National Park Service

Searing lava leaps 200 feet from the earth fires of Kilauea.

KILAUEA

The balloon bursts, more to come

Red-orange fountains of lava that boiled 200 feet high from Hawaii's Kilauea last week were less than a complete surprise to volcano-watchers who already forecast another eruption.

With arrays of tiltmeters, seismometers, lasers and other gear, scientists at the U.S. Geological Survey Observatory on the lip of Kilauea have long been monitoring every detail of volcanic activity, in hope of better understanding what makes volcanoes erupt, and when. Such knowledge could help scientists anticipate eruptions of the world's most dangerous volcanoes, located mostly in Indonesia, where thousands of people have been killed by sudden explosions of fiery mountains such as Krakatau which killed 35,000 people in 1883, and Mount Agung which killed 1,500 people in 1963.

All signs of the present eruption were there, says Dr. Dallas Peck, Survey geologist. It was just a matter of time. Since April, geologists had been momentarily expecting the eruption, although they could not pinpoint the exact time. It is much like blowing up a balloon, expecting it to burst, but not knowing exactly when, Dr. Peck explains. Minor earthquakes had been recorded as often as 200 to 400 a day in late October, and Kilauea's summit had puffed up to a size greater than ever recorded as molten rock flowed up from reservoirs some 25 to 40 miles below the earth's surface.

The eruption began about 2:30 a.m. (7:30 a.m. EST), Nov. 5, with skyrocketing fountains of flaming lava, pumice and fumes. Lava spurted out at the rate of about 2 million cubic yards per hour, forming a lava lake 160 feet deep at the bottom of the 500-foot crater. About 35 million cubic yards of lava poured out before the eruption died 23 hours later. The lava level began dropping as the molten rock drained back into a subterranean chimney.

So far, lava fountains and flows have been safely contained within the crater and caused no damage—only spectacular fireworks that attracted some 8,000 sightseers jammed in hired cars and chartered planes.

Scientists cannot tell how long the present activity will last, but swelling has begun again, foreboding additional activity. ◈

WEAPONRY

Shadow of the FOBS; bombs in orbit

On Sept. 17, 1966, the Russians launched a mysterious object from their Tyuratam complex at Baykonur, about 300 miles northeast of the Aral Sea. It had no name, not even a meaningless Cosmos number, and it followed a new trajectory inclined for the first time at 49.6 degrees from the equator. The mystery deepened when the object suddenly exploded in space, scattering debris into several different orbits. Less than seven weeks later, on Nov. 2, an identical object was launched, and again exploded in orbit.

Now the probable reason for the two strange shots has come to light. They were, it seems, the first of almost a dozen development flights for the latest weapon being tested by the Soviet Union, an orbiting nuclear bomb.

Defense Secretary Robert McNamara revealed the bomb's likelihood at a press conference called so hastily that the State Department—concerned with such matters as violations of the space weapons treaty—didn't know about it until it was over. McNamara describes the weapon as "something we have called a Fractional Orbital Bombardment System, or FOBS."

The difference between a FOBS and an intercontinental ballistic missile is that the ICBM is launched on a high ballistic trajectory, reaching a peak of perhaps 800 miles and then falling down to its target. The FOBS, McNamara says, is fired into very low orbit about 100 miles above the earth (about the same height as most manned orbital flights to date and well below most satellites), where it travels around the earth until a braking rocket slows down the payload and causes it to fall out of orbit, usually before the completion of one revolution.

The Russian system would probably have a warhead of from one to three megaton size, equivalent to from one million to three million tons of TNT and in the same range as the warheads of the submarine-launched Polaris missiles. Carried into orbit by a three-stage liquid-fueled rocket, the FOBS would get its downward kick when it was about 500 miles from the target.

A FOBS would have both advantages and disadvantages, McNamara says. Because of the long, low trajectory of its descent compared to an ICBM, it could avoid detection by the U.S. Ballistic Missile Early Warning System (BMEWS). Also, the impact point of such a weapon could not be determined until the rocket motor had fired to send it out of orbit, possibly as