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Conversing with Pelehonuamea: A Workshop Combining 1,000+ Years of Traditional Hawaiian Knowledge with 200 Years of Scientific Thought on Kīlauea Volcanism

Open-File Report 2017–1043
Version 1.1, June 2017

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Compiled and Edited by James P. Kauahikaua and Janet L. Babb

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Preface

The events surrounding volcanic eruptions and damaging earthquakes in Hawai‘i have often been described in journals, letters, and newspapers articles in the English language (for example, Dana, 1891; Brigham, 1909); however, the Hawaiian nation was among the most literate of countries in the 19th century, and many Hawaiian-language newspapers were in circulation through all but the earliest decades of the 19th century. Any modern reconstruction of the history of Hawaiian eruptions or earthquakes should take advantage of all available sources, and so we seek to add the Hawaiian-language newspaper articles, journals, stories, and chants to the volcano and earthquake literature. These sources have been used in many recent volcanological studies (for example, Swanson, 2008, Kauahikaua and others, 2002; Nakamura, 2003).

Another aspect to the mix of science and traditional Hawaiian values is that many of the volcanic summits in Hawai‘i are considered sacred to Hawaiians. Hawaiian travelers brought the first Western missionary team to the summit of Kīlauea and advised them of the proper protocols and behaviors while in this sacred area. The missionaries dismissed this advice as native superstition and they began a campaign of aggressively stamping out customs and protocols related to the Hawaiian volcano goddess Pelehonuamea. What has survived as native knowledge of the volcanoes is a few phrases from native guides included in some of the missionaries’ journals, and a few stories. Pualani and Ku‘ulei Kanahele provide excellent introductions to the Pelehonuamea chants.

In the 21st century, amid a reawakening of Hawaiian culture, modern Hawaiians are demanding protection of their sacred areas, and scientists must be aware of these interests. At the very least, scientists should show respect to Hawaiian values when working in these areas, and should try to minimize disruptions caused by their work. Kaeo Duarte, Peter Mills, and Scott Rowland describe taking this approach in their field work.

Traditional knowledge is also contained in place names. It is important not only to preserve old place names and to recover those no longer used, but also to preserve the stories of those places. Bobby Camara talks about the joys and frustrations of getting information on and recovering Hawaiian place names.

Finally, we hope that a broader interest in Hawaiian views about locations in Hawai‘i where physical scientific work is done will be as beneficial to physical scientists as it has been to life scientists investigating Hawaiian lifeforms on land and in the ocean, and that both studies will continue to benefit the native peoples of Hawai‘i.

Note that these proceedings are transcripts of oral presentations illustrated with PowerPoint presentations or charts. Although every effort has been made to assure the accuracy of the oral presentations, there are some gaps where words are not discernible in the voice recordings and are so noted. In other places, bracketed words were added to clarify the speaker’s meaning.

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The “Conversing with Pelehonuamea” workshop was funded by Monique Fordham, USGS National Tribal Liaison, USGS Office of Tribal Relations, and we thank Monique for her strong support of the workshop and publication. In addition, Monique has supported translation of Hawaiian language newspaper accounts of volcanic eruptions in Hawai‘i. These native voices and perspectives are critical to the reconstructions of these past events. Diann Keliikoa transcribed the audio tapes into text which was then edited by the speaker before final editing for readability.

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Workshop convened by Jim Kauahikaua[1] and Pualani Kanahele[2]

Proceedings compiled and edited by Jim Kauahikaua and Janet Babb

ʻAʻohe pau ka ʻike i ka hālau hoʻokāhi.

All knowledge is not taught in the same school.

Workshop Schedule

Kilauea Military Camp, Lehua Room

Monday, January 28

Pele and Volcanoes

-Pua Kanahele, Edith Kanakaʻole Foundation: Pelehonuamea

-Don Swanson, U.S. Geological Survey Hawaiian Volcano Observatory geologist: Speculative correlation between oral traditions and volcanic history of Kīlauea between ~1200 and 1800 C.E.

-Jadelyn Moniz-Nakamura, Hawaiʻi Volcanoes National Park archaeologist: Whose footprints are they really?

Hawaii Water Cycle

-Kuʻulei Kanahele, Edith Kanakaʻole Foundation: Rising Mist—Ohu Aela I Uka

-Kaeo Duarte, Kamehameha Schools/Bishop Estate hydrologist: Waipiʻo—The bend in the water

[1]U.S. Geological Survey.
[2]Edith Kanakaʻole Foundation.

Polynesian Connections

-Scott Rowland, University of Hawai‘i at Mānoa geologist: GG104—Volcanoes in the sea: A course that examines the effects of Pacific-Island geology and geophysics on Pacific cultures, past and present

-Peter Mills, University of Hawai‘i at Hilo archaeologist: Combining science and cultural sensitivity: Nondestructive sourcing of Polynesian stone tools

Field Trip for Location-Specific Discussions

-Kīlauea Overlook to talk about Halema‘uma‘u (Halemaumau) Crater, Kīlauea caldera, and general summit area features. Led by Don Swanson

-Wahine Kapu to talk about steaming area, origin, and significance. Led by Jade Moniz-Nakamura

Tuesday, January 29

-Pua Kanahele, Edith Kanaka‘ole Foundation: Pelehonuamea II

-Bobby Camara, National Park Service: Traditional place names in Hawai‘i Volcanoes National Park

Pelehonuamea

Speaker: Pualani Kanahele, Edith Kanakaʻole Foundation
Monday, January 28, 2013

Aloha!

I fully agree with Jim's consideration, which is to have a workshop between native culturists and scientists for the purpose of acquiring information vis-à-vis, therefore exhibiting respect for differences and principles.

I think the more we Hawaiians study the volcano from the native viewpoint, the less English vocabulary we possess for descriptive suitability. It becomes necessary to listen to the scientist's viewpoint and secure some terminology for the sake of expanding the English terms we use when translating from Hawaiian to English.

We can take the Hawaiian language and translate it literally, utilizing an equally common word in English; however, I'm thinking that this method is insufficient to define fully what we're looking at. It is incumbent to become smarter in the scientific language or a language other than common English to update the designated ancestral nomenclatures to their full range of possibilities.

Hawaiians have been recording this movement of volcanism for hundreds of years. The story of Pele and Hiʻiaka is the most substantial saga in the Hawaiian tradition. It is also the leading story we have describing people's relationship to nature. We have more information about volcanism than we have about any other natural phenomenon, except maybe the wind.

The reason for the literary longevity of the volcanoes comes from the fact that people responsible for this information started prior to their arrival to Hawaiʻi. We Polynesians share the common name of "Pele." The fact is, we share numerous god names. Our stories vary as far as quality, quantity, and clarity. The stories that we Hawaiians have about Pele begin on another archipelago. Some of the place-names in the chants are indications of points of migration, as well as similarity in land features.

My opinion is that we Hawaiians possess all of the migratory chants of the volcano. This indicates that people who were aware of the movement of magma and lava started before the migration to the north islands, Hawaiian Archipelago. A majority of them migrated here because they followed the fire or volcanic activity, which is Pele. "Pele" translates as "magma," "lava." They understood old, inactive volcanoes and the line of movement to newly birthing islands.

For the purpose of expanding volcanic awareness, this workshop benefits our common interest of Pelehonuamea or volcanism in Hawaiʻi. We have the opportunity to listen to the scientific study, as well as articulate the literary collection of Hawaiian accounting of eruptive phases in Hawaiʻi.

Again, the Pelehonuamea story is not just a cute story for us Hawaiians. It is a definite clue of the forming of our islands from the northwest to the southeast. It establishes some beliefs and practices, it reveals the relationship of man with nature, it incites natural laws that were needed to determine boundaries, it defines the concept of "gods," it is inclusive of weather phenomena in relationship to eruptions, it also hints at the attraction of the magma to the sun, it hints at our or human migration patterns, and, finally, it contains the largest collection of chants in our Hawaiian literature. Therefore, we have an abundant collection of profound information.

Chants are not merely poetry, and, in this case, they are abbreviated forms of historic accounting containing volcanic information of movement, whether this appeared in the form of canoe migration, shark migration, [and] development of land features or spectacular energy

between the earthbound volcanos, which produce outstanding weather in the space above. The story or narrative is entertaining and has to do with the particular time period it was created for; however, chants are timeless. Chants possess metaphors; otherwise, of course, the chants are literal, and because of the possibilities of metaphors, much consideration is expended in interpretation.

The descriptive language in a chant defines a particular eruption. This descriptive language used eons ago should demonstrate the characteristics of eruptive activity. Understanding the language for these descriptive characteristics is valuable because (1) it gives us a window into yesterday; (2) knowing and observing the image doubles the value; and finally, (3) this indulgent affords one a view into the mind of the composers.

The information I'm using for my presentation today comes from my book that was published last year, 2011 [Kanahele, 2011]. I actually wrote this book in 1983 and edited it for publishing in 2011. We are still updating our information in trying to better understand the given material then bringing it forward to language we speak today. That is the value of adding the scientific language to the interpretations of today. Despite the comprehension we possess today there will always be a need for further investigation, which is to improve what already is. This information also comes from a practice our family has been engaged in for generations.

This presentation begins with Pelehonuamea. The Pelehonuamea nomenclature is deconstructed as follows: "Pele,"magma, lava; "honua," earth; and "mea," red thing or substance. All elemental forms were assigned nomenclature to clearly determine the energy source represented. Pele is the energy. Honua indicates the location that strengthens or houses that energy, meaning it is earthbound. Mea provides further information of color, substance, matter or object or substance of the earth.

The idea of assigning nomenclature indicates generations of observation. Simply, the nomenclature specifies the present energy, where the energy is fortified, and any other kinds of information concerning the energy.

Today, basically, my interest is Pelehonuamea and this particular nomenclature. I will also throw in some others as I go along.

Earlier, the nomenclature here was broken down into three different words. Today just the initial part of the word is used, that is, "Pele." All elemental forms are gods because what was understood is that all elemental forms provided life one way or another. I think, like today, the word "god" is a mundane phrase and not totally descriptive. It is a common noun. The nomenclature is utilized for clarity and is the individual name of the absolute energy source involved, along with clear results of that energy.

Pele does not envelop the entire world of volcanism. Pele only represents the initial energy, which is magma [or] lava. That thing oozing out of the ground, that's Pele. Volcanism includes a great number of elemental forces that come together to actually provide this whole scenery—of being a large volcano and eventually building a volcanic island. There are elementals that prepare for the initial movement of magma and the exit of it. Then there are other elementals whose function is to prepare the new earth for growth, regrowth and weather cycles.

I'm going to share with you some of the outlook of Pelehonuamea when we were growing up and also provide characteristics of Pelehonuamea from a native point of view and how they observed the goddess during migration and eruptions, Pele's existence as a family

member, and as a force of nature. I will be using lines from different chants to demonstrate the ideology.

I will translate a chant, then interpret the many levels of symbology and metaphor involved in one particular chant and show how the process was done and perhaps answer the "why" of some chants. I'm also pulling out specific descriptive phrases from different chants just to give you a definition of Pelehonuamea, specifically for you to conjure up your own picture of what Pelehonuamea is all about from a native viewpoint, also provide place of origin as verbalized in the chants and other observation for the sake of the idea of "kapu."

When we were growing up as children, Pelehonuamea and the stories of said deity were always about a very wild woman or a wild-looking woman who could also be very beautiful sometimes, or one who smoked a cigarette on the roadside hitching a ride. Not a very beautiful image but a slutty, mysterious, or pitiful image. When she was picked up she was always placed in the backseat and eventually disappears mysteriously. These were contemporary stories usually of Pele during or before an eruption. These kinds of stories perpetuated intrigue and the mystery of the "goddess Pele." These kinds of stories, for the sake of the locals, would herald the coming of an eruption.

There are also many serious traditional myths of a very human Pele who migrated on a canoe with her siblings. There are stories of the battles between Pele and her oldest sister, Namakaokahaʻi. There is the lengthy saga of Pele and Hiʻiaka and her lover, a young chief from Kauaʻi. The human Pele is endowed with passionate emotions of love, anger, and jealousy. With these tales she also has many siblings, worshippers, and enemies. The traditional stories provide a very human perspective of Pele. These accounts add to the intrigue of the "Deity of Fire."

Initially I'm introducing one of the genealogical chants of Pelehonuamea. This genealogy was very cleverly composed. There are layers upon layers of information to decipher. One may interpret through one or two layers and be satisfied with the evidence revealed. If this level of knowing satisfies the researcher, then that is where it sits. However, the excitement is to reveal more than three layers. Therefore, in order to analyze the myth further into something solid, that is, to discover the primary forms of these mythical gods and goddesses, the journey into the depth of the composer is necessary.

One hint of interpreting chants is to use the first two or three lines of the chant as a guide to maintain the focus of the chant. The uses of metaphors require that one stays on focus constantly by referring back to the first three lines.

1. Haumea lāua ʻo Moemoeaʻaliʻi	*Haumea and Moemoeaʻaliʻi*
2. Makuahine, Haumea	*Mother, Haumea*
3. Makuakāne, Moemoeaʻaliʻi	*Father, Moemoeaʻaliʻi*
4. Kamohoaliʻi (k), hānau ma ka manawa nui	*Kamohoaliʻi (m) born from the fontanel*
5. Kānehekili (k), hānau ma ka waha	*Kānehekili (m) born from the mouth*
6. Kauilanuimakehaikalani (k) hānau ma ka maka	*Kauilanuimakehaikalani (m) born from the eyes*
7. Kūhaʻimoana (k) hānau ma ka pepeiao	*Kūhaʻimoana (m) born from the ears*
8. Kānemilohaʻi (k) hānau ma ka lima ʻākau	*Kānemilohaʻi (m) born from the right hand*
9. Leho (k) hānau ma ka ʻōpuʻupuʻu lima	*Leho (m) born from the knuckles*
10. Kāneikōkala (k) hānau ma ka manamana lima	*Kāneikōkala (m) born from the fingers*
11. Nāmakaokahaʻi (w) hānau ma ka umauma	*Nāmakaokahaʻi (f) born from the chest*

12. Pelehonuamea (w) hānau ma kahi mau e hānau ʻia ai ke kanaka	*Pelehonuamea (f) born from usual place where people are born*
13. Kapōʻulakīnaʻu (w) hānau ma nā kuli	*Kapōʻulakīnaʻu (f) born from the knees*
14. Kapōkohelele (w) hānau ma nā ʻōpuʻupuʻu wāwae	*Kapōkohelele (f) born from the ankles*
15. Hiʻiakakalukalu (w) hānau ma nā manamana wāwae	*Hiʻiakakalukalu (f) born from the toes*
16. Hiʻiakakuilei (w) hānau ma nā kapuaʻi wāwae	*Hiʻiakakuilei (f) born from the feet*
17. Hiʻiakaikapoliopele (w) hānau ma nā poho lima ma ke ʻano me he hua moa ala	*Hiʻiakaikapoliopele (f) born in the palm of the hand in the shape of a chicken egg*

Line one begins with, "Haumea lāua o Moemoeaʻaliʻi." Lines two and three establish the function of Haumea and Moemoeaʻaliʻi as parents with offspring. These three lines set the focus of the chant as a family genealogy by listing initially, progenitors. The remaining fourteen lines list the progeny from this union. There are seven male and seven female entities.

