

Guide: Data Description

URL: <https://www.pgc.umn.edu/guides/arcticdem/data-description/>

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Detailed specification of the ArcticDEM deliverables.

Details

Format

Data is stored and distributed in 32 bit GeoTIFF file format with floating point elevation values.

Resolution

ArcticDEM strip and mosaic files are distributed at a ground sample distance (GSD) of 2 meters. Mosaic files are also available at reduced resolutions of 10 meters, 32 meters, 100 meters, 500 meters, and 1 kilometer for cartographic purposes.

Coordinate System

All strip and tiled mosaic ArcticDEM deliverables are projected to National Snow and Ice Data Center (NSIDC) Sea Ice Polar Stereographic North and referenced to WGS84 horizontal datum ([EPSG:3413](#)).

Vertical Reference

Vertical reference is height above the WGS84 ellipsoid.

Elevation Units

Elevation unit of measure is meters.

Null Values

Data may contain void pixels or regions over lakes, rivers, and other hydrographic features. Data voids may also be present where the source imagery contains cloud cover or shadowed areas. The void areas will contain null values (-9999) in lieu of the terrain elevations.

Metadata

Basic source material and production metadata is contained within the Esri shapefile and associated text files provided for each ArcticDEM strip and mosaic file.

Accuracy

Absolute horizontal and vertical accuracy specifications of ArcticDEM data have not been verified. Future work may include accuracy validation.

File Naming

Strip ArcticDEM Files

File naming of strip ArcticDEM files incorporate several elements related to the source material used to create the

data. The example below describes the naming convention:

Example:

WV02_20150615_10300100443C2D00_1030010043373000_seg1_2m_v1.0_dem

Key:

SENSOR_DATE_STEREOIMAGE1_STEREOIMAGE2_SEGMENT_RESOLUTION_VERSION_FILETYPE

SENSOR - DigitalGlobe satellite that collected the stereopair image

DATE - Date of source stereopair image acquisition as YYYYMMDD

STEREOIMAGE1 - DigitalGlobe catalog ID number of the first stereopair image strip

STEREOIMAGE2 - DigitalGlobe catalog ID number of the second stereopair image strip

SEGMENT - Segment of DEM strip

RESOLUTION - Ground sample distance pixel size of the DEM file in meters

VERSION - Release version of DEM strip

FILETYPE - Category of file included within the distributed tape archive (TAR) file

Mosaic ArcticDEM Files

File naming of ArcticDEM mosaic files corresponds to tiling grid established where each tile is 100 km x 100 km (approximately 2,400 tiles cover the ArcticDEM production domain).

File naming components of the example ArcticDEM mosaic file **48_20_1_1_5m_v1.0_reg_dem.tif**

- **48_20** - 100km x 100km tile name
- **1_1** - 50km x 50km sub-tile name
- **5m** - Pixel resolution
- **v1.0** - Mosaic file version
- **reg** - IceSAT GCP registration tag
- **dem.tif** - File type

Files Included

Strip ArcticDEM Files

Each ArcticDEM strip TAR archive contains the following files:

- **_index.shp** - Esri shapefile polygon depicting the geographic extent of the DEM file including basic metadata information within the attribute table
- **_dem.tif** - 32-bit floating point DEM file
- **_browse.tif** - Low-resolution preview image of DEM file indicating relief with hillshading and no inherent elevation (z) values within pixels
- **_matchtag.tif** - Bitmask raster indicating DEM pixels derived from a stereo match (1) or those that have been interpolated (0)

- **_mdf.txt** - Text file metadata document
- **_readme.txt** - Text file indicating development phase of the associated ArcticDEM file, terms of use, warranty, and contact information
- **_isreg.txt** - Text file indicating xyz offset of strip DEM to IceSAT altimetry control points (if available)
- **_ngareg.txt** - Text file indicating xyz offset of strip DEM to NGA-provided control points (if available)

Mosaic ArcticDEM Files

Each ArcticDEM mosaic TAR archive contains the following files:

- **_index.shp** - Esri shapefile polygon depicting the geographic extent of the 50 km x 50 km mosaic sub-tile
- **_dem.tif** - 32-bit floating point DEM file
- **_matchtag.tif** - Bitmask raster indicating DEM pixels derived from a stereo match (1) or those that have been interpolated (0)
- **_meta.txt** - Text file metadata document describing the mosaicking alignment statistics for the parent 100 km x 100 km mosaic tile
- **_isreg.txt** - Text file indicating xyz offset of strip DEM to IceSAT altimetry control points (if available)

Characteristics

Digital Surface Model

ArcticDEM is a DSM that portrays first-return elevation values that include vegetation, tree canopy, buildings, and other man-made surface features. Exercise caution when using ArcticDEM data for applications that are better served using a bare-earth Digital Terrain Model (DTM) because results may be inaccurate or otherwise misleading.

Interpolation and Filtering

All DEM products derived from SETSM software come from a TIN-based model and pixels are given data values as the TIN is written to a raster. A default filter is applied using the matchtag raster that excludes pixels where >70% of the neighboring pixels in a local search window (21 x 21 or 5 x 5, depending on resolution) were interpolated. Further filtering can be accomplished using the matchtag raster.

Limitations

As with any optical imagery-derived elevation product, void areas or artifacts may appear where cloud cover, shadows, and unfrozen water bodies exist in the source imagery, or in regions of low radiometric contrast where pixel correlation cannot be resolved by the software.

Considerations

ArcticDEM has been assembled from source imagery collected over a period of several years and includes data collected throughout all seasons. Users should not assume that DEM data represent snow-free, leaf-off, or other temporally variable conditions. Every effort has been made to introduce the best-available source images into the final product, notwithstanding the challenges of producing a pan-Arctic dataset where source material from a single season or year is unavailable.