2017 GSA CORDILLERAN SECTION MEETING

Mauna Loa: Eruptive History, Hazards, and Risk, Island of Hawai‘i

FIELD TRIP #4       COST: US$165.33

DATE(S) OF FIELD TRIP: May 20-21, 2017
MAX # OF PARTICIPANTS: 24
MIN # OF PARTICIPANTS: 12

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SPECIAL NOTICE: This pre-conference field trip will start and end in Hilo, on the island of Hawai‘i (otherwise known as the big island). You are responsible for getting yourself to Hilo on May 20 in time to start the trip at 8:00 am, as well as to Honolulu in time to attend the conference. We will also pick people up in Hilo if they are spending the night of May 19 there. One option is to purchase a round-trip ticket from home to Honolulu (HNL) and back, as well as a round-trip ticket from Honolulu to Hilo (ITO) and back. Currently, interisland flights cost ~$180 round-trip. However, it may be cheaper to fly directly from home to Hilo, participate in the field trip, fly from Hilo to Honolulu to attend the conference, and then fly home from Honolulu. A travel agent should be able to help figure this out. You are also responsible for lodging arrangements during the field trip (i.e., in Kona, where you will end up at the end of the first day – see lodging suggestions below). It is possible to fly into Hilo on May 20 in time to make it to the start of the field trip, but only if you fly there from Honolulu (i.e., not from the mainland, and you will need to catch a very early flight to do this), so we strongly urge you to arrive the day before. This will require you to book a minimum of 2 nights on the big island (in Hilo the night of May 19 – before the trip starts, and in Kona the night of May 20 – between the two field trip days). The trip will finish back in Hilo, and note that hotel rooms there are likely to be a little cheaper than in Honolulu, so you might consider also spending the night of May 21 (i.e., the night after the field trip ends) in Hilo and flying to Honolulu the following morning (May 22; note that the conference icebreaker starts at 4 pm that day). Finally, only lunches are included in the field trip cost - you will be responsible for your breakfasts and dinners. For more information, feel free to contact the trip leaders.
DEPARTURE  Check in at 0800 May 20 at King Kamehameha Statue, Hilo. Discussion at the first stop on will begin promptly at 0815. For those staying in Hilo, pick up by van will be at the Hilo Hawaiian Hotel at 0745 sharp.

ITINERARY

Day 1. Meet at King Kamehameha Statue, Wailoa River State Park, Hilo in the parking lot at 0800 May 20, 2017

Stop 1. King Kamehameha Statue, Wailoa Park, Hilo. Provide overview of Mauna Loa, eruptive history of the Hilo region. Discuss the tsunami history and hazards that affected Hilo. Observe the morphological differences between Mauna Loa and Mauna Kea.

Drive up Waiānuenue Avenue toward Rainbow Falls:

Stop 2. This first stop, Rainbow Falls, provides a rare opportunity to see stratigraphic relationships between Mauna Loa flow units. Provide ages and stream development in a changing landscape.

Continue up Kaumana Drive, to Chong Street. On the way pass road cut on the right side of the road (under large eucalyptus tree) the Punahoa flow overlies the Homelani ash.

Stop 3. Arroyo, north of, and adjacent to, Kaūmana Drive ("Saddle Road"), provides a rare stratigraphic section here in Hilo. Discuss radiocarbon dating in Hawai‘i and ash distribution "Pāhala Ash" on Hawai‘i Island.

Continue up Kaumana Drive, to Kaūmana Cave.

Stop 4. Discuss the eruption of 1880-1881 and the development of Lava tubes. Participants get a short time to explore the tube.

Continue up Kaumana Drive, to Saddle Road to mile marker 21.

Along the way, we will pass the contact between the 1856-56 and 1880-81 contacts. Learn about how native vegetation is a good indicator of lava flow age and climatic conditions.


Continue up Saddle Road to mile 22. The 1935 eruption began near the summit on November 21. On November 27, a new vent opened on the north flank at 8,805 ft (2,685 m) elevation.

