

GG 211 FIELD GEOLOGY OF HAWAII

FALL 2013

FIELDTRIP DATES: NOV. 29 – 30, DEC. 1 -2

Dr. Floyd W. McCoy

Office: Hale 'Imiloa 115 telephone: 236-9115 *a message is recorded here with current information concerning this field trip*
email: fmccoy@hawaii.edu office hours: Mon. & Wed., 1030–1230, W. 1630-1730pm

Home: telephone: 230-8870

GOAL: To study the geology of Hawaii, the Big Island, by exploration and on-site observations during a supervised and guided fieldtrip, with focus on perception and appreciation of formative natural processes in landscape evolution, followed by a discussion and review session on campus.

OBJECTIVES: To spend 4 days on the Big Island to discuss, observe and study:

- the geologic structure, volcanology and history of its five subaerial volcanoes: Kohala, Mauna Kea, Hualalai, Mauna Loa, and Kilauea (with mention of its two underwater volcanoes, Mahukona and Loihi)
- the geologic effects of glacial activity such as in erosion, sediment accumulations, and landscape features
- landscape evolution
- detection and monitoring of volcanic activity and attendant phenomena
- the use of energy from volcanoes, and
- cultural, archaeological and political management/mitigation of volcanic risks.

PREREQUISITE: Completion or concurrent registration in GG 101, 103, or consent of instructor.

REQUIRED PARTICIPATION: For academic credit, attendance on all four days of the fieldtrip with participation at all field sites is mandatory, in addition to the satisfactory completion of the field exercise and/or a written final examination.

RECOMMENDED READING: *Volcanoes in the Sea*, Macdonald, Abbott and Peterson (3rd ed., UH Press), chapters 1, 2, 4, 7, 9, 13, 14 & 19;

Field Trip Guide: Kilauea, (http://www.soest.hawaii.edu/asp/GG/resources/docs/Kilauea_fieldguide08.pdf).

TRAVEL ARRANGEMENTS TO/FROM THE BIG ISLAND: This is your responsibility. Plan your itinerary to correspond to the field trip schedule. Arrivals after field-trip starting times cannot be accommodated, but we will wait for late arrivals due to delayed flights providing we know you are on the flight. Flight departures from Kona prior to the time scheduled for the end of the field trip, or at the time we arrive at the airport, cannot be accommodated.

TRANSPORTATION ON THE BIG ISLAND: Vans are booked. These are seven-passenger vans with four-wheel drive for the Mauna Kea road. All students must ride in these vans and contribute towards their rental cost. Additional instruction will occur within vans during transit between field sites. Vans are driven by drivers assigned and employed by the University of Hawaii; no others may drive vans. Anyone not registered for the course may not ride in the vans, excluding participants joining the class as professional contributors and participants with permission from Dr. McCoy (university faculty, graduate students, etc.). Other vehicles may not serve as transportation for registered students during official hours of the field trip.

HOTEL: The hotel serving as our headquarters is the Hilo Seaside Hotel near Reed's Bay in Hilo - Prof. McCoy can be contacted here. The first day of the field trip will begin at 0900 at the Hilo Airport (curbside), or at the hotel lobby at 0945 if you are already in Hilo. Thereafter each day's departure and finish will be at the Hilo Seaside hotel. A lecture each morning will precede departure. It is your responsibility to book and pay for your hotel accommodations – remember that the Thanksgiving holiday is busy in Hilo and rooms need to be reserved in advance.

ITINERARY/DATES: An tentative itinerary of daily activities during the fieldtrip is attached – conditions on an active volcano like Kilauea frequently change, thus does our itinerary; important dates to remember are these:

- **FIELDTRIP STARTS: FRIDAY, NOV. 23, HILO AIRPORT, 0900 (CURBSIDE, ARRIVALS AREA), or HILO SEASIDE HOTEL, 0945 (LOBBY);**
- **FIELDTRIP ENDS: MONDAY, NOV. 26, KONA AIRPORT, 6:30 pm.**

Note that you will miss one day of classes – please be sure to notify your instructors in advance of your absence from their class.

