CLPX-Ground: University of Michigan Ground-Based Microwave Radiometer, Version 1

USER GUIDE

How to Cite These Data

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

England, A. and R. DeRoo. 2004. *CLPX-Ground: University of Michigan Ground-Based Microwave Radiometer, Version 1*. [Indicate subset used]. Boulder, Colorado USA. NASA National Snow and Ice Data Center Distributed Active Archive Center. https://doi.org/10.5067/9QGQWHTH574F. [Date Accessed].

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

FOR CURRENT INFORMATION, VISIT https://nsidc.org/data/NSIDC-0167

National Snow and Ice Data Center

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1 DETAILED DATA DESCRIPTION

The majority of the data consist of brightness temperatures at a 54 degree incidence angle of the accumulated snowpack at the small clearing in the LSOS. Other observations include upwelling brightness temperatures from short and tall trees, and downwelling brightness temperatures from tall trees. Snowpack ranged from 0 to 80 cm in depth. The microwave radiometers operated at 6.7, 19, and 37 GHz. The LSOS is a 100 x 100 m study site located within the Fraser Intensive Study Area (ISA). The LSOS has flat topography with areas of both uniform and discontinuous pine forest, and a small clearing.

1.1 Format

The radiometer data are provided in tab-delimited ASCII files. The first row contains ten column headers, which are:

freq - nominal frequency of radiometer, in GHz
year - year
mon - month
dom - day of month
hr - hour, MST
min - minutes
sec - seconds
ang - incidence angle, degree from looking straight down
TbH - Brightness temperature (K), Horizontal polarization
TbV - Brightness temperature (K), Vertical polarization (-9 indicates no data)

1.2 File and Directory Structure

Data are presented in five files: one each for snow dwell (small clearing), large tree downwelling, large tree upwelling, short tree upwelling, and snow elevation scan.

1.3 File Naming Convention

Files are named `iop4XXX.tb`, where XXX represents the target within the LSOS: dwell (snow dwell), ltd (large tree downwelling), ltu (large tree upwelling), ses (snow elevation scan), or stu (short tree upwelling), and tb represents brightness temperature.

1.4 File Size

File sizes range from 2 to 548 KB.

1.5 Spatial Coverage

Radiometer measurements were taken in the CLPX LSOS (39.9066 N, 105.8829 W). The following map shows the location of the radiometer, and the locations of other instruments in the LSOS.

