

FIELD GEOLOGY OF LANAI, MOLOKA'I AND KAHO'OLAWA

GG 213

SPRING, 2014

March 22 – 27, 2014

A six-day field course to the islands of Lanai and Molokai, with discussion of Kaho'olawe. A survey of Hawaiian volcanology and geomorphology illustrated by field studies of the four volcanoes that created these islands, with emphasis on natural hazards and Hawaiian cultural relationships. Students are responsible for air and ground transportation, meals, and lodging [with exceptions as noted below].

1 credit hour; prerequisite – completion of or concurrent registration in GG 103 or GG 101, or consent of instructor; no recommended special preparation; basic reading skills required; partially satisfies natural science requirement for Assoc. in Arts degree in the community college.

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* a message is recorded here, changed weekly, concerning field trips, assignments, etc.

Consultation hours:

Mon., 1000 – 1230; Wed. 0930 – 1:00 p.m.**
other times by appointment

** best to look for me first in the laboratory, then at my office.

Recommended Reading:

Macdonald, Abbott and Peterson; *Volcanoes in the Sea, The Geology of Hawaii*; Univ. Hawaii Press, 1983 (2nd edition); chapters 6 - 10, 14 - 16, & 20; or corresponding chapters in

Macdonald and Abbott; *Volcanoes in the Sea, The Geology of Hawaii*; Univ. Hawaii Press, 1970 (1st edition, with Glossary).

Ancillary Reading and Events: Supplementary, non-required reading is in the library, both on reserve and on open shelves; you are encouraged to peruse this literature; numerous seminars, talks, symposia and exhibits occur throughout the university system and at various museums, you are particularly encouraged and welcomed to these.

Course Objective: To spend 6 days on these islands to study the geologic structure and history of (1) the Lanai volcanic shield; (2) the east and west Molokai volcanic shields, the latter with its post-erosional volcanics at Kalaupapa; (3) post shield-building processes of erosion and deposition on these islands; (4) geological processes active in sculpting Hawaiian landscapes, including catastrophic events; and, (5) the future of the islands in terms of geologic and anthropogenic processes. A side trip to, or chartered flight over, Kaho'olawe will be offered if possible – access constraints at the moment make any landing and hiking on this island difficult, if not impossible given time constraints.

Field Conditions/Clothing/Health Alerts:

It will be hot, dusty and dry during the day and chilly at night. You will need sweaters and jackets for cool nights, in addition to rain gear. Hats and sunscreen help. Shorts are adequate for all day trips and hikes. Most field sites are a short hike from vehicles. A day pack (backpack) is highly recommended, especially for the hike down to, and the day at, Kalaupapa and Kalawao.

The field exercise on Molokai will be over irregular terrain on a wide cleared area under hot sun with no shade, in grass and bushes. Travel on Molokai will be on paved roads. Travel on Lanai is over very rough, often unpaved roads in open cars often necessitating four-wheel drive - you must drive slowly and wear a seat belt. Expect bumps and dust. Field sites may be in dangerous settings such as along the ocean or at the edge of cliffs – use exceptional care and caution.

An optional short hike up Halawa valley on Molokai requires crossing a waist-deep stream a few times; bathing suits are nice here. This hike is long and portions are somewhat difficult. Swimming in Halawa stream and at the waterfall pool is not recommended because of a leptospirosis infestation - read the accompanying sheet concerning this disease. Do not drink the stream water, nor swim if you have open cuts or abrasions.

The longest hike (ca. 3 hrs) will be down to Kalaupapa/Kalawao along a well-marked but rutted/muddy/rocky trail, then around the peninsula. These hikes are not particularly difficult, but it can be long, rough, and tiresome – 3.5 miles downhill, 26 switchbacks, rutted by mule traffic, dropping ~600 m (~2000 ft) to sea level, with portions of the trail under repair after being washed out and removed by landslides. This hike is not recommended for those with acrophobia (fear of heights). Hiking poles highly recommended.

Important note – field conditions for this field course disallow accommodations for participation by those who are handicapped.

Transportation: On Moloka'i, vans/cars are rented. On Lana'i, four-wheel drive jeep-like cars are rented. Airplanes are chartered to transport us from Kalaupapa to Lana'i City, since commercial flights are not available for this part of the trip. These are small aircraft. Realize that the ~25 minute flight from Kalaupapa to Lanai can be uncomfortable for those with acrophobia (fear of heights). Chartered aircraft will fly baggage from Moloka'i to Lanai, so we do not have to backpack it down the Kalaupapa trail – because of the small aircraft, baggage weight limits constrain each to no more than 18 kg (40 lbs.).

Facilities and food:

Molokai: The first two nights will be in or near Kaunakakai – arrangements here are your responsibility. You may stay with family, relatives, friends, or camp. All meals will be at local restaurants, with the exception of perhaps a lunch in the field (see Itinerary – alterations to this schedule will be announced during the trip). Dr. McCoy will stay at the Hotel Molokai, about 3 km east outside of Kaunakakai. This hotel will be our meeting point while on Molokai.