One quick look at the chant literally reveals a mother, father, and birth of children from oldest to youngest, with the first half of the children being male children and followed by the second half as female births. A second reflection reveals the fact that each of the offspring is

born from various parts of Haumea. The third observation may consider the identity of the mother in Hawaiian mythology and antiquity. Compared to other native mythology, Haumea is mother earth. Her mother earth status assigns her the role of regenerative power for all living things, including that which lives in the ocean, the forest, the insect, germs, birds, man, et cetera.

The fourth surveillance realizes that these are symbolic births and there is a definite relationship to the entity born and the part of the body the birth exits. The fifth examination, we must remember, is to return to the first three lines and recognize Haumea as earthbound and, therefore, these elemental entities are productions of the earth, including the lightning and thunder. The sixth layer of interpretation is to deconstruct the nomenclatures. This will provide some clarity of the nomenclature to the part of the body assigned for exit. Therefore, and for the sake of time, brevity, and focus, we will analyze the topic of the day, that is, the nomenclature "Pelehonuamea," keeping in mind that all the progeny mentioned in this chant will engage in the same process of decoding in order to fully uncover the sixth layer.

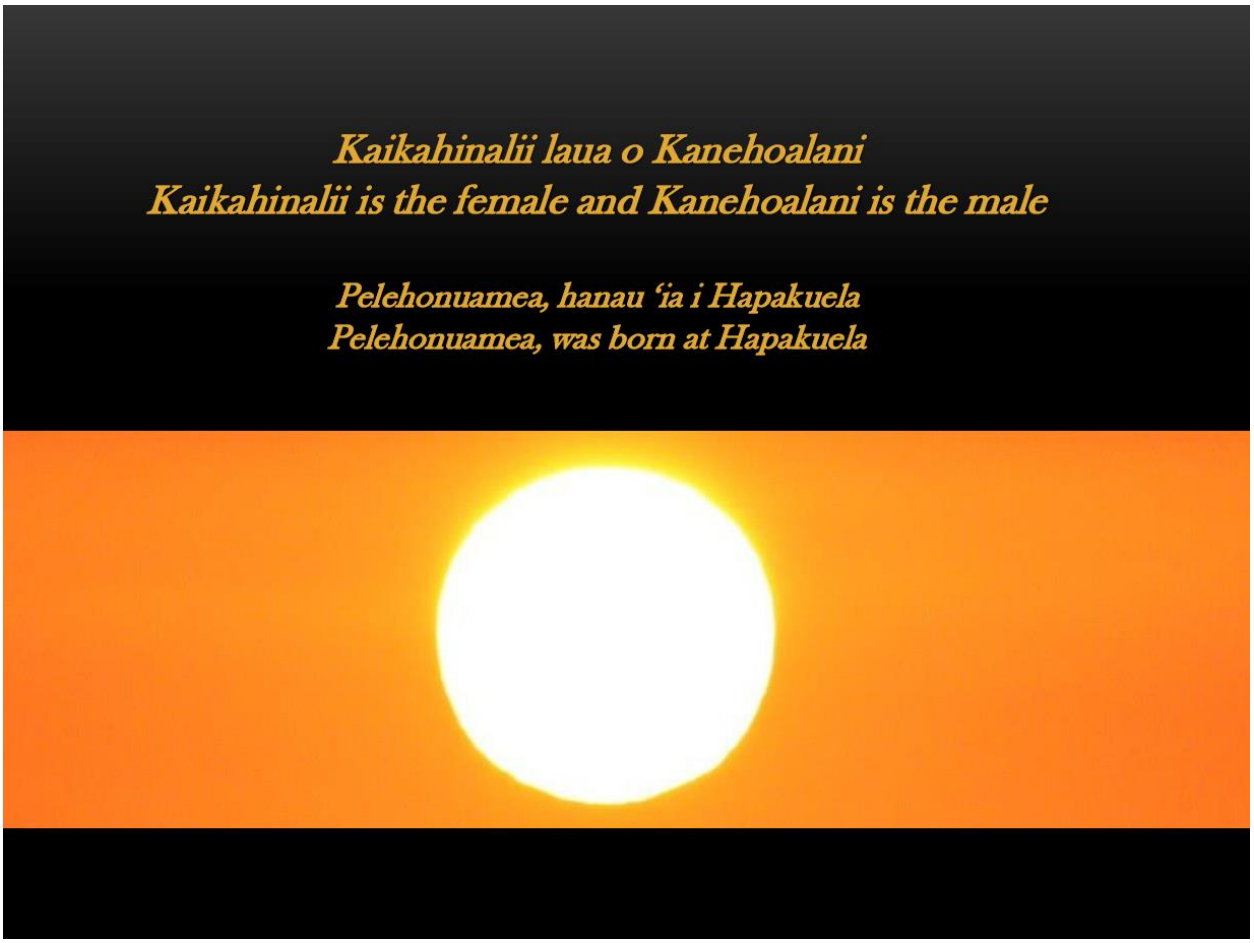
Focusing on Pelehonuamea, we initially uncover her birth: "Pelehonuamea, hānau ma kahi mau e hānau ʻia ai ke kanaka." This quoted phrase is taken from the chant above, line 12, with both the name and place of birth. This is the literal English translation from Hawaiian: "Pelehonuamea, born from the usual place where people are born." This usual place of birth would indicate the vagina, of course, but more than that, it is coming from the inside out. The significance of the birth hints that it is the elemental magma/lava that comes out from inside the earth with consideration of Haumea as mother earth. This knowledge of Pelehonuamea provides the clue for the other thirteen offspring.

Each birth place is significant to that elemental form it was born from, whether from the fontanel, the ears, the eyes, the mouth, the chest, fingers, palms of the hand, the knee, et cetera. The composer took advantage of his knowledge of Haumea as earth mother, kept the chant simple, yet was able to substantiate the basic knowledge of the creation of volcanic islands.

There are other genealogy chants of Pelehonuamea, and I am going to quickly talk through another chant. This is a shorter chant but just as effective as the first.

1. Kaikahinaliʻi lāua ʻo Kānehoʻālani	*Kaikahinaliʻi and Kānehoʻālani*
2. Makuahine Kaikahinaliʻi	*Mother Kaikahinaliʻi*
3. Makuakāne Kānehoʻālani	*Father Kānehoʻālani*
4. Kamohoaliʻi (k) hānauʻia i Hapakuela	*Kamohoaliʻi (m) born at Hapakuela*
5. Kahuilaokalani (k) hānaʻia i Hapakuela	*Kahuilaokalani (m) born at Hapakuela*
6. Pelehonuamea (w) hānauʻia i Hapakuela	*Pelehonuamea (f) born at Hapakuela*

In this particular genealogy there are only three siblings. This genealogy is attached to the story of the migration of the Pele clan to the Island of Kahoʻolawe and the eruption that happens between Maui and Kahoʻolawe. The story begins with this genealogy.



The mother is Kaikahinaliʻi. The "kai," of course, is ocean. "Hinaliʻi" is very swift horizontal movement; it is a reference to either ocean or air currents. Kaikahinaliʻi tells you that the ocean is moving horizontally and very fast. The purpose of this relation to Pelehonuamea exposes that this kind of wave action is induced by a volcanic underwater activity. Kaikahinaliʻi is tsunami.

"Kāneho'ālani" is the name for the sun. Kāneho'ālani nomenclature is used in other chants. There are three words here, one word is "Kāne," the other is "ho'ā" and the other is "lani." Lani is where this particular entity is found, that is, in the space above us in the atmosphere. Kāne's energy is heat. Ho'ā is to ignite, to light, to flare up as in fire or heat or light. With this genealogy, Pelehonuamea is directly related to the sun.

According to this chant, Pelehonuamea was born at Hapakeula. Hapakeula is a place name. It is yet to be discovered. The fact that Pelehonuamea, with her two siblings, are related to Kaikahinaliʻi and Kāneho'ālani divulges Pele's and her siblings' direct function with the ocean and the sun.

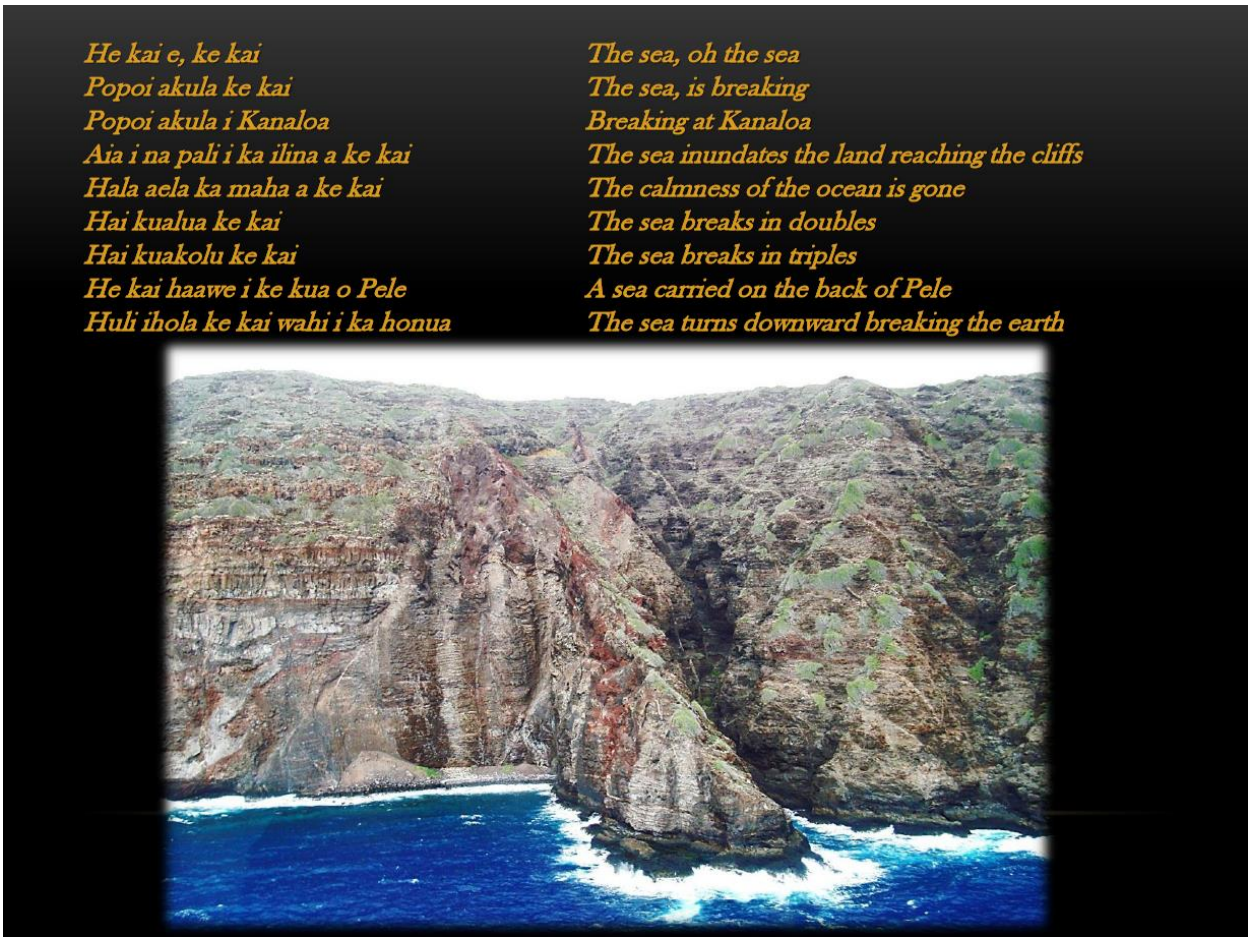
Kāneho'ālani is sometimes listed as Kānehoalani. The "hoa" without diacritical marks is defined as "companion" or "friend." The translation of Kānehoalani would be "heated companion of the atmosphere" which hints to the relationship of Pele to the sun. Both definitions are accepted.

This next chant is also from the story of the Pele's journey to Kaho'olawe. I will divide this short chant up in two parts, the first part of the chant, from lines 1–9, is noted at Kanaloa or

Kahoʻolawe. The second half of the chant, from lines 10–18, continues with the same theme of tsunami; this time it is on the island of Hawaiʻi, as youʻll be able to recognize the place names in the chant around Kīlauea and Puna:

1. He kai ē, he kai	*The sea, oh the sea*
2. Popoʻi akula ke kai	*The sea is breaking*
3. Popoʻi akula i Kanaloa	*Breaking at Kanaloa*
4. Aia i nā pali ka ilina a ke kai	*The sea inundates the land, reaching the cliffs*
5. Hala aʻela ka maha a ke kai	*The calmness of the ocean is gone*
6. Haʻi kualua ke kai	*The sea breaks in doubles*
7. Haʻi kuakolu ke kai	*The sea breaks in triples*
8. He kai hāʻawe i ke kua o Pele	*A sea carried on the back of Pele*
9. Huli ihola ke kai, wāhi i ka honua	*The sea turns downward, breaking the earth*
10. Ke amo lā ke kai, amo i Kīlauea	*The sea is rising, rising to Kīlauea*
11. He kai kālele i ka lima o Pele	*A sea supporting the five layers of Pele*
12. Hoʻomakua maila i ke kai a Pele	*The sea of Pele is overwhelming*
13. Kai hiʻi i ke alo o Pele	*Consumed in the breast of Pele*
14. Wawā ka leo o ke kai i o Papalauahi	*The roar is tumultuous at the sea of Papalauahi*
15. Piʻi aʻela ke kai i luna ʻĀkanikōlea	*The sea rises up to ʻĀkanikolea*
16. Holo ke kai i nā kī o Wahinekapu	*The sea reaches the edge of Wahinekapu*
17. Kai a Pele, a ke akua	*The sea of Pele, of the goddess*
18. ʻEliʻeli e kau mai!	*Descend, deepen the revelation!*

The chant speaks for itself; it is a large tsunami with descriptive movement of the ocean. Line 9 indicates that a large fissure opened, causing the ocean to react as such. [Or perhaps] the scientists have another theory, which would be great. This eruptive phase emphasizes Pele's relationship to Kaikahinaliʻi. It's unclear whether this is one and the same ocean disturbance of Kanaloa, Kahoʻolawe with Kīlauea, or it may be a part of a collection of tsunami incidents caused by Pele's influence.

