**SUMup Snow Density Subdataset readme**

## 1.0 Introduction

This snow density dataset was compiled by the Surface mass balance and snow on sea ice working group (SUMup). This dataset includes snow density measurements over both the ice sheets, ice caps and snow on sea ice. It excludes seasonal snow on land measurements. This dataset is a community effort to distribute easy to use in-situ data to improve surface mass balance modeling and remote sensing efforts. This dataset is a compilation of work from many individual researchers. When using this dataset please cite **both** the individual researchers who provided the data as listed in the Citation field as well as the SUMup dataset. For questions about the dataset or to contribute your data to the dataset please contact the dataset compilers Lora Koenig lora.koenig@colorado.edu or Lynn Montgomery lynn.montgomery@colorado.edu

## 2.0 Field definitions for the dataset

no data is entered as -9999 and measurements are accurate to four significant figures after the decimal place. A summary, Table 1, is included at the end of this section with the data fields.

Date Taken- the year and day the data was taken in format YYYYMMDD. If only the year is known YYYY0000 is entered.

Lat-Latitude of measurements in decimal degrees (dd) (N is positive S is negative).

Long- Longitude of measurement in decimal degrees (dd) (E is positive W is negative).

Start depth- the start depth of the measurement in m from the snow/air interface (snow surface). The snow/air interface (snow surface) is defined as 0 m or the zero point.

Stop depth- the stop depth of the measurement in m form the snow/air interface (snow surface). The snow/air interface (snow surface) is defined as 0 m or the zero point.

Midpoint depth- the midpoint depth of the measurement in m from the snow/air interface (snow surface). The snow/air interface (snow surface) is defined as 0 m or the zero point.

Snow Density- snow density measurement in g/cm^3.

Error- Uncertainty with associated snow density measurement in g/cm^3.

Elevation- the surface elevation of the location in m.

SDOS flag- snow depth on sea ice flag. If a snow density measurement was taken simultaneously with a snow depth on sea ice measurement contained in the SUMup Snow Depth on Sea Ice dataset 1 is entered. If not 0 is entered.

Method- see method key (section 4.0) for snow density measurements below for numeric value of method used.

Citation- see citation key (section 5.1) for snow density measurements below for numeric value of citation.

Table 1: The fields for each snow density measurement in the SUMup dataset with a brief description and the unit of measurement.

| Column | Description | Unit |
|---|---|---|
| Date Taken | Date the data was taken | yyyymmdd |
| Latitude | Latitude of measurement | Decimal degree |
| Longitude | Longitude of measurement | Decimal degree |
| Start Depth | Top depth of the measurement in m from the snow/air interface (snow surface). | m |
| Stop Depth | Bottom depth of the measurement in m from the snow/air interface (snow surface). | m |
| Midpoint Depth | Midpoint depth of the measurement in m from the snow/air interface (snow surface). | m |
| Density | Snow density measurement | g/cm^3 |
| Error | Uncertainty in density measurement | g/cm^3 |
| Elevation | Elevation above sea level | m |
| Method | How the measurement was collected (see section 4.0) | - |
| Citation | Cited source of data (see section 5.1) | - |

**3.0 Format**

The dataset is in comma separated variable (.csv) file. With the following columns, described in more detail in section 2.0. Date Taken, Lat, Long, Start depth, Stop depth, Midpoint depth, Snow Density in g/cm3, Error on Snow Density measurement, Elevation of surface in m, SDOS flag, method, citation. Measurements are accurate to four significant figures after the decimal place. Please use this as a standard when doing analysis of the data.

The dataset is also available in netCDF format. For additional information on netCDF format please see the National Snow and Ice Data Centers support page here https://nsidc.org/data/netcdf/.

No data value is -9999.

**4.0 Method Key**

1. 1000 cc density cutter
2. 250 cc density cutter
3. 100 cc density cutter
4. Ice core section
5. Neutron density probe/MADGE
6. Density cutter- size unknown

7. 2300 cc density cutter
8. 500 cc density cutter
9. 99 cc density cutter
10. X-ray microfocus computer tomography (AWI-IceCT)
11. Gamma-ray attenuation density (Wilhelms, 1996)
12. Pycnometer (Micromeritics)
13. Custom trace metal clean sampler

**5.0 Citations**

When using this dataset please cite **both** the individual researchers who provided the data as listed in the Citation column as well as the SUMup dataset.

**5.1 Snow Density Datasets Compiled and Citation Key (7/2017)**

New citations for the 2017 dataset begin after citation 12, all other citations were present in the July 2015 dataset.


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**6.0 Combining datasets**

Datasets compiled had different levels of precision yet all numbers in this dataset were standardized. Measurements are accurate to four significant figures after the decimal place. Please use this as a standard when doing analysis of the data.

**7.0 Acknowledgement**

The SUMup working group was previously supported by the NASA Cryospheric Sciences Program and is now supported by the National Science Foundation grant PLR 1603407.