Snow Data Assimilation System (SNODAS) Data Products at NSIDC, Version 1

USER GUIDE

How to Cite These Data

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

National Operational Hydrologic Remote Sensing Center. 2004. *Snow Data Assimilation System (SNODAS) Data Products at NSIDC, Version 1*. [Indicate subset used]. Boulder, Colorado USA. NSIDC: National Snow and Ice Data Center. https://doi.org/10.7265/N5TB14TC. [Date Accessed].

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

FOR CURRENT INFORMATION, VISIT https://nsidc.org/data/G02158

National Snow and Ice Data Center

TABLE OF CONTENTS

1 DETAILED DATA DESCRIPTION

1.1 Overview

This data set contains output from the NOAA National Weather Service's National Operational Hydrologic Remote Sensing Center (NOHRSC) SNOw Data Assimilation System (SNODAS). SNODAS is a modeling and data assimilation system developed by NOHRSC to provide the best possible estimates of snow cover and associated parameters to support hydrologic modeling and analysis. The aim of SNODAS is to provide a physically consistent framework to integrate snow data from satellite, airborne platforms, and ground stations with model estimates of snow cover (Carroll et al. 2001). SNODAS includes procedures to ingest and downscale output from the numerical weather prediction (NWP) models and to simulate snow cover using a physically based, spatially-distributed energy- and mass-balance snow model. SNODAS also includes procedures to assimilate satellite-derived, airborne, and ground-based observations of snow-covered area and snow water equivalent (SWE).

NOHRSC, located in Minneapolis, Minnesota, supplies snow information in a variety of products and formats to meet operational forecasting needs. Most of these products are available from the NOHRSC website. In partnership with NOHRSC, the NOAA program at NSIDC provides this subset of SNODAS output as a service for an extended community of users. We archive, document, and distribute selected SNODAS parameters. These output files are valuable for hydrologists, hydrologic modelers, climatologists, ecologists, and land surface modelers. These data are not suitable for snow fall events or totals for specific regions, for further details please see the FAQ *Can I sum SNODAS values for a given area?* For snow fall data, please see the state climatology reports for a particular state.

This documentation draws heavily on an assessment of SNODAS products by Barrett (2003) and on material provided by NOHRSC. Consult these sources for additional information. While we attempt to keep the documentation current, NOHRSC sometimes makes changes in processing or output format that are not caught by us before some time has passed. We depend on users to make us aware of inconsistencies in the product, and we correct them or document them as resources allow.

1.2 Parameter or Variable

Provided here are gridded data sets for the contiguous United States at a 1 km spatial resolution and a 24-hour temporal resolution. Data are stored in flat binary 16-bit signed integer big-endian format with header and metadata files. Both a masked version for the contiguous United States and an unmasked version that extends north into Canada are available.

The SNODAS product is model output and should not be confused with actual observations. These data are not suitable for snow fall events or totals for specific regions. For information on snowfall events or snowfall totals, please contact one of the climate centers listed below:

- American Association of State Climatologists website
- NOAA Regional Climate Centers website
- NOAA National Climatic Data Center website

Eight driving, state, and diagnostic parameters are archived by NSIDC (Table 1). Through September 2018, driving parameters were ingested from the Rapid Update Cycle 2 (RUC2) NWP model and used to force the snow model. For data after September 2018 through the present, driving parameters are ingested from the Rapid Refresh (RAP) NWP model. In early November 2018, the High-Resolution Rapid Refresh (HRRR) was added to the operational forcing engine. The HRRR grid does not cover the entire SNODAS domain, but the RAP grid does. Therefore, the two are combined. HRRR is used for the grid tiles where it is available; otherwise, RAP is used (Figure 1).

