Weather Research and Forecasting (WRF) North American Mountain Snow Data, Version 1

USER GUIDE

How to Cite These Data

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

Wrzesien, M. and M. Durand. 2018. *Weather Research and Forecasting (WRF) North American Mountain Snow Data, Version 1*. [Indicate subset used]. Boulder, Colorado USA. NASA National Snow and Ice Data Center Distributed Active Archive Center. https://doi.org/10.5067/W4JHZBCRCNLX. [Date Accessed].

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

FOR CURRENT INFORMATION, VISIT https://nsidc.org/data/NSIDC-0736

National Snow and Ice Data Center

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1 DATA DESCRIPTION

This data set provides simulated snow water equivalent (SWE) for 10 mountain ranges within North America at a spatial resolution of 9 km. The data were simulated using the Weather Research and Forecasting (WRF) regional climate model and are presented as 10 individual WRF simulations between 2004 and 2013 for each of the mountain ranges. Each simulation covers the time period from 01 October from one year to 30 June of the following year; i.e., the winter accumulation and spring melt seasons. See Table 1 for a list of mountain ranges and the corresponding simulation years.

1.1 Parameters

The parameter presented in this data set is SWE in millimeters.

1.2 File Information

1.2.1 Format

The data are in netCDF (`.nc`) format.

1.2.2 File Contents

Each netCDF file contains SWE in millimeters, elevation in meters, latitude and longitude coordinates, time, and a data mask. The purpose of the mask, which consists of values equal to 1, is to select the mountain ranges within each domain. Figure 1 shows peak (i.e., maximum) SWE for all mountain ranges from all representative years.