Lanai: Accommodations here are absurdly expensive. Accordingly, we book three (or more) houses in Lanai City that we can share for sleeping and cooking. You can also stay with family and relatives – camping is not recommended, permits are necessary and difficult to obtain. If you do not wish to stay in the houses on Lana'i, you shall have to make your own arrangements for those nights – be aware that accommodations on Lana'i are scarce and expensive. Lunches may be in the field, or at local restaurants. Breakfasts and dinners will be at local restaurants.

Travel arrangements to Moloka'i and from Lana'i: 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 on delayed flights providing we know you are on the flight. Do not book your departure prior to the time scheduled for the end of the field trip - we will be out in the countryside and cannot get to the airport earlier; simply stated: you will miss your flight. Book flights as soon as possible - commercial aircraft to these islands are small with few seats, operating on limited schedules.

Expenses: As noted, you are responsible for making your air travel arrangements to Molokai and from Lanai, and paying for them. You are also responsible for booking and paying for lodgings on Molokai. Vans (Molokai), four-wheel drive vehicles (Lanai), gasoline, and rooms (Lanai) are shared costs covered through the lab fee. This fee also pays for numerous other costs such as the Kalaupapa-Lanai transit, fees at Kalaupapa, etc. – all are required to pay this even if you elect to use a private car/van or accommodation on Lanai.

Final examination and grading: A course grade will be determined by accomplishment either in your final laboratory report or in a final written examination (if the latter, it will be on file at The Learning Center [at WCC] to be taken at your convenience, but must be done prior to the end of final exam period). 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; **N** can be assigned where unforeseen difficulties prevent completion, again with consent of the instructor.

Laboratory report: A major focus of this field course is to understand the scientific method and its use to resolve scientific questions (if it can be resolved), and in this course we shall find many questions as we study the landscape. As a science laboratory, we shall have a long field exercise on Molokai. You will be provided with all equipment needed for this exercise, including data sheets. You will be responsible for assembling, plotting, and discussing these data in your final field report, submitted before the end of the semester (last day of classes). It is also recommended that you bring a notebook for recording notes and thoughts as we discuss how this landscape came to be from a geological and historical perspective, and what its future might be. At all times we must be sensitive to Hawaiian places and sites, offer respect, and understand their significance to our culture and science.

Medical and waiver forms: these are available in class or in a plastic tray outside of Hale Imiloa 115. All forms must be returned to Dr. McCoy prior to the trip. It is highly recommended that you not participate in this course if you have asthma or other respiratory problems, heart or circulatory problems, are pregnant, have problems hiking, get motion sickness, or have acrophobia.

Other notes and constraints: This is a University of Hawaii accredited course, thus no liquor or drugs are allowed during official activities. Participation by spouses and children is not recommended - your full participation is required for credit. Travel in rental cars/vans/jeeps, participation in the segment on Kalaupapa, as well as travel on aircraft from Kalaupapa to Lanai, are restricted to those registered in the course or on official Univ. of Hawaii business. Vehicle rentals and accommodations are confirmed for only those registered in the course or on official Univ. of Hawaii business; others must make their own arrangements.

This is a one (1) credit course. No special preparation is required, but physical and health constraints exist. 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. Accordingly be aware that participation on such hikes requires appropriate physical prowess and conditioning. Flying from Kalaupapa to Lana'i is via small airplanes, and the trip is rough and noisy; commercial flights are not available.

Realize that the schedule for daily activities is tentative and subject to change. Announcements of changes will be made prior to the trip in class and on messages at the office telephone number given above, or during the field course.

MEDICAL AND WAIVER FORMS MUST BE SUBMITTED PRIOR TO THE TRIP

FIELD COURSE STARTS: HOTEL MOLOKA'I, 10 am, SAT., MAR. 22nd; ENDS: LANA'I AIRPORT, 1 pm, THUR., MAR. 27th.

BAGGAGE WEIGHT LIMITS, KALAUPAPA-LANAI = 18 kg (40 lbs.)

TENTATIVE ITINERARY - GG 213

Note: This is tentative and changes likely – these will be announced using your UH email as well as in class – it is important that you check your UH email for updates and changes.

Saturday March 22 Geology of East Molokai

- 1000 meet at Hotel Molokai, or Molokai Shores hotel [TBA] for lecture, safety briefing, etc.
1145 Kaunakakai - the later and future geological history of Molokai: sand dunes & sea-level fluctuations
1230 lunch in Kaunakakai at local restaurants or picnic in nearby park
1330 Kaunakakai – deposits left from giant tsunami (megatsunami) & implications of these events, past & future
1500 Kamalo at St. Joseph’s church - post-caldera/post-erosional volcanism: trachyte dome and block flow
1545 Waialua – the latest history of Molokai: Weloka Heiau (if access is open)
1645 Pohakuloa Point – feldspar crystals in basalts & crystallization processes in magma chambers; deep erosion of the shield volcano; spheroidal (chemical) weathering and soil development; the later geological history of Molokai; sea-level fluctuations
1715 Halawa Valley overlook – erosion & formation of deep “U” shaped valleys
1745 Halawa Valley - influence of sea-level fluctuations on fluvial processes; influence of sea-level changes on valley formation; nearshore processes; ancient Hawaiian lo’i & auwe systems
1830 alternate hike up Halawa Valley (to 1st waterfall; not recommended to 2nd waterfall); return to Kaunakakai

