3D Elevation Program (3DEP) Data Dictionary
Last updated: August 24, 2018

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3DEP 1/3 Arc-second, 1 Arc-second, and 2 Arc-second Data Dictionary

Source Identification

DEMNAME

Data Name (text)
For projects used to produce elevation products prior to March 31, 2014, this field indicates the name of the source DEM file.
For projects used to produce elevation products after April 1, 2014, DEMNAME is the name of the original project that was adapted for incorporation into the 1/3, 1 and 2 arc-second elevation layers. The format of this field will most commonly be three parts separated by underscores: PRIMARYSTATE, BRIEF-PROJECT-DESCRIPTION, YEAR.

QUADNAME

Quadrangle Name (text)
For DEMs derived from standard USGS paper map series, this is the name of the corresponding USGS quadrangle. This information may also be present in the first 40 characters of the FREETEXT field.
For new high resolution DEM source data, this field may be used in other ways.
Example QUADNAME = oak_island_MN
For DEMs introduced after April 1, 2014 this field will not be populated. Any values already in this field for DEMs used to produce elevation products prior to March 31, 2014 are preserved.

Source Production

PSITE

Production Site (text)
The site or party who created the source DEM for DEMs used to produce elevation products prior to March 31, 2014.
Valid codes are:

- **UNKNOWN** Unknown
- **CONT** Contractor
- **MCMC** Mid-Continent Mapping Center
- **RMMC** Rocky Mountain Mapping Center
- **EMC** Eastern Mapping Center
- **WMC** Western Mapping Center
- **MAC** Mapping Applications Center
- **FS** Forest Service
- **USFS** Forest Service
- **BLM** Bureau of Land Management
- **NGTO** National Geospatial Technical Operations Center
- **AB** Alberta Sustainable Resource Development: Edmonton, Alberta, Canada
- **GDB** Center for Topographic Information, Geomatics Canada
- **NS** Nova Scotia Geomatics Center
- **NTDB** Center for Topographic Information Geomatics Canada: Ottawa, Ontario, Canada or Landscape Analysis - Canadian Forest Service: Sault Ste. Marie, Ontario, Canada
- **ON** Water Resources Information Program: Ottawa, Ontario, Canada
- **RS** Center for Topographic Information Geomatics Canada: Ottawa, Ontario, Canada
- **Z** Direction generale de l’information geographique, MRNF, Quebec, Canada
- **YT** Yukon Environment Information Management and Technology
- **BC** Base Mapping and Geomatic Services: Victoria, British Columbia, Canada
- **MULT** Multiple Canadian government agencies

For DEMs introduced after April 1, 2014 this field will be populated with the value **UNKNOWN**. Any values already in this field for DEMs used to produce elevation products prior to March 31, 2014 are preserved.

### PMETHOD

Production Method (short integer)

The method used to compile or capture the source DEM. For more information regarding PMETHODS see Digital Elevation Models (USGS, 1993).

Valid codes are:

- **0** Unknown
- **1** Electronic Image Correlation (specifically GPM II)
- **2** Manual Profiling
- **3** DLG2DEM
- **4** DCASS
- **5** LT4X
- **6** Complex polynomial interpolation, such as ANUDEM
- **7** Lidar
- **8** Photogrammetric mass points and break lines
- **9** Digital camera correlation
- **10** Ifsar
- **11** Other remote sensing technique
<table>
<thead>
<tr>
<th>Device</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Topobathymetric model</td>
<td></td>
</tr>
<tr>
<td>Topobathymetric lidar</td>
<td></td>
</tr>
<tr>
<td>Bathymetric lidar</td>
<td></td>
</tr>
<tr>
<td>Geiger mode lidar</td>
<td></td>
</tr>
<tr>
<td>Single photon lidar</td>
<td></td>
</tr>
<tr>
<td>Flash lidar</td>
<td></td>
</tr>
<tr>
<td>Acoustic</td>
<td></td>
</tr>
<tr>
<td>Structure from motion</td>
<td></td>
</tr>
</tbody>
</table>

**PDEVICE**

Production Device (text)

The name of the instrument used to compile the source DEM. This field is of significance primarily to DEMs produced by manual profiling (PMETHOD = 2)

The current list of identified instruments is:

- Wild A-7  Wild Autograph A7 - Mechanical Stereoplotter
- Wild AG-1 Wild AG1 - Analytical Stereoplotter
- OMI AS11A OMI AS11A - Mechanical Stereoplotter
- Wild B-8  Wild Aviograph B8 - Mechanical Stereoplotter
- Wild BC-1 Wild BC1 - Analytical Stereoplotter
- Wild BC-2 Wild BC2 - Analytical Stereoplotter
- Zeiss C-8  Zeiss Stereoplanigraph C8 - Stereoplotter
- Zeiss C100 Zeiss C100 Planicomp - Analytical Stereoplotter
- GPM      Gestalt Photo Mapper II (GPM II)
- KELSH    Kelsh - Optical Stereoplotter
- Kern     PG-2 Kern PG-2 - Mechanical Stereoplotter
- Wild     PPO-8 Wild PPO-8 Orthophoto Equipment (Used with Wild A8)
- Santoni IIC Santoni IIC - Analytical Stereoplotter
- Galileo IIId Galileo-Santoni Stereosimplex IIId
- Jena Topocart B Zeiss Jena Topocart B
- Matra Traster Matra Optique Traster - Photogrammetric Workstation
- CP100 Unknown, but appears to be a stereoplotter
- CTOG     Contour to Grid Conversion
- DCASS    Digital Cartographic Software System (USGS Software)
- DLG      Digital Line Graph
- LT4X     Either LT4X or LTPlus software
- GDM COTS DEM made by GeoDigital Mapping, Inc.
- GTR COTS DEM made by GTRSystems, Inc.
- SRTM     Shuttle Radar Topographic Mission
- Unknown  Unknown
- ADS40    Leica ADS40 Digital Camera