FOOD: Breakfast and dinner sites are your choice – a listing of local restaurants is appended. Lunches will be in the field either as a picnic, purchased at a local store that morning or the night before, or at a restaurant – check the itinerary for the appropriate venue. Costs for food are the students' responsibility.

FIELD CONDITIONS AND CLOTHING:

Lava flows: If we have a long hike over lava flows, you must have sturdy socks, hiking boots/shoes and long pants – slippers and shorts will not be allowed. Should active lava flows be within reach, gloves and flashlights (the former should we attempt to sample the lava, the latter in case of a night hike to the flow fronts), with ample water, are required. If the hike is brief and no active flows are nearby, then these restrictions do not apply. The decision for a long or short hike will be made the day before the hike after consultation with scientists at the Hawaiian Volcanoes Observatory and rangers at the Hawaii Volcanoes National Park, as well as after Dr. McCoy has hiked out onto the flows [on Thanksgiving Day] to check conditions. Be prepared for either a long or short hike. In either case, consider having respirators or cloth masks for filtering volcanic fumes (consult the appended Guide to Field Conditions for health considerations). This hike is optional and can be dangerous.

Mauna Kea: We spend a day at 4,200 m/13,800 ft. where the atmosphere contains half the oxygen present at sea level – expect shortness of breath, headaches, and very low humidity. It can be extremely cold with snow and ice at the summit of Mauna Kea - bring long pants, a warm sweater, shoes and socks, and a windbreaker (and maybe a hat, gloves, scarf). Be aware that on previous trips we have encountered deep snow and blizzards. A hike to Lake Waiau is scheduled, a 2 km/1.2 mi. walk that is difficult at this altitude - not a hike for smokers, those with respiratory problems, or pregnant women (consult the appended Guide to Field Conditions for health considerations). Bring water, snacks, chapsticks, fruit, etc. Those not hiking will remain with the cars [or return to Pohakuloa; note also that if we spend the evening on the third day at Pohakuloa, it will be cold (2,600 m/8,500 ft.)].

Kilauea: It can be warm and pleasant or windy and cold at the summit – be prepared for both. Here we do only short hikes, and shoes are recommended (pyroclastic deposits can be difficult with slippers). In Puna on the rift zone, it is usually warm and rainy; shoes for a short hike across the flows at Kaimu are easiest but after that slippers are fine. Be aware that high concentrations of sulfur gas occur at the summit crater [Halema'uma'u].

EXPENSES/DEPOSIT: Students are responsible for all expenses - shared costs (vans, gasoline, admissions, and such are covered by the laboratory fee. Estimated total costs (airfare, food, hotel, and other personal costs) could be in excess of \$350.

LEGAL AND MEDICAL FORMS: These are available elsewhere, as well as in class. They must be completed and signed. Please submit (in person or by mail) to Dr. McCoy at Hale Imiloa room 115 (mail: WCC, 45-720 Kea'ahala Road, Kaneohe 96744), by Nov. 22, 2013. Understand that the medical forms provide background information should a health problem arise on the trip.

It is your responsibility to obtain the forms from Dr. McCoy (they are available in the lobby of the Hale Imiloa bldg., across from room 115). If these forms are not completed, signed and submitted before the trip, you may not participate in the course and will be turned back at Hilo Airport should you arrive without the completed forms.

FINAL EXAMINATION AND GRADING: A course grade will be determined by accomplishment on both the field exercise(s) and a final written examination, which will be scheduled at a mutually convenient time. Grades assigned with: **A** = 90-100 points, **B** = 80-89 points, **C** = 70-79 points, **D** = 60-69 points; less than 60 points = fail (**F**). Under special conditions, with consent of the instructor, a grade for no credit (**NC**) could be given.

The final examination date is scheduled for the week following the field trip, to be taken in the WCC Learning Center (TLC) before the end of the fall semester (if you are at another UH campus, other arrangements for the examination may be made).

