

# EXPLORATION of EMESINE CAVE and THE 1880-81 FLOWS OF MAUNA LOA VOLCANO

by

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On May 1, 1880 an eruption of lava began in Moku`aweoweo, the summit crater of Mauna Loa on the Big Island of Hawai`i. The flow of lava is believed to have lasted for only a few days and was not easily visible at most locals on the island. In and of itself, this was not a noteworthy event. Small eruptions of this type are more or less the norm for Mauna Loa. Most residents of the island paid little attention. Volcanologists today realize that these events are important indicators of bigger things to come on Mauna Loa, the Long Mountain.

On November 5, 1880 a second eruption began at an elevation of 11,000 feet along the Northeast Rift Zone of the mountain, roughly one mile above Pu`u Ula`ula. The National Park Service maintains a cabin at Red Hill along their summit trail in this area today. This second episode of the eruption sent high fountains of lava into the air as the magma found a path to the surface through narrow cracks and faults along the Rift Zone area. Though still a long ways away, this pyroclastic spectacle was clearly visible from Hilo and most of the eastern half of the island.

The high fountains continued for two weeks, pumping out massive amounts of lava and creating flows down each flank of the ridgeline. To the north the flow quickly raced down into the Saddle country between Mauna Loa and Mauna Kea. To the south a second flow extended into Kapapala Ranch and continued on toward Kilauea and the town of Volcano. The flow fronts of each of these fast flowing events deposited primarily a`a lava.

At this juncture, as is typical with eruptions on Mauna Loa, things suddenly changed. The fountains subsided and the flow switched direction. What was not easily visible from Hilo was that the vent had actually shifted and lava was now rising through an opening almost a mile away from the original source. It had shifted makai (down hill) along the Rift Zone and was now rising quietly through an obviously larger opening in the fault. There were no fountains associated with this flow and everything was now consolidated into a single stream.

The eruption site quickly shielded over and began sending lobes of pahoehoe down the mountain to the northeast. Slow moving frontal lobes of lava burned their way steadily thorough the Waiake Uku Forest for all of that winter and into the spring. The glow on the horizon above Hilo grew steadily stronger with each passing week. By early June it had passed through Kaumana town and was then only five miles away from the bay. Methane explosions in the forest could now be clearly heard by residents. A "day of prayer" was called by local Christian ministers. Most folks remained calm, but a few decided to pack up and move their belongings to Honolulu, even though they knew that the city was under a smallpox quarantine and they would not be able to leave.

On June 26<sup>th</sup>, the flow entered the stream course of Waipahoehoe on the upper city limits of town. Reverend Titus Coan described the event. "The lava came rushing down the rocky channel of a stream with terrific force and uproar, exploding rocks and driving off the waters. Hilo was now in trouble - we were now in immediate danger. Explosions and detonations were frequent. The glare of it by night was terrific. The progress of the flow was by now 100-500 feet per day."

The residents of Hilo had sent off several requests to Honolulu for what ever help the royal family could provide, but King Kalakaua was traveling in Europe at the time and the capitol was still under quarantine. Sometime in July, the ban of travel was finally lifted and Princess Ruth Ke`elikolani traveled to Hilo to lend her personal touch to the problem. She arrived late in that month, and was transported up to the flow front by horse and buggy just as it reached the area of the current day Mohouli Street. Here she offered traditional oli (chants) and paid ho`okupu (tribute) by throwing offerings into the active flow. King Kamehameha had done the same during the 1801 eruption on Hualalai. He is credited with stopping this earlier flow by throwing a large hank of his own hair into the flow. Princess Ruth was following in the footsteps of her ancestors. History does not record exactly what ho`okupu were offered that day, but we do know that the princess followed up the display by ordering that her encampment for the night be placed directly in line with the slowly advancing front.

Historians shall long debate the question of which of these atonements' to the gods was most effective. None will debate that it was Pele who finally acted to end the flow of lava on August 10, 1881. She left behind a continuous ribbon of pahoehoe that stretched for more than 25 miles. Skylights to the "pyroduct" systems within the flow would continue to glow with red eyes on the hillside above the city for weeks after the event finally stopped. The source at Pu`u Ulaula is at nearly 11,000 feet. The lowermost lobe lies on the grounds of current day University of Hawai`i, Hilo, just 1.5 miles above the Bay. Lava had flowed continuously for nine months and five days.

Members of the caving community could not ignore a feature as prominent as this. They knew with certainty that long runs of pahoehoe lava can only mean one thing, long lava tubes. An entrance into this underground system in Kaumana town was large enough that road crews decided to build the new Saddle Road around the feature and preserve it as a county park. The local Lions Club even produced a map featuring more than a mile of cave.

Even though the flow has long been known to contain extensive lava tubes, reaching them was still a challenging process. Kaumana Cave is the only easily reached access point. Red Hill cabin is a seven mile hike along the summit trail to Mauna Loa that is currently maintained by the NPS. There are only three other roads that cross the flow. All require several miles of 4-wheeling to negotiate.

Fred Stone was among the first of today's generation of cavers to reach the 1881 entrances and begin exploration. He had learned of an entrance along the Powerline 4-wheel access about midway along the flow. It was miles from the highway at Saddle Road, but he was willing and able to cover the distance and begin to explore the cave. Fred is a biologist, and one of the leading forces in the study of cave adapted invertebrates. His primary interest in the project was to try and determine just what sorts of arthropods would move into a relatively young volcanic cave system. And, oh yes, he also wanted to explore the cave. It didn't take long for him to realize that this was indeed a long, long cave, with many miles of passage to explore. Emesine is the name of one of the bugs that he collected while studying the cave and it quickly became the epicure for the lava tube, as well.