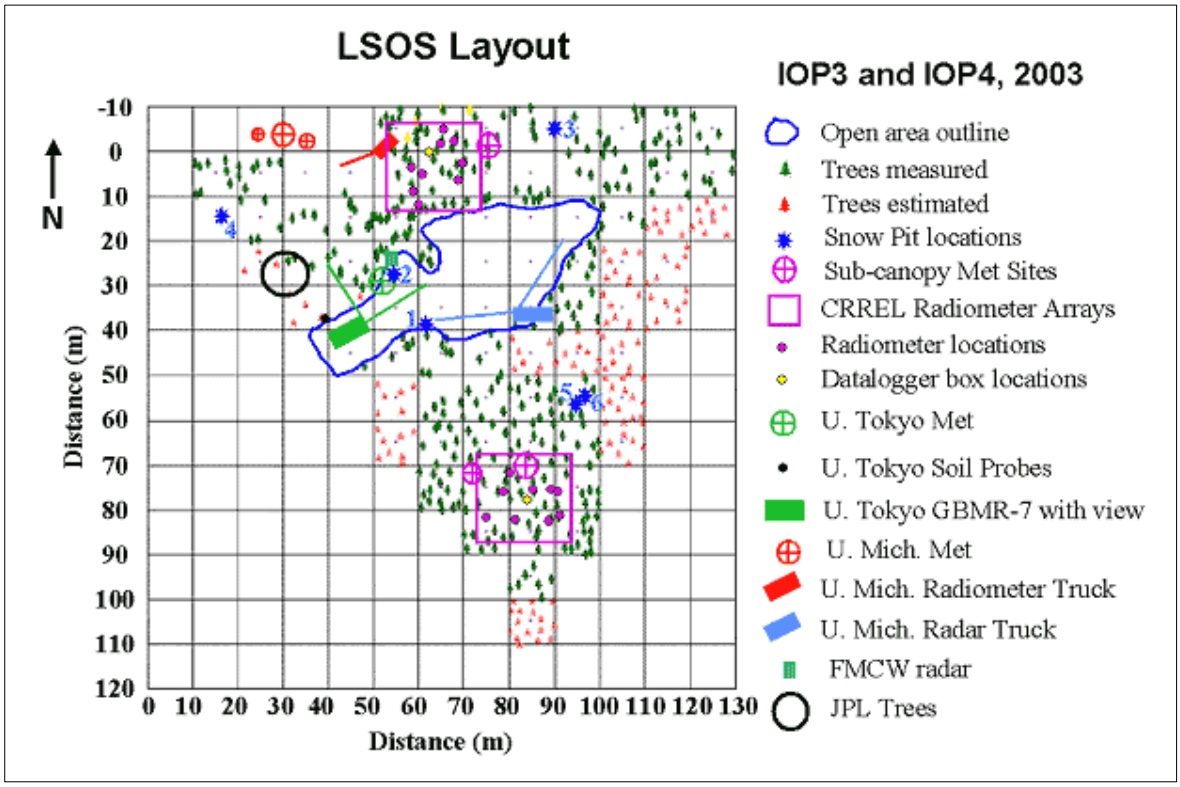

Figure 1. LSOS Layout in IOP3 and IOP4 (2003)

Within the LSOS, there were five radiometer targets, shown in the following photo.

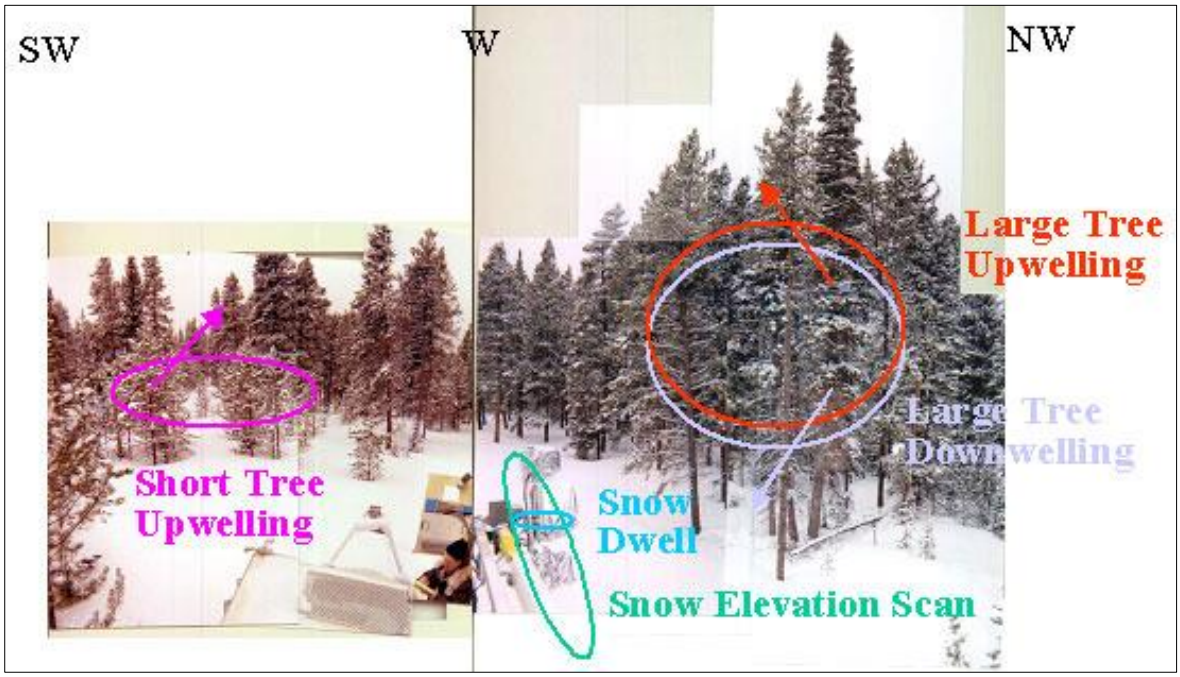

Figure 2. Five radiometer targets within the LSOS

1.6 Temporal Coverage

Snow dwell, considered to be the most important measurement, was the default measurement target. Snow dwell temporal coverage was planned to be a continuous measurement, except for select periods of up to 45 minutes. The select periods occurred twice daily, in the morning (approximately 10 am, when the snow would not have started melting), and in the late afternoon (approximately 4 pm, after daily peak melting). The non-dwell measurements (ltd, ltu, ses, stu) were to be conducted on a rotating basis during the select periods, although some select periods were actually used for instrument maintenance. Actual measurement dates are summarized by frequency and target in the table below. Per the rotating schedule and maintenance work, data for the indicated targets were collected at some point during the indicated dates, but are not continuous throughout these periods