--- purchase picnic lunch for Sunday ---

Sunday March 23 Geology of Central and West Molokai (Mauna Loa)

- 0830 depart Hotel Molokai
0845 Field Exercise - Kaunakakai – mapping deposits left from giant tsunami (megatsunami)
1200 Landfill road – the later geological history of Molokai; more deposits left from giant tsunami
1215 Kalaupapa overlook – rejuvenated volcanism; large landslides & collapse of volcano; Kaule o Nanahoa (phallic rock) – post-caldera volcanism, trachyte lava flow; erosional processes; ancient Hawaiian use of stones & weathered surfaces
1245 Palaau State Park (Kalaupapa overlook) – picnic lunch
1415 Maunaloa highway road cut – shield-building processes - thin aa lava flows; geological history of the Mauna Loa shield volcano
1600 Papohaku beach (south end) – the later geological history of Molokai; beaches & coastal processes; ancient sand dunes; sedimentary rocks & stratigraphic relationships; sea-level fluctuations
1645 Papohaku beach (north end) & Puu o Kaiaka – shield-building processes: rift zones & volcanism; cinder cones & pyroclastics; the later geological history of Molokai: sea-level fluctuations; formation of beach rock
1830 return to Kaunakakai

--- purchase water for hike to Kalaupapa and food for picnic lunch at Kalawao ---

Monday March 24 Kalaupapa/Kalawao

- 0800 depart hotel
0815 drop baggage at airport for transport to Lanai
0830 Kalaupapa overlook - collect at trailhead for instructions – hike down to Kalaupapa – upon arrival at the bottom of the trail, remain in grassy field & parking area - wait for others to arrive, including those flying in.

****** Under no circumstances either swim at the beach or hike into Kalaupapa town – all must remain in the grassy area until everyone is down from the trail and our guide has arrived with the bus! ******

- 0845 drivers only – return rental cars to airport, drivers and those who cannot do the Kalaupapa hike fly down to Kalaupapa to be met there & driven to the trailhead
morning brief tour of town & its history; drive, then hike up to Puu Oao – rejuvenated volcanism: Kauhako crater; lava Tubes; ancient sled run

- noon Kalawao – cultural history; historic churches & other buildings; “sea cliffs” and collapse of volcanic edifices; picnic lunch
- afternoon drive/hike around peninsula to airport – rejuvenated volcanism, lava flows; lava tubes; mega-landslides
- ~1730 Kalaupapa airport for chartered flights to Lanai
- ~1845 arrive Lanai; pick up cars; settle into houses, dinner in Lanai City

Tuesday March 25 Lanai

- 0900 meet at designated house, leave for Munro Trail
- 0930 Munro Trail [rugged & muddy four-wheel drive road], Lanaihale – geological history of the Lanai volcano; chemical weathering & soil-forming processes; aeolian (wind) erosion; orographic rainfall; former caldera in Palawai Basin
- 1230 lunch in Lanai City
- 1345 depart for “Garden of the Gods” – aeolian erosion; anthropogenic effects on the geological history of Lanai and historic (mis)management of the landscape; Nature Conservancy native forest preserve for demonstration of proper management of the landscape with guided tour
- 1615 Polihua - [rugged and rough four-wheel drive road] later geologic history of Lanai volcano (if exposures are uncovered); aeolian processes; contemporary beach & coastal processes; beachrock formation
- 1730 return to Lanai City for dinner and night

Wednesday March 26 Lanai

- 0830 meet at designated house, leave for Hulopoe and Manele Bay
- 0845 Hulopo’e Bay – short hike on fisherman’s trail along cliff edge to Kapikaa Bay, later geological history of Lanai; deposits from giant tsunami (megatsunami) [if trail is intact]
- 1000 Manele Bay – shield-building & rejuvenated volcanism; rift zones; cinder cones; sea-level fluctuations; coastal erosion; beachrock formation and implications
- 1230 lunch in Lanai City
- 1345 depart for Keomuku road
- 1400 Maunalei Gulch & possible visit to water tunnel – ground water resources, Gyben-Herzberg basal lens, springs, ancient & modern use of water resources
- 1515 ancient Hawaiian petroglyphs at coastline – use of weathered lava surfaces in antiquity
- 1630 Laehi – later geologic history of Lanai; aeolian activity; sedimentary rocks; chemical weathering
- 1730 Naha [muddy bumpy road] – later geological history of Lanai: coastal plain evolution; beach rock & sea-level fluctuations
- 1845 return to Lanai City for dinner and night

Thursday March 27 Lanai

- 0830 meet at designated house; leave for Kaunolu (if road is passable)
- 1000 Kaunolu (extremely rugged & rough four-wheel drive road, may not be passable) - shield-building volcanism; stream valley evolution; sea-level fluctuations; shield building lava flows; unconformities & palaeosoils; ancient Hawaiian village
- 1300 airport, drop-off all but car drivers
- 1330 return cars in Lanai City; drivers catch bus to airport