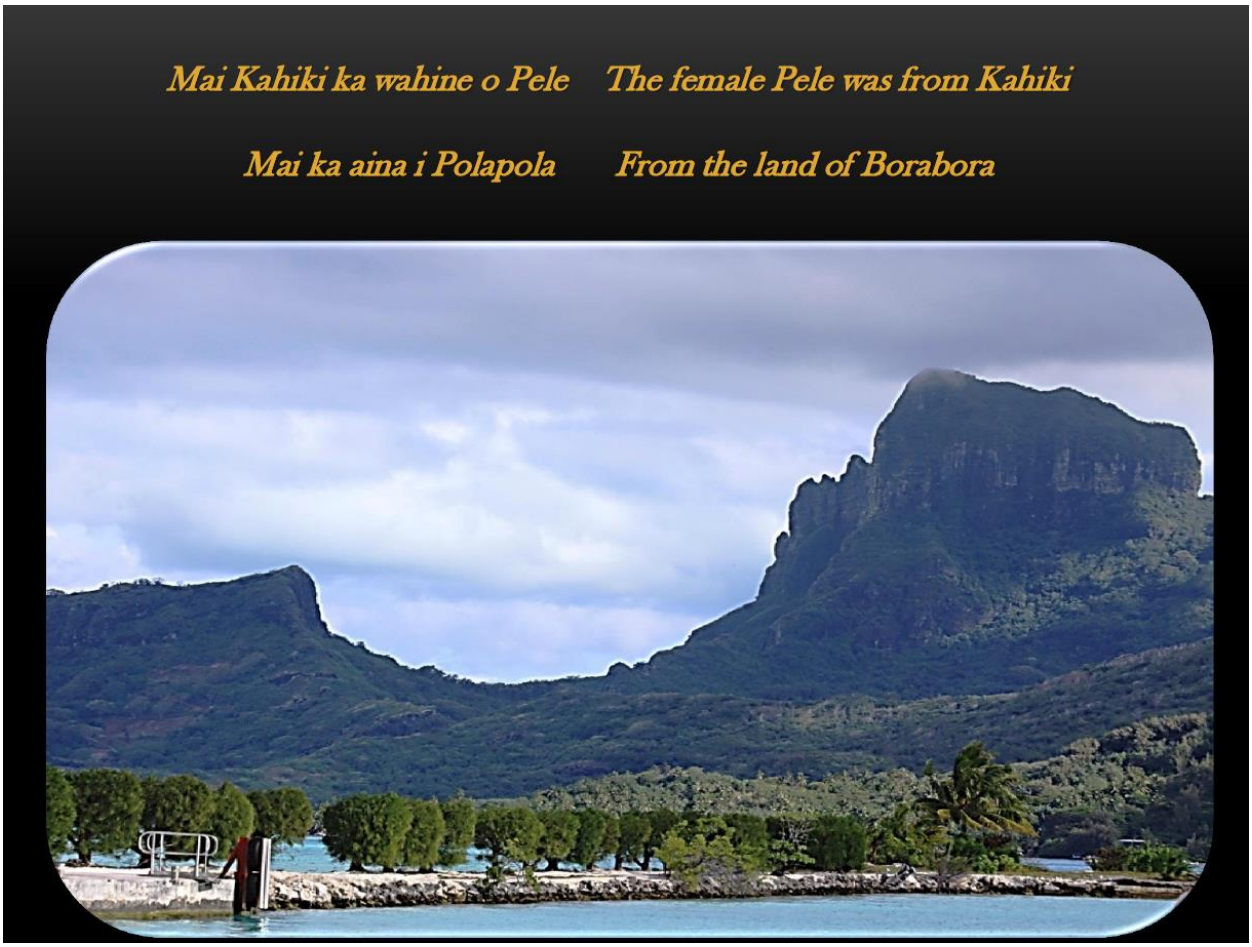


Earlier in this presentation I talked about the fact that some of this information migrated to Hawai‘i with those out-migrating from the south islands, and these chants inform us of the homeland left behind. We must also take into consideration they may only be passing through some of the islands mentioned. Nevertheless, the place names hint at lands the author listed with the urgency to record events. Luckily for us, today, this kind of evidence endures [with] longevity in the form of chants.

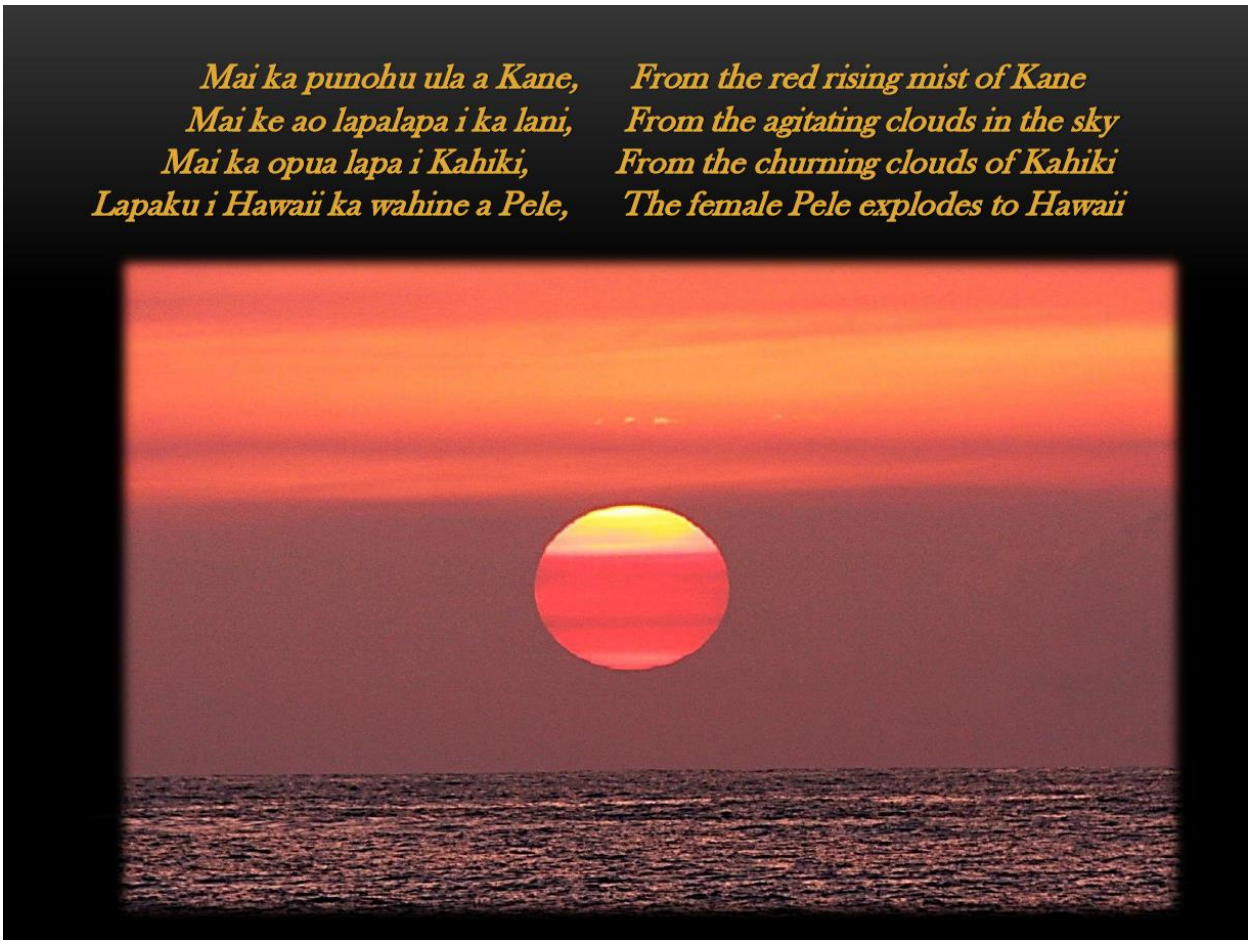
One of these migratory chants of Pele is as follows:

1. Mai Kahiki ka wahine ʻo Pele	*From Kahiki is the female, Pele*
2. Mai ka ʻāina i Polapola	*From the land of Bora-Bora*
3. Mai ka pūnohuʻula a Kāne	*From the red rising mist of Kāne*
4. Mai ke ao lapalapa i ka lani	*From the agitating clouds in the sky*
5. Mai ka ʻōpua lapa i Kahiki	*From the churning clouds of Kahiki*
6. Lapakū i Hawaiʻi ka wahine ʻo Pele	*The woman Pele explodes to Hawaiʻi*

There is no mistake of who is migrating and where she migrates from. It is the female, Pele, from Kahiki. There are times when Kahiki is just beyond the horizon, or [times when] it is the land we know as Tahiti. And because Bora-Bora is another place name given, then the chant’s reference is Tahiti.



The following three lines look at atmospheric disturbance as a way to trace migration pattern. The business of land-making does leave a lot of disturbance in the atmosphere with disturbing weather and cloud forms. On this island, Hawai‘i, these cloudforms are [part of] our experience—it is a familiar sight.



The part of the chant not included continues to mention the canoes that migrated and the navigators the canoes were designated for, as well as the steersman and which gods migrated with them, and the fact that this migration ends in the house of Pele; it doesn't mention specifically which volcano receives this eruption.

A portion of another chant reiterates the Pele's eruptive movement from Kahiki:

1. Hulihia, kulia mai ka moku o Kahiki	*Total upheaval from the island of Tahiti*
2. ʻĀina nō Kahiki i ka lā kahi	*Tahiti, land from the beginning of time*
3. ʻĀina hoʻowaliʻia e Haumea	*Land made fertile by Haumea*
4. Hoʻomoe akula Kahikikū	*Extending beyond Kahikikū, the horizon*
5. Kūlapa mai ka ulu wela, ʻō mai ke ahi	*The growing heat furrows, the fire pierces*
6. Keʻehi akula nō e nalo kapuaʻi ē	*Treading deeply, the footprints are concealed*
7. Kapuaʻi akua no Pele	*Godly footprints of Pele*
8. Ke keʻekeʻehi wale lā nō i ka lani	*Reaching effortless into the sky*
9. Hāʻule ʻuʻina i Polapola	*Falling, crackling at Bora-Bora*
10. Noho i ka lau haʻa i ka moku	*Establishing many low islands*
11. Hina kūkulu o Kahiki	*The border of Tahiti falls*

Here again are a few lines that reveal the migration from Bora-Bora and Tahiti. The chant continues with [descriptions of] weather phenomenon—of the winds and clouds and eventually the islands of Nihoa, Lehua, until the Island of Hawai‘i. It is at the Island of Hawai‘i that eruptive phases are more descriptive.

The above chant ends with the “kanawai” of Pele, or the natural laws of Pele, understood by those who tracked the eruptions and recorded them. Their observations of eruptions awakened a realization that elemental forces—gods, goddesses—had boundaries for the creational chaos that are the gods. From scores of observation, these laws of nature, “kanawai,” were recognized and articulated:

1. He hoʻokikī kanawai	*A law to cause lava to flow*
2. He kua ʻā kanawai	*A decree of the burning back*
3. He kai ʻokia kanawai	*A sea-separating edict*
4. He ala hele he ala muku	*A pathway, shortened pathway*
5. No Kāne me Kanaloa	*For Kāne and Kanaloa*
6. Ke kīhoʻihoʻi kanawai.	*A law of quick restoration.*

The first kanawai is a law of continuous flow. The knowledge of volcanism is primary for the simple fact that we live on volcanic islands and most, if not all, organisms [here] need land

space to exist. Therefore the continuous flow is a necessity. The simple fact is, there always must be volcanoes, because volcanoes build islands and we are island people.

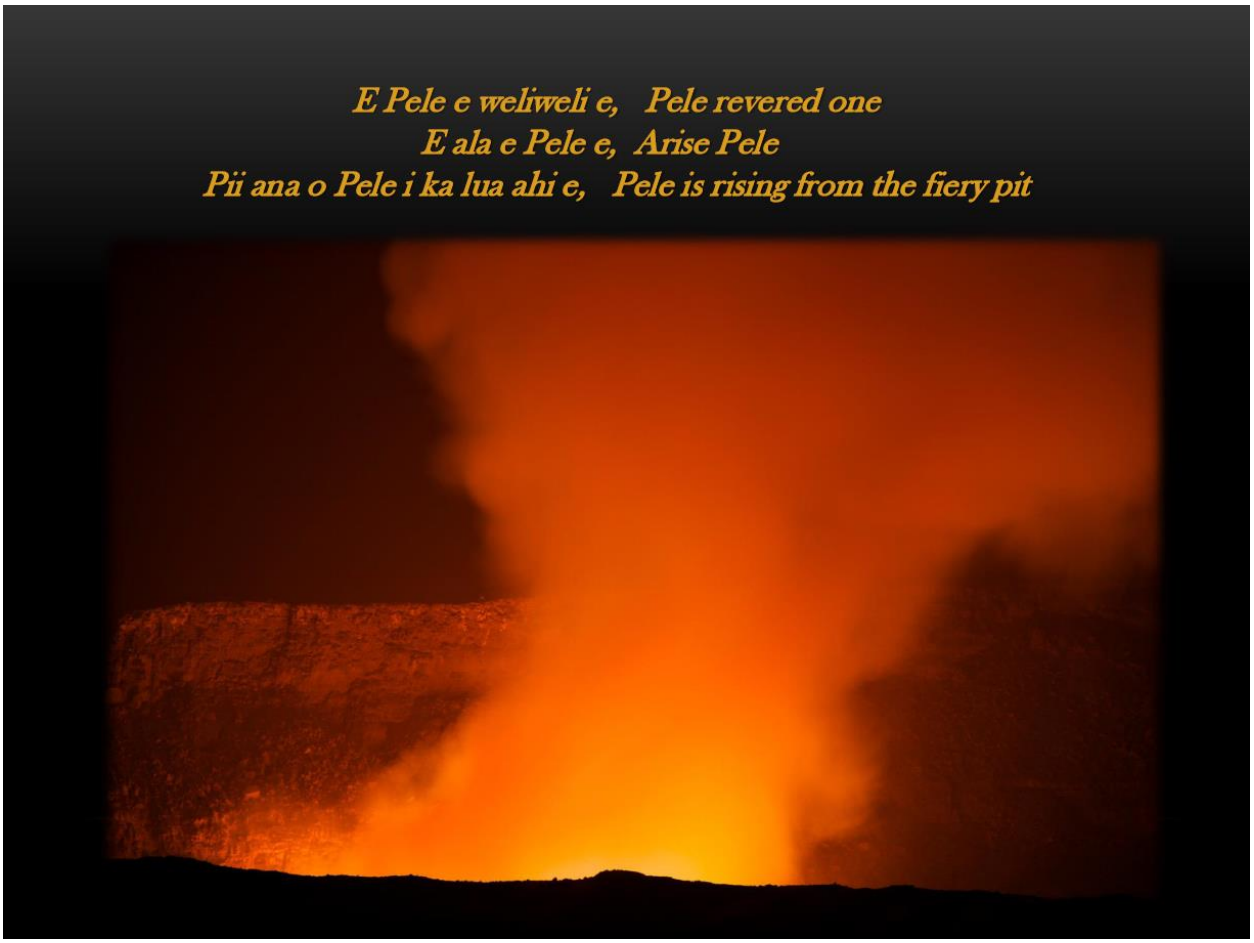
"Ke kua ʻā kanawai" communicates that if there is even a hint of sulfur in the air or the presence of steam coming out of the ground, the land is hot. There is a 100-percent chance this land will erupt. Don't build a subdivision on the slope to the ocean, because the subdivision will be very temporary. So the "kua ʻā kanawai" warns that the ground is still volcanically active. It is not just a warning; it is a law of nature.

"He kaiʻokia kanawai" is an interesting kanawai, because you can use that particular kanawai anywhere. It is the sea-separating edict, but it really has to do with boundaries. You can use it for something as mundane as your wife or your husband. If I were to use it, I would place a kaiʻokia on someone I loved. This means that this is my property, [and] no one will touch [it] without notification. Kaiʻokia in a relationship, for Pele, cuts a path in the ocean in which direction her foot prints travel.

"E ala hele he ala muku, no Kāne me Kanaloa"—this is not a kanawai, but the direction in which Pele is flowing. It is moving towards the east, [and] there is a rising of Kāne Kanaloa, which is a reference to the sun. The east promises newness, new births, new islands, and the west symbolizes the waning cycle of islands, life, et cetera.

The last kanawai listed is "kīhoʻihoʻi kanawai," which is quick restoration. After inundation by an eruption, quick restoration is immediate, that is, as soon as the heat of the land begins to fade, things will begin to grow again, beginning with lichen, ferns [and] ʻōhiʻa trees. Then a forest takes life on the new land, and a green mantle will cover the land to begin the cycles of life again.

The kanawai sets the foundation for the idea of "kapu," or sacred. Sacred or kapu is sometimes benevolent, beautiful, beneficial and touchable. Sacred or kapu sometimes exists outside of the realm of living organisms, [and] it [can be] dangerous, untouchable, chaotic, and uncontrollable.



This is an abbreviated view into who and what Pele is to the Hawaiians who honor the land they live on and value the myth as a hint of their own path of life and cycles.

Questions:

Q. Are there chants that describe the movement of Pele from the western part of the Hawaiian Islands, from Kauaʻi to Oʻahu, to Maui, [and the] Big Island?
PUA. There are chants that don't really describe an eruptive phase. We have chants; not one, but a few that hints at Mokumanamana, but definitely Nihoa, Kaula, Lehua, Niʻihau, Kauaʻi, Oʻahu, Molokaʻi, Lānaʻi, Maui, Kanaloa, then finally settling here on Hawaiʻi. So yes we do!
Q. It seems that most of the Pele chants focus on Kīlauea, are there any ones that talk about Mauna Loa?
PUA. Yes. We do have chants that talk about Mauna Loa and its relationship to Kīlauea. Then it talks about eruptions from Mauna Loa to lower Puna and it's still the same chant.
Q. Pua, when you were talking about the relationship of Pele to Maui and Kahoʻolawe, and we have the Hawaiian family kind of associating with Pele on this island, do we have families that make those same associations with Pele that live on Maui and Kahoʻolawe?
Pua. Not that I know of, not today. Most of the Maui families associate themselves with moʻo—water, waterfalls. They are all kind of skeptical of their relationship to the fire.

Okay. Thank you.

(End of presentation)

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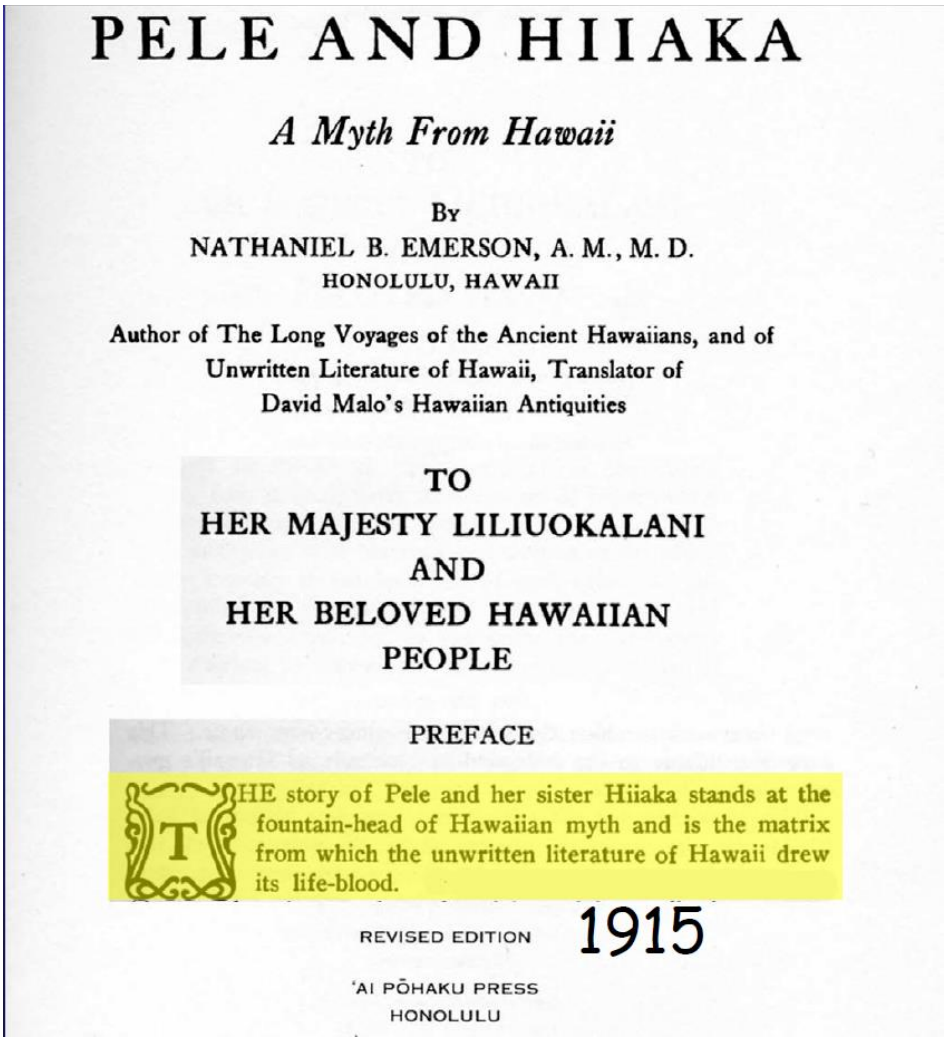
Speculative Correlation Between Oral Traditions and Volcanic History of Kīlauea Between ~1200 and 1800 C.E.

Speaker: Don Swanson, U.S. Geological Survey Hawaiian Volcano Observatory
Monday, January 28, 2013

When I returned to Hawai‘i in late 1996 and started some research or continued some research that I had started several years before, I soon met Bobby Camara, [who was] working for the park. I told Bobby what I was doing and he suggested, in fact, told me, that I had to read the translations of Pele chants by Emerson [Emerson, 1915]



PELE AND HIIAKA

A Myth From Hawaii

By
NATHANIEL B. EMERSON, A. M., M. D.
HONOLULU, HAWAII

Author of The Long Voyages of the Ancient Hawaiians, and of
Unwritten Literature of Hawaii, Translator of
David Malo's Hawaiian Antiquities

TO
HER MAJESTY LILIUOKALANI
AND
HER BELOVED HAWAIIAN
PEOPLE

PREFACE

THE story of Pele and her sister Hiiaka stands at the fountain-head of Hawaiian myth and is the matrix from which the unwritten literature of Hawaii drew its life-blood.

REVISED EDITION 1915

'AI PŌHAKU PRESS
HONOLULU

So I bought the book and, unknown to Bobby, I had an interest in poetry going way back. I almost majored in literature [in college] and have read a lot of poetry over the years. So this book fell right into my lap, really, because it is marvelous Victorian poetry as Pua was describing and it's really entrancing.

I would sit home and read a bit from this book. Then suddenly I started realizing that I'm reading what I think I'm studying. This may or may not be true, but what I'm going to describe today is what I think are correlations—tenable correlations that can be made between the chants and some of the important, in fact, the two largest eruptions that have occurred at Kīlauea since people have been here.

Note that this book was published in 1915, but the translations were made in the late 19th century. I think it's really important for studies like this to go as far back as you can, because, just as if you play a game of telephone, by the time you're back to where you started, the message has changed a lot.

So it's wise to start with the earliest possible chants, [the earliest] versions of the chants and translations. I should add right here that I know no Hawaiian. I've come at this completely cold, so I'm completely dependent upon Emerson's translations.

Now, to go over the story would take me too long so you can read that in [the table below], which shows the correlations that I think can be made between important events that are described in the chants, that is, the burning of the Puna forest that Pele caused when she was angry at Hiʻiaka for not returning from Lohiʻau soon enough.

Correlations of 2013 science with oral tradition

Geology	^{14}C ages	Oral tradition
Large lava flow covers much of Puna north of of east rift zone	~1410-1470 C.E.	Burning of Puna that angered Hi'iaka and estranged her from Pele
Collapse of caldera	~1470-1510 C.E. ("1500")	Hi'iaka digging for body of Lohi'au and warned of water
Explosive eruptions (when lakes were in caldera?)	~1500-1790 C.E.	Pele's quarrels with Kamapua'a Deaths of 100s in Keōua's group

I think that describes this huge lava flow that covers most of Puna. Some of it even goes down to the South Coast, and that happened between about 1410 and about 1470 C.E. or A.D.

As you recall, because of the burning of the forest, Hiʻiaka was very angry with Pele and upon returning to the summit of Kīlauea, Hiʻiaka made love with Lohiʻau right here on the lip of Ka Lua o Pele. So Pele killed Lohiʻau and threw Lohiʻau's body into the pit, and while Hiʻiaka was digging, she was warned to stop digging because [she was] getting too deep and water [would] come in and put out the fire of Pele.

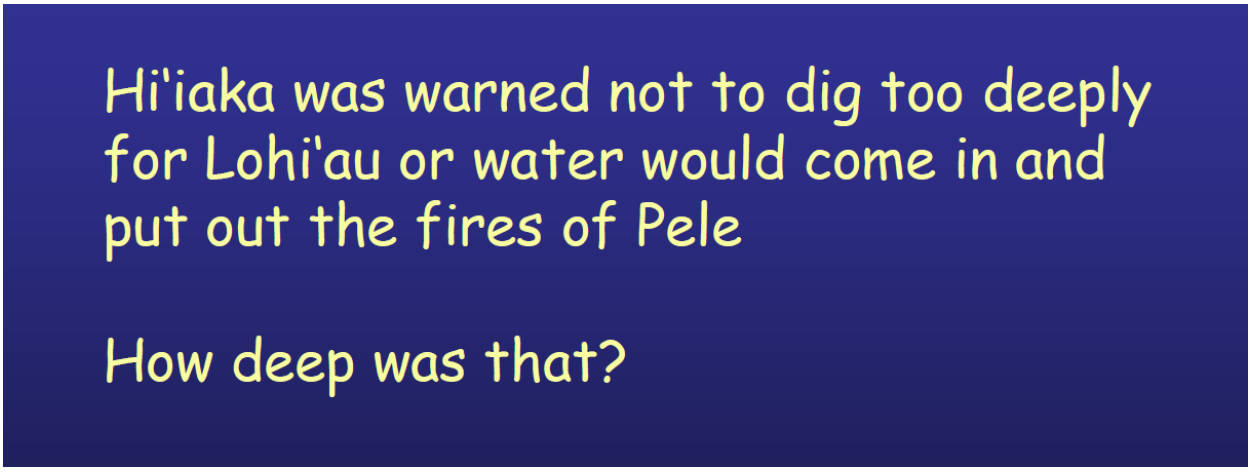
I think what this is telling us is about the timing of the caldera collapse that we'll be viewing at our first stop this afternoon. This [caldera collapse] took place, we now know, between about 1470 and 1510, roughly speaking, so we just use the round number of about 1500 for that, or so.

Then, [it is] not described in the chants, but [we know] the famous story of Pele throwing rocks at Kamapuaʻa and chasing him into the ocean. I think it records one of the explosions that took place during a 300-year period following the formation of the caldera, perhaps when there

were lakes in the caldera, and [these explosions] culminated in the deaths of several hundred people out here, within a kilometer of where we are now, in the 1790s.

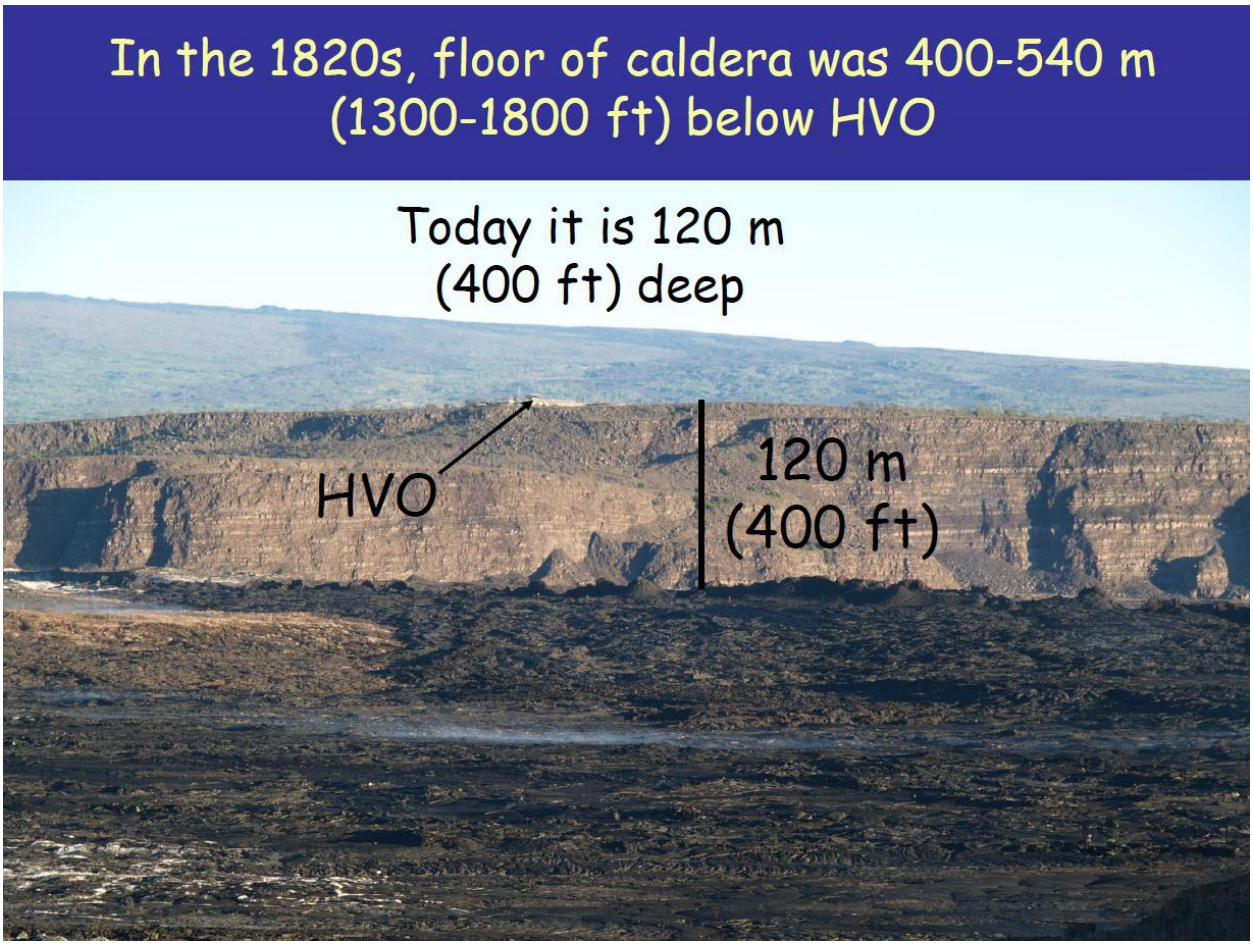
So I think the sequence of events that are described by the chants—the burning of the forest and the digging after the body of Lohi‘au—really make very nice fits to the known geology, which we didn’t know, incidentally, until about 15 years ago, 10 to 15 years ago.

