High Mountain Asia Multitemporal Landslide Inventories for the Pumqu/Arun River Basin, Version 1

USER GUIDE

How to Cite These Data

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

Amatya, P. and D. Kirschbaum. 2022. *High Mountain Asia Multitemporal Landslide Inventories for the Pumqu/Arun River Basin, Version 1*. [Indicate subset used]. Boulder, Colorado USA. NASA National Snow and Ice Data Center Distributed Active Archive Center. https://doi.org/10.5067/E4M8GRXKLCRC. [Date Accessed].

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

FOR CURRENT INFORMATION, VISIT https://nsidc.org/data/HMA2_MTLI

National Snow and Ice Data Center

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1 DATA DESCRIPTION

1.1 Parameters

Landslides are downslope movements of rock, debris, earth, or soil. This data set contains landslide polygons and their associated year of occurrence.

1.2 File Information

1.2.1 Format

This data set contains one set of ESRI shapefiles (.shp, .shx, .dbf, .prj, .sbn, .sbx, .cpg) compressed into one .zip file.

1.2.2 File Contents

The shapefile contains polygons of landslide extents and their year of occurrence in the Pumqu/Arun River basin.

1.2.3 Naming Convention

The .zip file containing all data files is named:

`HMA2_MTLI_Arun_2011_2020_landslide_polygons.zip`

The files inside the .zip file are named according to the convention described in detail in Table 1:

`HMA2_MTLI_Arun_2011_2020_landslide_polygon.[ext]`

Table 1: File Naming Convention

Variable	Description
`HMA2_MTLI`	High Mountain Asia Multitemporal Landslide Inventories for the Pumpqu/Arun River Basin
`Arun_2011_2020_landslide_polygon`	Data set location, years spanned, and parameter information
`.[ext]`	File name extension. An ESRI shapefile consists of a set of files with the following file name extensions: .shp, .shx, .dbf, .prj, .sbn, .sbx, .cpg

1.3 Spatial Information

1.3.1 Coverage

Northernmost latitude: 28.11° N
Southernmost latitude 26.94° N
Easternmost longitude: 87.59° E
Westernmost longitude: 86.93° E

1.3.2 Resolution

Digitized from approx. 5 m resolution raster imagery.

1.3.3 Geolocation

The following table provides information for geolocating this data set:

Table 2. Geolocation Details

Geographic coordinate system	WGS 84
Projected coordinate system	UTM zone 45N
Longitude of true origin	87
Latitude of true origin	0
Scale factor at longitude of true origin	0.9996
Datum	WGS 84
Ellipsoid/spheroid	WGS 84
Units	Meters
False easting	500000
False northing	0
EPSG code	32645
PROJ4 string	+proj=utm +zone=45 +datum=WGS84 +units=m +no_defs
Reference	https://epsg.io/32645

1.4 Temporal Information

1.4.1 Coverage

01 December 2011 to 31 December 2020

1.4.2 Resolution

Yearly

2 DATA ACQUISITION AND PROCESSING

2.1 Background

The transboundary Pumpqu/Arun River basin spreads across Nepal and Tibet. Nearly 95% of the basin lies in Tibet through which the Pumpqu River flows. The river is named the Arun River once it enters Nepal. Five large hydropower projects (in total about 3,163 MW) are currently under construction or are planned for the Arun River valley. Rainfall and earthquake-induced landslides, landslide-dammed lakes, and landslide-induced glacial lake outburst floods pose major risks to the smooth operation of these projects. This data set is a multitemporal landslide inventory covering the entire Pumpqu/Arun River basin. It was generated in support of the World Bank's Risk Assessment of Landslides in the Upper Arun Hydropower Project.

2.2 Acquisition and Processing

Yearly RapidEye (2011-2018) and PlanetScope (2019-2020) images were processed using the Semi-Automatic Landslide Detection (SALaD) system (Amatya et al. 2021), which combines object-oriented image analysis and machine learning. Landslide inventories were created using images acquired in December of each year.

2.3 Quality, Errors, and Limitations

Landslide polygons were manually corrected to resolve amalgamation, remove false positive, correct erroneous areas, and add missing areas. Landslides covered by snow and in shadow areas were not mapped. Some positional inaccuracy (RMSE < 10 m) related to satellites might exist.

To map new landslides for each year, the previous year's landslides are removed. In case of overlapping landslides in different years, only the first landslide is detected. In very few cases partial overlapping landslides were observed and data were manually inspected.

3 SOFTWARE AND TOOLS

Shapefile files can be opened using software that recognizes the shapefile format, such as QGIS and ArcMap.

4 RELATED DATA SETS

High Mountain Asia Landslide Catalog
High Mountain Asia at NSIDC | Data Sets

5 RELATED WEBSITES

High Mountain Asia at NSIDC | Overview

NASA High Mountain Asia Project

RapidEye Satellite Mission and Sensor Description

PlanetScope Satellite Mission and Sensor Description

6 CONTACTS AND ACKNOWLEDGMENTS

Pukar Amatya

NASA Goddard Space Flight Center Hydrological Sciences Laboratory

Dalia B. Kirschbaum

NASA Goddard Space Flight Center Hydrological Sciences Laboratory

7 REFERENCES

Amatya P., Kirschbaum D., Stanley T., & Tanyas H. (2021). Landslide mapping using object-based image analysis and open-source tools. Engineering Geology, 282: 106000. https://doi.org/10.1016/j.enggeo.2021.106000.

8 DOCUMENT INFORMATION

8.1 Publication Date

17 February 2022

8.2 Date Last Updated

04 March 2022