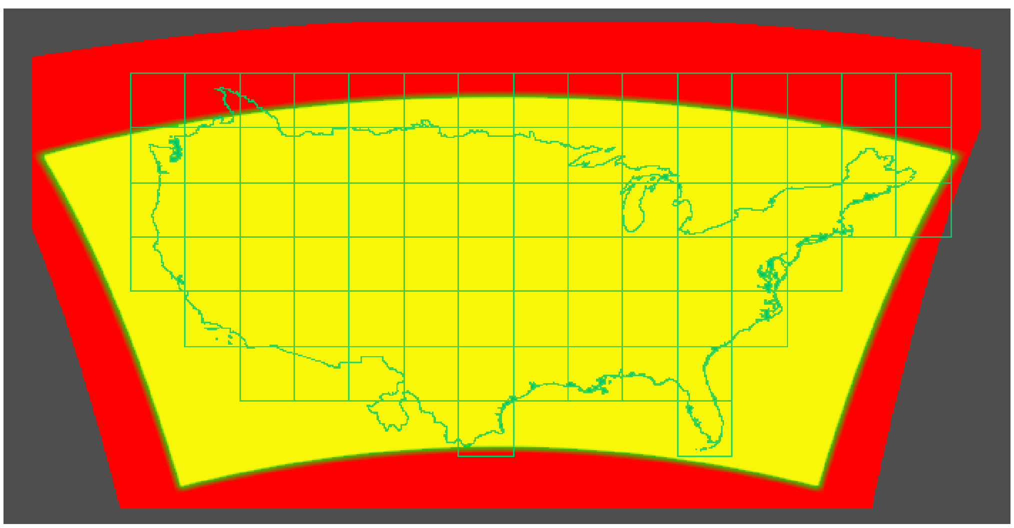

Figure 1. Map showing where HRRR and RAP grids are used. HRRR is used in yellow areas, and RAP is used in red. The square "tiles" overlaying the image show the extent of the SNODAS coverage.

State variables are defined here as parameters that the snow model keeps track of and that describe the state of the model snow pack. State variables are modeled snow pack characteristics that are also required to initialize the model. Diagnostic variables are model output but do not describe the internal state of the model. The parameters archived by NSIDC are listed in Table 1 and can be used to compute snow water balance.

Table 1. Daily NOHRSC SNODAS Products at NSIDC

Parameters	Units	Scale Factor[1]	Product Code	Description	Variable Type
SWE	meters	1000	1034	Snapshot at 06:00 UTC	State
Snow Depth	meters	1000	1036	Snapshot at 06:00 UTC	State
Snow Melt Runoff at the Base of the Snow Pack	meters	100,000	1044	Total of 24 per hour melt rates, 06:00 UTC-06:00 UTC	Diagnostic
Sublimation from the Snow Pack	meters	100,000	1050	Total of 24 per hour sublimation rates, 06:00 UTC-06:00 UTC	Diagnostic
Sublimation of Blowing Snow[3]	meters	100,000	1039	Total of 24 per hour sublimation rates, 06:00 UTC-06:00 UTC	Diagnostic
Solid Precipitation	kg/m^2	10	1025 (v code = IL01)	24-hour total, 06:00 UTC-06:00 UTC	Driving
Liquid Precipitation	kg/m^2	10	1025 (v code = IL00)	24-hour total, 06:00 UTC-06:00 UTC	Driving
Snow Pack Average Temperature[2]	kelvin	1	1038		State

[1] To convert integers in files to model output values, divide integers in files by scale factor.
[2] Please note that Snowpack Average Temperatures are integers. Also, this parameter is not included in files prior to 21 February 2004.
[3] The convention used for SNODAS sublimation fluxes is that a positive value means water is added to the snowpack, and a negative value indicates that water is removed from the snowpack. Blowing snow sublimation should never be positive. See main text for more details.

Warning: There are two issues to be aware of with respect to the SWE parameter:

1. There are some high-elevation regions that have erroneously high values of SWE (as high as 32.767 m). This issue is described further in section 1.9.1 Erroneously High SWE Values.

2. In December 2018, NSIDC became aware that there were persistent, erroneous zeroes in SWE data primarily found around the perimeters of water bodies and along coastlines. In October 2019, the data provider, NOHRSC, was able to diagnose and fix the issue. Details of the issue and its consequences are described below.

The issue arose when NOHRSC adjusted their land/water mask in October 2014. Because of an error made at the time in the modification of the model state variables, the new mask was never properly initialized for many locations on the SNODAS grid. Exactly 126,950 cells on the grid, primarily found around the perimeters of water bodies and along coastlines, were affected. In the SNODAS archives at NSIDC, these cells will erroneously have zero values for snow water equivalent and snow depth for the period from 09 October 2014 through 10 October 2019. Prior to 09 October 2014, these cells have missing values. After 10 October 2019, those cells are modeled and contain valid data (Table 2).

NOHRSC provided a GeoTIFF repair mask that can be used to identify the affected grid cells in the unmasked version of the SNODAS data files. A value of zero in this mask file indicates a cell where NSIDC archives should be used as is. A value of one in this mask file indicates a cell where gridded SNODAS archives of snow depth and snow water equivalent from 2014-10-09 through 2019-10-10 should be set to a no-data value. It is called SNODAS_Zero_Repair_Mask.tif and is available via HTTPS at: https://noaadata.apps.nsidc.org/NOAA/G02158/.

