USGS
science for a changing world

The National Map
US Topo

US Topo—*Topographic Maps for the Nation*

Building on the success of 125 years of mapping, the U.S. Geological Survey (USGS) created the US Topo, a georeferenced digital map produced from *The National Map*[1] data. Georeferencing provides the capability to display the ground coordinate location as the user moves the cursor around the map. US Topo maps are designed to be used like the traditional 7.5 minute quadrangle paper topographic maps for which the USGS is so well known. However, in contrast to paper-based maps, US Topo maps provide modern technological advantages that support faster, wider public distribution and basic, on-screen geospatial analysis for all users.

What Makes US Topo Different from Other Digital Topographic Maps?

US Topo provides the Nation with a topographic product that users can quickly incorporate into decisionmaking, operational or recreational activities. Topographic content of contours, shaded relief, and hydrography together with multiple data layers make US Topo more than a street map. Advantages of the US Topo product include the following:

- Freely available, self-contained, impartial, credible topographic maps for the Nation
- Made from nationally consistent authoritative data that are quality assured to high standards
- Richer content, multiple layers of data; more than a street map
- Continuously evolving, incorporating additional data layers and features
- Look and feel of legacy paper USGS topographic maps but with technological advantages
- Interactive capabilities with Google Maps®
- Can be used on a computer or printed to scale
- Users can select the reference systems:
  - Latitude-longitude
  - UTM (Universal Transverse Mercator)
  - MGRS (Military Grid Reference System)
- Free downloadable user tools
- Downloadable free from the USGS Store[2]

Figure 1. US Topo map of the Chattanooga, Tennessee quadrangle.

What is New about US Topo?

A significant design change is being phased in during 2013. The goal of the first cycle of US Topo maps for the 48 conterminous states was to use *The National Map*[1] databases to create a digital image-based cartographic map that retained the look and feel of the traditional USGS 7.5 minute quadrangle map. This approach served as a transitional step into digital map production and delivery, product recognition, and customer acceptance. However, a major issue that needed to be resolved was the readability

of the map symbols superimposed on a digital orthoimage (aerial photograph) background (fig. 1). To resolve the readability issue, the USGS worked with The Pennsylvania State University to redesign the US Topo maps so that map elements are visually distinguishable with the imagery turned on and off, while keeping the file size as small as possible (fig. 2). The US Topo map redesign includes improvements to various display factors, including symbol definitions (color, line thickness, line symbology, area fills), layer order, and annotation fonts. Adjusting the transparency of some features also has enhanced the visibility of multiple competing layers. For example, the lake area fill symbol is layered on top of the imagery, but is partially transparent so that the user can see the imagery through the blue lake area symbol (fig. 3).

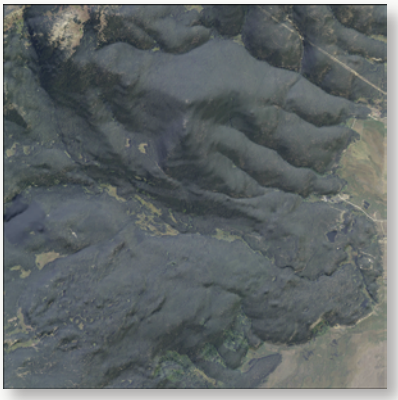

Figure 2. Shaded relief and image layers.

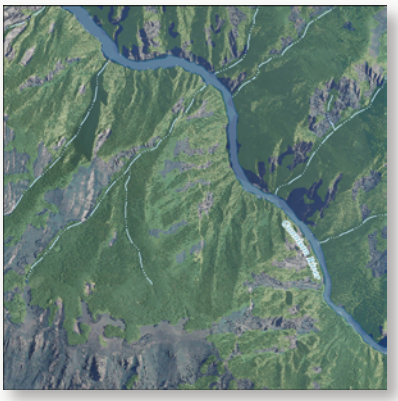

Figure 3. Hydrography and woodland area transparency.