What I want to do now is to just focus in on one small element to show how you can kind of, under favorable circumstances, tease out a very important element of the geology from the chants.



As I mentioned, Hi‘iaka was warned that if she continued to dig too deeply to recover Lohi‘au’s body that water would come in and snuff out the fires of Pele. Well, how deep might that have been for water to come in and put out the fire of Pele?

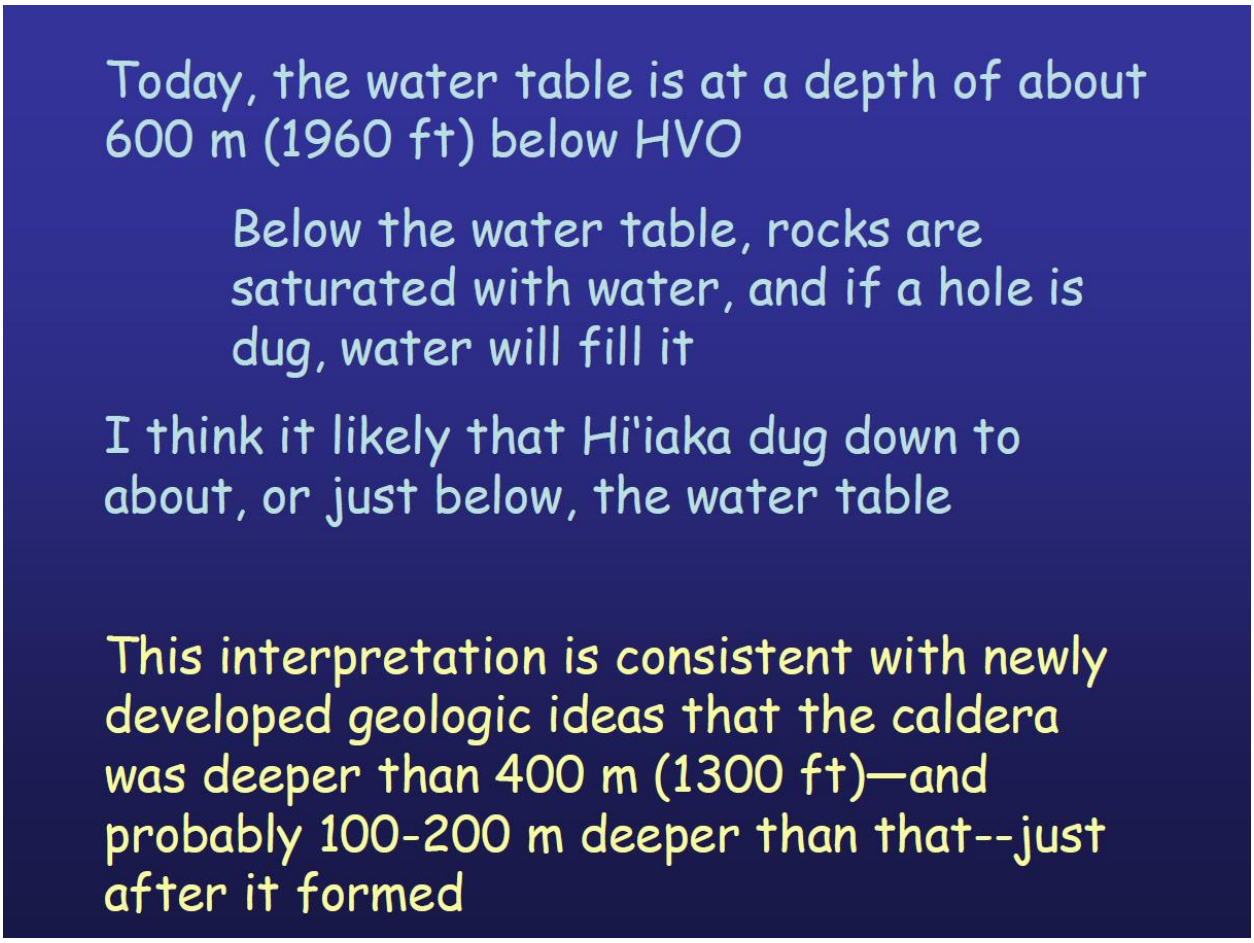
Today, as we look at the caldera, you get a very biased viewpoint of what the caldera [may have] looked like 300 years ago—200 years ago. Now the caldera rim—HVO is only about 400 feet above the caldera floor—whereas when it [the caldera floor] was first measured in the late 1820s, it was much deeper then, down to 1,800 feet or so [below the rim].



So you kind of have to erase from your mind's view this view of the caldera, and think that the caldera was very much deeper then than it is today.

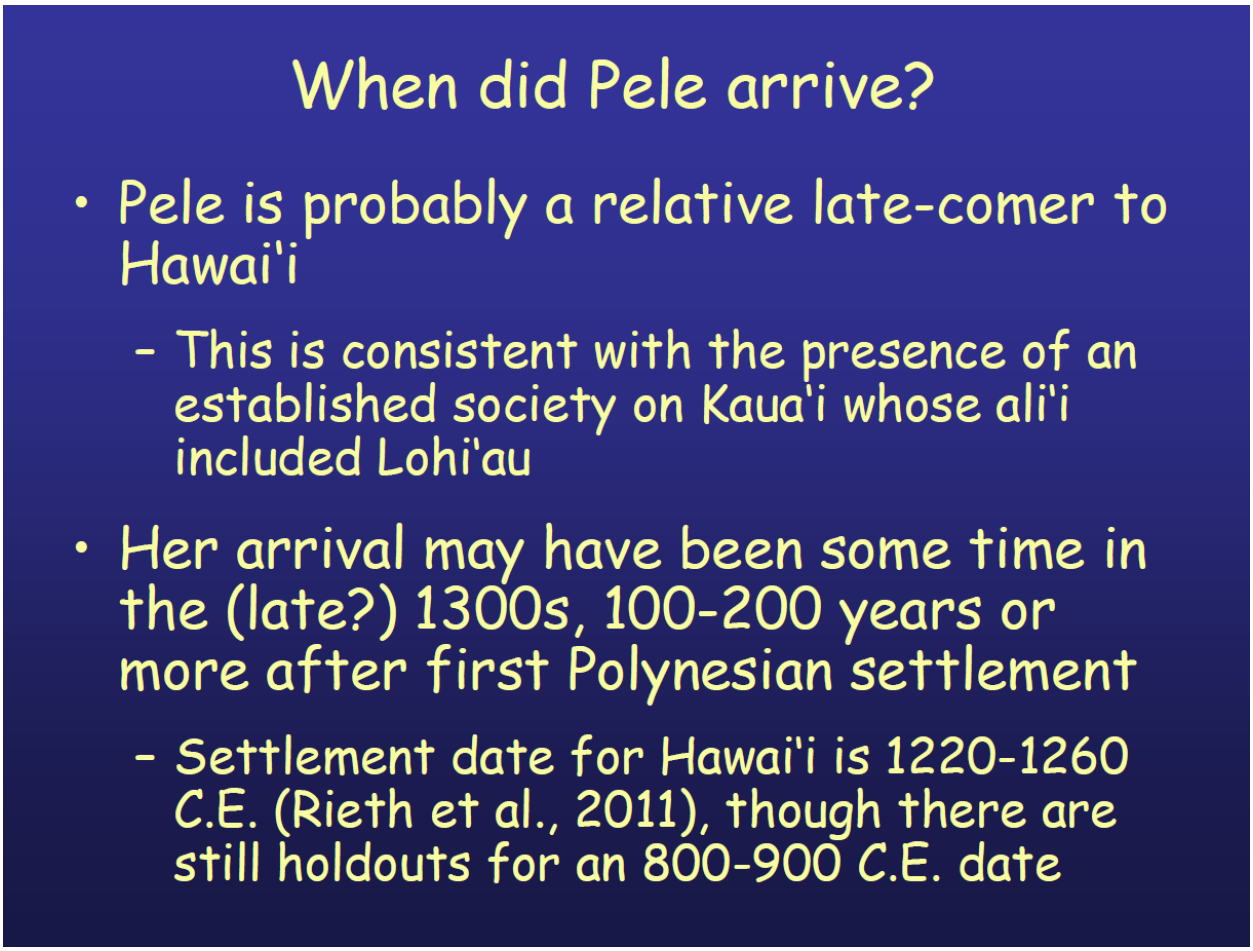
Today the water table, which is the depth below which the rocks are saturated with water, is about almost 2,000 feet below the caldera rim here. I think that is probably the depth to which Hi'iaka dug, [when] she started to see water coming in, and that is when she was warned not to go any deeper. So she dug down, that is, the caldera or part of the caldera collapsed down to a depth of 2,000 feet, [and] that has since been filled in to about 400 feet.

This interpretation is entirely consistent with what we know about the nature of the explosive activity that followed the formation of the caldera. It was a kind of explosive activity that is driven by expanding steam from groundwater driving the explosions. These explosions began just after the caldera formed.



So from the geologic perspective, we would say that it is likely that the caldera was very deep down—to the water table—and from the perspective of the chants, I think you could say the same thing.

We can say some words about when Pele arrived in Hawai‘i. It has been known for some time that she came after people were already here. Fornander (1996) described that—Lohi‘au was on Kaua‘i and so forth. Because the chants, at least [those] that Emerson translated, pick up just before the time of this huge eruption in the 15th century, that leads me to think that Pele arrived sometime in the 1300s, perhaps the late 1300s or so; a couple hundred years, maybe, after Polynesians first arrived on the island.



I might say some words about that. The most recent publication (Rieth and others, 2011) interprets that the first settlement date of Hawai‘i would be between 1220 and 1260, [based] on the very rigorous interpretation of very high quality carbon-14 data.

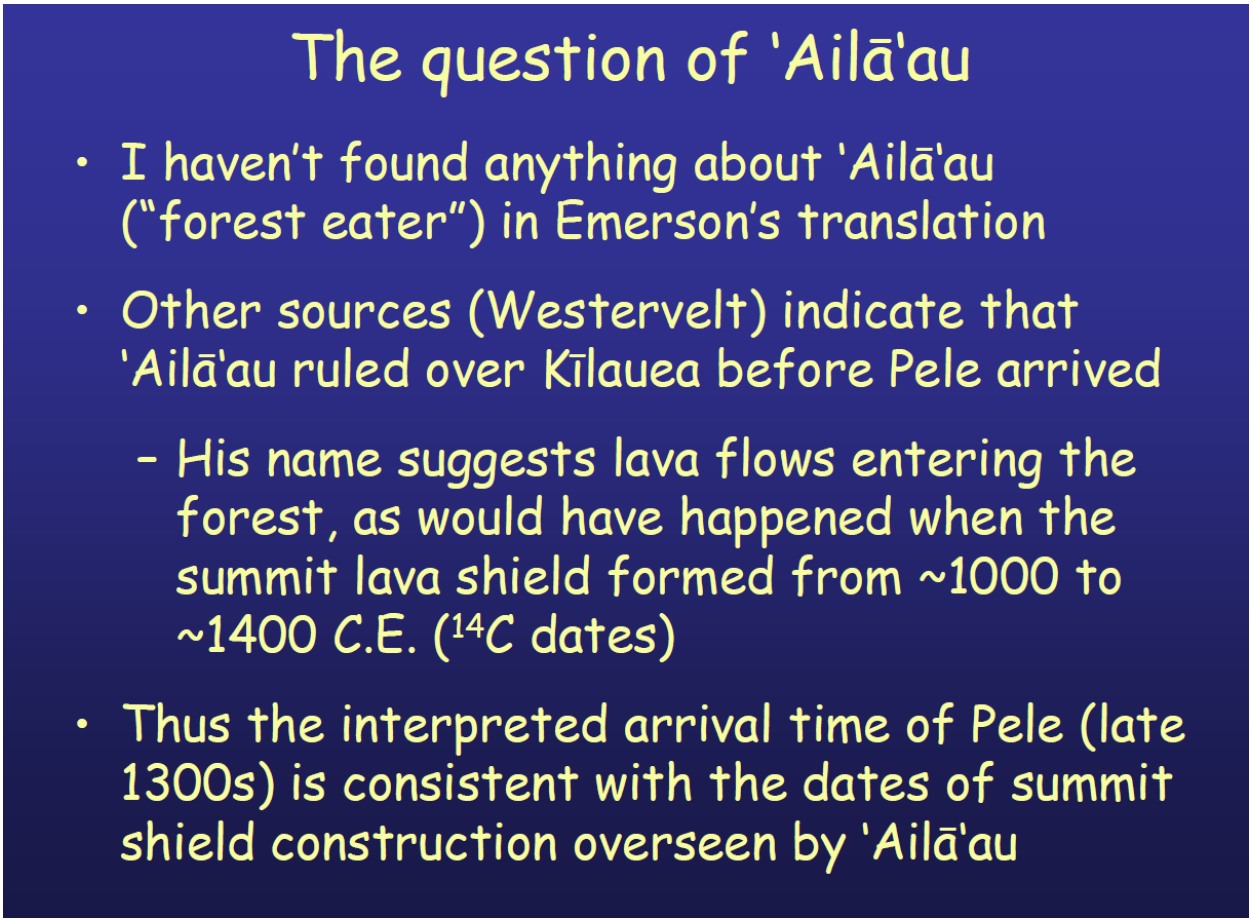
This is younger—by several hundred years—than what we have been considering for a long period of time. There are a lot of people who are questioning this interpretation, but this interpretation, to my view, is by far the most rigorous and careful that has yet been done and it is consistent with what has been found out for all of eastern Polynesia.

Eastern Polynesia apparently was settled in an exploratory blossoming period in the 12th and 13th centuries. That is just kind of a sideline here, but certainly even if the arrival of people had been as early as 800 to 900, this would even emphasize the fact that Pele was probably a late-comer to Hawai‘i.

Then there is a question of ‘Ailā‘au: I can’t find any mention of ‘Ailā‘au in Emerson’s translations and I’d certainly like to hear any information that any of you have about ‘Ailā‘au. You have to go to Westervelt (1916) and I don’t like his stories. It seems to me they’re kind of “kitschy,” simplified fairy-tale versions of serious matters. Westervelt mentions that ‘Ailā‘au was the deity at Kīlauea before Pele arrived.

That would make some sense, because, of course, his name is consistent with lava flow going into the forest and destroying the forest, and we know that there were countless eruptions at the summit of Kīlauea between about 1000 and 1400 C.E. That is the period of time of which the shield, the summit of Kīlauea that we are now resting on, was constructed. During that time,

there would have been many lava flows going into the surrounding forest and eating the forest—ʻAilāʻau. So, for Pele to come right after that and to take over from ʻAilāʻau is entirely reasonable and consistent.



