High Mountain Asia GFDL FLOR Modeled Daily Precipitation for Extreme Analysis, Version 1

USER GUIDE

How to Cite These Data

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

Kapnick, S., S. Pascale, T. A. Stanley, and D. B. Kirschbaum. 2019. *High Mountain Asia GFDL FLOR Modeled Daily Precipitation for Extreme Analysis, Version 1*. [Indicate subset used]. Boulder, Colorado USA. NASA National Snow and Ice Data Center Distributed Active Archive Center. https://doi.org/10.5067/I0T1I4WNQ462. [Date Accessed].

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

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

National Snow and Ice Data Center

TABLE OF CONTENTS

1 DATA DESCRIPTION

This data set contains daily modeled precipitation estimates, covering the Himalayan region at a spatial resolution of 0.625º x 0.5º. It is closely related to *High Mountain Asia GFDL FLOR Modeled Extreme Precipitation Indices*, which features seven standard annual mean extreme precipitation indices, simulated by the same model and at the same spatial resolution.

1.1 Parameters

The main parameter in this data set is precipitation (in kg m-2 s-1). Precipitation from the 30-member ensemble simulations and precipitation from the present-day climate simulation are provided in separate files. In addition, a mask file, containing a mask used to produce regional precipitation extreme calculations over the Himalayan Ridge where landslides are prevalent, is provided. Tables 1 to 3 list the parameters provided in the data files and the mask file.

Table 1. Parameter Information for 30-Member Ensemble Simulation Files

Parameter	Description	Units
prec20th	Daily precipitation from 20th century ensemble simulation (1961-2000)	kg m-2 s-1
prec21th	Daily precipitation from 21st century ensemble simulation (2061-2100)	kg m-2 s-1
lat	Latitude	°N
lon	Longitude	°E
day	Days since start date (01 January of a given year)	Days
ens	Ensemble run number	-

Table 2. Parameter Information for Present-Day Climate Simulation File

Parameter	Description	Units
prec	Precipitation from present-day climate simulation (1982-2017)	kg m-2 s-1
lat	Latitude	°N
lon	Longitude	°E
day	Days since start date (01 January of a given year)	Days

Table 3. Parameter Information for Mask File

Parameter	Description	Units
latitude	Latitude	°N
longitude	Longitude	°E
mask	Mask	-

1.2 File Information

1.2.1 Format

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

1.2.2 Naming Convention

There are four data files and one mask file in this data set:

```
HMA_EAPrecip_FLOR_data_summer_1961-2000_2061-2100.nc
HMA_EAPrecip_FLOR_data_winter_1961-2000_2061-2100.nc

HMA_EAPrecip_FLOR_data_summer_nudged_1982-2017.nc
HMA_EAPrecip_FLOR_data_winter_nudged_1982-2017.nc

HMA_EAPrecip_FLOR_GCMmask06.nc
```

The files are named according to the following convention, which is described in Table 4:

```
[HMA_EAPrecip_FLOR_data]_[season]_[1961-2000_2061-2100].[ext]

[HMA_EAPrecip_FLOR_data]_[season]_[nudged_1982-2017].[ext]

[HMA_EAPrecip_FLOR_GCMmask06].[ext]
```

Table 4. File Naming Convention

Variable	Description
HMA_EAPrecip_FLOR_data	Indicates the data set *High Mountain Asia GFDL FLOR Modeled Daily Precipitation* for Extreme Analysis
season	Indicates the season modeled: summer or winter Note: the summer season covers 185 days and starts on 01 May; the winter season covers 180 days (181 days for leap years) and starts on 01 November.
1961-2000_2061-2100	Time periods for the 20th and 21st century 30-member ensemble simulations
nudged_1982-2017	Indicates the nudged present-day climate simulation
HMA_EAPrecip_FLOR_GCMmask06	Indicates the mask file used for regional precipitation extreme analysis
.ext	Indicates file type: .nc = netCDF data file

1.3 Spatial Information

1.3.1 Coverage

Spatial coverage includes the Himalayas, as noted by the spatial extents below.