Table 2. Dates of valid and erroneous SWE and snow depth data values

Date (YYYY-MM-DD)	SWE/depth values for 126,950 affected cells
2014-10-08 and earlier	no-data value (-9999)
2014-10-09 through 2019-10-10	0.0 (erroneous SWE/depth data value)
2019-10-11 and after	valid modeled SWE/depth

The convention used for sublimation fluxes is that a positive value means water is added to the snowpack (which occurs with regular snowpack sublimation when condensation occurs), and a negative value indicates that water is removed from the snowpack. Blowing snow sublimation should never be positive and it does not add snow, and it is not sufficient to offset limitless accumulations in the model that can occur in some high-elevation regions and lead to erroneously high SWE values.

1.3 Format

SNODAS data files are supplied to NSIDC as flat binary 16-bit signed integer big-endian grids. A header file is also supplied to NSIDC as a text file, which includes metadata. The data files can be read by user-written routines such as Fortran and C programs; off-the-shelf image processing packages such as ENVI, IDL, MATLAB, and ERDAS IMAGINE; and by GIS and other mapping packages such as GMT, GRASS, and ARC/INFO. For instructions, such as importing files into ENVI, refer to Barrett (2003).

The header files contain information to georegister grids contained in the flat binary files. They also contain information about creation and modification of each file, data type of each file, georeferencing data, maximum and minimum values, calibration/scaling information, and a time stamp for each field. Two attributes of the header file that most users will want to pay attention to are the minimum/maximum x and y axis coordinates. These are the grid cell edges that define the extents of the grid. The Benchmark y-axis coordinate in SNODAS header files does change over time.

1.4 File and Directory Structure

The masked and unmasked data files are organized on the HTTPS site in separate directories labeled `masked` and `unmasked`. Within these two directories are subdirectories labeled by a 4-digit year (`YYYY`). Within the year directories, there are subdirectories for the months of the year of the form `MM_mon` where `MM` is the two-digit month number and mon is the three-character month abbreviation. Each month directory contains the tarred archive file, usually one for each day of the month.

1.5 File Naming Convention

This section describes the file names of the files on the HTTPS site. There are eight daily data files (one for each data parameter) and eight daily header files (one for each data file) that are compressed using gzip. These 16 gzipped files are packaged together into one daily tar file and placed on the HTTPS site.

Note that in July 2019, the filename extensions for the uncompressed header files (`.hdr`) were changed to `.txt`. The decision to rename the file extensions was made to reduce users confusing these files with standard .hdr files read by software packages like ENVI or ArcGIS.

1.5.1 Tarred Daily File Naming Convention (.tar)

The data are available through the HTTPS site as daily tar files with the following naming convention and as described in Table 3:

```
SNODAS_YYYYMMDD.tar
SNODAS_unmasked_YYYYMMDD.tar
```

Where:

Table 3. Daily Tar File Naming Convention

Variable	Description
SNODAS	Identifies this as SNODAS data
unmasked	Identifies this as an unmasked version of the SNODAS data
YYYY	4-digit year

Variable	Description
MM	2-digit month
DD	2-digit day of month
.tar	Identifies that this file has been tarred

1.5.2 Untarred Daily File Naming Convention (.gz)

Once you untar the daily files, you will find 16 gzipped files: Eight data files and eight header files. The gizipped files have the following naming format and are described in Table 4:

`rr_mmmffppppSvvvvTttttaaaaTSyyyymmddhhIP00Z.xxx.gz`

Example: `us_ssmv11034tST0001TTNATS2003102305HP001.dat` is modeled snow water equivalent (`ssmv11034`) summed for all the layers of the snow model (`tS__`). It is the output from just one hour (`T0001`), representing the time step starting at 2003-10-23, 0500h (`TS2003102305`). It is potentially generated for every hour of the day (`H`), and represents the snow an hour after the start of the time step (`P001`), that is, SWE at 0600h.

Where:

Table 4. Daily Tar File and Header File Naming Convention

Variable	Description
rr	Region of the file (us: United States, zz: Full unmasked version)
mmm	Model used to generate the estimates (ssm: simple snow model)
ff	Signifies if the file contains snow model driving data or model output v0: Driving data such as precipitation v1: Operational snow model output
pppp	Product code 1025: Precipitation 1034: Snow water equivalent 1036: Snow depth 1038: Snow pack average temperature 1039: Blowing snow sublimation 1044: Snow melt 1050: Snow pack sublimation
S	Denotes driving variables have been down scaled from NWP model resolution to the resolution of SNODAS. This code only appears in file names for driving variables.