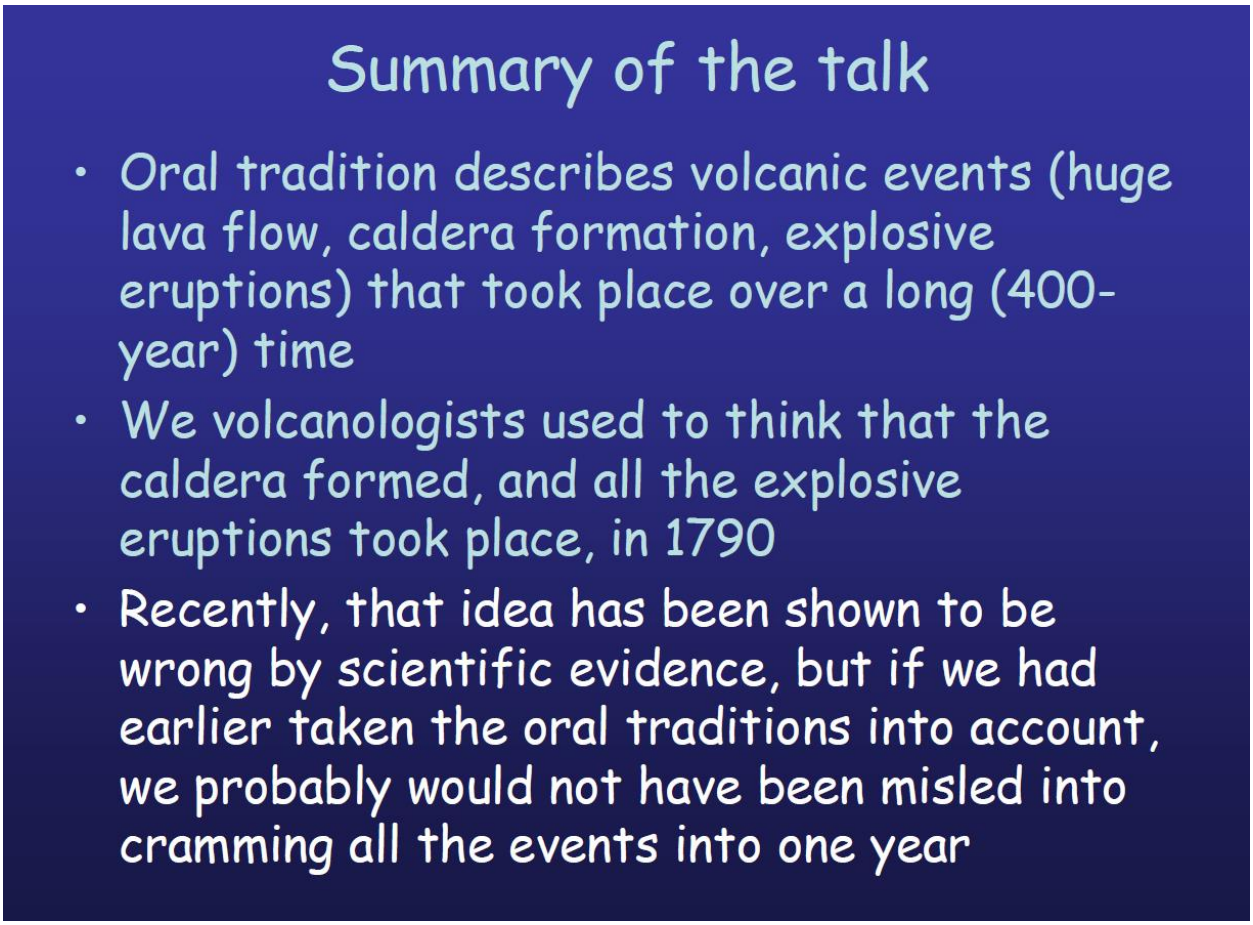
So then we can add to the table that I showed earlier the period of, perhaps, of ʻAilāʻau's control here, from let's say the middle 1200s or even later to maybe about 1400 or so. That would be the growth of the summit shield.

Geology	^{14}C ages	Oral tradition
Summit shield	~1000-1400 C.E.	'Ailā'au (1250-1400?)
Waning of shield	~(late?) 1300s	Arrival of Pele
Large lava flow covers much of Puna north of of east rift zone	~1410-1470 C.E.	Burning of Puna that angered Hi'iaka and estranged her from Pele
Collapse of caldera	~1470-1500 C.E.	Hi'iaka digging for body of Lohi'au
Explosive eruptions (when lakes were in caldera?)	~1500-1790 C.E.	Pele's quarrels with Kamapua'a Deaths of 100s in Keōua's group

The waning of the shield just before this huge eruption that covered Puna was taking place in the late 1300s and that would be the arrival time of Pele. Then, soon after she arrived, is when she sent Hiʻiaka to Kauaʻi and all the troubles began that led to the burning of the forest [and] the large lava flow.

So here we have, I think, almost 1400 to 1800, a good 400 years of geologic history of the summit region that is recorded either in the chants, mostly in the chants, or by what would be considered the presence of ʻAilāʻau.

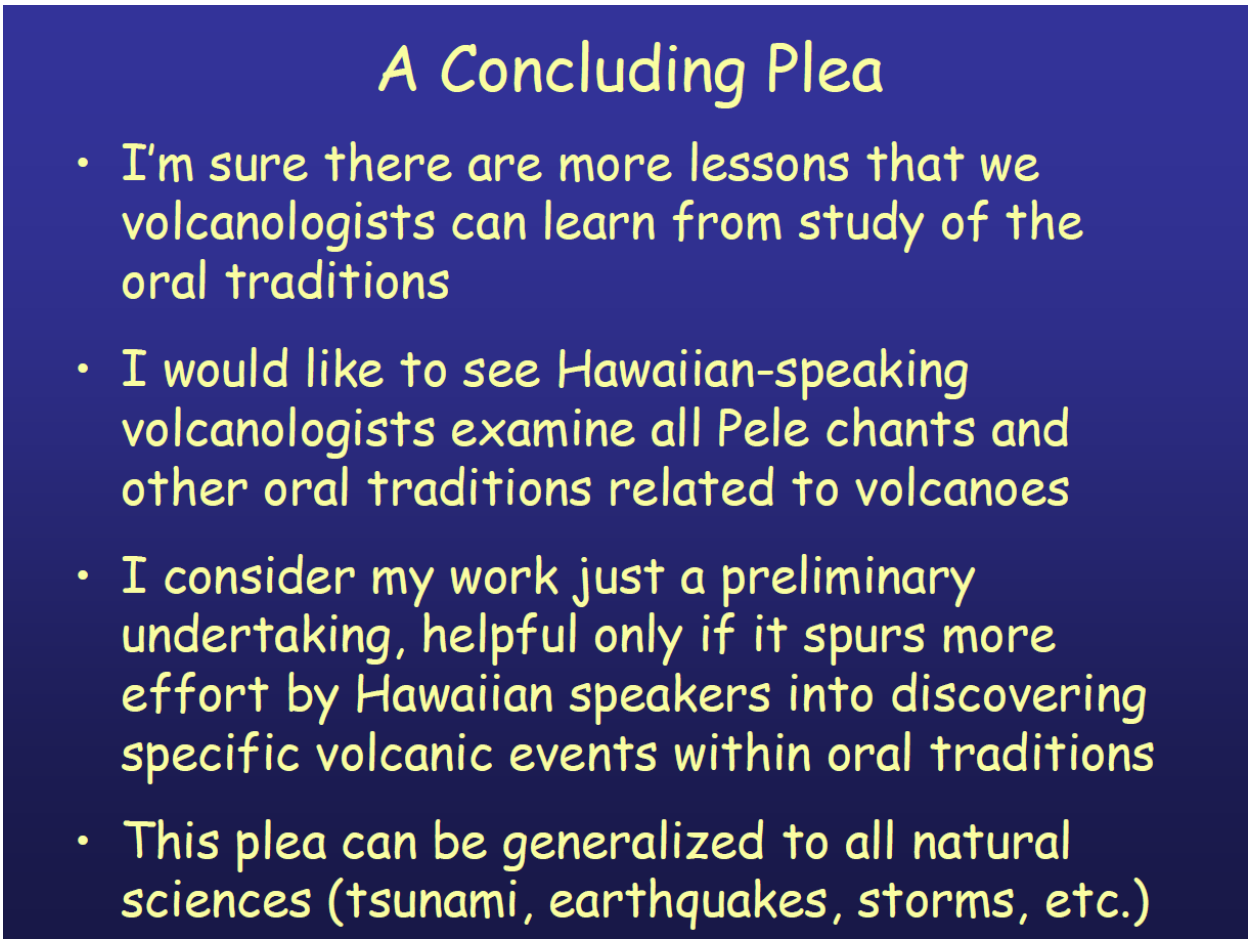
So oral tradition describes these volcanic events that took place over a long time. We volcanologists used to think differently. We thought the summit caldera had formed, not about 500 years ago, but about 200 years ago—in 1790, to be specific. Although I think it's asking too much for us to have built an interpretation out of the blue on the basis of the chants, I think we could have done that because the recent evidence that we've acquired scientifically is entirely consistent with what I think the chants are telling us.



I think the chants, in summary, are just a marvelous synopsis of what happened and of course that is just a small part. It's a backdrop for the chants that Emerson has translated.

Finally, I've gone as far as I can with this. It's really now up to young, I think, Hawaiians who have been trained in the language and also in the science to go through and look at the chants, many of which have never been translated. I think there are going to be gems in there, not only of volcanology, but of tsunamis.

Pua was talking about earthquakes, big storms, any large natural event; [which], I would think, could potentially be recorded by the chants. Because of the metaphorical nature of the chants, the poetic nature, it really takes someone who has the knowledge of science and the poetry both to be able to merge the two into a coherent interpretation. If I were 20 now, I just might try that—but I'm not.



That is as far as I'm going to go now. If you have any questions I'd be happy to answer them.

Questions:

Q. I'm a little curious about Emerson's interpretation of the Pele-Hi'iaka story. Does that sort of hang on its own or does it connect very well with the other chants?
DON: I'm going to defer to Pua on that.
PUA: It connects because a lot of the translation really wasn't done by him. It was done by some Hawaiians. We have actually many sources for Pele's stories in Hawaiian newspapers. We have one big source that actually I was just translating a few years ago. It comes in a big book, but prior to that, we had other sources that came before that, all of them in the Hawaiian newspapers. They wrote a lot from the 1840s up until the 1900s. There is an urgency in their writing, so they kept on putting stuff in the newspapers. But it fits very well with the interpretations. Some of his narrative part of it is a little flowery.
Q. Victorian?
PUA: Yes, Victorian.
DON: Victorian, yes.
PUA: But some cases are quite different from his narrative.

(End of presentation)

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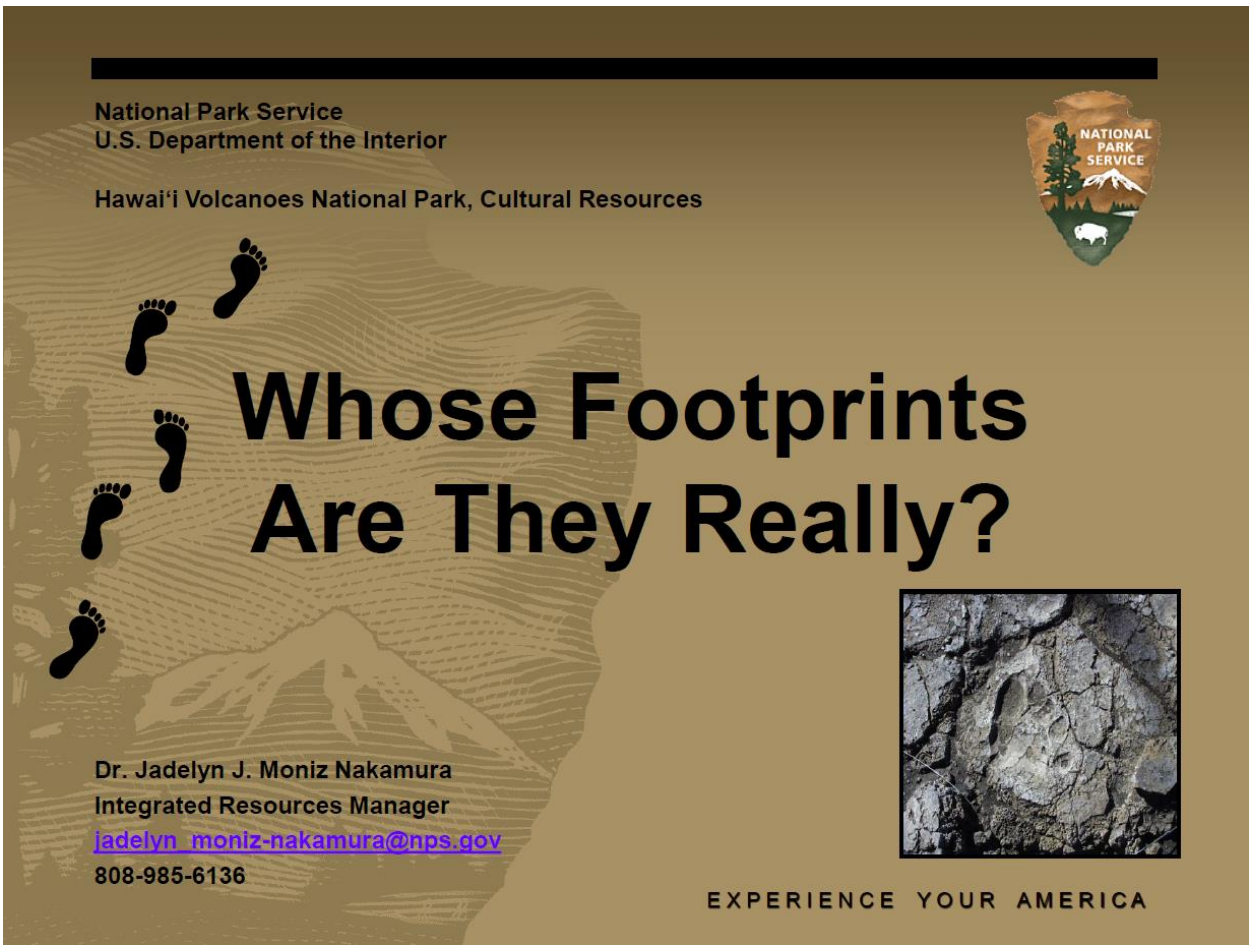
Whose Footprints are They, Really?