Table 1. Measurement Dates

dwell	6.7 GHz	24 March – 2 April 2003
	19.35 GHz	24 – 31 March 2003
	37 GHz	24 – 31 March 2003
ltd	6.7 GHz	29 and 31 March 2003
	19.35 GHz	29 and 31 March 2003
	37 GHz	29 and 31 March 2003
ltu	6.7 GHz	27 and 29 March, 2 April 2003

	19.35 GHz	27 and 29 March 2003
	37 GHz	27 and 29 March 2003
ses	6.7 GHz	25 March, 1 April 2003
	19.35 GHz	25 March 2003
	37 GHz	25 March 2003
stu	6.7 GHz	27 and 29 March, 2 April 2003
	19.35 GHz	27 and 29 March 2003
	37 GHz	27 and 29 March 2003

1.7 Parameter or Variable

1.7.1 Parameter Description

The parameter measured during this project is brightness temperature at a 54 degree incidence angle of the accumulated snowpack at the small clearing in the LSOS. Other observations include upwelling brightness temperatures from short and tall trees, and downwelling brightness temperatures from tall trees.

The radiometer operated at three frequencies: 6.7, 19.35, 37 GHz. Parameters recorded at each frequency are:

ang - incidence angle, degree from looking straight down
TbH - Brightness temperature, K, Horizontal polarization
TbV - Brightness temperature, K, Vertical polarization

1.7.2 Sample Data Record

The following figure is a sample brightness temperature time series during IOP4.

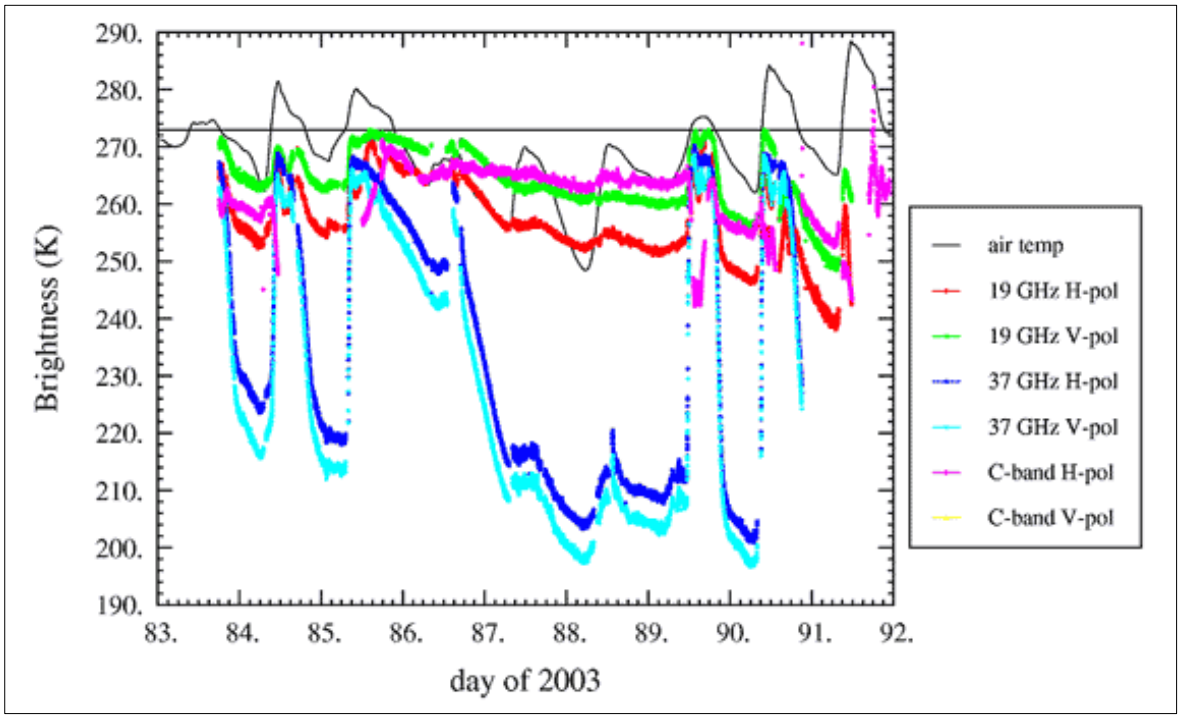

Figure 3. Sample brightness temperature time series during IOP4.

