National Elevation Dataset – Bare Earth Elevation Data

http://ned.usgs.gov/

Program Highlights

Data Product

- 2-arc-second (60-meter) posting Digital Elevation Model (DEM).
- 1-arc-second (30-meter) posting DEM.
- 1/3rd-arc-second (10-meter) posting DEM.
- 1/9th-arc-second (3-meter) posting DEM.

Advantages

- Most edge matching / seam issues from quad-based DEMs have been fixed.
- 1/3rd-arc-second National Elevation Dataset (NED) provides very close fidelity to quad contours. Suitable for non-regulatory flood risk products.
- Avoids many of the problems in original 30-meter DEMs.
- 1/9th-arc-second data are generally good enough for regulatory mapping.
- Newer 1/3rd- and 1/9th-arc-second data increasingly are from Light Detection and Ranging (LiDAR) and other high-resolution data sources.

Disadvantages

- 2- and 1-arc-second NED based on many sources with variable quality. Generally not suitable for hydraulics or floodplain mapping.
- 1/9th-arc-second data are not available everywhere.
- 1/3rd-arc-second quality varies based on original quad contour interval and NED production methods.
- Small areas of 1/3rd-arc-second data are resampled 1-arc-second data and are low quality.

Program Overview

The U.S. Geological Survey (USGS) NED has been developed by merging the highest resolution, best quality elevation data available across the United States into a seamless raster format. The NED has a consistent projection (Geographic) and elevation units (meters). Nationwide coverage is available for data at a 1-arc-second (30-meter) post spacing, with portions of Alaska at a 2-arc-second (60-meter) post spacing; and 1/3rd-arc-second (10-meter) post spacing (although small areas are resampled 1 arc second). The horizontal datum is North American Datum of 1983 (NAD83), except for Alaska, which uses the North American Datum of 1927 (NAD27). The vertical datum is North American Vertical Datum of 1988 (NAVD88), except for Alaska, which uses National Geodetic Vertical Datum of 1929 (NGVD29). NED is a living dataset that is updated bimonthly to incorporate the "best available" DEM data. As more 1/9th-arc-second (3-meter) post-spacing data covering the United States become available, they will be added to the seamless dataset.

Data Details

NED is designed to provide national elevation data in a seamless form with a consistent datum, elevation unit, and projection. NED has a resolution of 1 arc second (approximately 30 meters) for the conterminous United States, Hawaii, Puerto Rico and the island territories and a resolution of 2 arc seconds (approximately 60 meters) for Alaska. NED data sources have a variety of elevation units, horizontal datums, and map projections. In the NED assembly process, the elevation values are converted to decimal meters as a consistent unit of measure, NAD83 is consistently used as the horizontal datum, and all the data are recast in a geographic projection. Older DEMs produced by methods that are now obsolete have been filtered during the NED assembly process to minimize artifacts that are commonly found in data produced by these methods. Artifact removal greatly improves the quality of the slope, shaded-relief, and synthetic drainage information that can be derived from the elevation data. NED processing also includes steps to adjust values where adjacent DEMs do not match well, and to fill sliver areas of missing data between DEMs. These processing steps ensure that NED has no void areas and artificial discontinuities have been minimized. The artifact removal filtering process does not eliminate all of the artifacts. In areas where the only available DEM is produced by older methods, then "striping" may still occur.

(The following information about the accuracy of the NED is from Maune, D., (ed.), 2007, Digital elevation model technologies and applications: the DEM user's manual (2nd edition), Chapter 4. Courtesy of Dean Gesch, USGS.)

The accuracy of the NED varies spatially because of the variable quality of the source DEMs. As such, the NED inherits the accuracy of the source DEMs. In an effort to provide more information to users on the vertical accuracy of the NED, the dataset has been tested by comparing it with an independent reference source of very high accuracy. The reference data are the geodetic control points that the National Geodetic Survey uses for gravity and geoid modeling. The overall absolute vertical accuracy expressed as the root mean square error is 2.44 meters. As better sources of data are incorporated, the accuracy improves.

