

GG 214 FIELD GEOLOGY OF KAUAI AND NI'HAU
SPRING, 2012

FIELDTRIP DATES: MARCH 24 - 28, 2012

Dr. Floyd W. McCoy

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** a message is recorded here with current information concerning this field course*

GUEST PARTICIPANTS:

Dr. Gary Stice Professor Emeritus, U.H. - WCC
Dr. Chuck Bley Geologist; Director TEOK, Poipu, Kauai
Dr. David Burney Zoologist & Co-Director, Makauwahi Archaeological Excavation; Director Conservation, National Tropical Botanical Garden, Kalaheo, Kauai
Dr. Lida Pigott Burney Palynologist & Co-Director, Makauwahi Archaeological Excavation

GOALS: To study the geology of the islands of Kauai and Ni'ihau by exploration and on-site observations during a supervised and guided field course, with focus on perception and appreciation of formative processes in island and landscape evolution, on the scientific method, on the interaction of the earth sciences with cultural history and practices.

OBJECTIVES: To spend 5 days on Kauai to study the geologic structure and history of this island and Ni'ihau observing landscapes and outcrops in the field that portray (1) construction of the volcanic shields of both islands (shield-building, pre-caldera and post-caldera stages), (2) post-erosional (rejuvenated) volcanics on Kauai, (3) post shield-building processes of erosion and deposition, and (4) the effects of catastrophic geological processes - landslides, hurricanes, tsunami - in shaping the landscape. Discussion will focus on how natural history has shaped, and continues to interface with, both the environment and man's tenure, ancient and modern, on this landscape. These objectives will be accomplished via visits to areas of geologic interest; dialogue in the field will expand upon lectures in GG 101 or 103 with special emphasis on current research and new information from this research. Participation by visiting geologists, geophysicists, hydrologists and archaeologists will contribute to the discussion. A trip to Ni'ihau cannot be done, thus we observe and discuss the geology of this island from Kauai.

Each field course involves one or more field exercises concerned with observations, measurements, and the interpretation of one or more geologic features on the island. This exercise may involve a short hike to the geologic exposure, working in difficult or wet terrain, brush clearing, and dusty/dirty/muddy surroundings at the exposure; additional laboratory work may be required at WCC. A course report will be required, deadline for submittal is the last day of classes – there can be no exceptions. Complete information concerning field and laboratory work, including report format, will be issued while on Kauai; all field equipment and supplies necessary for this task will also be provided.

Field sites this year are at two locations where sedimentary deposits are reputed to have been left by tsunamis on Kauai, one at the Haena Dry Cave (Maninihoho) from the 1946 inundation, and the other from a prehistoric wave that washed into Makauwahi sinkhole near Poipu that was uncovered during archaeological excavations there.

PREREQUISITES: Completion or concurrent registration in GG 101 or GG 103; no recommended special preparation; basic reading and outdoor skills are required, the latter including a capability to traverse irregular terrain.

REQ. COURSE Partially satisfies natural science requirement for Associate in Arts degree in the community college
SATISFIES AT UH: system and for the Bachelor of Arts or Bachelor of Science degree at the university.

CONSULTATION WCC (live contact): office hours - Mon. & Wed., 1030 - 1230; 1630 – 1730, or by appointment
HOURS: WCC (remote contact): via e-mail or by appointment, voice message at 236-9115.

TEXTBOOK: ♦Blay and Siemers; Kauai's Geologic History: A simplified Guide, TEOK.

Please note - this book remains the basic source of information concerning the geology of Hawaii but is considerably out-of-date:

♦Macdonald, Abbott and Peterson; *Volcanoes in the Sea, The Geology of Hawaii*; Univ. Hawaii Press, 1983 (2nd edition)*, *or*

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

WAIVER AND MEDICAL FORMS: These are required, and must be submitted to Dr. McCoy before the field trip – you may not participate on the trip unless all forms are submitted. Do not submit forms to the WCC Business Office. Forms may be obtained from a box mounted in the hallway outside the office of Dr. McCoy (HI 115).