Variable	Description
vvvv	A vertical integration code that denotes what type of snow pack data are being collected. Precipitation data: IL00: Non-snow (liquid) precipitation IL01: Snow precipitation. Snow model outputs: IL00: Fluxes to and from the snow surface such as sublimation tS__: Integral through all the layers of the snow pack bS__: Bottom of the snow pack such as snow melt wS__: Snow-water-equivalent-weighted average of the snowpack layers
Ttttt	Time integration code: T0024: A quantity integrated over 24 hours (generally used for mass and energy fluxes) T0001: A one-hour snapshot (generally used for states, such as SWE) Note: Files with a product code (pppp) of 1038 have a time integration code of the form Atttt. All other values are the same.
aaaa	Detail of snow modeling operations (will always be TTNA)
TS	Stands for time step code . It is followed by the year, month, day, and hour of the start of the last time step of the integration period for which these data apply. For example, the time integration code, T0024, and time step code, TS2003102305, are for the time interval 2003-10-22 06 to 2003-10-23 05.
yyyy	4-digit year
mm	2-digit month
dd	2-digit day of month
hh	2-digit hour of day
I	Time interval (H: hourly, D: daily). In general, H is associated with rasters with a time integration code of T001 and D is associated with rasters with a time integration code of T0024.
P00Z	Offset code that refers to where the data applies during a snow model time step in the snow model's differencing scheme. P001: Denotes that a field represents a total flux for the entire time step such as precipitation or that a field represents data at the end of a time step. P000: Denotes a field of data from the start of a time step.
xxx	File extension .dat: Data file .txt: Header file
.gz	Identifies that this file has been compressed using gzip.

1.6 File Size

Table 5 shows the size of the files depending on level of compression or tarring and whether they are the masked or unmasked version.

Table 5. File Sizes

File Type	Size Range
Masked tar files (.tar)	1.2 MB - 35 MB
Masked uncompressed data files (.dat)	46.5 MB
Masked uncompressed header files (.txt)	4 KB
Unmasked tar files (.tar)	3.4 MB - 102 MB
Unmasked uncompressed data files (.dat)	67.1 MB
Unmasked uncompressed header files (.txt)	4 KB

1.7 Spatial Coverage

Note: A small spatial data shift occurs on 01 October 2013 in the SNODAS period of record. On this date, the data provider, NOHRSC, slightly changed the center coordinates of the grid to align with an integer value of latitude and longitude. The resulting shift is very small, 5 % of a 1 km grid cell in each direction (eastward and northward). However, if this shift will cause a significant impact to your study, we have listed the spatial coverage for the both the masked and unmasked files before and after 01 October 2013 (Table 6 and Table 7).

1.7.1 Masked Files

The masked data files represent snow cover in the contiguous United States, extending into Canada for certain drainage basins. Figure 2 is an example of the SNODAS SWE field displayed as an image. The spatial coordinates of the area are listed in Table 6.

Table 6. Spatial bounds for masked files before and after 01 October 2013.

	Files prior to 01 October 2013	Files 01 October 2013 onwards
Southernmost Latitude	24.9504° N	24.9500° N
Northernmost Latitude	52.8754° N	52.8750° N
Westernmost Longitude	124.7337° W	124.7333° W
Easternmost Longitude	66.9421° W	66.9417° W

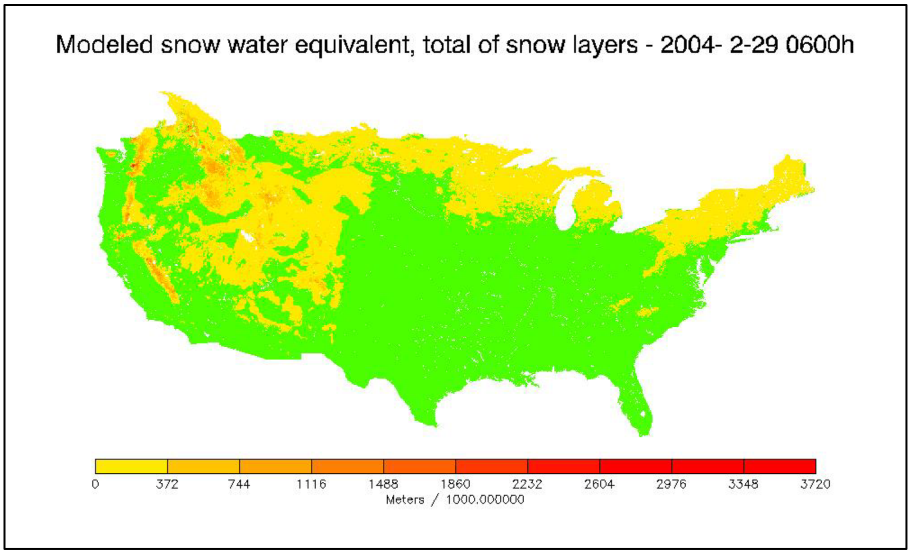

Figure 2. Sample SWE Output from SNODAS for 29 February 2004 for the masked files.