Figure 4. US Topo map content example (cemeteries, schools, post offices, fire stations, functional road classification).

US Topo maps are available online for free download.[2] Each map is constructed in a Portable Document Format (PDF) with a geospatial extension called Georeferenced PDF (GeoPDF®) using key layers of geospatial data (orthoimagery, transportation, geographic names, topographic contours, boundaries, hydrography, woodland, and structures) from *The National Map*[1] databases. New features for 2013 include the following: a raster shaded relief layer, military boundaries, cemeteries and post offices (fig. 4), and a US Topo cartographic symbols legend as an attachment. Additional features to be added in the near future include U.S. Forest Service and other foot trails, and U.S. National Park Service and U.S. Fish and Wildlife Service boundaries. US Topo users can turn geospatial data layers on and off as needed; zoom in and out to highlight specific features or see a broader area. The file size for each digital 7.5-minute quadrangle is about 30–35 megabytes. Users can interact with the GeoPDF® and do limited geospatial analysis using available freeware. US Topo quadrangles can be printed from personal computers or plotters as complete, full-sized maps or in customized sections, in a user-desired specific format. Download links and a user guide are featured on the US Topo Web site.[3] Paper copies of the maps can be purchased from the USGS Store.[2]

What are Future Plans?

The USGS is committed to completing the second US Topo production cycle for the 48 conterminous states, continuing support for the Alaska Mapping Initiative, investigating appropriate nationally consistent scale content additions, and modifying the US Topo program objectives based on user feedback and technology changes. Are staged products meeting our customer needs? What are the costs, feasibility, and maintenance of a dynamic US Topo production system? Is it time to move to a change initiated update cycle? Questions such as these will be assessed as the US Topo program evaluates objectives and focuses the future vision.

Powered by *The National Map*

The National Map is a collection of national geospatial databases (elevation, hydrography, geographic names, orthoimagery, land cover, transportation, boundaries, and structures) and associated products and services. US Topo map is one product derived from these databases—a digital topographic quadrangle map with fixed scale, traditional layout, and familiar design. The US Topo map is vital for science, research, land and resource management, industry, disaster response, recreation, homeland security, decision-making, spatial awareness, operational support, and many other applications.

The first releases of US Topo maps are available for all 48 conterminous states, Hawaii, and Puerto Rico. Alaska US Topo map production started in 2013. As the US Topo product continues to evolve, the USGS will incorporate additional geospatial data layers and features from *The National Map.*[1] Public feedback about US Topo is welcome through the US Topo website.[3] Public feedback assists the USGS in improving the US Topo concept.

The orthoimage layer of US Topo maps is based on U.S. Department of Agriculture 1-meter ground resolution National Agriculture Imagery Program (NAIP) orthoimagery, a data resource that is tone-balanced, publicly available, and nationally consistent. US Topo production and revision follows the NAIP 3-year acquisition cycle. Alternative image data sources are being assessed and applied for US Topo production in areas such as Alaska, Puerto Rico, the U.S. Virgin Islands, and the Pacific territories not covered by the NAIP acquisition plan.

Scanned historic paper USGS topographic maps in GeoPDF® format for the 48 conterminous states, Hawaii, and Alaska are available for free download from the USGS Store.[2]

For Further Information

U.S. Geological Survey at *http://www.usgs.gov/*.

[1]*The National Map* at *http://nationalmap.gov/*.

[2]US Topo maps and historical topographic maps can be downloaded for free through three interfaces: The Map Locator and Download application at USGS Store (*http://store.usgs.gov/*), *The National Map* viewer (*http://viewer.nationalmap.gov/viewer/*), and *http://geonames.usgs.gov/pls/topomaps/*.

[3]US Topo at *http://nationalmap.gov/ustopo/*.

US Topo User Guide at *http://nationalmap.usgs.gov/ustopo/quickstart.pdf*.