Stop 6. Pu‘u Huluhulu ("Hairy Hill") is a 55-m-high (180 ft) cinder cone surrounded by lavas on the flat plain of the Humu‘ula Saddle, along the boundary of the two volcanoes. Lava diversion via lava barriers – old dry-stack cattle walls – prompt discussion of the 1935 and 1942 flows. This is also a good place to view flow color as an indirect indicator of age.
Continue along Saddle Road to Mauna Recreation Area. Just beyond Pu‘u Huluhulu the road turns toward Mauna Kea. Off in the distance on the left hand side of the road is the ‘a‘ā front of the 1843 lava flow that is up to 17 m (56 ft) thick. The road passes three cinder cones (pu‘u) from Mauna Kea. These cones erupted approximately 14,000-65,000 yrs B.P.

Stop 7. Mauna Kea Recreation Area (lunch stop)
Glaciation of Mauna Kea: Mauna Kea is the only Hawaiian summit that bears unmistakable evidence of Pleistocene glaciation.

Continue along Saddle Road from Mauna Kea Recreation Area to Kilohana.

Stop 8. Kilohana: Radial vents (RV) are a class of eruptive fissures that are oriented radially to Mauna Loa's summit and are located outside the defined rift and summit regions on the west, northwest and north flanks. U. S. Army’s Pōhakuloa Training Area is visible at mile 37. Extensive testing was done here in 1975 and 1976 to assess the feasibility of using explosives for disrupting lava supply systems should lava-flow diversion be required on Hawaii.

Continue along Saddle Road from Kilohana to Saddle Road Junction with Highway 190.
Sand dunes: a road cut through a dune exposes dipping foreset strata consisting of slightly indurated dark-gray sand.

Turn left and continue south toward Hualālai. The road passes through Mauna Kea flows composed of alkalic basalts and their fractionation products.

At mile marker 11 we turn NW and head down slope to the ocean. The road soon crosses onto the rich grazing land of the 235,000-acre Parker Ranch (site 14), one of the largest privately-owned cattle ranches in the United States. From this area four of the five volcanoes that constitute the island of Hawai‘i can be seen on a clear day. More likely, however, you will see a thick veil of ‘vog’ (volcanic smog) that has blanketed much of the Kona coast since the beginning of the current Pu‘u ‘Ō‘ō - Kūpaianaha eruption on the Kīlauea East Rift. The vog blanket accumulates in the eddy system formed by the interaction of the low altitude trade winds with the Mauna Loa and Mauna Kea shields.

‘Anaeho‘omalu to Kona Airport:

Stop 9. ‘Anaeho‘omalu (mile 74.9): An olivine-rich eruption of Mauna Loa forms most of the coastline in this region. This is one of the few readily accessible picrites on the fieldtrip. We cross on to Mauna Loa flows that originate on the north and west flanks. A few of these flows have originated from the summit of the volcano over 50 km distant, and others are from radial vents.

Stop 10. Kīholo Bay Site where the 1859 Mauna Loa flow enters the sea. The 1859 eruption of Mauna Loa began in the evening of January 23. The western part of Mauna Loa and all of Hualālai lie in the districts of North and South Kona (Fig. 20). Both districts in Kona have been adversely impacted by lava flows during historical eruptions of Hualālai and Mauna Loa and by gas emissions from an ongoing eruption at Kīlauea. Risk to society in Kona has increased
sharply since the last eruptions in the area, due to growth in population, infrastructure, and economic relationship with tourism.

In addition, at mile 79, we pass the 1859 Mauna Loa flow; its source vent is nearly 31 miles from this location high on the upper slopes of Mauna Loa at nearly 11,000 ft above sea-level. The duration of the summit portion of the eruption was less than a day, followed by ~300 days of the flank portion. The total erupted volume was 383 million m$^3$.

1800–1801 Kaʻūpūlehu flow forms the southern point of the Kīholo Bay. The Kaʻūpūlehu flow is well known for its abundant xenoliths.

Puʻu Waʻawaʻa a singular eruption on Hawaiʻi. Puʻu Waʻawaʻa is a trachyte pumice cone of Hualālai, and Puʻu Anahulu is the associated lava flow.

Kuili axis of the northwest rift zone (site 22; mile 88): Kuili, a cinder cone on the ocean side of the road, is a feature on the northwest rift of Hualālai. The rift zone crosses the highway and continues beneath the sea.


**End Day 1**

Stay at King Kamehameha Hotel or other hotels in the area (make reservations on your own; see below for suggestions).