1.7.2 Unmasked Files

The unmasked data files represent snow cover in the contiguous United States, in addition to extending well into Canada as well as outlines the coast and contains parts of Mexico. Figure 3 shows an example of snow depth for the unmasked files. The spatial coordinates of the area are listed in Table 7.

Table 7. Spatial bounds for unmasked files before and after 01 October 2013.

	Files prior to 01 October 2013	**Files 01 October 2013 onwards**
Southernmost Latitude	24.0996° N	24.1000° N
Northernmost Latitude	53.9667° N	58.2333° N
Westernmost Longitude	130.5171° W	130.5167° W
Easternmost Longitude	62.2504° W	62.2500° W

Note: This coverage is not consistent until 2013. SNODAS data coverage over eastern Canada is non-existent in 2010, extends up to 50° N in 2011 and 2012, and then goes up to the full 58.2329° N in 2013.

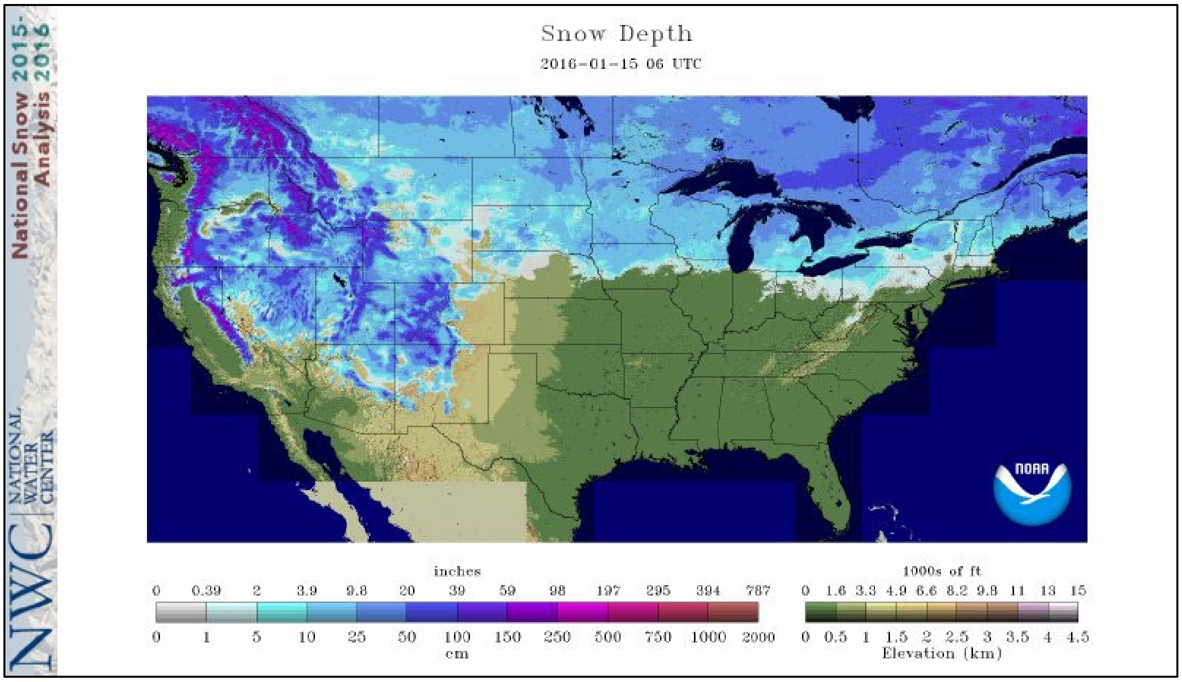

Figure 3. Sample Snow Depth Output from SNODAS for 15 January 2015
for the unmasked files. Image courtesy of NOHRSC.

1.7.3 Spatial Resolution

These data are provided at a 1 km spatial resolution.

