Mount St. Helens, Washington

On May 18, 1980, Mount St. Helens, Washington erupted in a spectacular and devastating explosion that shocked the world. The eruption, one of the most powerful in the history of the United States, registered 2.2 cubic kilometers of rock from the volcano's edifice, the bulk of which had been constructed by nearly 4,000 years of subaqueous volcanic building. In essence, the volcano'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 released about 40 million cubic meters of rock to the summit. During the two decades following the May 18, 1980 eruption, Mount St. Helens formed tongues of lava around the west and south sides of the lava dome in the deep, shaded niche between the lava dome and the north crater wall.

Long the most active volcano in the Cascade Range with a complex 300,000-year history, Mount St. Helens erupted again in 2004-2006 as a new episode of dome building began within the 1980-1986 crater. Between October 2004 and February 2006, about 85 million cubic meters of lava was extruded continuously, starting the 1980-86 lava dome. This episode released 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 enable geologists to construct a model of the volcano's growth over time. The model shows that the dome continues to grow, and the glacier continues to deform.

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.

REBUILDING MOUNT ST. HELENS

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February 4, 2006: The new lava dome had pushed southward, adding to a drum-shaped "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 day. By February 4, the dome had grown to a volume of 125-175 million cubic meters of rock, to roughly twice the volume of the 1980-86 lava dome and beginning to build a "whaleback" structure (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.

October 1, 2005: About 50 million cubic meters of new rock had been extruded by mid-October 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: The new lava dome had started pushing westward and deformed the west arm of Crater Glacier, visible to the left of the new dome.

February 21, 2006: By early 2006, the new lava dome had pushed southward, adding to a drum-shaped "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 day. By February 21, the dome had grown to a volume of 125-175 million cubic meters of rock, to roughly twice the volume of the 1980-86 lava dome and beginning to build a "whaleback" structure (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.

October 4, 2005: Ten days after the previous eruption, Mount St. Helens erupted again in late-October 2005 on a volume of wind-swept ash. A large dome began building in the center of the volcano's empty crater. This dome-building eruption lasted until 1986 and released about 40 million cubic meters of rock to the summit. During the two decades following the May 18, 1980 eruption, Mount St. Helens formed tongues of lava around the west and south sides of the lava dome in the deep, shaded niche between the lava dome and the north crater wall.

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 growth and glacier deformation. These colors help geologists to visualize the growth of the dome and the glacier that is moving over it. The colors indicate the relative heights of the dome and glacier as they moved around the volcano.

Selected References: