SAFARI 2000 Digital Elevation Model, 1-km (GLOBE)


Summary:

The Global Land One-Kilometer Base Elevation (GLOBE) digital elevation model (DEM) is a global data set with horizontal grid spacing of 30 arc-seconds (0.008333... degrees) in latitude and longitude, resulting in dimensions of 21,600 rows and 43,200 columns. At the Equator, a degree of latitude is about 111 kilometers. GLOBE has 120 values per degree, giving GLOBE slightly better than 1 km gridding at the Equator, and progressively finer longitudinally toward the Poles.

The horizontal coordinate system is seconds of latitude and longitude referenced to World Geodetic System 84 (WGS84). The vertical units represent elevation in meters above Mean Sea Level. The elevation values range from -407 to 8,752 meters on land. In GLOBE Version 1.0, ocean areas have been masked as no data and have been assigned a value of -500. Due to the nature of the raster structure of the DEM, small islands in the ocean less than approximately 1 square kilometer (specifically, those that are not characterized by at least one 30 grid cell and/or do not have coastlines digitized into Digital Chart of the World or World Vector Shoreline) may not be represented.

Six gridded DEMs, and five cartographic sources, were adapted for use in GLOBE. Sources include: National Imagery and Mapping Agency, Digital Terrain Elevation Data Level 1 and 0; Australian Surveying and Land Information Group (AUSLIG) and the National Geophysical Data Center (NGDC), 30 DEM for Australia; Geographical Survey Institute (GSI), 30 DEM for Japan; Servizio Geologico Nazionale (SGN) and NGDC, 30 DEM for Italy; Manaaki Whenua Landcare Research, Ltd. (LCR),DEM for New Zealand; NASA/Goddard Space Flight Center, DEM for Greenland from GEOSAT Altimetry; Defense Mapping Agency (now National Imagery and Mapping Agency),Digital Chart of the World; Army Map Service (now National Imagery and Mapping Agency), Maps for South America, South Pacific, and East Indies; Instituto Brasiliero de Geografia e Estatistica, Maps for the International Map of the World on the Millionth Scale; Ministerio de Guerra, Peru, Mapa Fisico Politico del Peru; and Scientific Committee for Antarctic Research, Antarctic Digital Database. A total of 18 combinations of source/lineage were used in GLOBE.

GLOBE may be used for technology development, such as helping plan infrastructure for cellular communications networks, other public works, satellite data processing, and environmental monitoring and analysis. GLOBE prototypes (and probably GLOBE itself after its release) has been used to help develop terrain avoidance systems for aircraft. In all cases, GLOBE data should be treated as any potentially useful but guaranteed imperfect data set. Mission- or life-critical applications should consider the documented artifacts, as well as likely undocumented imperfections, in the data.

Image of DEM Data:

