/  
  020220_raw/  
  020221_raw/  
  020222_raw/  
IOP2/  
  020328_raw/  
  020329_raw/  
  020330_raw/  
IOP4/  
  030326_raw/  
  030327_raw/  
  030328_raw/  
  030329_raw/  
  030330_raw/  
clpx_open_met_data_jd86-88.csv  
clpx_dense_met_data_jd86-88.csv
```

1.3 File Naming Convention

In each IOP, IR images are named IR##### with .dat or .ISI file extensions, where ##### refers to a four- or five-digit number representing the number of the photograph recorded in each IOP.

Meteorological files are named "clpx_open_met_data_jd86-88.csv" and "clpx_dense_met_data_jd86-88.csv".

1.4 File Size

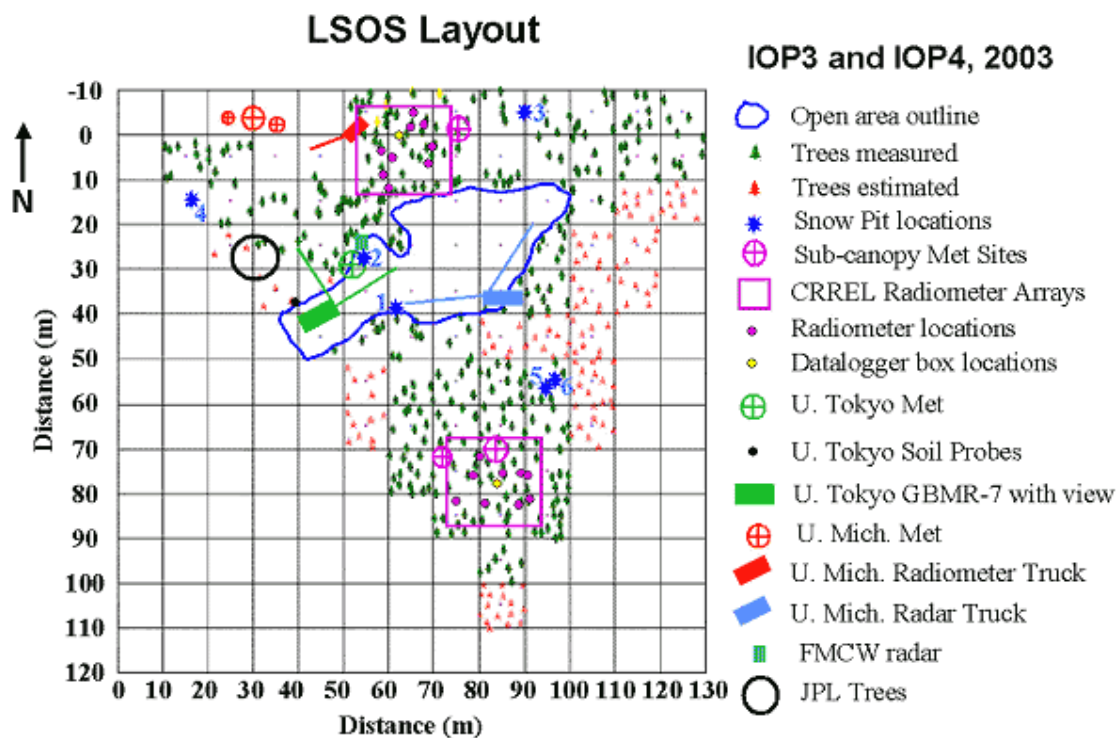
IR files range from 5 to 29 KB. Meteorological files are 96 and 100 KB.

1.5 Spatial Coverage

This data set covers the CLPX Local Scale Observation Area (LSOS) in northern Colorado. This site is 100 m x 100 m (39.9066°N, 105.8829°W).

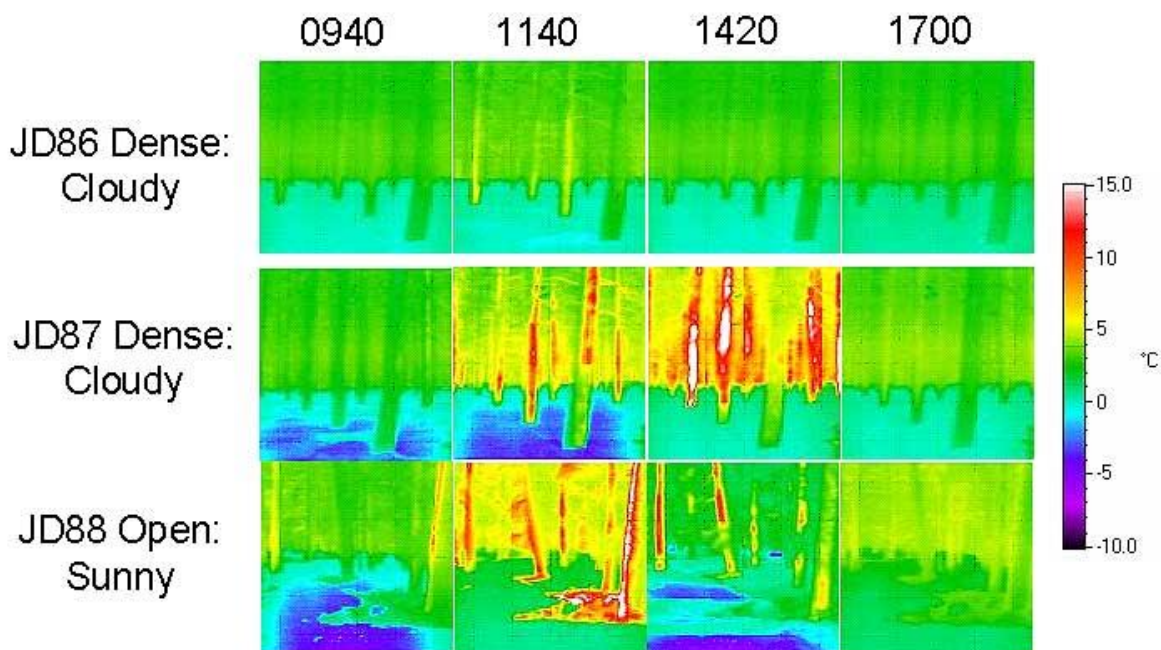
1.5.1 Spatial Coverage Map

The following maps show the CLPX LSOS, with the uniform pine area to the south and east of clearing, and the discontinuous pine site to the north of the clearing.



