SnowEx20 Grand Mesa IOP FMCW Radar Autopicked Snow Depths, Version 1 Technical Reference

1 INTRODUCTION

1.1 Data Set Overview

This dataset contains semi-automatically picked snow depths from FMCW radar transects in Grand Mesa, Colorado, as part of the NASA SnowEx 2020 field campaign. Available parameters include two-way travel time and calculated snow depth. Also included are the processed radiogram files, which were used to determine two-way travel time, formatted as netCDF files.

After FMCW processing, 2D Wavelet Transform Modulus Maxima (WTMM) segmentation method was applied to the radargrams, producing contour lines along interfaces of high brightness change throughout each radar image. The lines were then filtered using an average brightness gradient and length threshold. Final lines corresponding to the snow surface and ground interface were selected as the first and last line that pass the thresholds. Final radar picks were visually inspected and adjusted through a python GUI.

The filtered data were output into a .csv file which contain the indices and two-way travel time corresponding to the ground and surface pick, the index and x,y coordinate of each radar trace in UTM projection, and the snow depth in centimeters calculated using the average radar wave velocity calculated from the average snow density measured in the basin.

1.2 File Information

1.2.1 Format

The data are available in 577 granules. The primary data, including two-way travel time and calculated snow depth, is available in a single-file granule formatted as a .csv file. Processed radiogram files are available in 575 single-file granules formatted as netCDF files (.nc). A multi-file granule formatted as a compressed .tgz file contains shapefiles which define the boundary of the data collection site.

1.2.2 Naming Convention

The primary data files is named:

```
SNEX20_FMCW_SD_GM2020_rdpicks_all_20200126-20200212_v01.csv
```

The .tgz file containing the shapefiles is named:

`SNEX20_FMCW_SD_GrandMesa_boundary_UTM_v01.tgz`

The data files containing the radiograms conform to the following naming convention:

`SNEX20_FMCW_SD_[SAMPLING-ID]_[NN]_[YYYMMDD].nc`,

where `SNEX20_FMCW_SD` is the short-name for the data set title, `SAMPLING-ID` indicates the sampling identifier, NN is a single-digit number distinguishing data files which were collected at the same site, and `YYYYMMDD` indicates the date of data acquisition.

1.3 Spatial Information

1.3.1 Coverage

Northernmost Latitude: 39.12128° N
Southernmost Latitude: 38.98208° N
Easternmost Longitude: 107.77996° W
Westernmost Longitude: 108.26141° W

1.3.2 Geolocation

This data set conforms to the WGS 84 / UTM zone 12N coordinate reference system (EPSG 32612).

1.4 Temporal Information

1.4.1 Coverage

26 January 2020 to 12 February 2020