

SnowEx23 Time-Lapse Imagery, Version 1

1 INTRODUCTION

1.1 Data Set Overview

The dataset comprises time-lapse images captured by cameras placed near Fairbanks, AK as part of the NASA SnowEx 2022-2023 field campaign. Nine cameras were installed in the Bonanza Creek Experimental Forest and eight cameras were installed in the Caribou-Poker Creek Research Watershed. The time-lapse images were collected using a WingscapesTimeLapsePro camera in conjunction with a custom-made snow pole. The camera was securely mounted on a fence post and positioned to capture a clear view of the snow pole, which was constructed from a PVC pipe measuring 1.5 meters tall and 10 cm in diameter. Most of the PVC pipe was painted red, with the top 10 cm of the pipe painted yellow to facilitate accurate snow depth data processing. The camera captured one image per hour between 1100 and 1300 local standard time for a total of three images a day, documenting the fluctuations in snow levels throughout the observation period. This approach provided a consistent and dependable dataset for the analysis of snow depth changes over time in a high latitude environment with short daylight hours during the winter season. Table 1 and Table 2 present the geographical locations and collection specifics for the cameras installed in the two boreal forest sites.

1.2 File Information

1.2.1 Format and Granule Configuration

The data are .jpeg files, organized into multi-file granules formatted as compressed archived files (.tgz).

1.2.2 Naming Convention

Each granule is named according to the following convention:

SNEX23_TLI_[CAMERA_ID]_YYYYMMDD-YYYYMMDD_V01.0.tgz

Where:

- SNEX23_TLI is the short-name for the data set title,
- CAMERA_ID is the name of the time-lapse camera, as identified in Table 1 and Table 2 below,
- YYYYMMDD-YYYYMMDD is the range of data acquisition, and

- V01.0 is the data set version number.

Within each granule, files are named according to the following convention:

SNEX23_TLI_[CAMERA_ID]_YYYY_MM_DD_HH_MM_V01.0.jpg

Where:

- SNEX23_TLI is the short-name for the data set title,
- CAMERA_ID is the name of the time-lapse camera, as identified in Table 1 and Table 2 below,
- YYYY_MM_DD is the date of image acquisition,
- HH_MM is the time of image acquisition, and
- V01.0 is the data set version number.

2 DATA ACQUISITION AND PROCESSING

2.1 Data Acquisition

The location of each time-lapse cameras and details regarding the acquisition of imagery for the Bonanza Creek Experimental Forest are outlined in Table 1 below. The naming convention for the cameras is structured to include the research site name along with the camera number (for instance, BC represents Bonanza Creek), TL denotes time-lapse, and is succeeded by the initial letter of the land cover class (D, E, S, or W) and the first letter of the snow class (B, N, or A), as detailed in Table 3.

Table 1. Time-lapse imagery information for Bonanza Creek Experimental Forest

TL Camera	Long ° W	Latitude ° N	Start Date	End Date	Readings per day	Total Images
BC1_TL_DA	148.3162838	64.7405957	14 Oct 2022	17 Aug 2023	3	1,951
			1 Sep 2023	8 Aug 2024		
BC2_TL_DA	148.330016	64.7390309	14 Oct 2022	1 Sep 2022	3	1,996
			1 Sep 2023	8 Aug 2024		
BC3_TL_DB	148.3139959	64.740644	19 Oct 2022	6 Jan 2023	3	698
			1 Sep 2023	31 Jan 2024		
BC5_TL_DSB	148.3019619	64.7041768	14 Oct 2022	15 Sep 2023	3	1,843
			15 Sep 2023	18 Jun 2024		
BC7_TL_EB	148.322755	64.7021653	14 Oct 2022	1 Sep 2023	3	969
BC8_TL_SA	148.3290094	64.71088	14 Oct 2022	3 Jan 2023	3	360
			2 Sep 2023	9 Oct 2023		

BC11_TL_SB	148.3193875	64.7379119	19 Oct 2022	24 Jul 2023	3	1,086
			15 Sep 2023	6 Dec 2023		
BC13_TL_WA	148.331805	64.7173083	14 Oct 2022	15 Dec 2022	3	347
			1 Sep 2023	23 Oct 2023		
BC15_TL_WB	148.3061364	64.7013791	14 Oct 2022	3 Mar 2023	3	796
			15 Sep 2023	17 Jan 2024		

The location of each time-lapse cameras and details regarding the acquisition of imagery for the Caribou-Poker Creek Research Watershed are outlined in Table 2 below. The naming convention for the cameras is structured to include the research site name along with the camera number (for instance, CP represents Caribou-Poker), and it is followed by the initial letter of the land cover class (D, E, S, or W) and the first letter of the snow class (B, N, or A), as detailed in Table 3.

Table 2. Time-lapse imagery information for the Caribou-Poker Creek Research Watershed

TL Camera	Long ° W	Latitude ° N	Start Date	End Date	Readings per day	Total Images
CP_BA_2	147.5574511	65.1846001	27 Oct 2022	30 Aug 2023	3	2,224
			30 Aug 2023	6 Nov 2024		
CP_WB_3	147.4995699	65.156602	31 Aug 2023	23 Nov 2023	3	252
CP_EA_4	147.4856666	65.1499392	26 Oct 2022	29 Nov 2022	3	1,229
			31 Aug 2023	11 Sep 2024		
CP_SA_5	147.5031978	65.1927804	23 Oct 2022	29 Aug 2023	3	2,239
			30 Aug 2023	6 Nov 2024		
CP_DB_6	147.4958637	65.1660769	28 Oct 2022	30 Aug 2023	3	2,221
			30 Aug 2023	6 Nov 2024		
CP_MA_12	147.4564715	65.1371548	25 Oct 2022	10 Feb 2023	3	754
			31 Aug 2023	20 Jan 2024		
CP_EB_13	147.6030708	65.1451735	22 Oct 2022	23 Oct 2023	3	871
			24 Oct 2023	24 Jan 2024		
CP_MB_14	147.5320027	65.1519265	19 Oct 2022	23 Oct 2023	3	1,901
			24 Oct 2023	13 July 2024		
CP_DB_15	147.4850298	65.1789063	23 Oct 2022	30 Aug 2023	3	1292
			30 Aug 2023	26 Dec 2023		

Table 3. Abbreviations key for Land Cover and Snow Classes

Land Cover Classes	Snow Classes
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D	Deciduous	A	Above Average
E	Evergreen	B	Below Average
S	Shrub	N	Average (neutral)
W	Wetland		

2.2 Processing

These files are raw time-lapse photos; no processing was performed.

2.3 Errors and Uncertainties

The dataset comprises the original time-lapse photographs. The quality of these images may differ due to varying local lighting and weather conditions at the time of capture. Some photographs may exhibit blurriness or may be partially obscured by falling snow. Furthermore, the temperature readings shown in the images are uncalibrated and may include considerable inaccuracies resulting from changes in solar radiation. Additionally, it is possible that some cameras and/or snow poles have experienced slight displacement from their original installation positions throughout the duration of the study.

3 ACKNOWLEDGMENTS

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