Peering into the Earth

A RIM WITH A VIEW IN HAWAII VOLCANOES NATIONAL PARK BY MARGUERITE HOLLOWAY

We lift off from the Hilo airport on Hawaii's Big Island, and our pilot, Robert Blair, swings the helicopter toward a horizon gray with mist, steam and volcanic gas. For the first several minutes, we pass over 2,500 acres of green macadamia plantations while Hilo's famous rain, between 130 and 200 inches a year, splatters the front window. The morning's torrent is clearly subsiding, though—fortunately for us, because most of the drops are coming in where the helicopter's doors used to be. Four passengers and a pilot, we are about to fly over an active volcano—one spewing sulfurous fumes, scarlet lava and searing steam—with just a seatbelt tethering us to a metal contraption whose doors have been removed so we can commune with nature. Against the volcano and its fields of lava, all things seem puny, but at the moment, this helicopter most of all.

The wind is blowing to the west, taking the giant plume of gas and smoke with it, so we hover to the east side of the Pu`u `O`o vent, which is on the eastern rift zone of the Kilauea volcano and has been erupting for 20 years. The ashy brown sides of the vent rise conelike; inside them and through four windows—or skylights, as they are also called—that have opened in the crater floor, we see the incandescent glow of liquid rock. Lava fields stretch around the vent, a vast plain of older brown and newer shiny black cooled rock.

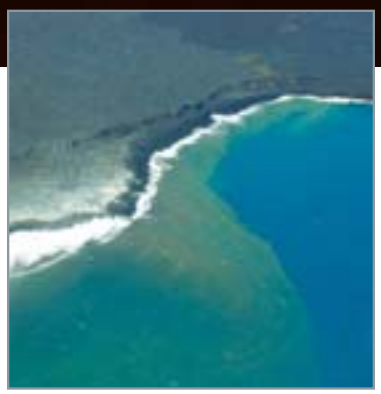
Blair flies tight circles around Pu`u `O`o, taking us lower and lower. Soon we can make out equipment from the U.S. Geological Survey's Hawaiian Volcano Observatory—which is located in Hawaii Volcanoes National Park on the rim of the now quiet Kilauea caldera—and we feel the heat and smell the sulfur. (The vent releases more than 1,500 tons of sulfur dioxide a day, enough to fill 100 blimps, according to the USGS.) After several passes, we veer to the south, following a lava tube, a tunnel of hardened lava through which the roughly 2,100 degree Fahrenheit molten rock travels, down to the Pacific Ocean. There red lava flows into turquoise water, and thick clouds of bright white steam laced with shards of silica and hydrochloric acid rise high above the black sand of the beach. These are the colors of early earth: red, black and blue.

The hour-long helicopter tour is over, and we return to Hilo, flying back over a largely bleak landscape, a battlefield of burned trees and buried houses—although a few structures stand stranded in small patches of rain forest, spared by the flow. Pu`u `O`o destroyed the Royal Gardens community here between 1983 and 1986 and covered part of the park's Chain of Craters Road. From the air it is easy to appreciate the power and reach of the volcano, the primal force shaping this island, creating new land (about 600 acres' worth so far), incinerating everything in its path. From the ground this power feels even more vast and unruly. Down here you can hear the crackle of cooling lava as you walk over it.

Volcanoes National Park is perhaps the only place on earth where visitors arrive in continuous carloads to peer at ashy craters, calderas, cones, plumes of gas, and skeletons of trees and to clamber over sharp rock, desperate to see lava. Despite many posted warnings, people in open-toed sandals and shorts eagerly trot along newly hardened, still hot lava to peek through a sudden opening and catch a glimpse of the red flow. The desire to be as close as possible to this force of nature has cost five people their lives in the past decade because they ignored warnings either about lava hazards or about medical conditions that can be aggravated by sulfuric fumes, says Jim Martin, the park's superintendent. At the same time, however, Hawaiian volcanoes are, as volcanoes go, gentle ones—so if you are going

GAS FROM the Pu`u `O`o vent often affects Big Island residents. The volcanic smog—or vog, as it is called—contains sulfur dioxide, which turns rainwater acidic and causes respiratory health problems.

PHOTOGRAPHS BY U.S. GEOLOGICAL SURVEY, HAWAIIAN VOLCANO OBSERVATORY



LAVA CONES from Pu`u `O`o are among the volcanic iterations found in the park (*bottom image*)—along with jets of lava (*left*), devastated forests (*right*), and clouds of steam and hydrochloric acid (*below*), where molten rock hits the Pacific Ocean.

lava hunting, this is the place to do it. The magma here is more fluid than most and contains less gas, so it is less explosive and gives rise to what are called shield volcanoes because of their sloping profiles.

The volcanoes that make up the Hawaiian Islands are not the result of the subduction of one tectonic plate under another—as are Mount Pinatubo, Mount Fuji, Mount Saint Helens and other volcanoes in the Ring of Fire. Instead magma spurts up from an unmoving hot spot located about 60 miles below the seafloor, in the earth's mantle. The magma cools, building huge mountains that rise out of the sea. As the Pacific plate moves northwest, over millions of years, these volcanic islands pull away from the hot spot and become dormant. New mountains then form above the hot spot. The youngest of these are Kilauea and, 20 miles or so off the coast of the Big Island, a seamount called Lo`ihi, which might break through the waves in 10,000 years.

Volcanoes National Park contains volcanoes in various stages, from Pu`u `O`o to Mauna Loa, the largest volcano in the world, and its many cooled lava fields. Mauna Loa last erupted in 1984 but was stirring again this past year, and headlines warned that it might become active again. (Some volcanologists estimate that the hot spot is about 200 miles in diameter, so vents can open or reopen in several places across it.) Visitors can walk through the hollow Thurston Lava Tube, and every Wednesday a park volunteer leads a limited tour through the less accessible Pu`u lava tube (call 808-985-6000 well in advance to reserve a spot). The park is also a good place to see the rain forests and grasslands that eventually colonize the mineral-rich lava fields.

The Volcanoes National Park visitor center is open from 7:45 A.M. until 5 P.M., and there are regular video shows and ranger talks that explain the geology of the region and provide information about native plants and animals (www.nps.gov/havo). The Jagger Museum, located right next to the USGS observatory, is open from 8:30 A.M. to 5 P.M. The exhibits describe the various techniques volcanologists use to study their subjects, and there are seven operational seismographs on display (http://hvo.wr.usgs.gov).

Several companies offer helicopter tours, including flights with the doors on, with the doors off, and with detours to nearby waterfalls. Blair works for Tropical Helicopters: 808-961-6810 (www.tropicalhelicopters.com). Other companies found at the Hilo airport are Paradise Helicopters (808-969-7392), Sunshine Helicopters (808-882-1223) and Blue Hawaiian Helicopters (808-961-5600). Fifty-minute flights run from about $100 to $175 a person. SA