USAF Average Elevation Data – One Degree and 5 Minute

National Center for Atmospheric Research
Roy L. Jenne
Will Spangler
March 1976

NCAR has a tape containing mean elevation data for one degree lat-lon squares with 30 minute components and for 5 minute squares. The 5 minute data coverage is for Europe and a portion of North Africa, and for North America but not for Alaska or parts of the Northwest Territories. The data coverage is shown on Figure 3 from a writeup received with the data.

The data was received on seven tapes from the Air Force Aeronautical Chart and Information Center (ACIC). It has now been blocked and merged onto one tape. The cards have been blocked 20/block to contain the one degree data. The complete tape including the 5 minutes data has 163,978 cards all nines, separating the types. Card 65161 contains ACIC writeups describe the method of obtaining the data and the format of the card images. Portions of the data were once classified, but it is now all unclassified.

Program 542 can be used to access the data. See Folder D-38 for format and coverage information.

The tapes are:

<table>
<thead>
<tr>
<th>Date</th>
<th>Tape</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 June 71</td>
<td>C0212</td>
<td>Has all the data.</td>
</tr>
<tr>
<td>2 June 71</td>
<td>C0213</td>
<td>Same as C0212.</td>
</tr>
<tr>
<td>31 May 71</td>
<td>C0204</td>
<td>Only the one degree data.</td>
</tr>
<tr>
<td>31 May 71</td>
<td>C0207</td>
<td>Only the 5 minute data.</td>
</tr>
</tbody>
</table>

We could purge the last two tapes listed.

Note: The original records were card images in the first 80 characters and characters 81 through 132 were blanks. The latter were insured to be blanks and then dropped.
REPLY TO
ATTN OF: RSBNL

SUBJECT: Mean Elevation Data

TO: National Center for Atmospheric Research
ATTN: Mr. Roy L. Jenne

1. Reference your request, 16 April 1971.

2. Five magnetic tapes of mean elevation data for global 1° x 1° and 5' x 5' areas for the North American and European datums are forwarded for your use. The magnetic tapes are 7 track, 800 bpi, ECD, even parity. Each tape has a hardware end of file (EOF). The last tape of 5' x 5' and 1° x 1° file is terminated by nines. A sample printout and card format is included to facilitate interpretation of the magnetic tapes.

3. The magnetic tapes should be copied and returned to ACIC.

ELI S J. HAUER
Chief, DOD Gravity Services Branch

8 Atch
1. Mean Elevation Card Format, 17 May 71
2-5. 5' x 5' Mean Elevation Magnetic Tapes, U429, U15, U14, U372, 17 May 71
6-8. 1° x 1° Mean Elevation (with 30' Magnetic Tapes, U320, U350, components) U243, 17 May 71
ACIC CARD FORMAT FOR MEAN ELEVATION DATA

1. Column 1: Formerly for security control, now set to blank.

2. Column 2: Formerly for security classification. All data now unclassified and open for distribution.

3. Columns 3-7: Latitude of north-west corner of area covered by card regardless of whether all mean elevations for area are shown on card. Column 3 gives sign of latitude, positive (12 punch) for north latitudes and negative (11 punch) for south latitude. Columns 4-5 give degrees, Columns 6-7 minutes. Proceeding zeros are always used. Minutes columns are left blank if latitude for quad size is always in even degrees.

4. Column 8: Reserved for file maintenance.

5. Columns 9-13: Longitude of north-west corner of area covered by card regardless of whether all mean elevations for area are shown. Longitude is given east of Greenwich, 0° to 359° E. Columns 9-11 give degrees, Columns 12-13 minutes. Proceeding zeros are always used. Minutes columns are left blank if longitude for quad size is always in even degrees.

6. Column 14: Units of measure. Apply to all mean elevations shown on card. Coded as follows:

   1 = meters
   2 = feet
   3 = fathoms

7. Columns 15, 23, 31, 39, 47, 55: Type of area for which mean elevation is given. Coded as follows:

   0 = quad contains all positive land (land above sea level).
   9 = quad contains all ocean.
   8 = quad contains some negative land (land below sea level).
   5 = quad contains both land and ocean.
   4 = quad contains ice and mean elevation is for surface of ice.
   3 = quad contains ice and mean elevation is in terms of land or ocean.
   2 = quad contains a significant lake which was considered in determining mean elevations.
8. Columns 16, 24, 32, 40, 48, 56: Accuracy of mean elevations. Coded as follows:

<table>
<thead>
<tr>
<th>Ft</th>
<th>Meters</th>
<th>Ft</th>
<th>Av. Meters</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 &lt; 3</td>
<td>0 &lt; 1</td>
<td>0 &lt; .5</td>
<td>0.5</td>
</tr>
<tr>
<td>3 &lt; 10</td>
<td>1 &lt; 3</td>
<td>.5 &lt; 2</td>
<td>2.0</td>
</tr>
<tr>
<td>10 &lt; 20</td>
<td>3 &lt; 6</td>
<td>2 &lt; 3</td>
<td>4.5</td>
</tr>
<tr>
<td>20 &lt; 30</td>
<td>6 &lt; 9</td>
<td>3 &lt; 5</td>
<td>7.5</td>
</tr>
<tr>
<td>30 &lt; 40</td>
<td>9 &lt; 12</td>
<td>5 &lt; 7</td>
<td>10.5</td>
</tr>
<tr>
<td>40 &lt; 50</td>
<td>12 &lt; 15</td>
<td>7 &lt; 8</td>
<td>13.5</td>
</tr>
<tr>
<td>50 &lt; 65</td>
<td>15 &lt; 20</td>
<td>8 &lt; 11</td>
<td>17.5</td>
</tr>
<tr>
<td>65 &lt; 80</td>
<td>20 &lt; 25</td>
<td>11 &lt; 14</td>
<td>22.5</td>
</tr>
<tr>
<td>80 &lt; 115</td>
<td>25 &lt; 35</td>
<td>14 &lt; 19</td>
<td>30.0</td>
</tr>
<tr>
<td>115 &lt; 150</td>
<td>35 &lt; 45</td>
<td>19 &lt; 25</td>
<td>40.0</td>
</tr>
</tbody>
</table>