For DEMs introduced after April 1, 2014 this field will no longer be populated. Any values already in this field for DEMs used to produce elevation products prior to March 31, 2014 are preserved.
For DEMs derived from standard USGS paper map series, this field is first 136 bytes of the source DEM file, including the quadrangle name, free format text, and process field. This field may contain additional information, though there are no standards for the use of the free text field.

Example: NORTH CHINOOK RESERVOIR, MT -VDYA 1-09 9/06/75 WILD A-7 60000 4 -10915 0.0000 4845 0.00002

The contents of the FREETEXT field vary greatly from one DEM to the next, and in some cases are more confusing than helpful.

For DEMs introduced after April 1, 2014 this field will no longer be populated. Any values already in this field for DEMs used to produce elevation products prior to March 31, 2014 are preserved.

RESOLUTION

Source Resolution (short integer)

This code indicates the planimetric (x, y) spacing of elevation postings within the source DEM. Note that all source data are resampled to a common resolution during production.

For DEMs used to produce elevation products prior to March 31, 2014 valid values are:

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Unknown</td>
</tr>
<tr>
<td>1</td>
<td>1 arc-second (Alaska, Canada, Mexico)</td>
</tr>
<tr>
<td>2</td>
<td>2 arc-seconds (1:100k series)</td>
</tr>
<tr>
<td>3</td>
<td>3 arc-seconds (1:250k series)</td>
</tr>
<tr>
<td>5</td>
<td>5 meters (non-standard data)</td>
</tr>
<tr>
<td>10</td>
<td>10 meters (7.5-minute series)</td>
</tr>
<tr>
<td>30</td>
<td>30 meters (7.5-minute series)</td>
</tr>
<tr>
<td>13</td>
<td>1/3 arc-second (non-standard data)</td>
</tr>
<tr>
<td>19</td>
<td>1/9 arc-second (non-standard data)</td>
</tr>
</tbody>
</table>

For DEMs introduced after April 1, 2014 the actual resolution of the original high-resolution source DEM will be populated in the HORIZRES_M field, and the RESOLUTION field will be populated with:

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>High-resolution source</td>
</tr>
</tbody>
</table>

HORIZRES_M

Horizontal Resolution of Source DEM (floating point)

The horizontal resolution (x, y) of the original DEM which was used to produce elevation products, expressed in meters. Regardless of the source DEM horizontal units, this field is expressed in the common unit meters for more meaningful comparisons and simplified queries.

This is a new field in the spatial metadata shapefiles for DEMs used to produce elevation products after April 1, 2014. For DEMs used to produce elevation products prior to March 31, 2014, this field will be populated with -100.

S_DATE

Data Source Date (short integer)
For DEMs derived from standard USGS paper map series, this field is data element 21 in the source DEM Type A record, the date of original photography from which the DEM was compiled (Digital Elevation Models (USGS, 1993). This information was not provided with some standard DEMs with a native resolution of 30 meters.

In the case of high resolution source data, this field reflects the year that the base elevation data was collected, as in the case of LIDAR derived DEMs. For projects whose collection spanned more than one calendar year, this is the earliest acquisition year.

Format: YYYY

**I_DATE**

Data Inspection Date (short integer)

For DEMs derived from standard USGS paper map series, this field is data element 22 in the source DEMs Type A record: DEM Edit System (DES) inspection date (Digital Elevation Models, USGS, 1993). This information was not provided with some standard DEMs.

Format is either YYYY or YYMM

This field not used for newer, high-resolution data sources.

For DEMs introduced after April 1, 2014 this field be populated with -100. Any values already in this field for DEMs used to produce elevation products prior to March 31, 2014 are preserved.

**Source Planimetric Descriptors**

- HDATUM
- LRLAT
- LRLON
- ULLAT
- ULLON
- UTMZONE
- XSHIFT
- YSHIFT

**HDATUM**

Horizontal Datum (short integer)

Valid values:

- 0 Unknown
- 27 North American Datum of 1927 (NAD 27)
- 83 North American Datum of 1983 (NAD 83)
- 72 World Geodetic System of 1972 (WGS 72)
- 84 World Geodetic System of 1984 (WGS 84)
- 99 Other
LRLAT, LRLON, ULLAT, ULLON

Coordinates defining the minimum bounding box of the source DEM (floating point)

For DEMs derived from standard USGS paper map series, this field is derived from corner coordinates indicated in data element 11 of the DEMs Type A record (Digital Elevation Models USGS, 1993).