**Day 2. Meet at King Kamehameha Hotel at 0800 May 21, 2017**

Stop 1. Napoʻopōʻo at Mile 110.3 turn toward Kealakekua Bay. An excellent view may be obtained of Kealakekua Bay. The cliff on the northern side of the bay is believed to be a fault scarp, somewhat modified by wave erosion, exposing Kahuku lavas. A monument marks the place on the northwestern shore of the bay where Captain James Cook was killed in a dispute with the natives.

Stop 2. Hōnaunau 3.7 miles south of Napoʻopōʻo. A short side trip leads to the ancient Hawaiian City of Refuge at Hōnaunau (national historical park), with its partly restored ruins of stone temples. Excellent views of ancient landslide scarps can be seen both north and south. Return to Hwy 11 and turn right (south). We will encounter five 20th century lava flows, three of which were erupted during the 1950 eruption. Exposures and views are not ideal, so we will not stop at these locations.

**A.D. 1950**
The largest historical eruption from the southwest rift zone occurred in this year. It was noteworthy in that lava from a nearly continuous 18-km-long fissure fed three westbound flows that reached the sea in less than 24 hours.

Mile marker 98 is the northernmost 1950 flow. This flow reached the ocean in ~3 hours after the vent feeding it opened.

**0.2 mi south of the Mile marker 97 is the second lobe of 1950 lava. This flow reached the sea in ~14 hours.**

**0.2 mi south of the Mile marker 93 is the third lobe of 1950 lava. This flow reached the sea in ~17 hours.**

A.D. 1919 0.8 mi south of the Mile marker 92 is the 1919 lava flow. The 1919 ʻĀlika eruption began at the summit of Mauna Loa on September 26. That same day, at 6:00 p.m., HST, a new vent opened on the SWRZ at the 7,843-ft (2,391-m) elevation. This vent fed a flow that reached the sea in approximately 18.5 hours.

A.D. 1926 0.8 mi south of the Mile marker 88 is the 1926 lava flow, which destroyed a fishing village at the coast. The 1926 eruption began on April 10, after an increase in tilt and a swarm of earthquakes. It lasted 14 days and produced a volume of 121 x 10⁶ m³. The western lobe destroyed the coastal village of Hoʻōpūloa near Miloliʻi.

A.D. 1907 0.6 mi southeast of the Mile marker 79 is the first of the two 1907 lava flow lobes. Note the house built on the flow. Preceded by an earthquake swarm that began on January 7, the 1907 eruption began on January 9 and continued for 15 days. The main vents, which became active on the 10th, were distributed along a 2-km segment of the SWRZ, upslope from Hawaiian Ocean View Estates (HOVE), at the 6,555-ft (1,998-m) to the 6,000-ft (1,829-m) elevation.

**Stop 3 Scenic Lookout.** Mile marker 75 is the second of the 1907 lava flow lobes. Note the sparse vegetation on the flow. The climate is getting drier for the next 3-5 miles.

A.D. 1887 Mile marker 74 the 1887 lava flow lobe. The 1887 eruption began on January 16 and continued for about 7 days. Most of the erupted lava is ʻaʻā. The flows entered the sea at Kākiʻo approximately 29 hours of the onset of the eruption. The lowermost vents are within the HOVE subdivision.

A.D. 1868 0.3 mi southeast of the Mile marker 72 is the 1868 lava flow. This flow reached the sea in just over 3.5 hours from the source vents located 2.5 km above the highway. This eruption started on occurred Mauna Loa’s most spectacular eruptive sequence began on Friday, March 27, 1868, at 5:30 a.m., HST and lasted for 15 days. On the second day, March 28, a magnitude 7.1 (estimated) earthquake occurred on one or more nearby faults. On the 7th day of the eruption (April 2nd), the largest recorded earthquake in Hawaiʻi (estimated at magnitude 7.9) occurred on the south flank of Kilauea.
Kahuku Pali at Mile 72. The pali is a fault scarp 152 m high at the base of which lies a branch of the lava flow of 1868. The fault can be traced about 16 km on land and an additional 28 km out to sea. The cliff is the type locality for the Kahuku lavas. They are capped by Pāhala ash.

1200. Lunch will be taken along the route where convenient (rest stop with bathrooms).

Stop 4. Punaluʻu junction Mile 57.5. A side road leads to Punaluʻu where springs discharge about 95 million liters a day into the ocean from the basal zone of saturation. Inland are the prominent Nīnole Hills of Kaumaikeʻōhu, Puʻuenuhe, Kaiholena, and Puʻu One, high ridges of an ancient rift zone.