ADDITIONAL NOTES AND CONSTRAINTS: This is a University of Hawaii accredited course, thus no liquor or drugs are allowed during official activities. This is a one (1) credit course. No special preparation is required. Recommended basic skill-levels are college level reading capability. At WCC, this course partially satisfies AA degree requirements and counts as a laboratory course in physical science. At UHM, this course partially satisfies the requirement in the General Education Core, as well as in the College of Arts and Sciences. Portions of the trip involve hiking, sometimes over difficult terrain that can be physically demanding. Be aware that participation on such hikes requires appropriate physical prowess and conditioning (should this not be the case, you can wait in the vans for our return without penalty towards completing the course). Safety concerns are paramount, and will be discussed prior to departing on the field trip – it is your responsibility to read and understand the attached materials that describe potential difficulties, safety issues, and such, and by doing so you accept these conditions as documented by your signature on the waiver forms.

**TENTATIVE ITINERARY - GG 211 - FIELD GEOLOGY OF THE BIG ISLAND
FALL, 2013**

Friday, November 29

- 0900 am Meet at Hilo airport terminal, curbside, at the arrivals area
--- or ---
0945 Meet at Sand and Seaside Hotel, lobby, for lecture
1030 depart for Lyman House museum in Hilo
1045 Lyman House museum – minerals and rocks (a superb mineral collection)
1130 depart for Hawaii Volcanoes National Park (HVNP), Headquarters and Museum
1215 National Park Headquarters and Museum for lecture, films, displays, bookstore, etc.
- 1:00 pm Lunch in Volcano village at Volcano Store or other restaurants nearby
- 2:15 short hike to Sulphur Banks/steam vents area in HVNP for observations and discussions concerning chemical weathering and mineral deposits from hot volcanic gases; gases as a predictor for eruptions
3:30 Kilauea caldera; Jagger Museum for displays; Hawaiian Volcano Observatory for science exhibits and discussions with scientists
4:15 Southwest rift zone - cracks, flows and ash deposits from ~700 years of highly explosive eruptions by Kilauea volcano [if accessible*]
4:30 Halema'uma'u crater [if accessible*]
5:00 Keanakako'i crater; 1972 lava channel [if accessible*]
5:30 Return to Hilo – purchase picnic lunch for Saturday [this cannot be done Sat. morning]
[* These areas are closed currently due to dangerous conditions with high sulphur emissions and ash fallout from vent activity within Halema'uma'u crater.]

Saturday, November 30

- 0900 am Lecture in the lobby at the Sand and Seaside Hotel
0915 Tsunami Museum, Hilo – understanding tsunami
1130 depart for Hawaii Volcanoes National Park (HVNP)
- 12:15 pm Lecture and picnic lunch at Bird Park/Kipuka Puauulu off of Mauna Loa road
- 1:30 Thurston lava tube – formation and importance of lava tubes
2:30 Kilauea Iki crater; 1959 eruption; devastation trail with Pele's tears and tree molds
3:45 Two options:
- Option 1 (if active flows might be accessible by hiking or viewing from the Natl. Park):**
4:15 Ke Ala Komo overlook off of the Chain of Craters Road – Koa'e and Hilina Pali fault systems; collapse of Kilauea's south flank; 1975 Halape earthquake
5:00 Park at the end of Chain of Craters Rd. at new lava flows; hike along coastline to (hopefully) see active lava-flows on land and/or entering the ocean; if no active flows are observable, then there will be a short hike onto older flows - lava flow structures, methane explosion pits, Pele's hair, limu-o-Pele, formation of black-sand beaches, etc.
5:45 Two choices depending upon weather conditions and flow activity:
(1) if active flows are accessible, hike to and remain at active-flow area for night viewing (must have flashlights!), return to Hilo about 8:30 pm;
(2) if active flows are not accessible to hike to, return to Hilo after viewing.
- Option 2 (if active flows are accessible by hiking or viewing from Kalapana):**
3:45 Drive to Kalapana, onto access road to/over active lava flows
4:45 Hike along coastline to see active lava-flows on land and/or entering the ocean – lava flow structures, methane explosion pits, Pele's hair, limu-o-Pele, formation of black-sand beaches, etc.
5:45 Two choices depending upon weather conditions and flow activity:
(3) if active flows are accessible, hike to and remain at active-flow area for night viewing (must have flashlights!), return to Hilo about 8:30 pm;
(2) if active flows are not accessible to hike to, return to Hilo after viewing.