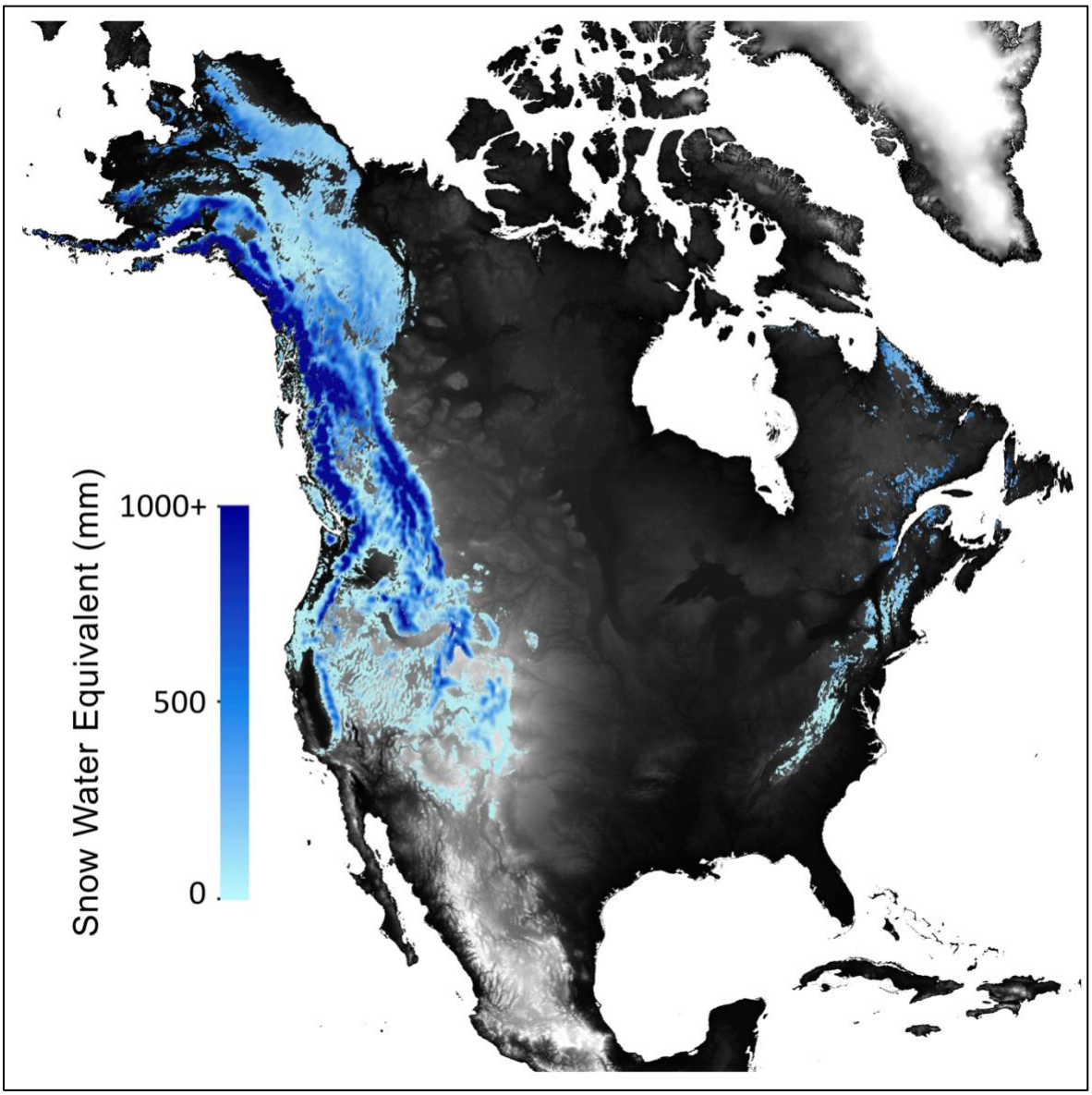

Figure 1. Compilation of peak SWE (in mm) from each WRF simulation, i.e., for all mountain ranges in this data set. Figure adapted from Wrzesien et al. (2018).

1.2.3 Directory Structure

Data are available via HTTPS from the following directory:

https://daacdata.apps.nsidc.org/pub/DATASETS/nsidc0736_WRF_swe_v01/

Within this directory, there are 10 files that correspond to the different mountain ranges on the North American continent and span different time periods. Table 1 lists the different mountain ranges and corresponding simulation years; Figure 2 provides the locations of the mountain ranges.

Table 1. Mountain Ranges and Corresponding Simulation Years

Mountain Range (x) = Number in Figure 2	File Name Designation	Simulation Years
Alaska (1)	alaska	2007–2008
Appalachian (2)	app	2004–2005
Brooks (3)	brooks	2004–2005
Cascades (4)	cascades	2008–2009
Coast (5)	coast	2004–2005
Mackenzie (7)	mackenzie	2012–2013
Rockies, Canada (8)	nrockies	2011–2012
Sierra Nevada (9)	sierra	2008–2009
Rockies, USA (6, 10)*	srockies	2005–2006
Torngat (11)	torngat	2007–2008

Note: The Rockies, USA, range also includes the Great Basin range (mountain range number 6 in Figure 2).