On January 8<sup>th</sup>, 1998 an effort to document the system with current day survey systems and cameras was begun. Kevin and Carlene Allred had been working to complete their amazing atlas of Kazumura Cave and were now looking for a new project. They lead a team into the mauka extension of the cave. The author and Pat Kambesis lead a team into the makai section of the cave. This spontaneous decision was to set the stage for most of the future exploration of the system. Kevin and Carlene ventured back to the mauka extension and completed a total of nine survey trips. They were supported by their sons, Flint and Sauron on many of these trips. Carlene produced excellent drafts of this end of the system. In his usual indomitable style, Kevin also produced survey work on at least three solo trips into the cave.

The makai regions of the cave became by default the major focus of work conducted by the author with cartographic support from Patty Kambesis. Over the course of the next four years, the author was to return to the cave on additional survey trips a total of twenty-two times. Ms. Kambesis returned for nine trips. Their permit to explore included an agreement to produce maps of the entire cave system. Pencil drafts on mylar were produced for their section of the cave. Work is ongoing to produce an atlas of the

entire 13.7 miles of survey. Many other patient surveyors contributed to the effort with three to five trips into the cave. Andrew and Ali DuBois, Taco Vanleperen, Monique Castonquay, Peter and Ann Bosted, Ric Elhard, Steve Lewis, Bruce Dunlavy, Penelope Pooler, Mark Fritzke, and Doug Strait, along with many others complete the roster.

The cave is formed not unlike many others in the Aila`au Flow of Kilauea Volcano. Sinuous flow features are beautifully preserved in shades of color ranging from gun metal black through crimson red with accents of yellow and even green. The younger age of this Mauna Loa flow also preserve fantastic displays of late stage basalt formations including soda straws more than two meters in length, driblet spires and extrusion stalagmites up to .5 meters in height, and more than thirty well developed cockscomb formations. Fortunately most of these features are developed in sections of cave that are extremely remote and very difficult to access.

On average the passage dimensions within Emesine Cave are somewhat smaller than those in Kazumura. Nine months was apparently not a long enough period of time for the system to develop the extensive downcutting and tall canyons that are so prominent in the latter. The caldera flow that produced Kazumura may also have contributed a somewhat larger or more stable flow regime. Most of Emesine Cave is developed as quite comfortable walking passage with the ceiling usually just out of reach overhead. A noticeable increase in the average size of the main corridor is noticed roughly one mile below the primary entrance. At this point a large braid in the original flow rejoins the line of survey. The tributary added significant volume to the flow path. Long single passage sections are often complicated by areas of incredibly complicated maze. Crawlway braids are very common in these sections, but a primary route was always discovered to continue on down the mountain. Careful analysis of the survey data in these areas indicate that the maze sections tend to be developed in areas of slightly higher incline.

Work to reach additional areas of the 1880-81 flow has also discovered significant sections of cave passage. All were formed by the same flow event, but long gaps remain between the segments documented to date.

It's a seven mile hike up the Mauna Loa summit trail to Pu`u Ulaula and the NPS cabin. The author has made the trek twice to date with assistance from Peter Bosted and Chrissy Frotten. Two caves have been documented here. One is located just below the later stage pahoehoe forming event that formed Emesine Cave. The other begins just beneath a large hornito at the highest point in the 1880 flow. This episode of the flow event deposited a`a at lower elevations, but did flow as pahoehoe near the source. This passage is unique in that the explorer can actually descend into the throat of the original vent for at least thirty vertical feet at the very apex of the tube. The high elevation and low rainfall combine to decorate both of these caves with unusual proliferations of frost like gypsum displays.

Stainback Road is a 4-wheel drive track off the Mauna Loa Observatory Road that crosses the flow at an elevation of just over 8,000 feet. Many short segments of cave have been surveyed here by the author and a current permit to Steve Smith has added additional cave sections at even higher elevations.

The Lion's club survey of Kaumana Cave has now been reworked. It's interesting to note that several hundred feet of cave have been cut off by a road construction project along Edita Street. The lowest point of the system is no longer accessible. Current survey efforts have accumulated more than two miles of survey extending mostly mauka from the entrance at the roadside park. Unfortunately the upper reaches of cave pass directly beneath modern day homes that have been built atop the lava flow. Many of these homes are currently using the cave for storm sewers, trash dumps and even septic disposal.

The 1880-81 Flow lasted for nine months and five days. Current day documentation of the cave systems formed by this event has been ongoing for nearly two decades. More than 19 miles of cave have been surveyed to date. Much remains to be done. The lower most areas of Emesine Cave have many unfinished leads. Access to this area require three miles of rugged 4-wheeling with an additional 2.5 miles of hiking through ever thicker Uluhe Fern. There should be more cave to discover along Tree Planting

Road. This is another 4-wheel drive track that accesses the flow roughly two miles below the Emesine surveys. Two short caves have been surveyed in this area to date with just .5 miles of survey combined. The main challenge with exploring this area is that it rains 300 inches a year on this flank of the mountain and the vegetation makes hiking roughly equivalent to trying to negotiate a tangled pile of bed springs. Upper Kaumana Cave continues. We believe that we are past the worst of the septic drains and will hopefully enter into a more hospitable environment. Steve Smith continues to accomplish long hikes at high elevations to access many new caves along the upper reaches flow. One of the most promising leads in the system is located at the lower end of the 1880 tube that originated at the apex of the flow. For reasons that have not been fully explained, the tube drops vertically into a pit located on the rift zone fault. It is more than 100 feet in depth and will require more rope than the explorers had on hand to reach the bottom.

The challenges to exploration are formidable, but the rewards should be, as well. I for one will be very intrigued to follow the exploits of cavers that choose to continue the documentation of the 1880-81 flow event on Mauna Loa Volcano, the Long Mountain with very deep caves.