The following figure is a sample of IOP3 large tree upwelling data.

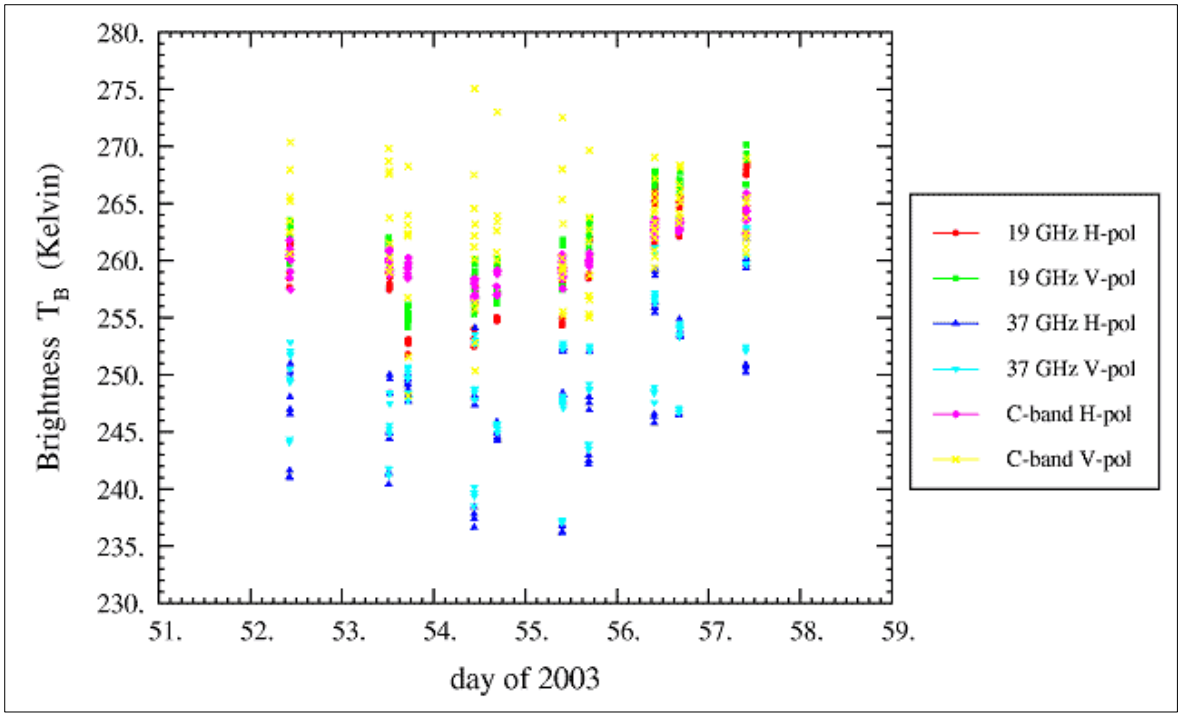

Figure 4. Sample large tree upwelling data during IOP3

1.8 Quality Assessment

1.8.1 Accuracies

The time in these files is corrected to Mountain Standard Time, +/-5 minutes. The inclinometer was calibrated at the beginning of IOP4, but was reading 6-7 degrees too high on 31 March 2003. For all the radiometers, the precision is +/-0.5 K. The 6.7, 19, and 37 GHz brightness temperatures are accurate to +/-3 K. The 6.7 GHz V-pol data could not be calibrated and is marked as "Not A Number" by the value "-9."

1.8.2 Data filters

Data were removed for any of the following conditions:

1) Obvious malfunctions, e.g. out-of-range ADC values. Although the radiometer was capable of outputting voltages less than 0V or greater than 2.5V, these values were considered to be out of range, and were discarded by the ADC.

2) Unstable electronics. During a 4-second interval, each radiometer antenna monitored a reference brightness both before and immediately after the target observation. Data were discarded if the references differed by more than 3K, which was considered to be an indication of unstable electronics or thermal control of the electronics.

3) Unstable amplifier temperature. The amplifiers become more efficient (amplifier gain increases) at colder physical temperatures. Small changes in the physical temperature of the amplifiers can produce changes in the readiometer output that are indistinguishable from brightness changes. Data were flagged and discarded if the amplifier physical temperature changed, or differed from the calibration temperature by more and 1-degree Celsius.

2 CONTACTS AND ACKNOWLEDGMENTS

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3 DOCUMENT INFORMATION

3.1 Publication Date

2004

3.2 Date Last Updated

09 March 2021