Northernmost latitude: 35.25° N
Southernmost latitude 26.75° N
Easternmost longitude: 87.8125° E
Westernmost longitude: 72.8125° E

1.3.2 Resolution

The spatial resolution of the data is 0.625° (x-direction, longitude) by 0.5° (y-direction, latitude).

1.3.3 Geolocation

Table 5 provides geolocation information for this data set.

Table 5. Geolocation Details

Geographic coordinate system	WGS 84
EPSG code	4326
PROJ4 string	+proj=longlat +datum=WGS84 +no_defs
Reference	https://epsg.io/4326

1.4 Temporal Information

1.4.1 Coverage

01 January 1961 to 31 December 2000 (20th century 30-member ensemble simulation)
01 January 2061 to 31 December 2100 (21st century 30-member ensemble simulation)

01 January 1982 to 31 December 2017 (present-day climate simulation)

1.4.2 Resolution

Daily

2 DATA ACQUISITION AND PROCESSING

2.1 Background

This data set features modeled precipitation from different simulations by the National Oceanic and Atmospheric Administration (NOAA) Geophysical Fluid Dynamics Laboratory (GFDL) Forecast-oriented Low Ocean Resolution version of the CM2.5 model (GFDL FLOR):

Two 30-member ensemble simulations of daily precipitation for summer and winter spanning 40-year time periods in the 20th century (1961-2000) and 21st century (2061-2100). These data were produced by R. Gudgel and first described in Zhang and Delworth (2018).

One present-day climate simulation from 1982 to 2017, forced with observed sea surface temperatures (Hurrell et al., 2008) and produced using air temperatures and winds nudged to the Modern-Era Retrospective analysis for Research and Applications (MERRA; Rienecker et al., 2011). These data were produced by X. Yang and first described in Yang et al. (2018).

These modeled precipitation estimates can provide insight into the past, present, and future of rainfall-triggered natural hazards, such as landslides, in High Mountain Asia. Landslides are a particular concern in this region due to the frequency with which deadly events occur; the Himalayan Mountains' stark relief, combined with heavy monsoon rainfalls and occasional seismicity, place the region at high risk for landslides.

2.2 Acquisition and Processing

The data were derived from the global climate model GFDL FLOR. To generate the data presented in this data set, a global climate simulation of GFDL FLOR was first performed for each of the three time periods. Then, a subset of data over the High Mountain Asia region set was extracted from the global output for each simulation.

See the Instrumentation section for more information on GFDL FLOR.

2.3 Quality, Errors and Limitations

The precipitation estimates in this data set have not been evaluated for error against an absolute reference.

2.4 Instrumentation

GFDL FLOR is descended from the NOAA GFDL Coupled Climate Models CM2.5 and CM2.1; it combines the higher spatial resolution in the atmosphere and land, higher vertical resolution in the atmosphere, and significantly improved land model of CM2.5 with the relatively low-resolution ocean and sea ice components of CM2.1. GFDL FLOR accurately simulates continental hydroclimate, including extreme precipitation trends in High Mountain Asia.

The original FLOR simulations are described in more detail in Yang et al. (2018).

3 SOFTWARE AND TOOLS

The climate indices were calculated in R using the climdex.pcic library. More details can be found on the climdex.PCIC CRAN repository or the Pacific Climate Impacts Consortium website.

4 RELATED DATA SETS

High Mountain Asia GFDL FLOR Modeled Extreme Precipitation Indices
High Mountain Asia TRMM-derived 3B42 Extreme Precipitation Indices
High Mountain Asia at NSIDC | Data Sets

5 RELATED WEBSITES

High Mountain Asia at NSIDC | Overview
GFDL Global Climate Models, CM2.5 and FLOR
NASA High Mountain Asia Project
NASA Research Announcement: Understanding Changes in High Mountain Asia
GLIMS: Global Land Ice Measurements from Space

6 CONTACTS

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8 REFERENCES

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9 DOCUMENT INFORMATION

9.1 Publication Date

16 January 2019

9.2 Date Last Updated

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