
Press Release

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New Application of Technology Helps Scientists Uncover Changes at Mount St. Helens:

In less than two weeks, uplift grows to the height of a 35-story building

NEWS EDITORS: FOR DOWNLOADABLE LIDAR GRAPHICS (Color maps of elevation change, animations, fly-throughs), VISIT URL's:

<http://www.nasa.gov/vision/earth/lookingatearth/mshelenslidar.html> and
<http://vulcan.wr.usgs.gov/Monitoring/LIDAR/>

U.S. Geological Survey and NASA scientists studying Mount St. Helens are using high-tech Light Detection and Ranging (LIDAR) instrumentation to analyze changes in the surface elevation of the crater, which began deforming in late September 2004. With data derived from LIDAR, scientists can more accurately map – often in exquisite detail – the dimensions of the uplift and create better models to forecast volcanic hazards.

LIDAR, for example, shows that in the two weeks before Oct. 4, the new uplift grew to the height of a 35-story building (110 meters or 360 feet) and the area of 29 football fields (130,000 square meters or 0.05 square miles).

LIDAR mapping uses a scanning laser rangefinder mounted in a small aircraft to measure distances from the aircraft to the ground several tens of thousands of times each second and commonly measures the ground position at points a meter apart with vertical accuracy as good as 10 centimeters (4 inches).

“This is the first time that USGS and NASA have teamed to use LIDAR to measure volcano deformation,” said Ralph Haugerud, a USGS scientist. He noted that the LIDAR technology enables researchers to compare with greater accuracy than ever before the topography before and after volcanic events.

“The resulting pictures of topographic change can reveal information found in no other kind of data set,” added David Harding, a scientist at NASA’s Goddard Space Flight Center.

In 2003 the USGS contracted a LIDAR survey of Mount St. Helens. In early September this year, USGS and NASA scientists began detailed planning for a second survey, contracted by NASA, which would extend the area covered by the first survey. But when the mountain began rumbling on Sept. 23, USGS and NASA scientists accelerated plans and re-surveyed the mountain on Oct. 4. The topographic

changes resulting from the current unrest at Mount St. Helens are shown in detail in the Oct. 4, 2004, LIDAR survey.

Some of the Mount St. Helens features related to the volcanic unrest that can be visualized in the new LIDAR-derived Digital Elevation Model (DEM) include growth of a new volcanic dome south of the 1980-1986 volcanic dome and new steam-and-ash vents.

Comparison and analysis of the DEMs from the two surveys by Haugerud and Harding show that, as of Oct. 4, 2004, 5.3 million cubic meters (6.9 million cubic yards) of volume change has occurred in the area of uplift. This analysis confirms photogrammetric measurements made over the same period by the USGS.

Linda Mark, a hydrologist with the USGS Cascades Volcano Observatory, said “Global Positioning System (GPS) data provide us with very accurate point measurements of deformation, but only at locations where we can place an instrument. LIDAR, however, helps us quantify the ongoing deformation in the crater of Mount St. Helens with lesser accuracy but over a much broader area. Used together, the two methods complement each other, and the LIDAR-derived DEMs can be used for modeling efforts to help forecast volcanic hazards.”

NASA scientists and engineers in the 1980s and 1990s pioneered airborne LIDAR mapping, said Harding. “Because of its very high accuracy and fast turn-around of results, LIDAR is rapidly becoming the preferred method for detailed topographic mapping and is conducted worldwide on a commercial basis by numerous companies,” he said.

For more information, including a synthetic fly-through of the crater and a map of changes at Mount St. Helens between September 2003 and Oct. 4, 2004, see <http://vulcan.wr.usgs.gov/Monitoring/LIDAR/> and <http://www.nasa.gov/vision/earth/lookingatearth/mshelenslidar.html>. The September 2003 LIDAR survey will be available from The National Map, <http://nationalmap.usgs.gov>. Upon delivery of a final product, the Oct. 4, 2004, LIDAR survey will be distributed on behalf of NASA by the Institute for the Application of Geospatial Technology (<http://www.iagt.org/>) through the EarthScope project data portal (<http://www.earthscope.org/>).

The USGS serves the nation by providing reliable scientific information to describe and understand the Earth; minimize loss of life and property from natural disasters; manage water, biological, energy, and mineral resources; and enhance and protect our quality of life.