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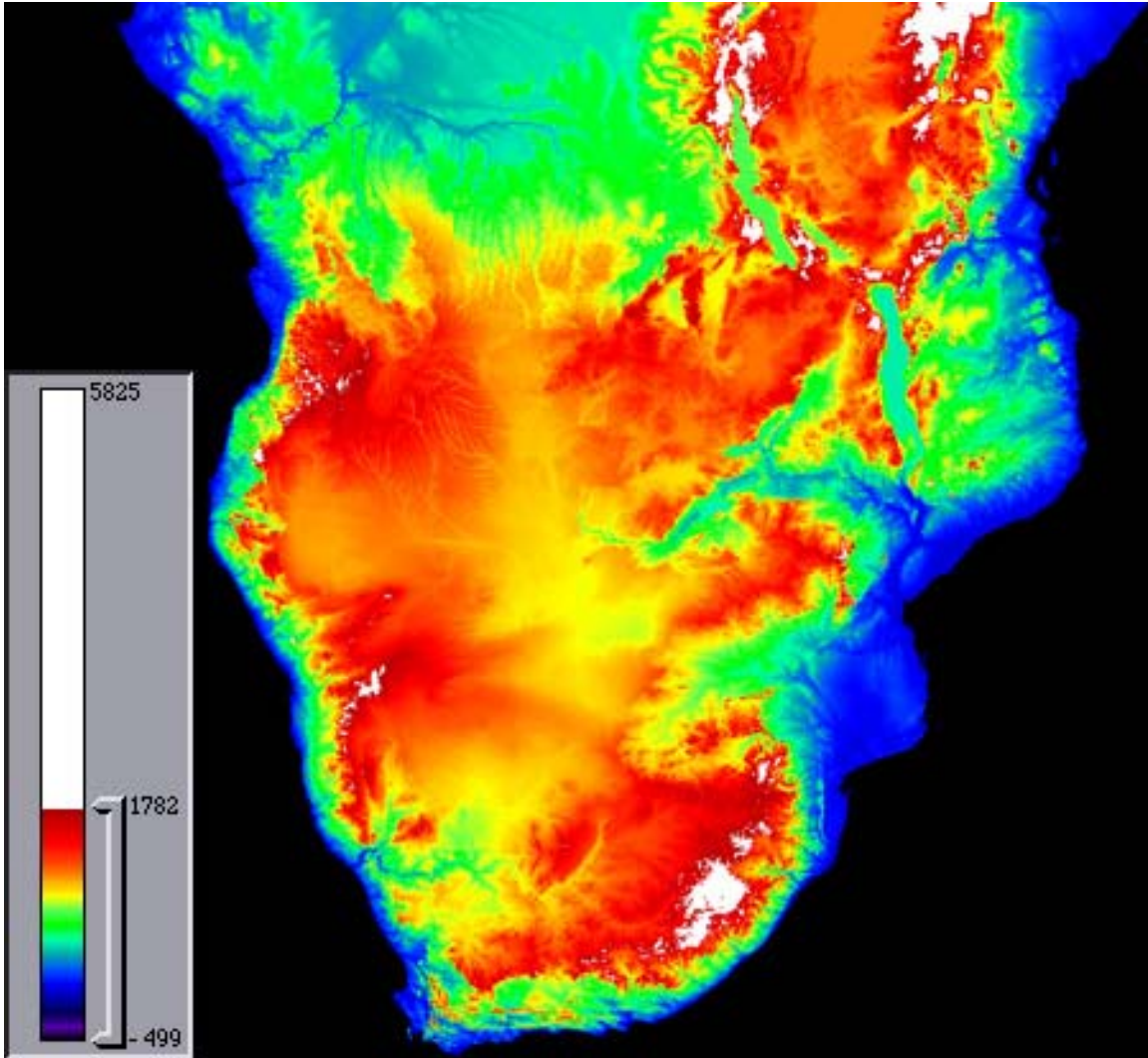
Data Set Information:

Investigators:
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Project: SAFARI 2000
Data Set Title: Global Land One-km Base Elevation (GLOBE) DEM, Southern Africa
Subset

Site: Southern Africa
Westernmost Longitude: 5
Easternmost Longitude: 43
Northernmost Latitude: 0
Southernmost Latitude: -35

Data Set Citation:
GLOBE Task Team and others (Hastings, David A., Paula K. Dunbar, Gerald M.
Elphingstone, Mark Bootz, Hiroshi Murakami, Hiroshi Maruyama, Hiroshi Masaharu,
Peter Holland, John Payne, Nevin A. Bryant, Thomas L. Logan, J.-P. Muller, Gunter
Schreier, and John S. MacDonald), eds., 1999. The Global Land One-kilometer Base
Elevation (GLOBE) Digital Elevation Model, Version 1.0. National Oceanic and
Atmospheric Administration, National Geophysical Data Center, 325 Broadway,
Boulder, Colorado 80303, U.S.A. Digital data base on the World Wide Web (URL:
http://www.ngdc.noaa.gov/seg/topo/globe.shtml) and CD-ROMs.

