SnowEx23 Apr23 Spectrometer Snow Surface Reflectance and Albedo, Version 1 Technical Reference

1 INTRODUCTION

1.1 Data Set Overview

This data set contains a comprehensive set of field-based measurements of snow surface reflectance and broadband snow albedo collected during the NASA SnowEx 2023 field campaign in interior Alaska. Data were acquired in April and May 2023 across three study sites near Fairbanks, Alaska, selected to represent the dominant boreal landcover types: closed-canopy forests, recently and historically burned forests, and open meadows. Together, these environments capture the heterogeneity of snow–vegetation interactions that influence snow albedo in high-latitude ecosystems.

1.2 File Information

1.2.1 Format

The data are available as a single comma-separated value file (.csv).

1.2.2 Naming Convention

The file is named `SNEX23_Albedo_20230405-20230505_v01.csv`,

where `SNEX23_Albedo` is the data set identifier and `20230405-20230505` is the date range of data collection.

1.3 Spatial Information

1.3.1 Coverage

Northernmost Latitude: 65.16127° N

Southernmost Latitude: 63.86191° N

Easternmost Longitude: 145.7231° W

Westernmost Longitude: ° W

1.3.2 Geolocation

This data set conforms to the WGS 84 coordinate reference system (EPSG 4326).

1.4 Temporal Information

1.4.1 Coverage and Resolution

5 April 2023 to 5 May 2023

The data set constitutes field data that was only collected when there were favorable weather conditions. There is no regular temporal resolution for when data was collected. Rather, data was collected opportunistically within the month-long campaign.

2 DATA ACQUISITION AND PROCESSING

Measurements were collected along transects ranging from 500 to 1,000 meters in length. Snow surface reflectance and albedo observations were obtained using multiple field spectrometer models, including the ASD FieldSpec 4, Spectral Evolution RS-8800, and Spectra Vista HR-1024i. Each instrument provided hyperspectral measurements spanning the visible to shortwave infrared (400–2,500 nm), with consistent calibration protocols followed across teams to ensure comparability.

All sampling locations were georeferenced using GPS systems, and ancillary metadata—including time of observation, landcover type, and snow conditions—were recorded for each point. Slope and aspect were derived from a 10 m DEM, and a simple cosine correction was applied to account for topographic effects on incident radiation.

These ground-based observations were collected in coordination with coincident hyperspectral measurements from NEON flux towers, UAV platforms, NASA's Airborne Visible/Infrared Imaging Spectrometer–Next Generation (AVIRIS-NG), and international hyperspectral satellite missions (EnMAP and PRISMA; only field hyperspectral data is included in this dataset). By integrating field spectroscopy with airborne and satellite remote sensing, this dataset provides a critical reference for scaling snow albedo observations across platforms and improving representation of snow–forest interactions in boreal regions.

3 ACKNOWLEDGEMENTS

Special thanks to Marianne Cowherd, Christopher Crawford, Julian Dann, Sage Ebel, Adam Hunsaker, Jeremy Johnston, Joe Meyer, Andrew Mullen, Anika Pinzner, Ben Roberts-Pierel, Patrick Saylor, Molly Tedesche, Hannah Van Dusen, Brent Wilder.