For some applications of elevation data, the relative, or point-to-point, vertical accuracy is more important than the absolute vertical accuracy. Whereas absolute accuracy accounts for the combined effects of systematic and random errors, relative accuracy is a measure of just random errors. Averaged over all 9,187 point pairs, the relative vertical accuracy is 1.64 meters.

One caveat to note about the accuracy assessment presented here is that even though the reference control point dataset is large, the number of quadrangle-based USGS DEMs on which the points are located is relatively small. Thus, if users have a need for very specific accuracy information for the NED for a local area, a separate assessment should be done with suitable reference data just for that area.

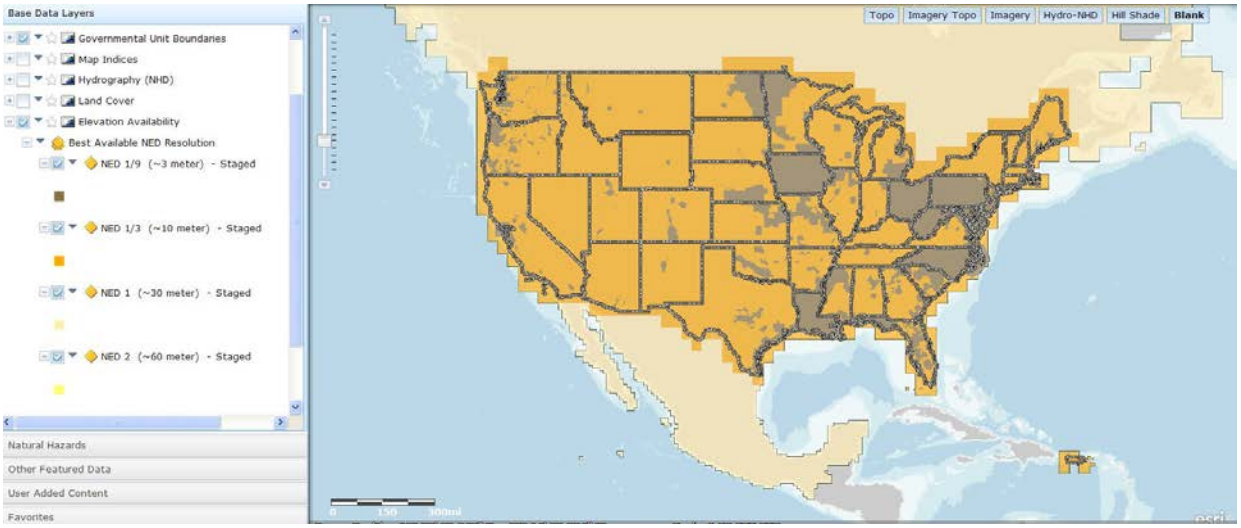
Data Applicability to Flood Mapping Program

- 1/3rd-arc-second data provide very close fidelity to quad contours and may be acceptable for flood risk products.
- 1/9th-arc-second data are generally good enough for most regulatory flood map updates.

Data Availability

The data dictionary, release notes, and update information can be found at http://ned.usgs.gov/Ned/downloads.asp.

Information about the best resolution available and methods of production are available through the USGS GISDATA Map Studio Interactive Viewer at http://gisdata.usgs.net/website/usgs_gn_ned_dsi/viewer.htm. The following figure illustrates the resolution of data available on September 9, 2013:



Data Ordering

In the Seamless Data Distribution System at http://viewer.nationalmap.gov/viewer/, users specify the footprint of the data they require. Large downloads may be broken into chunks.

A separate system allows 1x1-degree tiles of NED to be downloaded. Many users find this to be easier than using the seamless server: http://cumulus.cr.usgs.gov/webappcontent/neddownloadtool/NEDDownloadToolDMS.html.

For very large datasets, users may provide the Earth Resources Observation and Science (EROS) data center a hard drive to ship the data. Requests for bulk data may take several weeks to process (http://cumulus.cr.usgs.gov/bulk.php).