1.6 Temporal Coverage

IR images were collected during IOP1 (18-22 February 2002), IOP2 (28-30 March 2002), and IOP4 (26-30 March 2003). Meteorological data were collected on 27-29 March 2002. Images were recorded at various times throughout the day, between 0730 and 1800 local time. The following figure provides an example of diurnal differences in sub-canopy thermal energy in the dense and open pine areas:



1.7 Parameter or Variable

Parameters include digital thermograms, hypodermic needle thermocouple temperature, shortwave radiation, longwave radiation, net radiation, and albedo.

2 DATA ACQUISITION AND PROCESSING

The IR SnapShot™ Thermoelectric Infrared Imaging Radiometer has the following specifications:

Detector: 120-element linear array of uncooled thermoelectric detectors, 50 μm square pixels

System Dynamic Range: 12 bits usable with digitizing resolution of 16 bits

FOV: 17.2° horizontal and vertical

Lens: Germanium 20 mm, F/0.8, focus 10" to infinity

Spectral Band: 8 μm to 12 μm , anti-reflection-coated Germanium optics

NETD: <0.1°C at 30°C

Accuracy: 2°C or 2% of reading

Measurement Temperatures: 0 to 350°C (custom ranges available within -30°C to 600°C)

Operating Temperature: 0 to 40°C (0 to 50°C custom range available)

Image Scan Time: <1.5 seconds

Some thermocouple (TC) measurements were made using an IRTC (Infrared Thermocouple) from Exergen, Inc. Others were made using a HYP-0 (Hypodermic Thermocouple) from Omega Engineering. Kup, Kdown, Knet, albedo, NetRad, Lup, and Ldown were measured using a CNR1 Net Radiometer from Kipp & Zonen.

2.1 Quality Assessment

The IR SnapShot™ has a spectral range of 8 to 12 µm, an absolute accuracy of 1.2°C, and a differential accuracy of 0.1°C. Separate tests with the imaging radiometer, narrow-beam thermal infrared radiometers, and hypodermic needle thermocouples inserted into various natural surfaces onsite confirmed that the imaging radiometer was operating well within accuracy specifications.

3 REFERENCES AND RELATED PUBLICATIONS

Hardy, J., D. Cline, K. Elder, R. Davis, R. Armstrong, G. Castres Saint-Martin, R. DeRoo, T. Graf, Y. Koh, T. Koike, H-P. Marshall, K. McDonald, T. Painter, and K. Sarabandi (submitted). An overview of data from the Local Scale Observation Site of the Cold Land Processes Experiment (CLPX). *Journal of Hydrometeorology*.

Hardy, J. P., D. Cline, K. Elder, R. Davis, J. Pomeroy, G. Koh, R. Armstrong, T. Koike, and K. McDonald. 2002. The Cold Land Processes Experiment (CLPX) Local Scale Observation Site (LSOS). American Geophysical Union Fall Meeting 6-10 December 2002, San Francisco, California. *Eos Transactions* 83 (47): F537.

Rowlands, A. P., J.W. Pomeroy, J.P. Hardy, D. Marks, K. Elder, and R. Melloh. 2002. Small-scale variability of radiant energy for snowmelt in a mid-latitude sub-alpine forest. *Proceedings of the Eastern Snow Conference* 59: 109-119.

3.1 Related Data Collections

- [AMSR-E Validation Data Sets](#)
- [CLPX-Ground: ISA Snow Pit Measurements](#)
- [CLPX-Ground: Micrometeorological Data at the Local Scale Observation Site \(LSOS\)](#)
- [CLPX-Ground: Ground-based L and Ku Band Polarimetric Scatterometry at the LSOS](#)
- [CLPX-Ground: Ground Based Passive Microwave Radiometer \(GBMR-7\) Data at the LSOS](#)

4 CONTACTS AND ACKNOWLEDGMENTS

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5 DOCUMENT INFORMATION

5.1 Publication Date

15 June 2005

5.2 Date Last Updated

6 April 2021