1.7.4 Projection and Grid Description

The grid for the masked data files is 6,935 columns by 3,351 rows; for the unmasked files, it is 8,192 columns by 4,096 rows. Grid values are 16-bit, signed integers (big-endian). The first value at (1,1) is the top-left corner of the array (NW corner in this context). The file is structured so that values are read across the rows. For example, the second value to be read would be the second column of the first row (2,1). Grid cells have a 30-arc second spacing (nominally 1 km on the ground). Model output and precipitation variables are point estimates for the center of each grid cell and not an areal estimate. However, for the purposes of hydrologic and snow-cover forecasts, these point estimates are assumed to represent average conditions in each grid cell.

The x- and y- axis coordinates are listed in the header files (.txt) associated with each data file. The x-axis coordinate of the center of the upper left-hand cell is given in the **Benchmark x-axis coordinate**, and the x-axis coordinate of the left edge of the upper left-hand cell is given in the **Minimum x-axis coordinate**. The y-axis coordinate of the center of the upper left-hand cell is given in the **Benchmark y-axis coordinate**, and the y-axis coordinate of the top of the upper left-hand cell is given in **Maximum y-axis coordinate.**

Note: There are two things to be aware of with respect to the coordinates in the .txt header files:

1. The Benchmark y-axis coordinate changes over time
2. The minimum and maximum x- and y-axis coordinates do not exactly match the spatial bounds listed in Table 6 and Table 7. This is due to minor precision issues with how these coordinates are expressed in the header files. If you wish to convert the files to GeoTIFF or NetCDF format please use the coordinates that are listed in the tutorial How do I convert SNODAS binary files to GeoTIFF or NetCDF?

The **X-axis offset** and the **Y-axis offset** in the header files are the distances between the origin and the center of the pixel that lays over the origin. The purpose of those parameters is to provide an easy way of confirming whether or not two grids are aligned, without regard to whether or not they occupy the same region.

1.7.4.1 Projecting SNODAS Data

SNODAS fields are grids of point estimates of snow cover in latitude/longitude coordinates with the horizontal datum WGS 84. Estimates of SWE and snow depth, as well as other parameters, have no real areal extent. Therefore, projecting SNODAS output to a particular projection may not be necessary. Moreover, different users prefer different projections. For example, federal agencies are likely to use the Albers Equal Area projection, while researchers may prefer an alternative such as one of the projections used for the Equal Area Scalable Earth (EASE-Grid). Refer to All About EASE-Grid for more information. Given that SNODAS outputs are essentially point estimates, the decision to project the data and choice of projection can be left to individual users.

1.8 Temporal Coverage and Resolution

The masked files span 30 September 2003 to the present, and the unmasked files span 09 December 2009 to the present at a daily resolution. Throughout the record there are several days for which there are no data and hence no file available to download, the dates vary for the masked and unmasked files. For a list of dates known to be missing all data, see the text file G02158_missing_files.txt, which can be found via HTTPS at: https://noaadata.apps.nsidc.org/NOAA/G02158/G02158_missing_files.txt.

NSIDC archives fields representing the model state for 06:00 Universal Time (UTC). The time 06:00 UTC was chosen because this is closest to midnight for the United States. Snow data are for 01:00 local time for the East Coast and 22:00 for the West Coast. SWE, snow depth, and snow pack average temperature represent the state of the snow pack at 06:00 UTC. Snow melt runoff, sublimation and evaporation, and precipitation parameters that describe sources and sinks of snow pack water are integrated for the previous 24 hours, giving daily totals. Note that output for 06:00

UTC is a best estimate of snow pack characteristics. Because SNODAS only updates snow fields once a day, 18 out of 24 time steps in each day's model run do not use observations to update model estimates. Therefore, hourly data from SNODAS is model output only and does not represent the best possible estimate of the snow pack.

1.8.1 Near-Real-Time Data

NSIDC has scripts that run several times a day. If new SNODAS files are found, these scripts will automatically post them to our HTTPS server. If you need data sooner than the normal time frame that NSIDC uploads files to our HTTPS site, you can contact NOHRSC, as they distribute the data for operational users.

1.9 Quality Assessment

Warning: NOHRSC did not begin to routinely perform snow assimilation until the start of the October 2004 – September 2005 water year. Therefore, users are discouraged from using SNODAS data before October 2004.

NSIDC has not assessed the quality of these data. For information, please refer to Barrett (2003), or contact NOHRSC.

