

Obtaining and Importing Elevation Data from the SDDS

Digital Elevation Model (DEM) data are freely available on the Internet from several sources, in several formats. This document will provides information on how to obtain and import data from the USGS Seamless Data Distribution System (SDDS). A more general description of the DEM data types and alternate sources can be found in the [DEM description](#) document in CEO FAQ section of this web site.

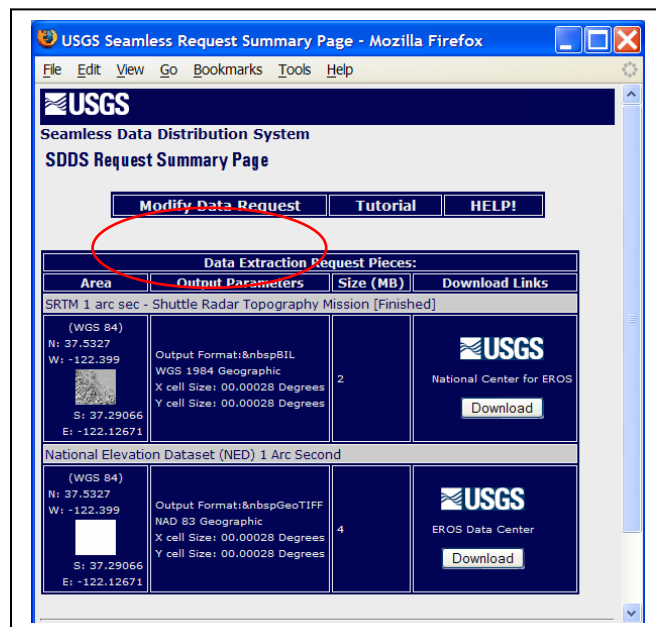
The SDDS is the primary source of both the National Elevation Dataset (NED) and Shuttle Radar Topography Mission (SRTM) data. When you first visit this site you should take the tutorial *before* searching for data. This will teach you to easily navigate the site and select exactly what you need. The site is at: <http://seamless.usgs.gov/>. These data have a “projection” of Geographic or Geodetic (latitude/longitude). The SRTM data use the WGS84 datum and NED uses the NAD83 datum. You will notice that there are many other types of data available at this site, which are not covered in this document.

The first decision you will need to make at the SDDS is to search for international data, or to search for data within the U.S. For international locations you can obtain the 3 arc second SRTM data. This has a resolution of approximately 90 meters.

Within the U.S. you can access SRTM data at 3 arc second (~90 m) or 1 arc second (~30 m) resolution and the NED at multiple resolutions. NED is a seamless dataset of elevation for the United States with a 1 arc second (~30 meter) resolution. You can also obtain 1/3 arc second (~10 m) resolution data for much of the U.S. at this site.

Once you have selected the type of data you wish to obtain, and the region you want, use the “Define Download Area” tool to select the data. Your data request will be processed and in a short time the SDDS Request Summary Page will open. Depending on the size of your area, you will have one or more tiles listed for each product selected. The size in megabytes and output format are also displayed in this window.

Warning! The default download data format is ArcGrid. This format is native to ESRI GIS products and is difficult to work with in most remote sensing programs. GeoTIFF, BIL, and GridFloat formats are also available. We *strongly* recommend that you select **GeoTIFF** as follows:



Click on the “Modify Data Request” button to select **GeoTIF**. You also have the choice of two compression formats. You should accept the default ZIP format. After downloading the data, extract it into a new directory for processing. Each format requires unique processing, described below.

GeoTIFF

GeoTIFF data can be directly read in most applications you will use. The SDDS GeoTIFF DEM data are a bit unique in that they use a floating point, or IEEE 4-byte, 32 bit data type as opposed to a more typical signed 16-bit data type for elevation data. ERMapper, ENVI and ArcMap can all open these data directly.

In many cases you may want to convert the data from Geographic to a projection such as UTM. In ERMapper this would be done in the Geoprocessing Wizard using the Map to Map Projection option. You will need to change the cell size from decimal degrees to meters or feet. This information can be found in Appendix B. You should also change the data type to signed 16-bit integer.

Before you can use these data in ERDAS Imagine you need to compute statistics with the Linear bin function. From the Imagine main menu, select **Tools | Image Information** to open the “ImageInfo” window. Open the GeoTIFF file and click on the Σ button to compute statistics, changing the Bin Function from Default to Linear.

BIL

If you request DEM data in the Band Interleaved by Line (BIL) format, you will need to import these data as follows. Use MyComputer (Windows Explorer *not Internet Explorer*) to navigate to this new directory to view the files in this new directory. If you cannot see file extensions, Windows is hiding these. You can fix this from the Windows Explorer menu **Tools | Folder Options | View** and *uncheck* the box “Hide extensions for known file types”. Click the “Apply to All Folders” button then OK. You will see a number of files, all with the same base name such as “29562617”, followed by different file extensions. The “.bil” file holds the data, the “.hdr” file is the native header file, and the “.blw” file contains coordinate information.

Open the 29562617.blw file in a text editor to view the coordinate information. Appendix A contains an annotated version of a “.blw” file as a reference.

Next in ERMapper select **File | Open** and *single click* the 29562617.hdr file to select it (*do not load it yet!*). Click on the “Info” button then the “Edit” button to open the “Dataset Header Editor” window. Select “Raster Info” and change the “Cell Type” to *Signed 16-bit Integer*. Now you should enter the coordinate information from the “.blw” file opened above. This process is described in the document “Editing ERMapper Header Information” found on the CEO FAQ web page.

Once you have entered the information, save these changes and ERMapper will create a new header file using the same base name with the “.ers” file extension. In the example

above, the new file would be 29562617.ers. You now have a good DEM in ERMapper format.

Note: The complete dataset now consists of three files; nnnnnnn.bil, nnnnnnn.hdr, and nnnnnnn.ers which must be kept together. If you use File | Save As to save this as a new ERMapper dataset with a meaningful name, the new dataset will have the standard two files; a basefile

ArcGrid

SDDS data are provided in the ESRI ArcGRID format by default. You can use these data directly in ArcMap, but not in ERMapper or ENVI. Before you can use these data in ERDAS Imagine you need to compute statistics with the Linear bin function. From the Imagine main menu, select **Tools | Image Information** to open the “ImageInfo” window. Open the ArcGrid file and click on the Σ button to compute statistics. Change the Bin Function from Default to Linear.

GridFloat

GridFloat is the fourth format that SDDDS DEM data can be obtained. The CEO Lab has no experience with data in this format and does not recommend selecting this option.

Appendix A – BLW coordinate information

The following is an annotated “.blw” type file containing coordinate information for a BIL formatted DEM dataset. This information should be entered into an ERMapper header file. See the document in the Techniques section of the CEO FAQ web page for detailed instructions on editing these files. Remember that these data use the “Geodetic” projection. The datum for NED is NAD83 datum and the datum for SRTM is WGS84.

```
0.00027777777780 ← Cell size
0.00000000000000
0.00000000000000
-0.00027777777780
-122.39902778756660 ← Upper left latitude
37.53263889190632 ← Upper left longitude
```

Appendix B – Cell Size Equivalents

3 Arc-second data -- 0.0008333 decimal degrees -- 90 meters
1 Arc-second data -- 0.0002777 decimal degrees -- 30 meters