LRLAT Southern extent in latitude
LRLON Eastern extent in longitude
ULLAT Northern extent in latitude
ULLON Western extent in longitude

UTMZONE

Source UTM or State Plane Zone (short integer)
The projection zone of the source DEM.
If two digits, a UTM zone.
If four digits, a State Plane zone.
A value of zero in this field indicates that the source DEM is cast in geographic (lat/lon) coordinates.
For DEMs introduced after April 1, 2014 this field will be populated with -100. Any values already in this field for DEMs used to produce elevation products prior to March 31, 2014 are preserved.

XSHIFT, YSHIFT

Horizontal Shift (floating point)
Units: decimal degrees
The positional shifts in longitude and latitude, respectively, applied to each posting in the source DEM to convert from NAD27 coordinates to NAD83 coordinates. These values will be zero if the source DEM’s HDATUM field value is 83, 84 or 72. (WGS84 is nearly identical to NAD83, and WGS72 is sufficiently similar that no shift was deemed necessary). The shift values were obtained from NGS’s NADCON software, and were calculated at the nominal center of each quadrangle.
New high-resolution DEMs introduced after April 1, 2014 generally have a horizontal datum of NAD83 and this field will be populated with -100. Any values already in this field for DEMs used to produce elevation products prior to March 31, 2014 are preserved.

Source Elevation Descriptors

VDATUM
ZUNIT
ZSTEP
ZSHIFT
VDATUM

Vertical Datum (short integer)

This code represents the vertical datum of source DEM.

Valid values are:

- 0  Unknown
- 1  Local Mean Sea Level
- 2  American Samoa Vertical Datum of 2002 (ASVD02)
- 3  Northern Marianas Vertical Datum of 2003 (NMVD03)
- 4  Guam Vertical Datum of 2004 (GUVD04)
- 5  Puerto Rico Vertical Datum of 2002 (PRVD02)
- 6  Virgin Islands Vertical Datum of 2009 (VIVD09)
- 29 National Geodetic Vertical Datum of 1929 (NGVD 29)
- 88 North American Vertical Datum of 1988 (NAVD 88)
- 99 Other

ZUNIT

Elevation Unit (short integer)

This code represents the unit of elevation values in source DEM.

Valid values:

- 0  International Feet
- 1  Meters
- 2  U.S. Survey Feet
- 3  Decimal degrees
- 4  Centimeters
- 5  Inches
- 99 Other

ZSTEP

Elevation Resolution (floating point)

For DEMs derived from standard USGS paper map series, this field, together with ZUNIT, defines vertical resolution of the source DEM. Typical values are 1 and 0.1, though others are possible.

Example: ZSTEP = 0.1 This indicates that the source DEM records elevations to the nearest tenth of a meter.

A value of 0 is used when this field does not apply, as in the case of source data with floating point precision.

New high-resolution DEMs introduced after April 1, 2014 all have floating point precision, and this field will be populated with -100. Any values already in this field for DEMs used to produce elevation products prior to March 31, 2014 are preserved.

ZSHIFT

Elevation Shift (floating point)

The elevation shift, in meters, applied to each posting within the source DEM to convert to
NAVD88 values. The shift values were obtained from NGS’s VERTCON software, and were calculated at the nominal center of each quadrangle.
New high-resolution DEMs introduced into after April 1, 2014 all have a vertical datum of NAVD88, therefore this field will be populated with -100. Any values already in this field for DEMs used to produce elevation products prior to March 31, 2014 are preserved.

Source Elevation Summary Statistics

ZMIN
ZMAX
ZMEAN
ZSIGMA

Discussion: The summary statistics shown in these fields usually describe the entire source DEM, even when only some portion of the source DEM is used in elevation products, or when the source DEM is represented by more than one polygon within the metadata. These data are presented in common units (meters) and in a common vertical datum (NAVD88) to allow for more meaningful graphical displays and simplified queries.

ZMIN, ZMAX

Minimum and Maximum Elevation of Source DEM (floating point)

The minimum and maximum elevation values of the source DEM before any filtering or reprojection, but after conversion to meters and to NAVD88. For DEMs derived from standard USGS maps, subtracting ZSHIFT and converting to the DEM’s original units results in the min and max values reported in data element 12 of the DEM’s Type A record (Digital Elevation Models, USGS, 1993).

ZMEAN

Mean Elevation of Elevations in Source DEM (floating point)

The mean elevation value of the source DEM before any filtering or reprojection, but after conversion to meters and to NAVD88

ZSIGMA

Standard Deviation of Elevations in Source DEM (floating point)

The standard deviation of the elevations of the source DEM, before any filtering or reprojection, but after conversion to meters.

