High Mountain Asia Langtang Shortwave Downward Irradiance, Version 1

USER GUIDE

How to Cite These Data

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

Tsay, S. 2019. *High Mountain Asia Langtang Shortwave Downward Irradiance, Version 1*. [Indicate subset used]. Boulder, Colorado USA. NASA National Snow and Ice Data Center Distributed Active Archive Center. https://doi.org/10.5067/1W3HSQ5D3VKP. [Date Accessed].

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

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

National Snow and Ice Data Center

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1   DATA DESCRIPTION

This data set is closely related to *High Mountain Asia Langtang Snow Properties, High Mountain Asia Langtang Snow Bidirectional Reflectance Factor*, and *High Mountain Asia Langtang Automatic Weather Station Measurements*. All of these data sets feature point measurements that were collected on or near the Yala Glacier in Nepal.

1.1 Parameters

The main parameter provided in this data set is shortwave downward irradiance (SDI). The parameters provided in the netCDF files are described in Table 1.

Table 1. Parameter Information

Parameter	Description	Units
altitude	Altitude	m
JulianUTC	Julian time in UTC	-
latitude	Latitude	° N
longitude	Longitude	° E
SWdn_Irrad	SMART-R shortwave downward irradiance	W m^{-2}
UTDay	UTC day	-
UTHour	UTC hour	-
UTMin	UTC minute	-
UTMonth	UTC month	-
UTYear	UTC year	-

1.2 File Information

1.2.1   Format

The data files are provided in netCDF (.nc) format.

1.2.2   Naming Convention

There are two data files in this data set:

HMA_SDI_SMARTr_ICIMOD_BC_20171023_20181125.nc
HMA_SDI_SMARTr_ICIMOD_Kyanjing_20171021_20181124.nc

The files are named according to the following convention, which is described in Table 2:

`HMA_SDI_SMARTr_[site]_[yyyymmdd]_[YYYYMMDD].[ext]`

Table 2. File Naming Convention

Variable	Description
HMA_SDI	Indicates the data set *High Mountain Asia Langtang Shortwave Downward Irradiance*
SMARTr	Indicates the instrument used: SMART-R
site	Indicates one of two measurement sites: • ICIMOD_BC • ICIMOD_Kyanjing
yyyymmdd	Year, month, and day of start of data collection
YYYYMMDD	Year, month, and day of end of data collection
.ext	Indicates file type: .nc = netCDF data file

1.3 Spatial Information

1.3.1 Coverage

Spatial coverage includes two locations in Langtang, Nepal, as noted by the spatial extents in Table 3.

Table 3. Information about Measurement Sites

Measurement Site Name	Latitude	Longitude	Altitude
ICIMOD BC	28.214° N	85.610° E	4901 m
ICIMOD Kyanjing	28.211° N	85.566° E	3862 m

1.3.2 Resolution

This data set consists of two individual measurement sites that are located 4.3 km apart in Langtang, Nepal (see Table 3).

1.3.3 Geolocation

Each data file contains measurements for a single site (see Table 3).

1.4 Temporal Information

1.4.1 Coverage

23 October 2017 to 25 November 2018 (ICIMOD BC)
21 October 2017 to 24 November 2018 (ICIMOD Kyanjing)

1.4.2 Resolution

1 minute

2 DATA ACQUISITION AND PROCESSING

2.1 Background

Climate studies require long-term accurate observations of solar and terrestrial irradiances (fluxes) at the Earth's surface. Commercial pyranometers, such as the Eppley Precision Spectral Pyranometer (PSP), have been widely used since the 1950s for measuring solar irradiance. However, until recently, a major uncertainty in pyranometer specification was the "zero (or thermal) offset", which is not considered a random error. The zero offset is believed to be related to the thermal emission of the instrument's two glass domes, and that ignoring this thermal dome effect (TDE) can cause a few percent of uncertainty in the measurement results.

The shortwave downward irradiance (SDI) measurements in this data set have been TDE-corrected. For more information on this process, see Ji et al. (2011).

2.2 Acquisition and Processing

The acquisition and processing steps include in-lab calibration using a NIST Traceable Lamp with thermal-dome correction and field calibration using night-time data and pre-calibration. For more information on the data acquisition and processing steps, see Ji et al. (2011).

2.3 Quality, Errors, and Limitations

The uncertainty in SDI is close to the NIST Traceable Lamp source uncertainty (roughly 1%). A snow cover flag (Snow_Flg) value of 0 indicates viable data, whereas a value of 1 indicates that the dome is covered with snow. For more information on data quality, errors, and limitations, see Ji et al. (2011).

2.4 Instrumentation

The Eppley Precision Spectral Pyranometer (PSP) is a World Meteorological Organization First Class Radiometer, designed for the measurement of total solar radiation (the sum of direct and diffuse radiation). For more information on the Eppley PSP, see Eppley Lab's Instrument List web page

3   SOFTWARE AND TOOLS

The data files can be opened using netCDF-visualization software such as Panoply.

4   RELATED DATA SETS

High Mountain Asia Langtang Snow Properties

High Mountain Asia Langtang Snow Bidirectional Reflectance Factor

High Mountain Asia Langtang Automatic Weather Station Measurements

High Mountain Asia at NSIDC | Data Sets

5   RELATED WEBSITES

High Mountain Asia at NSIDC | Overview

NASA High Mountain Asia Project

NASA Research Announcement: Understanding Changes in High Mountain Asia

6   CONTACTS

Si-Chee Tsay

NASA's Goddard Space Flight Center (GSFC)

7   ACKNOWLEDGMENTS

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8 REFERENCES

Ji, Q., Tsay, S.-C., Lau, K. M., Hansell, R. A., Butler, J. J., & Cooper, J. W. (2011). A novel nonintrusive method to resolve the thermal dome effect of pyranometers: Radiometric calibration and implications. Journal of Geophysical Research: Atmospheres, 116(D24), n/a-n/a. https://doi.org/10.1029/2011jd016466

9 DOCUMENT INFORMATION

9.1 Publication Date

16 January 2019

9.2 Date Last Updated

18 March 2020