9. Columns 17, 25, 33, 41, 49, 57: Sign of mean elevation; positive (12 punch) where given in terms of land elevation, negative (11 punch) where given in terms of water depth.

10. Columns 18-22, 26-30, 34-38, 42-46, 50-54, 58-62: Mean elevations, given as whole numbers. Preceding zeros are always used. The arrangement of mean elevations on cards depends on quad size and is according to the following system:

   Note: Numbers in diagrams are keyed to six quads or mean elevation spaces on format.

   a. A 1° x 1° mean elevation and its 30' x 30' components are put on one card.
b. 5' x 5' mean elevations are put on cards in groups of six so that one card covers an area 5' in latitude and 30' in longitude.

<table>
<thead>
<tr>
<th>61° N</th>
<th>238°</th>
<th>239°</th>
</tr>
</thead>
<tbody>
<tr>
<td>60° N</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>60°30' N</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>60° N</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

11. Columns 63-66: Control Number. Used by ACIC to distinguish between groups of data for internal control.


13. Column 71: Batch Number. Used by ACIC for internal control.

14. Column 72: Quad size. Gives size of quadrangle for which mean elevations are given. Coded as follows:

- 1 = 1° x 1° and 30' x 30'
- 5 = 5' x 5'

15. Column 80: Card Manipulation. Used internally by ACIC.
Problems with AF elevation:

1° x 1° and 30° x 30°:
1. Card image for 45°N, 39°E is missing.
2. Card image for 30°N, 357°E is duplicated, and following this all card images for 30°N are duplicated.
3. Card image for 29°N, 30°E is missing.
4. Card image for 30°S, 359°E is duplicated, and following this all card images for 30°S are duplicated.
5. There is no data for 39°S.

5' x 5' (reported by user 10 Aug 78):
1. Card images for 21°25'N and 287°30'W - 287°55'W are missing, (Should be all ocean)
2. Card images for 26°50'N and 261°30'W - 261°55'W are missing, (Should be all positive land)
3. Card image for 20°50'N and 261°00'E - 261°25'E is duplicated.

1° x 1° (reported by user Aug 84):
1. Card image for 43°5, 146 E contains bad value of +2500 m
Dear Will,

I've been playing with this data set for the last week or two and I have found some problems with it. I would like to report them so that this information can be included in the documentation file for this data set. The problems mentioned here concern the 5-minute data set -- I haven't checked the 30-minute data set.

Problem 1: In addition to Mean Elevation, this data set contains information about Type of Area (e.g., all land, all ocean, coast, ice, significant lake). Such information can be very useful in mesoscale modelling to specify coastlines and water bodies. However, some large North American lakes are not correctly identified as type 2's (significant lakes), but rather are marked as type 0's (all land). The ones which I have noticed are Lake Champlain in Vermont/New York, Lake Nipigon and Lake of the Woods in Ontario, Lakes Winnipeg, Winnepegosis, and Cedar Lake in Manitoba, Lake Sakakawea in North Dakota, and the Great Salt Lake in Utah. There are likely other large lakes which have been misidentified too.

Problem 2. Mean elevations over the Atlantic and Pacific Oceans are given as zero, i.e., sea level. However, the five Great Lakes of North America (Ontario, Erie, Huron, Michigan, and Superior) are assumed to be dry so that their BOTTOM elevations are used in calculating mean elevations for the appropriate grid squares. For instance, some squares in the middle of Lake Ontario have negative mean elevations. This is not strictly an error but is inconsistent with the treatment of the oceanic areas and hence unexpected. Moreover, the terrain heights across any of the Great Lakes are not equal (this might surprise lake freighter captains and recreational boaters as well as modellers).

Let me know what you think. Sincerely, Mike Moran
(491-8425)
Hi,

I'd like to report a problem that I found with data set 755.0, the U.S. Air Force elevation data set, in the 5-minute section. I extracted all 5-minute terrain data from 134 W to 52 W and from 24 N to 55 N (i.e., continental U.S., northern Mexico and southern Canada) from file C0227. As I did this, I checked for large height jumps between adjacent squares. I found two cases that looked bad. They are listed below with data-set lat-long coordinates at the left and the west-east group of six elevations following. Has anyone already reported this problem? I have a copy of handwritten DSS documentation dated 9 October 1978 detailing some problems with both the 30-minute and 5-minute sections but nothing with more recent reports of errors.

   (Labrador, Canada)
   (near Green Bay, Wisconsin)

I can send you a copy of my FORTRAN program and script file if you want to check what I did.

Mike Moran
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Colorado State University
Fort Collins, CO
(303)491-8425