Source Accuracy Statistics

ABSX
ABSY
ABSZ
ABSPTS
RMSE
RMSEX
RMSEY
RMSEZ
RMSEPTS
VA_UNIT

ABSX, ABSY, ABSZ
Absolute Accuracy (short integers)
Absolute accuracy in X, Y, Z.
This field applies only to standard production USGS DEMs and echos data element 2 of the source
DEM’s Type C record,(Digital Elevation Models, USGS, 1993). See Standards for Digital
Elevation Models for more information. This field is populated with zero if not available.
For DEMs introduced after April 1, 2014 this field will be populated with -100. Any values
already in this field for DEMs used to produce elevation products prior to March 31, 2014 are
preserved.

ABSPTS
Sample Size (short integer)
This field applies only to standard production USGS DEMs and echoes data element 3 of the source
DEM’s Type C (sample size record) (Digital Elevation Models, USGS, 1993).
For DEMs introduced after April 1, 2014 this field will be populated with -100. Any values
already in this field for DEMs used to produce elevation products prior to March 31, 2014 are
preserved.

RMSE
Availability of Relative Accuracy Statistics (short integer)
This field applies only to standard production USGS DEMs and echos data element 4 of the source
DEM’s Type C (relative accuracy statistics) (Digital Elevation Models, USGS, 1993).
Valid codes:
  1  Available
  0  Not available
For DEMs introduced after April 1, 2014 this field will be populated with -100. Any values
already in this field for DEMs used to produce elevation products prior to March 31, 2014 are
preserved.

RMSEX, RMSEY, RMSEZ
Relative Accuracy (short integer)
This field applies only to standard production USGS DEMs and echos data element 5 of the source
DEM’s Type C (relative accuracy in X, Y, Z (Digital Elevation Models, USGS, 1993).This field is
zero if not available.
For DEMs introduced after April 1, 2014 this field will be populated with -100. Any values
already in this field for DEMs used to produce elevation products prior to March 31, 2014 are
preserved.
RMSEPTS

Sample Size (short integer)

This field applies only to standard production USGS DEMs and echoes data element 6 of the source DEM’s Type C (sample size) (Digital Elevation Models, USGS, 1993).

For DEMs introduced after April 1, 2014 this field will populated with -100. Any values already in this field for DEMs used to produce elevation products prior to March 31, 2014 are preserved.

3DEP Production Timestamps

QUADDATE

QUADDATE

Date the data were used to produce the elevation product (long integer)

The date on which the source DEM was first processed into elevation products. This field is particularly useful in the identification of recently updated areas.

Format: YYYYMMDD
### 3DEP 1/9 Arc-second Data Dictionary

#### Source Identification

**PROJ_NAME**

Project name (text)

This field is the name of the original project that was adapted for incorporation into the 1/9 arc-second elevation layer. The format of this field will most commonly be three parts separated by underscores: PRIMARYSTATE, BRIEF-PROJECT-DESCRIPTION, YEAR.

**DEMNAME**

Data Name (text)

The name of the final elevation dataset processed into a common coordinate system and units according to 1/9 arc-second elevation product specifications.

For DEMs introduced after April 1, 2014 this field will no longer be populated. Any values already in this field for DEMs used to produce elevation products prior to March 31, 2014 are preserved.

#### Source Production

**RESOLUTION**

Resolution (short integer)

The planimetric (x, y), spacing of elevation postings of the final pre-processed datasets. Source LiDAR datasets resolution varies but is typically less than 3 meters. During 1/9 arc-second elevation processing, source datasets are resampled to a common resolution (e.g. 1/9 arc-second or about 3 meters).

For DEMs used to produce elevation products prior to March 31, 2014 valid values are:

19 1/9 arc-second (non-standard data)

For DEMs introduced after April 1, 2014 the actual source resolution is used in elevation product processing. The source resolution of the source data in meters of the original high-resolution source DEM will be populated in the HORIZRES_M field, and the RESOLUTION field will be populated with:
HORIZRES_M
Horizontal Resolution of Source DEM (floating point)
The horizontal resolution (x, y) of the original DEM which was used to produce elevation products, expressed in meters. Regardless of the source DEM horizontal units, this field is expressed in the common unit meters for more meaningful comparisons and simplified queries.
This is a new field in the spatial metadata shapefiles for DEMs used to produce elevation products after April 1, 2014. For DEMs used to produce elevation products prior to March 31, 2014, this field will not be populated.

PMETHOD
Production Method (short integer)
The method used to collect the original source elevation data. Valid codes are:
7    Lidar
10   Ifsar
11   Other remote sensing technique
12   Topobathymetric model

S_DATE
Data Source Date (short integer)
The year the source elevation data were collected. If acquisition of a project spanned two or more calendar years, the earliest acquisition year is indicated in this field.

FREETEXT
Free Text Description (text)
There are no standards for the use of the free text field. This field may contain additional information to further describe the source project or clarify other metadata fields.
For DEMs introduced after April 1, 2014 this field will no longer be populated. Any values already in this field for DEMs used to produce elevation products prior to March 31, 2014 are preserved.

Output Production
ZUNIT

ZUNIT
Elevation Unit (short integer)
This field describes the elevation units of the output 1/9 arc-second elevation product data. During 1/9 arc-second elevation product processing, the source data vertical units are converted to a consistent elevation unit.