1.9.1 Erroneously High SWE Values

There are some high-elevation regions that have erroneously high values of SWE due to the following reasons (Greg Fall, personal communication January 2023):

1. The mechanisms for snow removal in certain high-elevation areas are insufficient in the SNODAS model, causing the snowpack in these areas to grow without limit. The only way to lose snow in a place where it never gets above freezing is through sublimation. It is likely that the sublimation mechanisms in the model are not sufficient to limit or necessarily even control boundless snow accumulation.
2. In general, there are not observations at these elevations, and the SNODAS assimilation process does not have a mechanism for controlling the SWE estimates in these areas.
3. When the data are archived, the floating-point values in meters are scaled by a factor of 1000 and stored as integers. Any SWE value ≥ 32.767 meters will thereby scale to 32,767 which is the maximum value of a two-byte signed integer.

2 DATA ACQUISITION AND PROCESSING

NOHRSC supplies NSIDC with files that only have the eight variables contained in this data set. No additional processing is done at NSIDC except for the renaming of the file extension. See the References section for a list of papers on NOHRSC processing.

A note on solar radiation. The SNODAS surface energy balance model does incorporate solar radiation forcing. The method for incorporating solar radiation into the snowpack upper surface is akin to the snow surface temperature calculation of Tarboton and Luce (1996), whereas the mass/energy fluxes are modeled after SNTHERM. Incoming solar radiation from Numerical Weather Prediction (NWP) models is downscaled using Jeff Dozier's TOPORAD formulation which is based on terrain (pers. comm. Greg Fall, NOHRSC, August 2023).

Details of the modeling systems that were combined to create the SNODAS model can be found in Jordan (1991), Pomeroy et al. (1993), and Tarboton et al. (1996).

3 SOFTWARE AND TOOLS

The following tutorials are available for the SNODAS product:

- **How do I import SNODAS data into ArcGIS?**
- **How do I convert SNODAS binary files to GeoTIFF or NetCDF?**

4 VERSION HISTORY

Version	Release Date	Description of Changes
1	November 2004	Initial Release

5 REFERENCES AND RELATED PUBLICATIONS

Barrett, Andrew. 2003. *National Operational Hydrologic Remote Sensing Center Snow Data Assimilation System (SNODAS) Products at NSIDC*. NSIDC Special Report 11. Boulder, CO USA: National Snow and Ice Data Center. 19 pp.

Carroll, T. 2005. *Overview of the Center's Web Site and Products*. National Operational Hydrologic Remote Sensing Center, 15 pp.

Carroll, T., D. Cline, G. Fall, A. Nilsson, L. Li, and A. Rost. 2001. *NOHRSC Operations and the Simulation of Snow Cover Properties for the Conterminous U.S.* In Proceedings of the 69th Annual Meeting of the Western Snow Conference, Vol. 69, 14 pp.

Carroll, T., D. Cline, C. Olheiser, A. Rost, A. Nilsson, G. Fall, C. Bovitz, and L. Li. 2006. *NOAA's national snow analyses*. In Proceedings of the 74th Annual Meeting of the Western Snow Conference, Vol. 74, 14 pp.

Jordan, R. 1991. A one-dimensional temperature model for a snow cover: technical documentation for SNTHERM.89. U.S. Army Cold Regions Research and Engineering Laboratory, Hanover, New Hampshire. 49 pp. https://hdl.handle.net/11681/11677

Jordan, R. 1990. *User's guide for USA-CRREL one-dimensional snow temperature model (SNTHERM.89)*. USA Cold Regions Research and Engineering Laboratory (CRREL), 18 pp.

Pomeroy, J.W., D.M. Gray, and P.G. Landline. 1993. The prairie blowing snow model: characteristics, validation, operation. Journal of Hydrology. Vol. 144 (1-4). 165-192 pp. https://doi.org/10.1016/0022-1694(93)90171-5

Tarboton, D.G., and C.H. Luce. 1996. Utah Energy Balance Snow Accumulation and Melt Model (UEB). Utah Water Research Laboratory, Utah University and USDA Forest Service, Intermountain Research Station. 41 pp. https://hydrology.usu.edu/dtarb/snow/snowrep.pdf

5.1 Related Websites

- NOHRSC Web site: Provides additional NOHRSC snow products and tools.
- NOHRSC Science and Technology web site: Provides links to presentations about NOHRSC and their products. Two presentations that may be of interest:
  - NOHRSC Overview (2015)
  - National Snow Analysis: 13 Years of Operations (2017)
- In Colorado, the Bureau of Reclamation and Colorado Water Conservation Board are assessing SNODAS for hydrological forecasting purpose. Visit the U.S. Department of the Interior Bureau of Reclamation Web site Snow Data Assimilation System (SNODAS) Colorado Data Plots and the Western Water Assessment for more information.
- Open Water Foundation SNODAS data viewer: Provides an interactive web application of an historical archive of SNODAS data products for Colorado water supply basins

6 CONTACTS AND ACKNOWLEDGMENTS

Thomas Carroll (Retired)
National Weather Service, National Operational Hydrologic Remote Sensing Center
Chanhassen, MN USA

6.1 Acknowledgments

This data set and documentation were developed with the assistance of NOHRSC Director, Thomas Carroll, and NOHRSC staff as well as NSIDC's Andrew Barrett.

