Volcano Watch — How fast does Hawaiian lava flow?

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While watching the Olympics a few weeks ago, I started wondering how our lava flows would place in typical competitions. Of course, it wouldn't be quite as simple as setting up a course, getting an eruption to happen at a convenient time at the starting point, and accurately timing the result. No, we can only get lava-flow speeds by having the presence of mind during the start of an eruption - a hectic and sometimes frightening time - to record lava-flow locations at specific times and later calculate the flow velocities.

The fastest recorded Hawaiian lava flow was the first of three flows from the 1950 Mauna Loa southwest rift zone eruption. The front of this flow advanced from its vent to Highway 11 between Ho`okena and Miloli`i at an average speed of 6 miles/hour (mi/hr) or 2.7 meters/second (m/s). By contrast, typical Pu`u `O`o `a`a (try saying that fast three times) flow advance rates were less than 1/3 mi/hr or 0.15 m/s. The "fast" `a`a flow on the night of February 1, 1996, advanced from near Pu`u `O`o over Pulama pali at a ripping 2/3 mi/hr, or 0.3 m/s. Pahoehoe flows are even slower than this.

Now, lava can flow quite a bit faster than 6 mi/hr, but only in tubes or channels where it is confined and thermally insulated. Like most fluids, lava flows faster if it stays hot. For example, chocolate syrup that's just been in the refrigerator may not flow at all until it is warmed over the stove. The hotter you can get the syrup, the faster it will flow when poured. The insulation of a lava tube can keep the lava to within 10- 15?C (18-27? F) of its eruption temperature (1155?C or about 2100?F) all the way to the ocean. Lava has been clocked within a channel at nearly 35 mi/hr or 15 m/s during the1984 Mauna Loa eruption and similarly in channels during the first years of Pu`u `O`o. Within the current tube system, lava speeds have been measured up to 23 mi/hr, or 10 m/s.

To put these speeds into perspective, let's compare them to typical human running speeds. Athletes can run the 100 yard dash in about 10 seconds, an average speed of 23 mi/hr or 10 m/s. Longer races are run at slower average speeds. Runners can cover a mile in approximately 4 minutes at an average speed of 15 mi/hr, or 6.7 m/s. By comparison, Olympians can speed-skate a mile in about 2 minutes, but that doesn't seem very relevant here in mostly ice-free Hawai`i. Marathon runners can win at speeds of around 11.5 mi/hr, or 5 m/s; typical walking speeds are 2-4 mi/hr, or 0.9-1.8 m/s.

Clearly, we don't need to be athletes to outrun the front of even the fastest Hawaiian lava flow. In fact, we can walk (briskly) out of the way of most Hawaiian lava flows. Keep an eye on the advancing flow, however, in case it's one of the faster ones, which may require a slow jog. In reality, this would be difficult over rough terrain on a steep slope. It would be humanly impossible to keep up with the fastest lava flowing in tubes or channels. If ever you are challenged to race lava (by Pele or anyone else), make sure you first ask "advancing flow front or flow in a channel or tube?"

Volcano Activity Update

The east rift zone eruption of Kīlauea Volcano continued unabated during the past week. The lava enters tubes near the Pu`u `O`o vent and flows continuously to the coast. Lava escapes sporadically from the tube system along the coastal plain, but the flows have been of limited extent. The tube system discharges lava into the ocean at two locations - Waha`ula and Kamokuna. The public is reminded that the ocean entry areas are extremely hazardous, with explosions accompanying the frequent collapses of the lava delta. The steam clouds are highly acidic and laced with glass particles.

Three earthquakes were reported felt since last week. On March 20 at 6:42 a.m., an earthquake located 15 km (9.0 mi) southeast of Glenwood was felt in Hilo. The earthquake had a magnitude of 3.5 and originated from a depth of 8.4 km (5.0 mi). Residents of Waimea and Honokaa reported feeling an earthquake at 12:33 p.m. on Wednesday, March 25. The magnitude 3.5 earthquake was located 5 km (3 mi) east- northeast of Pohakuloa at a depth of 4.5 km (2.7 mi). Later that same afternoon at 2:07 p.m., a resident of Glenwood reported feeling an earthquake. The epicenter of the magnitude 3.4 earthquake was 8.4 km (5.0 mi) west of Keaau at a depth of 38.7 km (23.2 mi).

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