Valid value:

1  Meters

**Source Accuracy Statistics**

- **S_FVA**
  - Source DEM Fundamental Vertical Accuracy (FVA) (floating point)
  - This is the tested FVA of the source resolution DEM. FVA, or Accuracy\(z\), is based only on points in clear and open terrain. The fundamental accuracy is the value by which vertical accuracy can be equitably assessed and compared among datasets. The S_FVA is calculated at the 95-percent confidence level as a function of vertical Root Mean Square Error (RMSE) i.e., Accuracy\(z\) = RMSE\(z\) x 1.96.
  - S_FVA is expressed in the units reported in the VA_UNIT field.
  - Valid values:
    - -1 Not available
    - Other Values Actual Calculated RMSE value

- **S_CVA**
  - Source DEM Consolidated Vertical Accuracy (CVA) (floating point)
  - This is the tested CVA of the source resolution DEM. CVA is based on check points in all land cover categories combined. Error distribution for points in vegetated areas does not have a normal distribution. Therefore S_CVA is reported as the 95th percentile.
  - S_CVA is expressed in the units reported in the VA_UNIT field.
  - Valid values:
    - -1 Not available
    - Other Values Actual Calculated RMSE value
S_NVA
Non-vegetated Vertical Accuracy (floating point)
This field is reserved for future use.
Current valid value: -1

S_VVA
Vegetated Vertical Accuracy (floating point)
This field is reserved for future use.
Current valid value: -1

VA_UNIT
Vertical Accuracy Unit (short integer)
The units in which the vertical accuracy statistics are reported.
Valid values:
0 International Feet
1 Meters
2 US Survey Feet
3 decimal degrees
4 centimeters
5 inches
99 unknown

RMSEZ, RMSE_FVA, RMSE_SVA, RMSE_CVA
RMSE(z), RMSE(FVA), RMSE(SVA), RMSE(CVA) (double)
Vertical accuracy for source DEMs introduced after April 1, 2014 are reported in the S_FVA and S_CVA fields above.
Reported RMSE statistics are in meters.
RMSE(z): Root Mean Square Error of the elevation estimates.
RMSE(FVA): RMSE (Fundamental Vertical Accuracy).
RMSE(SVA): RMSE (Supplemental Vertical Accuracy).
RMSE(CVA): RMSE (Consolidated Vertical Accuracy).

RMSE is the square root of the average of the set of squared differences between dataset coordinate values and coordinate values from an independent source of higher accuracy for identical points.

\[
\text{RMSE}_z = \sqrt{\frac{\sum (Z_{\text{data} \ I} - Z_{\text{check} \ I})^2}{n}}
\]

where \(Z_{\text{data} \ I}\) is the vertical coordinate of the \(I\)th check point in the elevation dataset, \(Z_{\text{check} \ I}\) is the vertical coordinate of the \(I\)th check point in the independent reference source of higher accuracy, \(n\) is the number of points being checked, and \(I\) is an integer from 1 to \(n\).

The Fundamental Vertical Accuracy (FVA) of a dataset must be determined with check points located only in open terrain, where there is a very high probability that the sensor will have detected
the ground surface. The fundamental accuracy is the value by which vertical accuracy can be equitably assessed and compared among datasets. The FVA is calculated at the 95-percent Confidence Level as a function of vertical RMSE, i.e., \( \text{Accuracy}_z = \text{RMSE}_z \times 1.9600 \).

In addition to the fundamental accuracy, supplemental or consolidated accuracy values maybe calculated for other ground cover categories or for combinations of ground cover categories. Because elevation errors often vary with the height and density of ground cover, a normal distribution of error cannot be assumed and, therefore, RMSE cannot be used to calculate accuracy values. Consequently a nonparametric testing method (95th Percentile) is employed for supplemental and consolidated accuracy tests. The SVA or CVA are calculated at the 95th percentile for each supplemental land cover category or combination of categories.

Valid values:

- 0 Not available
- Other Values Actual Calculated RMSE value

For DEMs introduced after April 1, 2014 these RMSE fields will be populated with -100. Instead, accuracy statistics for these DEMs will be provided in the S_FVA and S_CVA fields or in the S_NVA and S_VVA fields above. Any values already in the RMSE fields for DEMs used to produce elevation products prior to March 31, 2014 are preserved.

### 3DEP Production Timestamp

**QUADDATE**

Date the data were used to produce elevation products (long integer)

The date on which the source DEM was first processed. This field is particularly useful in the identification of new elevation product coverage areas.

Format: YYYYMMDD
3DEP Original Product (Source) Resolution Data Dictionary

**Source Identification**

**PROJ_NAME**

Source Project Name (text)

Project name is the name of the original source DEM project that was adapted for incorporation into the 1/9, 1/3, 1, or 2 arc-second elevation layers. The elevation Original Product Resolution production process maintains the coordinate reference system and horizontal units of the original project. However, vertical units are converted to meters.

The format of this field will most commonly be three parts separated by underscores: PRIMARYSTATE, BRIEF-PROJECT-DESCRIPTION, YEAR.

