Tracking the Kilauea eruption

May 23 2018, by Einat Lev

Einat Lev stands in front of a lava fountain. Credit: Brett Carr

Sitting on the porch of our B&B at Hawaiian Paradise Park, watching the pouring rain, I am still overwhelmed by last night's events. Glowing lava. Blocked roads. Flashing drone lights. An ocean entry being born. It was all very intense. OK, let me start from the beginning.

As many of you have heard, Kilauea volcano on the Big Island of Hawai'i has recently changed its pattern and begun erupting lava much further down on its East Rift Zone. Sadly, the location of the new cracks that opened (called fissures) is at the center of the Leilani Estates subdivision. The lava has already claimed dozens of homes, and the community has had to evacuate. Our volcanology team at Lamont-Doherty Earth Observatory is on-site to witness this historic natural event, and to be of service to the local authorities in their constant, exhausting chase to monitor the eruption and protect the public.

We arrived on the Big Island just four days ago, and immediately joined the team from the University of Hawai'i – Hilo (UHH). They have been using drones to track the lava flow and working with Civil Defense since the eruption's very beginning. Our first experience was a night-time aerial survey of the flow front off Fissure 17, on the easternmost end of the fissure line. The UHH team used an unmanned aerial vehicle (UAV) equipped with thermal infrared ("night vision") cameras, which can easily detect the mostly black lava.

Going into the evacuation zone at night is a truly unique experience. It requires signing in at the Field Operations office, receiving an SO2 detector that allows us to keep an eye on exposure to the toxic gas and get away when levels get too high, putting our gas masks around our necks ready to be used at a moment's notice, wearing high-visibility vests, and crossing the road blocks manned by the police and the National Guard. It all felt a little bit like a Hollywood disaster movie, except this was all very real.

Yesterday, one of the main flows (coming off Fissure 20, the most active fissure now) picked up speed and began advancing fast across the fields and forest towards Highway 137, a critical road connecting towns in the Puna district (south of the flows). Obviously, everyone's top concern was: when and where will the lava cross the road? Two other slower

flows were also advancing towards this road and had to be monitored carefully.

During the day, helicopters monitored the flows from the air, operated by the U.S. Geological Survey, the Army, and, of course, tour operators carrying enchanted tourists. This busy helicopter traffic meant our UAVs were capped to fly only under 200 feet above ground. While we could still see the flows burning the forests at a distance, this limited flight height meant we could not get close to them from where we were positioned. At night, however, our versatile UAVs and their thermal vision capabilities 'rule the sky.'

Einat Lev and team track lava flows by night. The glow from the lava reflects off of clouds in the sky. Credit: Einat Lev

We headed back out to the field after dark. The night skies were lit with an orange hue as the clouds reflected the glow of the lava. Our first task

was to measure the temperature at the cracks that opened last week on Highway 130. The steaming cracks have been covered with steel plates to keep the road open for traffic. We reported our readings (160 degrees Fahrenheit) to Field Ops, and headed to Highway 137.

Our first stop: the entrance to the Malama-Ki forest reserve, where we stood just hours ago. Now, we could see the lava, black with red-orange streaks where the skin cracked, heading down on the forest road towards us. We took off immediately (well, after snapping a few photos).

We found a safe spot for UAV launch a few hundred yards away, and our trusty UHH pilots, Roberto and Nick, launched the UAV. To our surprise, and to the surprise of everyone standing watch, the flow we were monitoring had split into two flows that afternoon, and both were advancing to the road. We were standing on the road between them, in a zone that would get cut off from all evacuation paths if (when) both flows hit the road. Oh-oh! We took images of the flow front positions, moved to a safer spot outside the flow target zone, and notified Civil Defense: they also needed to move their ground teams immediately.

From our new vantage point and with the help of our UAVs, we kept watching the flows as they made their way down. We watched as the first one hit the road. We were now cut from the west side of Puna. Our only way out was behind us, to the East.

Shortly after, we witnessed a game-changing moment in the eruption's evolution: the first flow entered the ocean. A tall plume of steam and volcanic glass particles emerged and lit the sky even brighter. We were all glued to the purple-and-orange video feed from the UAV, streaming this exceptional event to us in real time.

After collecting as many images and videos of the flows as we could, and updating the Field Ops office of the position of both advancing flows,

we retreated to Highway 132, which gave us a more convenient approach to image the fountaining lavas from Fissure 17 and Fissure 20. It was, again, magnificent. The spattering orange lavas against the pitch-black ground and skies are a sight we will remember forever. We had to remind ourselves that as awe-inspiring as this was, these molten rocks spewing out of the grounds have been destroying the homes of the community we were here to serve.

Tonight is likely to be similar. We will head out, see where the flows went during the day, monitor the highest priority targets, and be captivated by this extraordinary display of nature's power.

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