Hiking on lava flows and getting close to active lava flows requires special dress, equipment (gloves and flashlights), and safety concerns – see syllabus and attached documents for details. Additional concerns and restrictions will be outlined prior to the hike in connection with current conditions.

Please also be aware of dangerously high levels of sulfur dioxide gas from the vent at Halemaumau as well as from ocean entries.

Sunday, December 1

- 0900 am Lecture in the lobby at the Sand and Seaside Hotel
0915 Rainbow Falls, Hilo – stream erosion, waterfalls, post-caldera lava flows
1000 End of Kalapana beach road at new lava flows in Kaimu
- field exercise 1 (horizontal tree molds as indicators of flow directions in pahoehoe lava flows)
- field exercise 2 (origin and lifetime of a black sand/gravel beach)
1215 County park, hot springs and heat from the southeast rift zone
1245 pm Lunch in Pahoa
2:45 pm Puna Ventures Geothermal facility – use of geothermal heat; feasibility of extracting geothermal energy in Hawaii and its future; technology of geothermal drilling
3:45 Lava Trees State Park outside of Pahoa – formation of lava tree-molds; southeast rift zone
- field exercise 3 (tree mold morphology as indicative of flow thickness)
4:45 1960 Kapoho lava flow at Cape Kumukahi lighthouse – diversion of flows and feasibility for hazard mitigation; burial of Kapoho village; hazard zoning
5:15 Littoral cones (Sand Hills) at 1842 eruption; Green Lake and tuff cone (depending upon time and access)
6:00 return to Hilo, purchase snacks and lunch for tomorrow [this cannot be done Mon. morning]

Monday, December 2

- 0745 am Lecture in the lobby of the Sand and Seaside Hotel
0830 Depart with baggage for Mauna Kea summit – see cautionary notes in syllabus and attached sheets concerning problems at high altitudes
0930 Hunter check-in station at intersection of Saddle Road and Mauna Kea Access Road – recent flows, glacial morphology of Mauna Kea, shield morphology of Mauna Kea and Mauna Loa, diversion of lava flows; rest stop for altitude adjustment [elev. = 1500m/5000ft.]
1015 Hale Pohaku and Onizuka Museum – exhibits; rest stop for altitude adjustment [elev. = ~3,000m/10,000ft.]
1130 Keck Observatory – public gallery; rest stop for altitude adjustment [elev. = 4145m/13,599ft]
1215 hike up summit ash cone to summit [elev. = 4205m/13,796ft]
1215 Hike to Lake Waiau and ancient Hawaiian adze quarry – glacial features, deposits and history; subglacial eruptions with glass-rich lavas and use by ancient Hawaiians as tools; volcanic bombs; post-caldera eruptions; pyroclastic cones; Lake Waiau; alpine dwarf plants; stratospheric dust (*weather permitting and trail not buried in snow; sun-screen recommended, UV radiation is intense at this elevation*)
1:45 pm Depart for Hale Pohaku
2:00 lunch at Hale Pohaku
4:00 Pu'u Wa'awa'a trachyte cone and block flow at quarry on Pu'u Wa'awa'a ranch
5:30 1800-1801 Hualalai lava flow - a'a lava channel; large nodules of olivine; contemporary hazards and dangers from Hualalai volcano
6:45 Keahole airport in Kona

This itinerary is tentative, and likely to change depending upon weather conditions (snow on Mauna Kea, rain elsewhere), lava flow activity, as well as health issues with volcanic gas particularly at the summit of Kilauea, or with altitude on Mauna Kea.