**Source Production**

**PMETHOD**

Production Method (short integer)

The acquisition method used to collect the source elevation data (Digital Elevation Models, USGS, 1993).

Valid values are:

7 Lidar
10 Ifsar
11 Other remote sensing technique
12 Topobathymetric model
13 Topobathymetric lidar
14 Bathymetric lidar
15 Geiger mode lidar
16 Single photon lidar
17 Flash lidar
18 Acoustic
19 Structure from motion

**S_DATE**

Data Source Date (short integer)

The year the source elevation data were collected. If acquisition of a project spanned two or more calendar years, the earliest acquisition year is reported in this field.
Output Production

ZUNIT
REFSYS
HORIZRES
HORIZUNIT
FORMAT
HORIZRES_M

ZUNIT
Elevation Unit (short integer)
This field describes the elevation units of the output data. During elevation Original Product Resolution processing, the source data vertical unit is converted to consistent elevation unit, which is meters.
Valid value:
1    Meter

REFSYS
Coordinate Reference System (text)
This field describes the coordinate reference system and projection of the elevation Original Product Resolution DEM.

HORIZRES
Horizontal Resolution (floating point)
The horizontal resolution (x, y) of the elevation Original Product Resolution DEM. The value is reported in the units recorded in the HORIZUNIT field.

HORIZUNIT
Horizontal Resolution Units (short integer)
The unit in which the horizontal resolution, HORIZRES, is reported.
Valid values:
0    International Feet
1    Meters
2    U.S. Survey Feet
3    Decimal Degrees
4    Centimeters
5    Inches
99   Unknown

FORMAT
Raster File Format (short integer)
The raster file format of the Original Product Resolution DEM.
Valid values:
1    IMG
2    ArcGrid
3    GridFloat
4    Tiff
HORIZRES_M

Horizontal Resolution Expressed in Meters (floating point)

The horizontal resolution (x, y) of the Original Product Resolution DEM expressed in meters. This field is provided for easy comparison of and sorting of horizontal resolutions, regardless of the horizontal units of the actual DEM.

Accuracy Statistics

FVA
CVA
NVA
VVA
VA_UNIT

FVA

Fundamental Vertical Accuracy (FVA) (floating point)

This is the tested FVA of the source resolution DEM. FVA, or Accuracy$_z$, is based only on points in clear and open terrain. The fundamental accuracy is the value by which vertical accuracy can be equitably assessed and compared among datasets. The FVA is calculated at the 95-percent confidence level as a function of vertical Root Mean Square Error (RMSE) i.e., Accuracy$_z$ = RMSE$_z$ x 1.96.

FVA is expressed in the units reported in the VA_UNIT field.

Valid values:
-1 Not available
Other Values Actual Calculated RMSE value

CVA

Consolidated Vertical Accuracy (floating point)

This is the tested CVA of the source resolution DEM. CVA is based on check points in all land cover categories combined. Error distribution for points in vegetated areas do not have a normal distribution. Therefore S_CVA is reported as the 95$^{th}$ percentile.

CVA is expressed in the units reported in the VA_UNIT field.

Valid values:
-1 Not available
Other Values Actual Calculated RMSE value
NVA
Non-Vegetated Vertical Accuracy (floating point)
This field is reserved for future use.
Current valid value: -1

VVA
Vegetated Vertical Accuracy (floating point)
This field is reserved for future use.
Current valid value: -1

VA_UNIT
Vertical Accuracy Unit (short integer)
The units in which the vertical accuracy values are reported.
Valid values:

<table>
<thead>
<tr>
<th>Value</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>International Feet</td>
</tr>
<tr>
<td>1</td>
<td>Meters</td>
</tr>
<tr>
<td>2</td>
<td>U.S. Survey Feet</td>
</tr>
<tr>
<td>3</td>
<td>Decimal Degrees</td>
</tr>
<tr>
<td>4</td>
<td>Centimeters</td>
</tr>
<tr>
<td>5</td>
<td>Inches</td>
</tr>
<tr>
<td>99</td>
<td>Unknown</td>
</tr>
</tbody>
</table>

3DEP Production Timestamp
QUADDATE

QUADDATE
Date the data were released (long integer)
Quaddate is the date when the Original Product Resolution DEM was processed. Format:
YYYYMMDD
The National Map – Elevation, Lidar Point Cloud Project Data Dictionary

Lidar Project Information

- project_id
- state
- vendor
- s_date
- e_date
- entry_date
- lr_lat, lr_long, ll_lat, ll_long, ul_lat, ul_long, ur_lat, ur_long
- sensor_type
- spec
- nva_swath
- va_unit

project_id

Project Name (text)
The format of this field will most commonly be three parts separated by underscores: PRIMARYSTATE, BRIEF-PROJECT-DESCRIPTION, YEAR.