FIELD CONDITIONS: Sunny and warm (hopefully); expect rain and cool weather in the mountains at Koke'e; most field sites are only a short hike from the vans/cars; all field excursions are during daylight; proper shoes (canvas, jogging, Tivas, etc.) are needed if you plan to do the short hike to the Kalalau valley overlook and Pihea Peak, or into the sinkhole archaeological site; swimming at Polihale may be an option if there is time. All field sites are visited regardless of weather conditions, thus raingear is advisable. Expect dusty/dirty/muddy conditions at the archaeological site within the sinkhole – access to this site is through a small cave that requires crawling for about two meters. The road to Kipu Kai is difficult, steep, narrow, and tricky, and there are very limited facilities here.

LOGISTICS: Lodging and food: this is your responsibility. The class will assemble every morning for a lecture prior to field work, likely at the hotel where Dr. McCoy will be staying (announced later). Lunch will be in the field, purchased at a store that morning, or at a restaurant – see the itinerary for details. Breakfast and dinner are your choice.

Transportation: to and from Kauai is your responsibility. On Kauai, during field course activities, all students registered in the course must ride in rented vans. We share in the costs of these rented vans, including gasoline, which is incorporated into the amount of the deposit noted below.

Expenses and travel arrangements: students are responsible for all expenses - air transportation, ground transportation, lodging and food; estimated total costs (for everything, course fee, airfare, rental vans, lodging, food) might be on the order of \$300 depending, of course, on where you stay, your appetite and other extracurricular activities; you are responsible for making your own air travel arrangements and paying for them.

DEPOSIT: A deposit of \$200 is due at the WCC Business Office by **March 1, 2012**. A final grade cannot be issued until this deposit is paid. If you have questions on the deposit, please contact Dr. McCoy – do not ask the WCC Business Office.

ADDITIONAL NOTES AND CONSTRAINTS: This is a University of Hawaii accredited course, thus no liquor or drugs are allowed during official activities. You must participate on all days, at all field stops, complete and submit all field exercises/reports for credit.

Rented vans are driven by drivers assigned and employed by the University of Hawaii; no others may drive these vans.

Spouses and children may come along, but realize their interests may not match yours (i.e., they'll want to go home early), and your full participation (i.e., every field stop) is required for credit. Spouses and children may not ride in the vans unless they are enrolled in the course; they are not encouraged to be at sites where field exercises and study are being conducted, nor is UH responsible for their safety at these sites.

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 UH, 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, as well as other strenuous activity, that can be physically demanding in dangerous settings. Be aware that your participation requires appropriate physical prowess, clothing and conditioning.

Safety concerns are paramount, and will be discussed at each morning lecture prior to departing.

Personal problems, family visits, and such, must be handled in the evening - it is important to follow the schedule and itinerary.

GRADING SCHEME A course grade will be determined by participation and field/laboratory reports(s). 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 (**N**) could be given. An incomplete (**I**) grade may be given by request, but must be satisfied by submittal of the field/laboratory report writing before the posted deadline during the following semester. Extra/special credit is not routinely awarded.

MEET AT LIHUE AIRPORT (CURBSIDE, CENTRAL PORTION) 0900
OR AT DR. MCCOY'S HOTEL (announced later) MARCH 24, 2012

DEPOSITS DUE BY MARCH 1, 2012.

MEDICAL AND LEGAL WAIVER FORMS DUE BY MARCH 1, 2012.

A DETAILED ITINERARY WILL BE PROVIDED LATER.

GG 214 Field Geology of Kauai and Niihau -- Information

With apologies for the delayed transmission of this – we are attempting to get permission to spend a half-day in Kipu Kai. This is a remote and stunningly beautiful fragment of old Hawaii, the Hawaii I grew up with, that is in private ownership and difficult to access (it was a backdrop in the movie “Descendents”). So far no permission... we were in there on the last field course – stunning geology.

Attached is the syllabus for the course (if you have not already obtained one from the rack hanging outside my office door [HI 115] attached to the termite-ridden display cabinet).

Also in this rack are the waiver/permission/medical forms that must be completed and submitted before you can come on the field course. You will not be allowed to participate without these forms being submitted. Those who have been on previous field courses, your medical forms are on file and adequate unless your health has gone through major changes- thus they do not need to be redone. All other forms need to be submitted, however.

Attached is the itinerary. This is tentative and almost certainly will be modified. It is provided only to give you an idea of what is coming, and when. If Kipu Kai is arranged, then it will be substantially revised.