At Mile 48. Wood Valley was the site of a mudflow that overwhelmed a village during the earthquakes of 1868.

At Mile 40. The Kaʻōiki Pali, parallel with the road on the northwest side, is a fault scarp in lavas of the Kahuku volcanic series, partly veneered with later lavas of the Kaʻū volcanic series. Kahuku lavas covered with yellow Pāhala ash are exposed in small kīpukas along it.

Stop 5. Hawaii Volcano Observatory and Overlook vent. Overview of eruptive activity on Kīlauea.

Glenwood. Road cuts expose 2.4 m of Pāhala ash overlying lavas of the Kahuku volcanic series of Mauna Loa. One and a half kilometer southwest of Glenwood, the highway passes from the slope of Mauna Loa to that of Kīlauea. A change from Pāhala ash to fresh olivine basalt with scanty ash cover indicates the boundary.

Return to Hilo by 6:30 pm. Note: if you are flying to Honolulu on this day, be sure that your flight does not leave any earlier than 8 pm. We recommend instead that you arrange to spend the night in Hilo, and fly to Honolulu in the morning.

COST INCLUDES: Van rental, two lunches, water. All participants are required to cover the cost of lodging, meals other than lunches, airfare to and from Hilo, and incidentals. On the first day, you are responsible for getting yourself to the Hilo Hawaiian Hotel by 8:00 or the King Kamehameha Statue, at Wailoa State Park, Hilo by 8:15.

SPECIAL INSTRUCTIONS: Be prepared for a range of weather including heavy rain and strong sun. The weather varies hourly and may be hot and sunny or rainy and chilly in the same day. Wind speed ranges up to 10 m/s, averaging 5 m/s. Typical daytime temperature ranges are 16 to 24°C; wind chill can be several degrees less. Umbrellas are useless because of the wind; we suggest pack light rain gear. Temperatures may be 5 to 10 degrees hotter at sea level.
Depending on wind direction during the day, there is a slight possibility you may be exposed to minor amounts of vog or sulphur dioxide gas and sulfate aerosol particles. This should be no more than a very minor annoyance unless you have respiratory sensitivities; please see this link for more information: http://ivhhn.org/vog/

For both days of the trip, sturdy shoes are recommended (lightweight hikers are OK). We will not be walking through brushy areas, but long pants and long-sleeved but lightweight shirts are advisable. Our longest walk will be a 1.0 km roundtrip through open country with little elevation change.

Sunscreen, sunglasses if needed/desired, and a hat with chin strap are strongly recommended. Remember that sunburn happens quickly at 19°30’ latitude.

Sampling will not be allowed during the fieldtrip, as this requires a special collections permit from various Federal, State and County agencies.

Helpful information about the National Park fees, amenities, and what is available in the general area can be found here:

https://www.nps.gov/havo/index.htm

King Kamehameha Statue, Wailoa Park, Hilo. For participants staying in Hilo, vans will pick you up at 7:00 in the morning in the parking lot of the Hilo Hawaiian Hotel, and take you to HVO. These vans will not stop so please be ready for the entire day’s activities when the vans pick you up.

LODGING:

Prior to the trip, we recommend staying at the Hilo Hawaiian Hotel, as this is where vans will meet you the first morning at 0745 before driving to King Kamehameha Statue, to begin the field trip. On day two, we recommend staying at the Courtyard King Kamehameha’s Kona Beach Hotel. At the start of day 2, the vans will meet you at the King Kamehameha Hotel main entrance at 8 am.

There are many lodging options in and around Hilo and Kailua-Kona, Hawai‘i.

Hilo

http://www.castleresorts.com/big-island/hilo-hawaiian-hotel/

http://dolphinbayhilo.com/
Discussion at the first stop will begin promptly at 08:15 at the King Kamehameha Statue, Wailoa Park, Hilo.

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**CANCELLATION:** Must be made in writing and received by the Field Trip Coordinator, GSA Headquarters, PO Box 9140, Boulder, CO 80301-9140, (303) 357-1006, by date TBD to qualify for refund. NO refunds for cancellation notices received after this date. Refunds will be processed as soon as possible after the meeting.