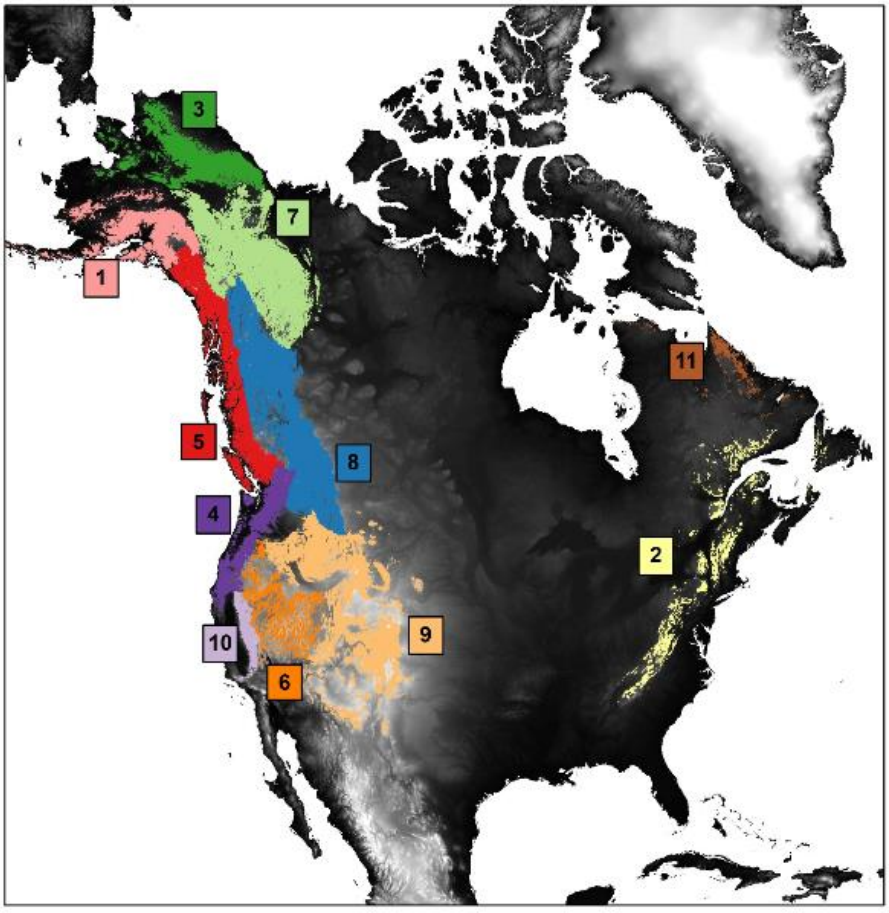

Figure 2. Individual mountain ranges from the WRF simulations. The numbers on the map correspond to the numbers in parentheses in Table 1. Figure from Wrzesien et al. (2018).

1.2.4 Naming Convention

The data files are named according to the following convention and as described in Table 2.

Example file names:

`alaska_2007_2008_swe_v01.nc`

File naming convention:

`mtnrange_YYYY_yyyy_swe_v01.nc`

Table 2. File Naming Convention

Variable	Description
`mtnrange`	Mountain range; e.g., alaska = Alaska (see Table 1)
`YYYY_yyyy`	Simulation start and end years; e.g., `2007_2008` (see Table 1)
`swe`	Data set parameter; `swe` = snow water equivalent
v01	Data set version; `v01` = Version 1

1.2.5 File Size

The total file volume is approximately 2.1 GB.

1.3 Spatial Information

1.3.1 Coverage

The mountain ranges simulated in this data set fall within the following geographical boundaries:

Northernmost latitude: 69.7° N
Southernmost latitude: 31.9° N
Easternmost longitude: 56.8° W
Westernmost longitude: 168.2° W

1.3.2 Resolution

The data are gridded at a horizontal resolution of 9 km x 9 km.

1.3.3 Geolocation

All 10 WRF simulations in this data set were run using a Lambert Conformal Conic Projection. However, different true latitude and standard longitude points were chosen for each of the

simulated domains. Thus, the coordinate system information varies between the individual domains and for each file.

1.4 Temporal Information

1.4.1 Coverage

01 October 2004 to 30 June 2013

1.4.2 Resolution

Daily

2 DATA ACQUISITION AND PROCESSING

2.1 Acquisition and Processing

The reader is referred to Wrzesien et al. (2018) for details on the processing steps used to generate these data.

2.2 Quality, Errors, and Limitations

Due to the computational demands of simulating a model at 9 km resolution across the whole North American continent, it was not possible to perform one continuous multiple-year simulation to produce a multi-decadal climatology. Instead, a new method called "representative-climatology" was introduced, which approximates a traditional climatology by simulating separate model domains for a single representative year specific to each mountain range (see Table 1). One caveat of the representative-climatology method is that the SWE estimates were derived from simulating individual years instead of using a more traditional multi-decadal climatology. Wrzesien et al. (2018) performed an analysis to assess the suitability of this approach and found that for three independent global data products, the total SWE across individual representative years for each range fell within ±7% of the 30-year average. Thus, this approach reasonably approximates a continental climatology at a fraction of the computational cost.

2.3 Instrumentation

The numeric model used in this study is WRF, Version 3.6, coupled to the Noah-MP land surface model (Niu et al., 2011). Simulations were run as one-way nested domains, with an outer and an inner domain. The outer domain, which has a spatial resolution of 27 km, forces the inner 9 km

domain. Only the 9 km resolution data are presented in this data set. The outermost boundaries were forced by the ERA-Interim reanalysis (Dee et al., 2011), which was chosen as the forcing data set since it covers all of the North American continent. More information on the WRF model and the simulations can be found in Wrzesien et al. (2018).

3 SOFTWARE AND TOOLS

Use Panoply or GIS software tools to view the NetCDF files.

4 RELATED DATA SETS

Snow Data Assimilation System (SNODAS) Data Products at NSIDC
ASO L4 Lidar Snow Water Equivalent 50m UTM Grid
Canadian Meteorological Centre (CMC) Daily Snow Depth Analysis Data

5 RELATED WEBSITES

MEaSUREs at NSIDC | Overview

6 CONTACTS AND ACKNOWLEDGMENTS

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7 REFERENCES

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8 DOCUMENT INFORMATION

8.1 Publication Date

20 August 2018

8.2 Date Last Updated

20 May 2021