This is an intense five days. Clothing for most sites can be shorts and tee shirts and slippers. Bring field shoes, however. And jackets and sweaters – this is Kauai which is farther north, and can be chilly especially up at Koke’e. It always seems to rain at He’e, at the end of the road (but if it is not, then the sunset from there from the ancient hula heiau is gorgeous).

Note that there are two field labs. These will be grimy, muddy, dirty, goeey, and exciting. You will be collecting data that the archaeologists and I will use for research. Your contribution, via the lab, will be to work up the data as a lab report with interpretation. The research focuses on deposits left by tsunamis. In one area at the dry cave near Haena, they appear to be from the 1946 tsunami, and if so are the only deposits known to remain from that event in Hawaii. The other deposit is within a sinkhole, accessed by a short cave (which we crawl through for about 2 – 3 meters) that appears to be a huge inundation a few hundred years ago (or more) – also unstudied. Wear old clothes...

Lab instructions, field data sheets, equipment, etc., will be distributed on Kauai. A forthcoming email will include reading assignments that provide background on the lab work, which will help you in writing your final lab report. Additional attachments will help with the geology of Kauai.

We do not go to Ni’ihau. We discuss the geology of that island from a high vantage point near Koke’e.

It remains unclear if we can get into Polihale. The last field course could not because the road was in bad shape. But if we can, and things are right, it is a beautiful beach with great body surfing.

We depart each day from the Kauai Sands Hotel (420 Papaloa Road, Kapa’a, 822-4951) where I am booked. Each morning will likely start with a lecture in the hotel lobby.

Four vans are booked. If you are not riding in these with the class, please let me know. You can book your own transportation, or use that of friends/relatives, but again – please let me know. If you do not ride in the vans and do not inform me, then I expect you are in the vans.

Lunch will be either a picnic in the field or at local restaurants – see the itinerary.

Note that a deposit is required for academic credit.

There is a very long waiting list to participate in this course – please, if you are not coming, let me know so we can admit some from this list.

Accompanying us will be four guest scientists, two geologists and two archaeologists/palaeoecologists.

Floyd Cell/mobile 341.3959

T E N T A T I V E I T I N E R A R Y - G G 2 1 4
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Saturday, March 24: southern Kauai [Kilauea-Hanalei-Ke'e]

[Field conditions: sunny and warm; shorts and slippers/light shoes are adequate; brief showers often at Ke'e; swimming at Ke'e if we get there before sunset – it will be a long day with a late return]

- 0900 Those arriving today - meet at Lihue airport, curbside at the arrivals area; pick-up vans
- 0930 Those already on Kauai – meet at Kauai Sands Hotel in Kapa'a; orientation and introductory lecture on Kauai geology at the hotel.
- morning Kilauea National Wildlife refuge
 short hike to tuff cone, if possible; shoreline erosion; pyroclastic eruptions; rejuvenated volcanism
- Kauapea ("Secret" beach)
 short hike down steep and muddy trail, long walk along beach; erosional contact between shield building and rejuvenated volcanics, with buried stream and valley containing pillow lavas = unconformity or hiatus; significance of unconformities; formation of beach rock; coastal processes
- Hanalei valley overlook
 river and stream valley evolutionary processes; geomorphic change and cyclicity; shield and rejuvenated volcanism; sea level changes
- lunch Hanalei (local restaurants – this will be a late lunch)
- afternoon Lumaha'i beach
 time permitting; coastal/littoral and nearshore processes
- Maniniholo dry cave
 sea-level changes; sills and dikes; rift zones; tsunami deposits
 Field Exercise No. 1 – mapping and sampling of sedimentary deposits left by the April 1, 1946, tsunami
- Waikapala'e wet cave
 short hike up rocky trail and down into cave over boulders; sea-level changes; ground water
- Ke'e
 formation of the Na Pali coastline and sea cliffs; mass wasting; mega-landslides; beach rock formation as a sea level indicator; optional short hike to Paoa hula heiau (via an ancient luakini heiau) for sunset
- evening purchase food for picnic lunch for Sunday

Sunday March 25: south Kauai [Poipu-Makauwahi Sinkhole Site]

[Field conditions: sunny and hot; irregular and sharp rocks at Poipu along coastline; crawl through short cave to enter sinkhole; muddy conditions at the sinkhole archaeological site and in the quarry; swimming if there is time]