Southern African subset extractions of this data were performed by Oak Ridge National
Laboratory:

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Data Set Link: http://www.ngdc.noaa.gov/seg/topo/gltiles.shtml
Data Set Link: http://www.ngdc.noaa.gov/cgi-bin/seg/ff/nph-newform.pl/seg/topo/subset

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Binary File Information

The binary image file (so_africa_dem_1km.zip) can be viewed in any standard image
viewing package. The file is a 2-byte signed image, no header, 4560 columns by 4200
rows. For more information on viewing raw binary images, see the Image Viewing
Tutorial.

```
 file_title            = southern Africa
 data_type             = raster
 grid_cell_registration  = center
 map_projection        = Lat/Lon
 left_map_x            = 5.00000000000
 right_map_x           = 43.00000000000
 upper_map_y           = 0.00000000000
 lower_map_y           = -35.00000000000
 number_of_rows        = 4200
 number_of_columns     = 4560
```

```
grid_size              = 0.00833333333
elev_m_unit            = meters
min__value             = 1
max__value             = 5825
elev_m_min             = 1
elev_m_max             = 5825
elev_m_missing_flag    = -500
number_of_display_colors = 256
data_value_unit        = elev_m
data_byte_value        = 2 bytes
data_byte_order        = big_endian
```

File Compression Information

For this archive, the data file has been compressed with the MS Windows-standard Zip compression scheme. This file was compressed using Aladdin's DropZip on a Macintosh. DropZip uses the Lempel-Ziv algorithm, also used in Zip and PKZIP programs. The compressed file may be uncompressed using PKZIP (with the -expand option) on MS Windows and UNIX, or with StuffIt Expander on the Mac OS. Versions of the decompression software for MS Windows, Mac OS, and several varieties of UNIX systems are included on the CD-ROMs. You can get newer versions from the PKZIP Web site at http://www.pkware.com/shareware/.

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ASCII File Information

The data is also available in ASCII Grid (so_africa_dem.dat.gz) format for ArcInfo. The *.dat file contains a single ASCII array with integer values. Coordinates listed below are in decimal degrees. The ASCII file consists of header information containing a set of keywords, followed by cell values in row-major order. The file format is:

```
 NCOLS 4560
 NROWS 4200
 XLLCORNER 4.9958333333333
 YLLCORNER    -34.995833333333
 CELLSIZE     0.0083333333333333
 NODATA_value  -9999
 row 1
 row 2
 .
 .
 .
 row n
```

Row 1 of the data is at the top of the grid, row 2 is just under row 1 and so on. The end of each row of data from the grid is terminated with a carriage return in the file.

To import this file into ArcInfo use the following command at an ARC prompt:

    ASCIIGRID {in_ascii_file} {out_grid} {INT | FLOAT}

Arguments:
{in_ascii_file} - the ASCII file to be converted.
{out_grid} - the name of the grid to be created.
{INT | FLOAT} - the data type of the output grid.
    INT - an integer grid will be created.
    FLOAT - a floating-point grid will be created.

File Compression Information

This file was compressed using the UNIX utility gzip. The gunzip utility on UNIX can be used to uncompress the file. Windows based utilities such as Winzip or PKzip can also be used to uncompress this file.

Procedure Used to Create the Southern Africa Subset

The original data were obtained from the GLOBE Web site. The data were imported into ArcInfo and subsetted.

Using GRID (a raster- or cell-based geoprocessing toolbox that is integrated with ArcInfo) the SETWINDOW command was used to define the subarea of interest. This subarea was defined by identifying the bounding coordinates as follows:

    x_min 5   y_min -35   x_max 43   y_max 0

The "snap_grid" option of the SETWINDOW command was used. This snaps the lower-left corner of the specified window to the lower-left corner of the nearest cell in the snap_grid and snaps the upper-right corner of the specified window to the upper-right corner of the nearest cell in the snap_grid. In this case the snap_grid is an original data grid. The purpose of this is to ensure the proper registration of the newly set analysis window. The command format used is as follows:

    SETWINDOW x_min y_min x_max y_max original_grid

Once the window was set, creating the new grid was simply a matter of setting the new subset grid equal to the original grid.

    subset_grid = original_grid

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Legend & Additional Sources of Information

GLOBE data are distributed at no cost from the GLOBE web site (http://www.ngdc.noaa.gov/seg/topo/globe.shtml) and from NGDC's anonymous FTP site (ftp.ngdc.noaa.gov). Data users can download any or all 16 tiles that combine for global coverage or create a custom subset from the Get GLOBE Data web site at http://www.ngdc.noaa.gov/seg/topo/globeget.shtml. GLOBE data are also available at modest cost-of-reproduction on CD-ROMs (http://www.ngdc.noaa.gov/seg/fliers/topoprod.shtml).