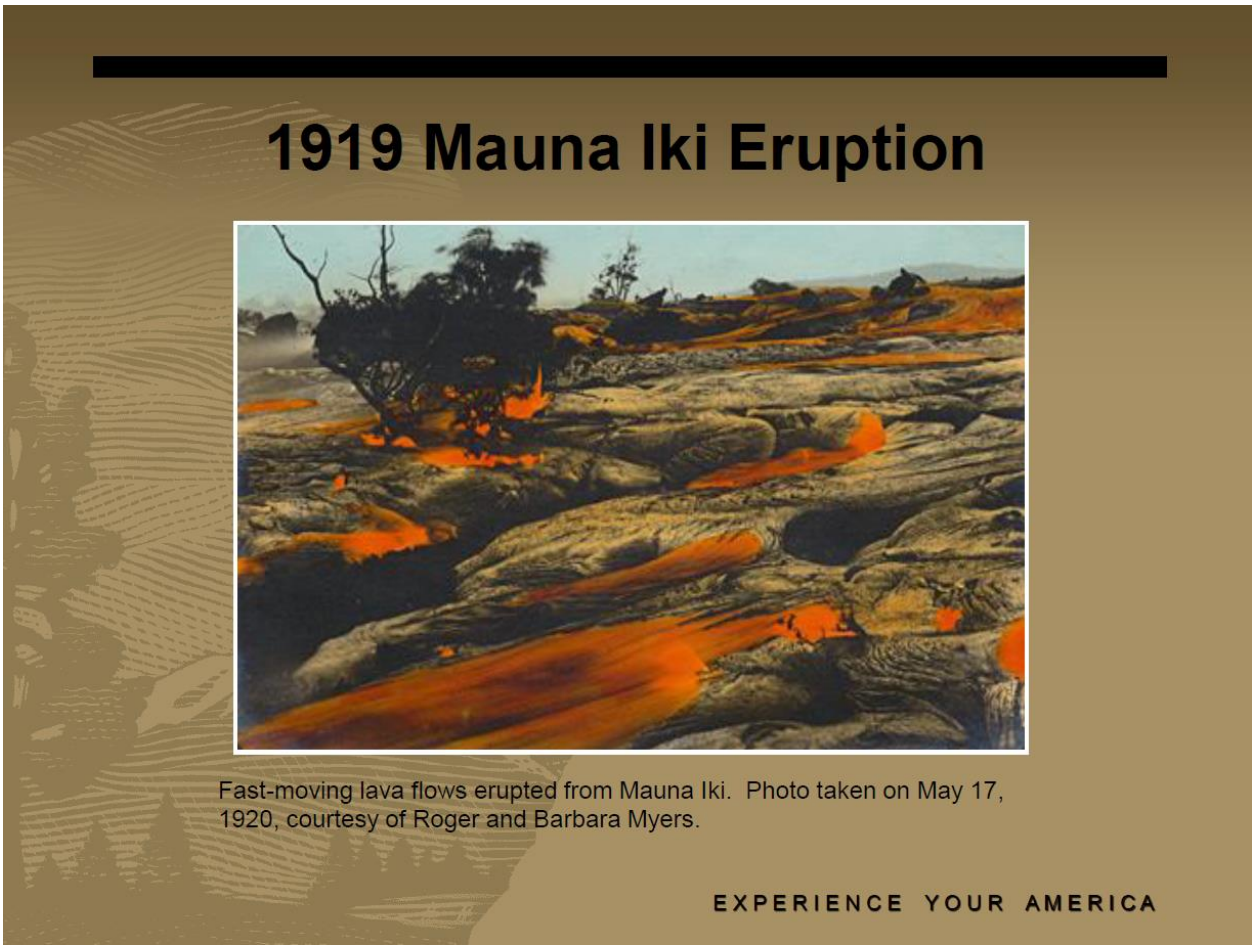
Speaker: Jadelyn Moniz-Nakamura, Hawai‘i Volcanoes National Park (National Park Service)
Monday, January 28, 2013

Good afternoon.

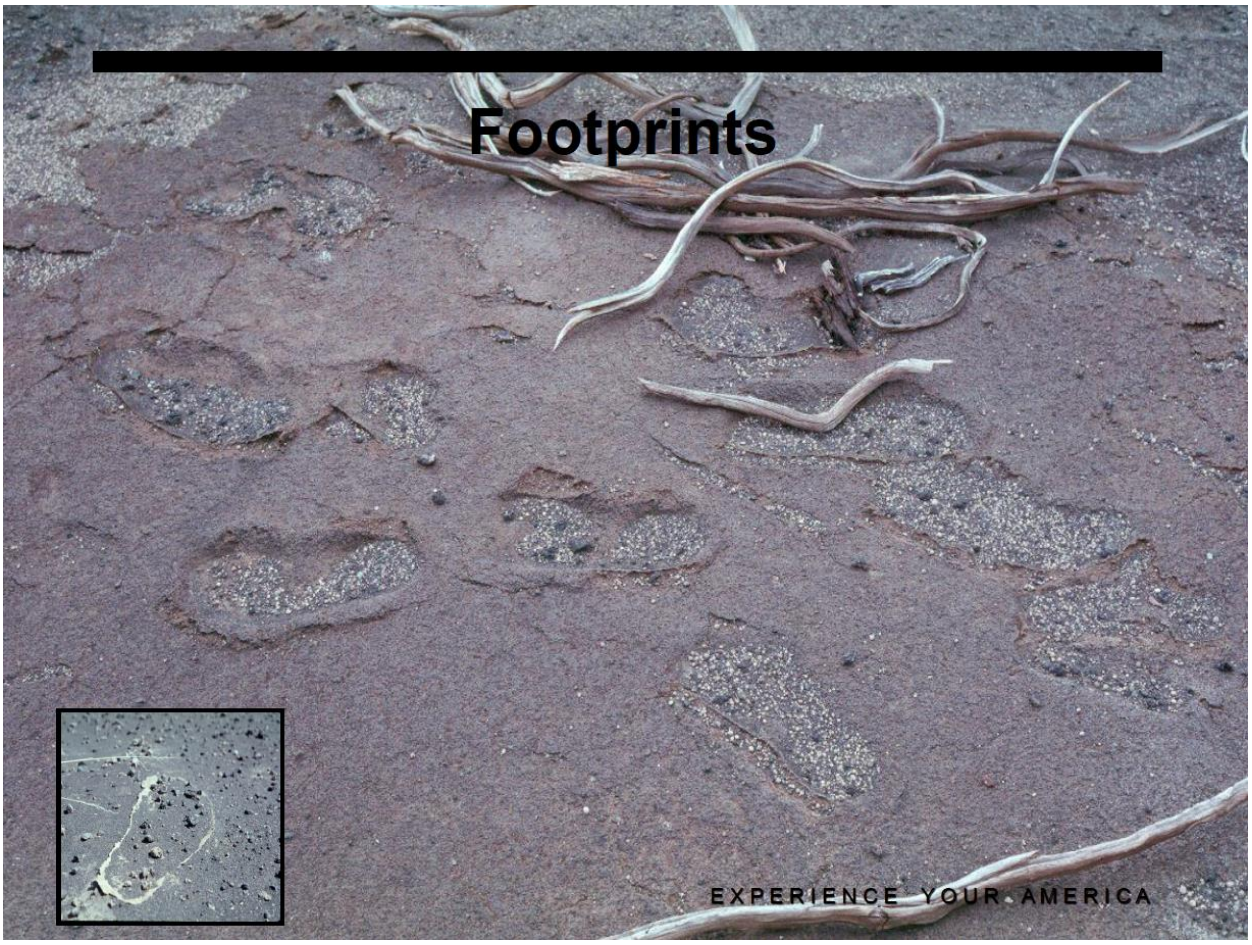
Today I’d like to present our latest information on the footprints area and the explosive eruption [of Kīlauea volcano in 1790] that produced ash in which are found fossilized footprints.



We’ve been able to better understand the archeological record because of the work of geologists at HVO, especially Don Swanson, who has really graciously shared both his time and data with us.

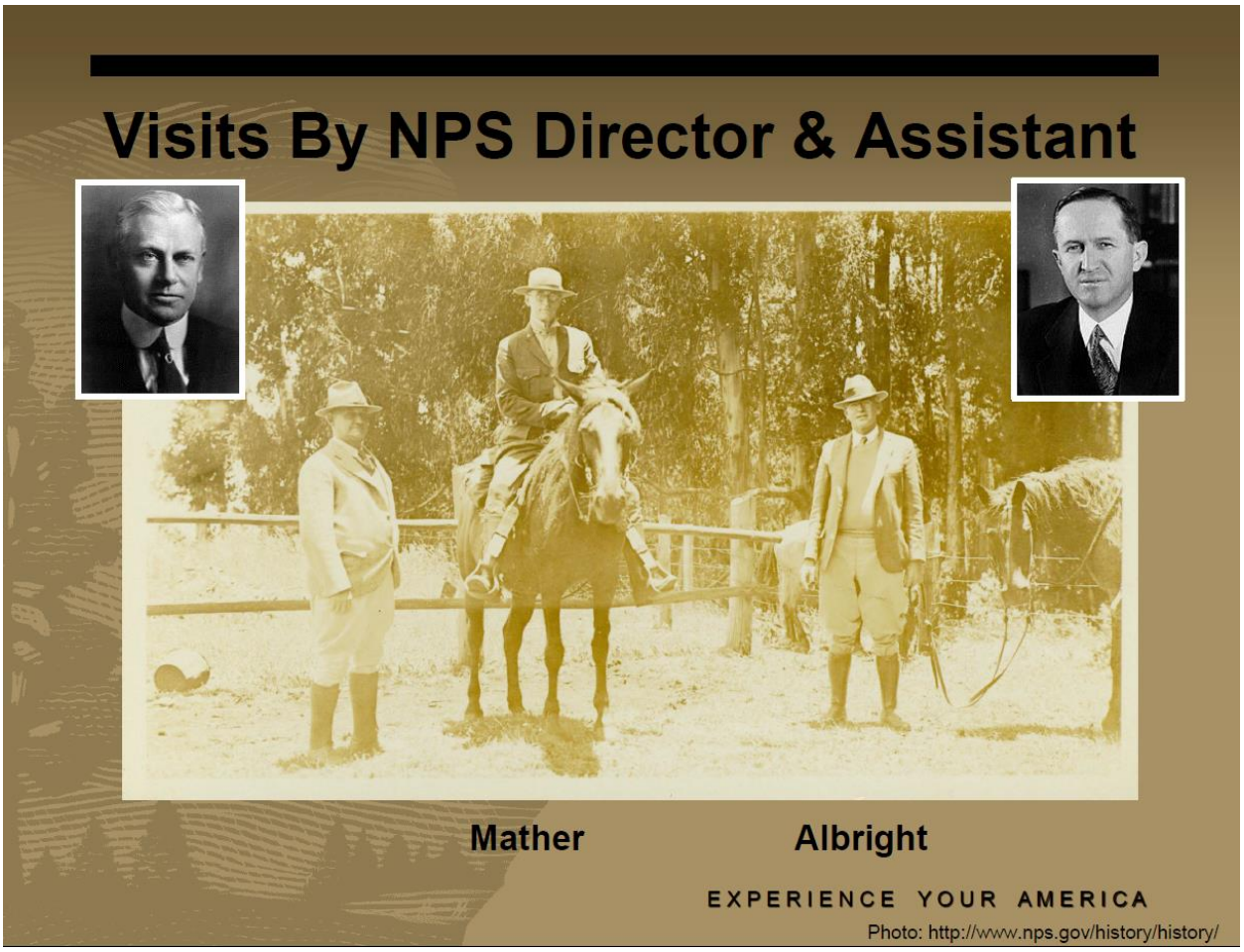


The footprints were discovered in 1919 when an event began at Kīlauea, during which lava from Halemaʻumaʻu erupted in the Kaʻū Desert, building the Mauna Iki lava shield.



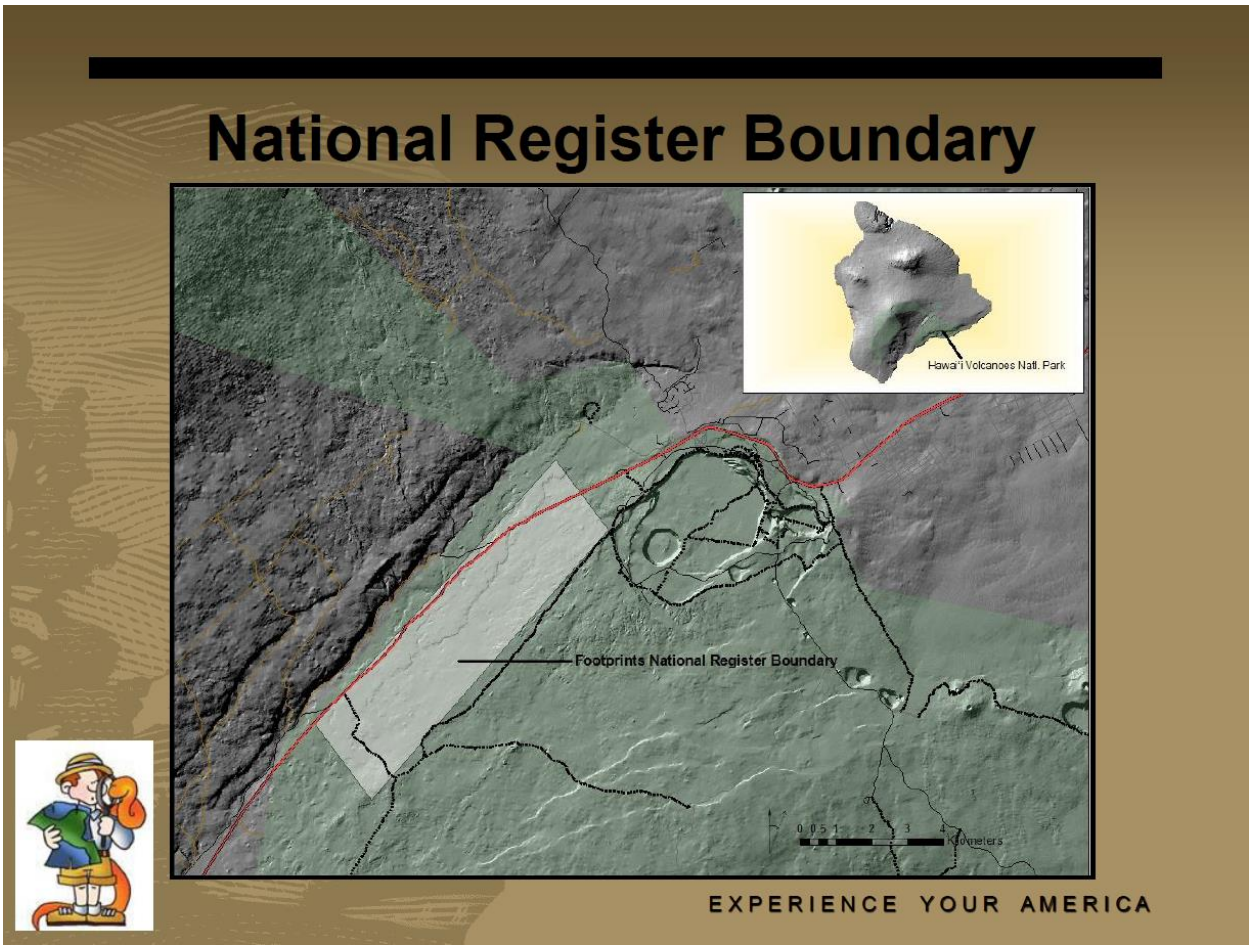
While crossing through the desert, geologist Ruy Finch found human footprints preserved in the desert ash. After the prints were found, a crude trail was marked to them and many people visited the area and the area soon became known as “Footprints.”

Acquisition of the land began after a visit to Hawaii National Park by Director Mather and his assistant Horace Albright in 1920. Both recommended that Footprints be included as part of Hawaii National Park. After many long negotiations, Congress finally approved acquisition on June 29, 1938.