- 0900 meet and depart Kauai Sands Hotel
- morning “spouting horn” blowhole at Poipu
 sea level changes; formation of coastal benches
- Poipu coastline and beach
 lithified and non-lithified sand dunes, significance for sea level changes; microatolls and their significance for sea level changes and island subsidence; chemical weathering of carbonate rocks, and karst topography; fossil molds of trees and shrubs, and significance to palaeo-environmental history of Kauai; archaeology

lunch	Koloa
afternoon	Field Exercise No. 2 - Makauwahi sinkhole archaeological site – excavating, mapping & sampling of ancient tsunami deposit, with interpretation of wave dynamics and impact; study of the archaeological stratigraphy with inferences for ancient climate, ecology, and environment during Hawaiian occupation pre-European contact.
evening	purchase food for picnic lunch on Monday

Monday March 26: central and west Kauai [Alaka'i swamp–Koke'e–Polihua]

[Field conditions: rain-gear recommended – the Alaka'i swamp/Koke'e area is near the summit of Mt. Waialeale, which ranks as the wettest spot on earth with the highest rainfall rate known; it can be chilly and foggy in Koke'e]

0830	meet and depart from Kauai Sands Hotel
morning	outcrops along Waimea Canyon road chemical weathering – chemistry, spheroidal weathering Waimea canyon overlook shield-building and caldera-filling lava sequences; evidence of the Kauai caldera; dikes; stream erosion, chemical and mechanical weathering Kalalau Valley overlook shield-building volcanism; geomorphological landscape evolution; stream erosion; mass wasting and mega-landslides Pihea peak optional short hike along muddy and irregular ground; chemical weathering; Alaka'i swamp; perched surface and ground water
lunch	Kalalau Valley overlook for picnic lunch (if sunny)
afternoon	museum at Koke'e State Park (lunch here if raining) Alaka'i swamp possible short hike into swamp along boardwalk; perched water; chemical weathering Pu'u Hinahina discussion of Ni'ihau geology; contemporary erosion and formation of badlands Mana Plain, beach at Polihale and Na Pali coastline coastal-plain sediments; sea-level changes; coastal/littoral and nearshore processes; mass wasting; sea cliffs; beach rock formation [if exposed]

Tuesday March 27: south Kauai [Wailua-Lihue Basin-Nawiliwili]

[Field conditions: sunny and warm; muddy and irregular ground in quarry and possibly at Kilohana crater]

0900	meet and depart Kauai Sands Hotel
morning	Opaeka'a waterfall river and valley evolution and geomorphic change Wailua River overlook and heiau river and valley evolution; stream terraces; archaeology) Wailua waterfall pillow lavas; rejuvenated volcanism and the formation of the Lihue basin; the Lihue basin as an example of the geological future of windward Oahu Wailua River at beach petroglyphs [if exposed] Halfway bridge quarry rejuvenated volcanism; thick lava flows with dunite inclusions; significance of inclusions
lunch	Nawiliwili

afternoon Nawiliwili harbor
 hexagonal jointing in thick lava flows; rejuvenated volcanism
 menehune fishpond
 river evolution; subsidence; estuaries; archaeology
 Haupu Ridge
 Haupu caldera and flows; subsidiary volcanic shield, Lihue basin and Koloa rejuvenated
 volcanics
 Kilohana crater
 rejuvenated eruptions

Wednesday March 28: West Kauai [Hanapepe-Waimea]

[Field conditions: sunny and warm; muddy at the Hanapepe salt flats]

0900 meet and depart Kauai Sands Hotel

 morning quarry at Poipu
 secondary minerals and mineralization; calcite crystals; relict sand dunes; formation of terra rosa;
 karst topography; unconformities and their significance
 Hanapepe valley overlook
 relict topography and erosion of the Kauai shield
 Hanapepe salt flats
 sea level change; formation of salt rocks and minerals = evaporates; archaeology
 “Glass” beach
 marine pollution and debris; coastal sedimentation processes

 lunch Waimea, or picnic lunch at the old Russian Fort

 afternoon Menehune Ditch
 pillow lavas; archaeology
 return to field laboratory sites as necessary for completion of laboratory exercises and reports

 4:00 pm Lihue airport for those returning to Honolulu; return vans; ua pau