# 3D Elevation Program—Virtual USA in 3D

**Games and apps on your smart phone let you see and experience many virtual worlds and imagined places. But how do scientists accurately model the real world in 3D?**

The U.S. Geological Survey (USGS), in partnership with many other government agencies, is managing the 3D Elevation Program, called 3DEP (pronounced three-dep), to map the United States in three dimensions (3D). From an airplane, hundreds of thousands of laser beams are fired down to the ground per second. These laser beams bounce off of buildings, trees, and even off of rocks and the ground underneath trees, which allows us to create a virtual reality map of the world that is very accurate. This laser system called 'lidar' (light detection and ranging) is used all over the country. In Alaska, the USGS uses a system called "IfSAR" (interferometric synthetic aperture radar), which bounces radar signals instead of laser beams. Radar signals can penetrate through clouds, and although not as detailed as lidar, the data collected from radar allows the USGS to make 3D maps in areas that are very cloudy.



**An airborne lidar system. Lidar, short for light detection and ranging, uses light from a laser (IfSAR uses radar). The quick light pulses measure the distance from the plane to the surface and back. [GPS; global positioning system]**
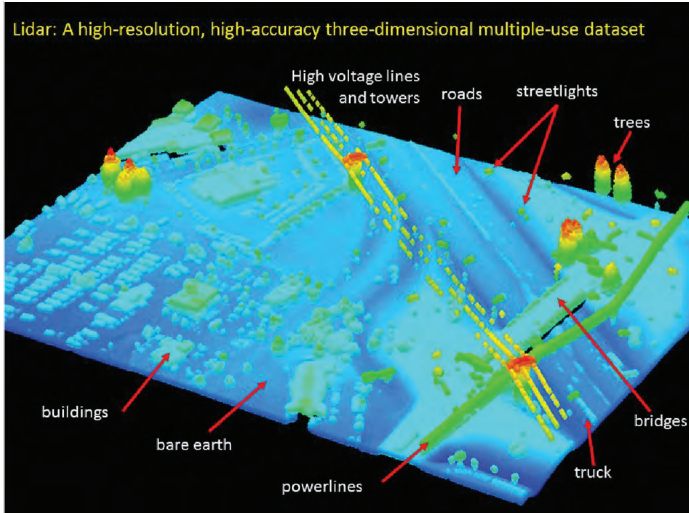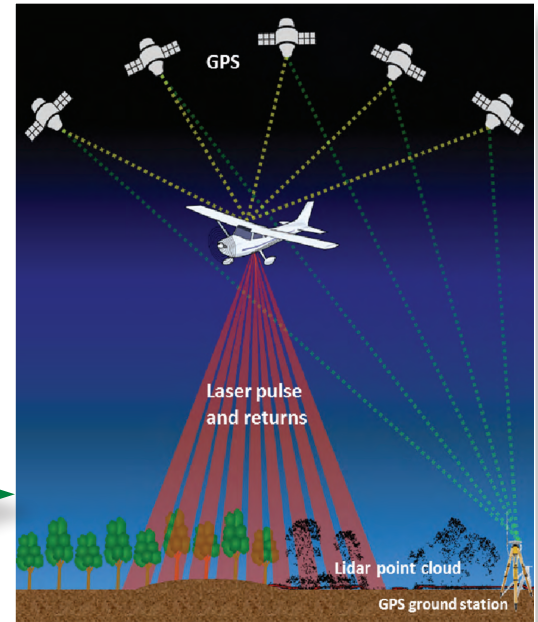


**3D map with features labeled.**

Computers use the data from the laser beams to create 3D models of the real world. These data can then be converted into paper maps, viewed in 3D in computer models, or even used in apps and games. A goal of the USGS is to create these 3D data for every inch of the country, so anyone can zoom to their house on a map and see a 3D view of their neighborhood.

**How are 3D maps used?** 3D maps have many uses with new uses being discovered all the time. For example, 3D maps help communities predict areas of flooding, find the best place to build a new power plant, allow us to know more about our forests and soils, grow food crops in ways that lower the amount of chemicals used, figure out where landslides may occur, and ensure that airplanes navigate safely over mountains and other obstacles.
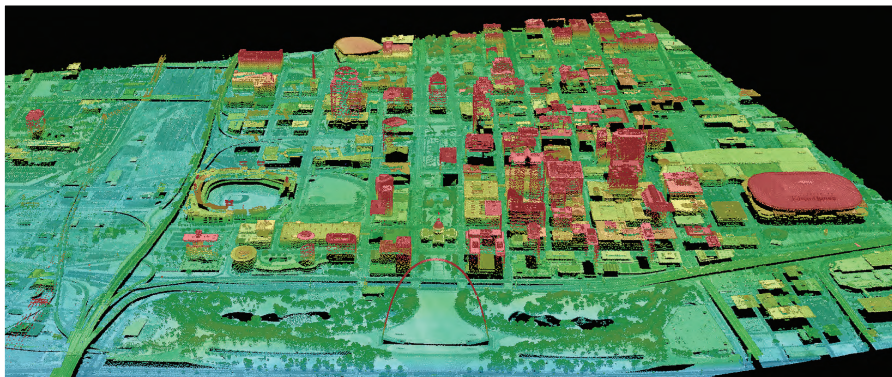


**3D map of St. Louis, Missouri.**

**Learn more at:**
http://nationalmap.gov/3DEP