state

The State(s) the project is in. (text)
Format: Two letter State abbreviations

vendor

The name of the company which collected and processed the data. (text)

s_date

Start date of data collection for the project (date)

e_date

End date of data collection for the project (date)

entry_date

Date the lidar data were released into the The National Map (date)

lr_lat, lr_long, ll_lat, ll_long, ul_lat, ul_long, ur_lat, ur_long

Coordinates defining the minimum bounding box of the lidar point cloud project (double)
lr_lat, lr_long Southeastern extent in latitude and longitude
ll_lat, ll_long Southwestern extent in latitude and longitude
ul_lat, ul_long Northwestern extent in latitude and longitude
ur_lat, ur_long Northeastern extent in latitude and longitude

sensor_type
Sensor used in lidar collection for the dataset. (text)

spec
Applicable specification for the dataset. (waiting on domain)
Valid Values:
0 Draft Version 12
1 Draft Version 13
2 USGS Lidar Base Specification 1.0
3 USGS Lidar Base Specification 1.2
4 USGS Lidar Base Specification 2.0
99 Other

nva_swath
Non-vegetated vertical accuracy assessed against a swath. Measured as RMSEz. (waiting on domain)

va_units
Units of NVA RMSEz
Valid Values:
0 International Feet
1 Meters
2 US Survey Feet
3 Decimal Degrees
4 Centimeters
5 Inches
99 unknown

Coordinate Reference System
refsys
horizunit
zunit

refsys
Coordinate Reference System (text)
This field describes the coordinate reference system and projection of the lidar project.

**Horizunit**

HorizontalUnits (long integer)
This field describes the horizontal unit of the lidar point cloud project.
Valid values:

- 0  International Feet
- 1  Meters
- 2  U.S. Survey Feet
- 3  Decimal Degrees
- 4  Centimeters
- 5  Inches
- 99 Unknown

**Zunit**

Elevation Unit (long integer)
This field describes the vertical unit of the lidar point cloud project.
Valid values:

- 0  International Feet
- 1  Meters
- 2  U.S. Survey Feet
- 3  Decimal Degrees
- 4  Centimeters
- 5  Inches
- 6  Feet
- 99 Unknown

**Lidar Information**

- las_type
- quality
- rptd_nps
- rptd_pd
- rptd_units
- rptd_anps
- rptd_anpd
las_type

LAS type (long integer)
This field describes the organization of the LAS files and whether or not the points are classified.
Valid values:
0 Tile unclassified
1 Tile classified
2 Swath unclassified
3 Swath classified
4 Other

quality

Quality Level (long integer)
This field indicates the 3DEP quality level of the tile. For more information regarding 3DEP quality levels, see The 3D Elevation Program Initiative: A Call for Action (USGS, 2014).
Valid values:
1 Quality level 1 (10cm RMSE_z, 0.35m nominal pulse spacing)
2 Quality level 2 (10cm RMSE_z, 0.7m nominal pulse spacing)
3 Quality level 3 (20cm RMSE_z, 1.4m nominal pulse spacing)
99 Other

rptd_nps

Vendor reported nominal pulse spacing (double)
This field describes the reported average point spacing of dataset.

rptd_pd

Vendor reported pulse density (double)
This field describes the reported concentration of points in the dataset.

rptd_units

The units of the vendor reported pulse density and nominal pulse spacing (long integer)
Valid values:
0 International Feet
1 Meters
2 U.S. Survey Feet
3 Decimal Degrees
4 Centimeters
5 Inches
6 Feet
99 Unknown
rptd_anps

Vendor reported aggregate nominal pulse spacing (waiting on domain). This field describes the reported average aggregate pulse spacing of the dataset.

rptd_anpd

Vendor reported aggregate nominal pulse density (waiting on domain). This field describes the reported average aggregate pulse density of the dataset.
The National Map – Elevation, Lidar Point Cloud Tile Data Dictionary

Lidar Tile Information
- **project_id**
  - Project Name (text)
  - The format of this field will most commonly be three parts separated by underscores: PRIMARYSTATE, BRIEF-PROJECT-DESCRIPTION, YEAR.

- **tile_name**
  - Tile Name (text)
  - The .las file name, not including the extension.

- **entity_id**
  - Project and tile name, separated by an underscore. (text)

- **s_date**
  - Start date of data collection for the project (date).
  - Format: YYYYMMDD

- **e_date**
  - End date of data collection for the project (date).
  - Format: YYYYMMDD

- **entry_date**
  - Date tile became available in The National Map (date).
  - Format: YYYYMMDD

- **lr_lat, lr_long, ll_lat, ll_long, ul_lat, ul_long, ur_lat, ur_long**
  - Coordinates defining the minimum bounding box of the point cloud tile (double)
lr_lat, lr_long Southeastern extent in latitude and longitude
ll_lat, ll_long Southwestern extent in latitude and longitude
ul_lat, ul_long Northwestern extent in latitude and longitude
ur_lat, ur_long Northeastern extent in latitude and longitude

**Coordinate Reference System**

refsys
horizunit
zunit

refsys

Coordinate Reference System (text)
This field describes the coordinate reference system and projection of the lidar project.

horizunit

Horizontal Resolution Units (long integer)
This field describes the unit in which the horizontal resolution, HORIZRES, is reported.
Valid values:

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>International Feet</td>
</tr>
<tr>
<td>1</td>
<td>Meters</td>
</tr>
<tr>
<td>2</td>
<td>U.S. Survey Feet</td>
</tr>
<tr>
<td>3</td>
<td>Decimal Degrees</td>
</tr>
<tr>
<td>4</td>
<td>Centimeters</td>
</tr>
<tr>
<td>5</td>
<td>Inches</td>
</tr>
<tr>
<td>99</td>
<td>Unknown</td>
</tr>
</tbody>
</table>

zunit

Elevation Unit (integer).
This field describes the vertical units of the lidar tile.
Valid value:

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>International Feet</td>
</tr>
<tr>
<td>1</td>
<td>Meters</td>
</tr>
<tr>
<td>2</td>
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<td>3</td>
<td>Decimal Degrees</td>
</tr>
<tr>
<td>4</td>
<td>Centimeters</td>
</tr>
<tr>
<td>5</td>
<td>Inches</td>
</tr>
<tr>
<td>6</td>
<td>Feet</td>
</tr>
<tr>
<td>99</td>
<td>Unknown</td>
</tr>
</tbody>
</table>
Lidar Information

las_type
quality
version
rtrnct_1
rtrnct_2
rtrnct_3
rtrnct_4
rtrnct_5
rtrnct_6
rtrnct_7
rtrnct_8
rtrnct_9
rtrnct_10
rtrnct_11
rtrnct_12
rtrnct_13
rtrnct_14
rtrnct_15
point_ct

las_type
LAS file type (integer).
This field describes if the LAS file has been classified, and whether it is delivered as a tile or swath.
Valid values:
0 Tile unclassified
1 Tile classified
2 Swath unclassified
3 Swath classified
4 Other

quality
Quality Level (integer)
This field indicates the 3DEP quality level of the tile. For more information regarding 3DEP quality levels, see The 3D Elevation Program Initiative: A Call for Action (USGS, 2014).
Valid values:
1 Quality level 1 (10cm RMSE_z, 0.35m nominal pulse spacing)
2 Quality level 2 (10cm RMSE_z, 0.7m nominal pulse spacing)
3 Quality level 3 (20cm RMSE_z, 1.4m nominal pulse spacing)
99 Other
version
    The LAS file format version of the tile (double)

rtnct_1
    Number of first return points in the .las file. (integer).

rtnct_2
    The number of second return points in the .las file. (integer)

rtnct_3
    The number of third return points in the .las file. (integer)

rtnct_4
    The number of fourth return points in the .las file. (integer)

rtnct_5
    The number of fifth return points in the .las file. (integer)

rtnct_6
    The number of sixth return points in the .las file. (integer)

rtnct_7
    The number of seventh return points in the .las file. (integer)

rtnct_8
    The number of eighth return points in the .las file. (integer)

rtnct_9
    The number of ninth return points in the .las file. (integer)

rtnct_10
    The number of tenth return points in the .las file. (integer)

rtnct_11
    The number of eleventh return points in the .las file. (integer)

rtnct_12
    The number of twelfth return points in the .las file. (integer)
rtnc_13
The number of thirteenth return points in the .las file. (integer)

rtnc_14
The number of fourteenth return points in the .las file. (integer)

rtnc_15
The number of fifteenth return points in the .las file. (integer)

point_ct
The total number of points in the .las file. (integer)

References Cited

Appendix A

Correspondence between selected 3DEP metadata items and USGS DEM Type A records.

Refer to Data User’s Guide 5, Appendix A, for complete descriptions of the A record data elements referenced below.

**FREETEXT** The FREETEXT field is a literal copy of Data Element 1: The first 140 bytes of the A record. By USGS definition, only bytes 41 through 80 are free format text, but this restriction is not commonly observed.

**PSITE** This is a literal copy of data element 2, the Mapping Center origin code. If this field is blank, the code “UNKNOWN” is assigned to PSITE.

**ZONE** This is a literal copy of data element 6.

**ZUNIT** This field is derived from data element 9, but does not use the same values. Data element 9 is coded as 1 = feet, 2 = meters. ZUNIT, however, is coded as 0 = feet, 1 = meters.

**LRLAT, LRLON, ULLAT, ULLON** These fields are derived from data element 11.

**RESOLUTION** This field is derived from data element 15, which indicates the x, y, and z resolutions of the source DEM. In the case of Alaska data, where x and y resolutions differ, the y resolution is taken to be the resolution of the DEM. Further, RESOLUTION is indicated in the DEM’s native units (meters or decimal seconds). Nonstandard DEM’s may be assigned RESOLUTION values in a different manner.

**ZSTEP** This is a literal copy of the z resolution component of data element 15.

**S_DATE** This is a literal copy of data element 21, or 0 if data element 21 is absent.

**I_DATE** This is a literal copy of data element 22, or 0 if data element 22 is absent.

**HDATUM** This field is derived from data element 27, but uses different values. Data element 27 specifies unique codes for the Old Hawaii Datum and the Puerto Rico Datum, both of which are designated as 27 in HDATUM.

**VDATUM** This field is derived from data element 26, but uses different values. A value of 0 is assigned to VDATUM if no vertical datum information is present.