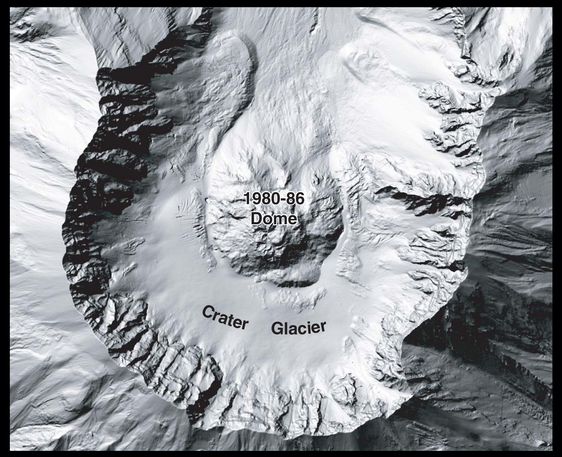
U.S. Department of the Interior
U.S. Geological Survey

Scientific Investigations Map 2928



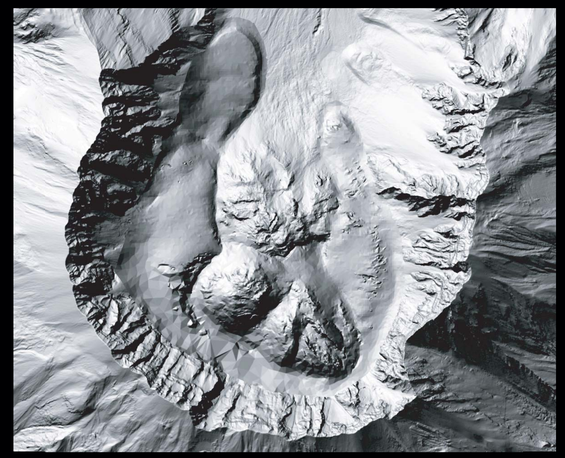
September 22, 2003: A lava dome about 80 million cubic meters in volume grew in the center of Mount St. Helens' crater from 1980 to 1986. Crater Glacier grew between the dome and the high south crater walls and formed tongues of ice around the east and west sides of the dome. In 2003, the glacier was as much as 200 meters thick and continued to grow. The volcano was relatively quiet during this period.

October 4, 2004: After 18 years of relative quiescence, Mount St. Helens reawakened in September 2004 as swarms of small earthquakes began in and beneath the 1980-86 lava dome. As magma rose toward the surface, a broad welt formed as parts of the 1980-86 lava dome, crater floor, and glacier deformed. Solid, hot lava reached the surface on October 11, 2004.

February 21, 2005: By early 2005, the new lava dome had pushed southward to form a smooth "whaleback" structure (see photo below left) and was building at a rate of around 2 to 3 cubic meters (one small dump truck load) per second. By February, the dome had grown to over one-half the total volume of the 1980-86 lava dome and began pushing eastward, bulldozing the east arm of the glacier.

July 14, 2005: Almost 60 million cubic meters of new rock had been extruded by mid-July 2005. The "whaleback," visible in early 2005, had cooled and broken apart. A tall spine was extruded, attaining a height of 2,368 meters, just 2 meters short of the lowest point on the crater rim. This spine later crumbled.

October 24, 2005: Over one year had passed since the eruption began. During this time, the new lava dome had started pushing to the west, where it deformed and severely cracked the west arm of the glacier. The volume of new rock extruded was about 70 million cubic meters.



February 9, 2006: The new lava dome continued to rise and push westward. A massive fin of hot lava projected skyward (see photo below right), rising at a rate of nearly 2 meters per day. The dome had built to a volume roughly equal to that of the 1980-86 lava dome.

Mount St. Helens, Washington

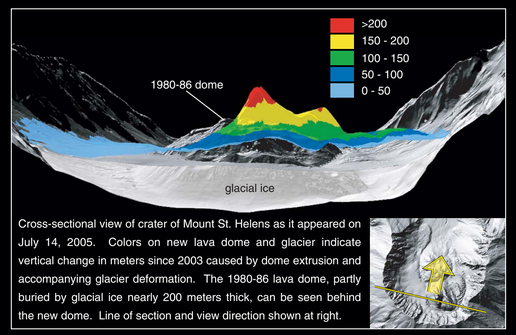
On May 18, 1980, Mount St. Helens, Washington exploded in a spectacular and devastating eruption that shocked the world. The eruption, one of the most powerful in the history of the United States, removed 2.7 cubic kilometers of rock from the volcano's edifice, the bulk of which had been constructed by nearly 4,000 years of lava-dome-building eruptions. In seconds, the mountain's summit elevation was lowered from 2,950 meters to 2,549 meters, leaving a north-facing, horseshoe-shaped crater over 2 kilometers wide.

Following the 1980 eruption, Mount St. Helens remained active. A large lava dome began episodically extruding in the center of the volcano's empty crater. This dome-building eruption lasted until 1986 and added about 80 million cubic meters of rock to the volcano. During the two decades following the May 18, 1980 eruption, Crater Glacier formed tongues of ice around the east and west sides of the lava dome in the deeply shaded niche between the lava dome and the south crater wall.

Long the most active volcano in the Cascade Range with a complex 300,000-year history, Mount St. Helens erupted again in the fall of 2004 as a new period of dome building began within the 1980 crater. Between October 2004 and February 2006, about 80 million cubic meters of dacite lava erupted immediately south of the 1980-86 lava dome. The erupting lava separated the glacier into two parts, first squeezing the east arm of the glacier against the east crater wall and then causing equally spectacular crevassing and broad uplift of the glacier's west arm.

Vertical aerial photographs document dome growth and glacier deformation. These photographs enabled photogrammetric construction of a series of high-resolution digital elevation models (DEMs) showing changes from October 4, 2004 to February 9, 2006. From the DEMs, Geographic Information Systems (GIS) applications were used to estimate extruded volumes and growth rates of the new lava dome. The DEMs were also used to quantify dome height variations, size of the magma conduit opening, and the mechanics of dome emplacement.

Previous lava-dome-building eruptions at the volcano have persisted intermittently for years to decades. Over time, such events constructed much of the cone-shaped mountain seen prior to the May 18, 1980 eruption. Someday, episodic dome growth may eventually rebuild Mount St. Helens to its pre-1980 form.



Cross-sectional view of crater of Mount St. Helens as it appeared on July 14, 2005. Colors on new lava dome and glacier indicate vertical change in meters since 2003 caused by dome extrusion and accompanying glacier deformation. The 1980-86 lava dome, partly buried by glacial ice nearly 200 meters thick, can be seen behind the new dome. Line of section and view direction shown at right.

New lava dome exhibiting "whaleback" form as seen from the northwest on February 23, 2005. The 1980-86 lava dome is visible in the lower left corner. Dome growth severely cracked and deformed the east arm of Crater Glacier, visible to the left of the new dome. photo by Steve P. Schilling

REBUILDING MOUNT ST. HELENS

By

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2006

Actively growing fin of lava as seen from the 1980-86 lava dome on April 28, 2006. Fin is about 100 meters tall. photo by Daniel Dzurisin

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