Development and distribution of the data set from NSIDC is supported by funding from NOAA's National Environmental Satellite, Data, and Information Service (NESDIS) and the National Centers for Environmental Information (NCEI).

7 DOCUMENT INFORMATION

7.1 Authors

This documentation was written by Keri Webster and Florence Fetterer and is based on the publication National Operational Hydrologic Remote Sensing Center Snow Data Assimilation System (SNODAS) Products at NSIDC (Barrett, 2003).

7.2 Publication Date

November 2004

7.3 Revision History

August 2023: J. Roebuck added a footnote to Table 1 regarding convention used for snow sublimation and added further details on snow sublimation to section 1.2. Also added details on solar radiation driving variable to section 2.

February 2023: J. Roebuck corrected the spatial shift note, in section 1.7, from ¼ of a 1 km grid cell to 5% of a 1 km grid cell.

January 2023: J. Roebuck added details about high SWE values to section 1.9 Quality Assessment.

December 2022: J. Roebuck added a note about the G02158_missing_files.txt file to section 1.8 and added a note under Table 1 about the lack of product code 1038 in files prior to 21 February 2004.

June 2022: A. Windnagel added a description and link to the zero value repair mask supplied by NOHRSC to section 1.2.

May 2022: J. Roebuck added a link to an FAQ about summing SNODAS data values to section 1.1, added a note about the usage of the HRRR and RAP grids to section 1.2, added details about a spatial shift in the data to section 1.7, and added a warning about the quality of the data prior to October 2004 in section 1.9.

February 2020: A. Windnagel updated the Data Description section describing the persistent zero issue in SWE/depth data.

July 2019: A. Windnagel updated the documentation to reflect the name change to the header file from .hdr to .txt.

January 2019: A. Windnagel updated the documentation with a list of tools to manipulate

SNODAS data, updated the Overview section, and updated the Detailed Data Description section to note that the RUP model is used now instead of the RUC2 model.

February 2012: A. Windnagel updated the documentation to describe the unmasked files that are now available.

June 2011: A. Windnagel updated the File and Directory Structure and File Naming Convention sections to describe the FTP site structure. Also removed the Opening FTP .tar.gz Files with WinZip section since the files are not tarred and gzipped the same way anymore.

February 2010: A. Windnagel removed all references to the GISMO subsetting interface because it is being decommissioned.

January 2010: A. Windnagel added an SSI about the new Beta Advanced Data Search interface.

June 2009: A. Windnagel updated the Grid Description section with information on the order of the array.

May 2009: A. Windnagel updated the File Naming Convention section that was missing some information, added information on opening the .tar.gz files with WinZip, added information on obtaining near-real-time data, and added a glossary.

August 2008: D. Miller updated guide doc with edits from Florence Fetterer and Andy Barrett.

April 2008: D. Miller reformatted and reorganized the guide documentation based on comments from User Services (Kara Gergely) to make the guide documentation easier to use. USO was receiving a lot of questions about this data set.

February 2007: F. Fetterer made the following changes: Added link to the Bureau of Reclamation and WWA Web sites, added units and product code to table, added information on using GISMO formerly found in the FAQ.

February 2006: F. Fetterer added links to a Frequently Asked Questions page authored by L. Ballagh.

December 2005: F. Fetterer added text describing the renaming of .grz files at NSIDC. Renaming was instituted in December 2005 for the following reasons: 1) .grz is not a standard data type or file extension, 2) The compression and storage of the files is accomplished by tarring each set and then compressing them using the gzip compression program. This has several recognized file name extensions, but the most prevalent is .tar.gz. Changing the extension to this more recognized format will help alleviate user confusion while at the same time not altering the actual distributed data files contained within the tarred file.

December 2005: F. Fetterer added text advising users needing data on an operational basis to contact NOHRSC.

May 2005: F. Fetterer added information on subsetting options.