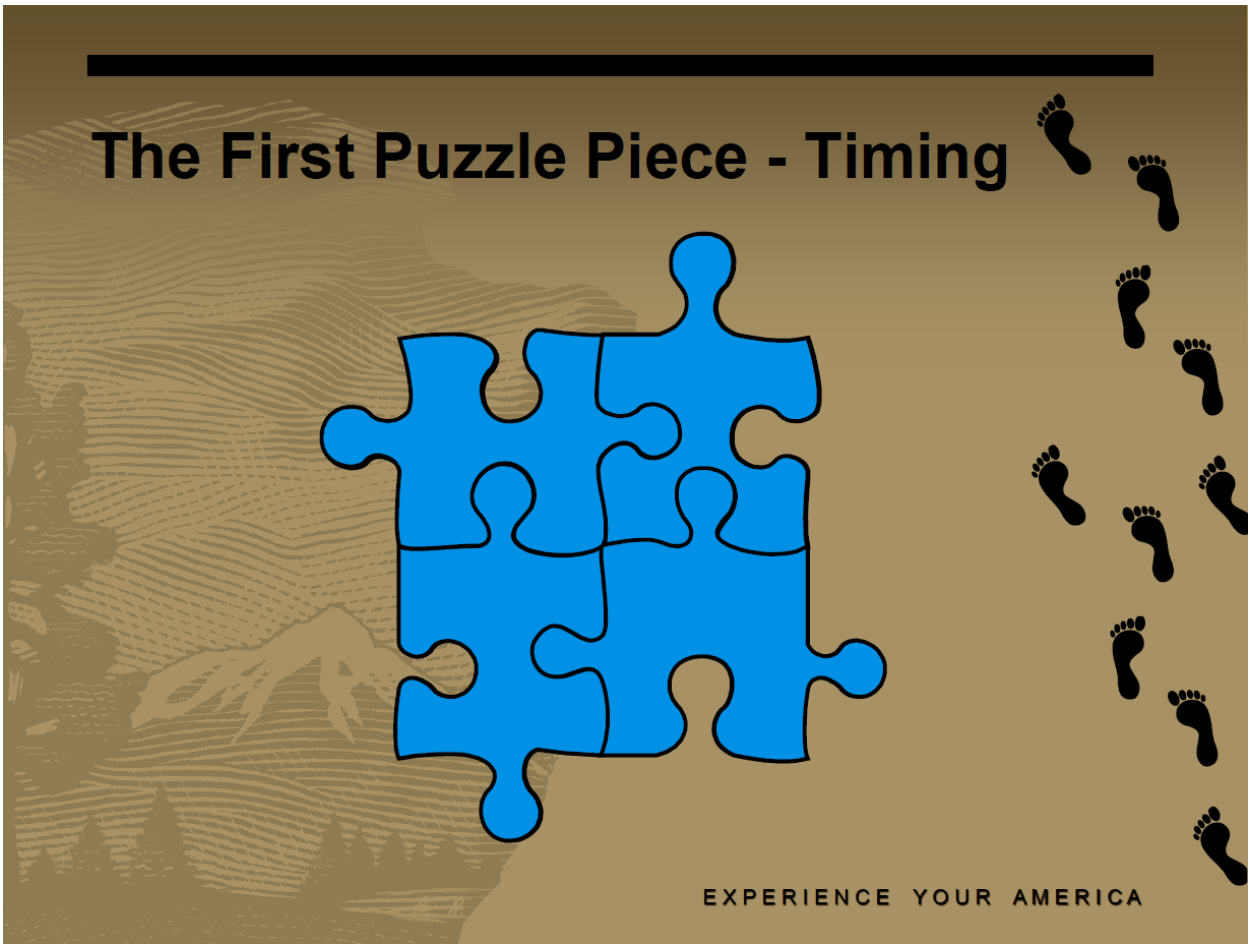


The trails to the area were added, and, in 1941, Civilian Conservation Corps built the shelter to interpret the site.

In 1974, approximately 4,200 acres was placed on the National Register of Historical Places. In the late 1990s, a Park Service archeologist began formal inventory of the site, and, since then, much more has been learned.

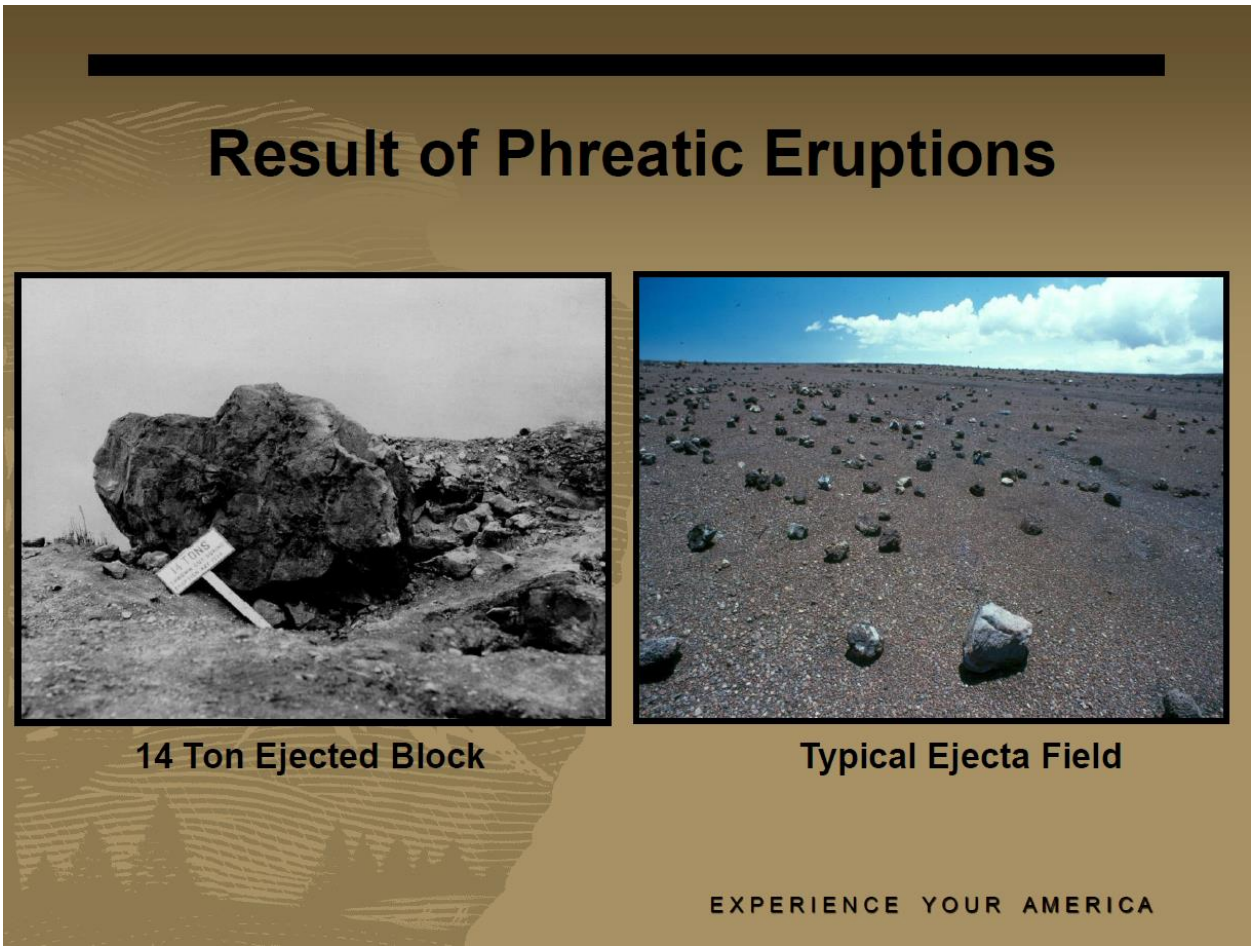


Working with the geologists from HVO, we're beginning to put together the pieces to this puzzle and we have now a much better understanding of the cultural and geological history of the area.

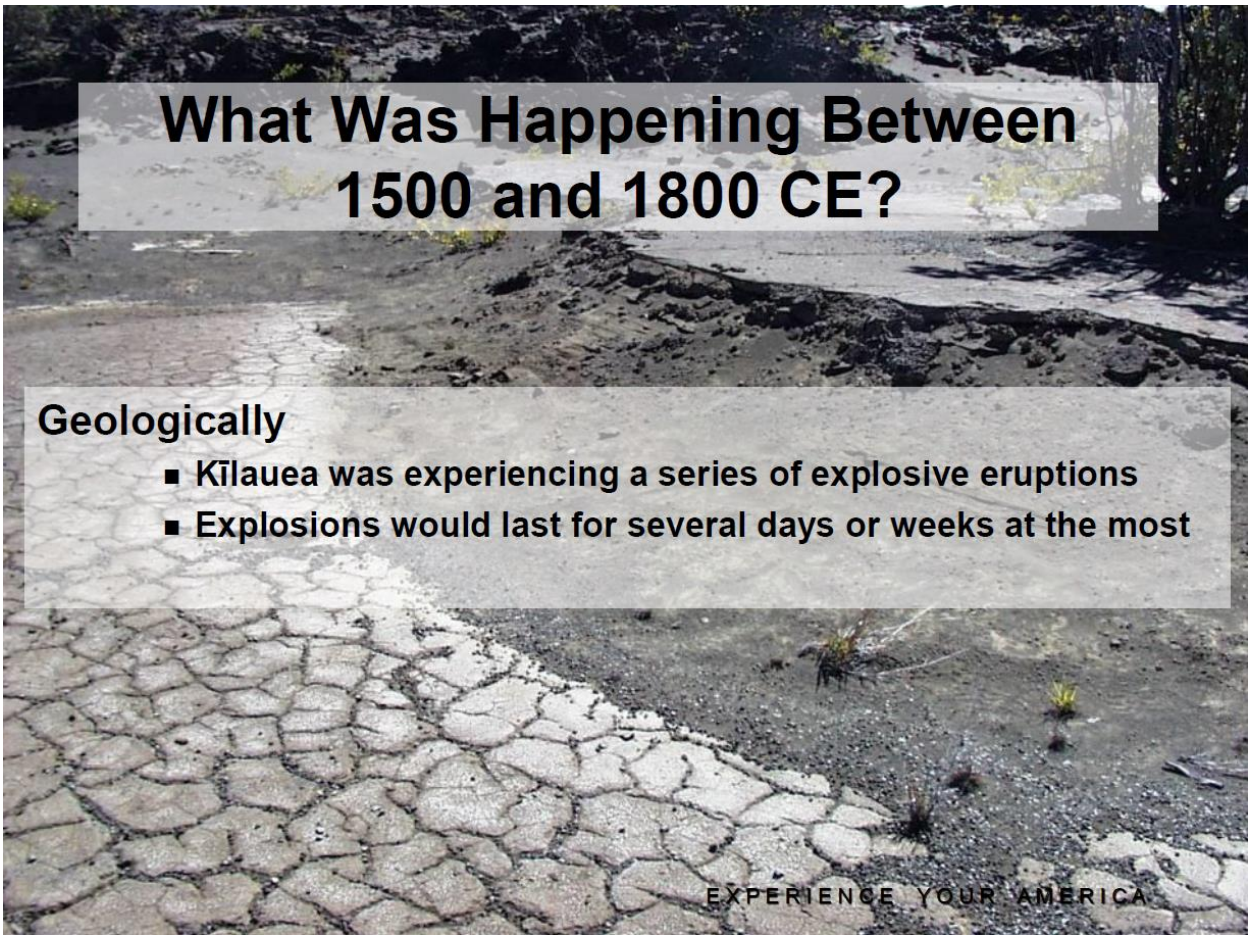


So let's start with the geological and cultural timing. Millions of visitors come to Hawai'i Volcanoes National Park each year to enjoy this relatively safe dynamic volcanic landscape, but Kīlauea has erupted explosively many times. The most recent event began at 2:50 a.m., March 19, 2008.

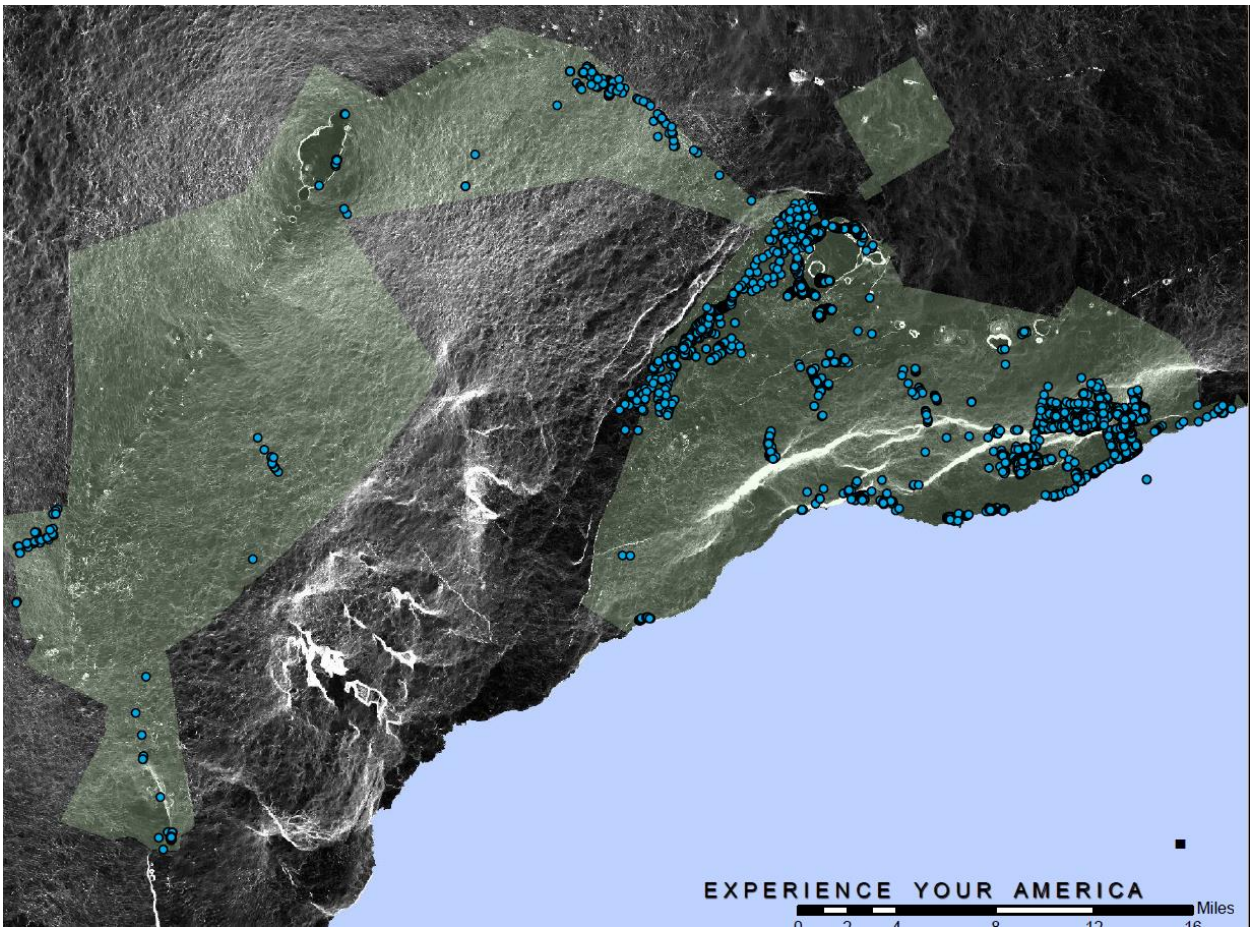
These types of explosive eruptions are called phreatic explosions. During these events, the sidewalls and the vent of the crater collapse onto itself, causing pressure to build inside and causing an explosion. This explosion sends ejecta, rock, ash, and sand out of the vent onto the nearby landscape.



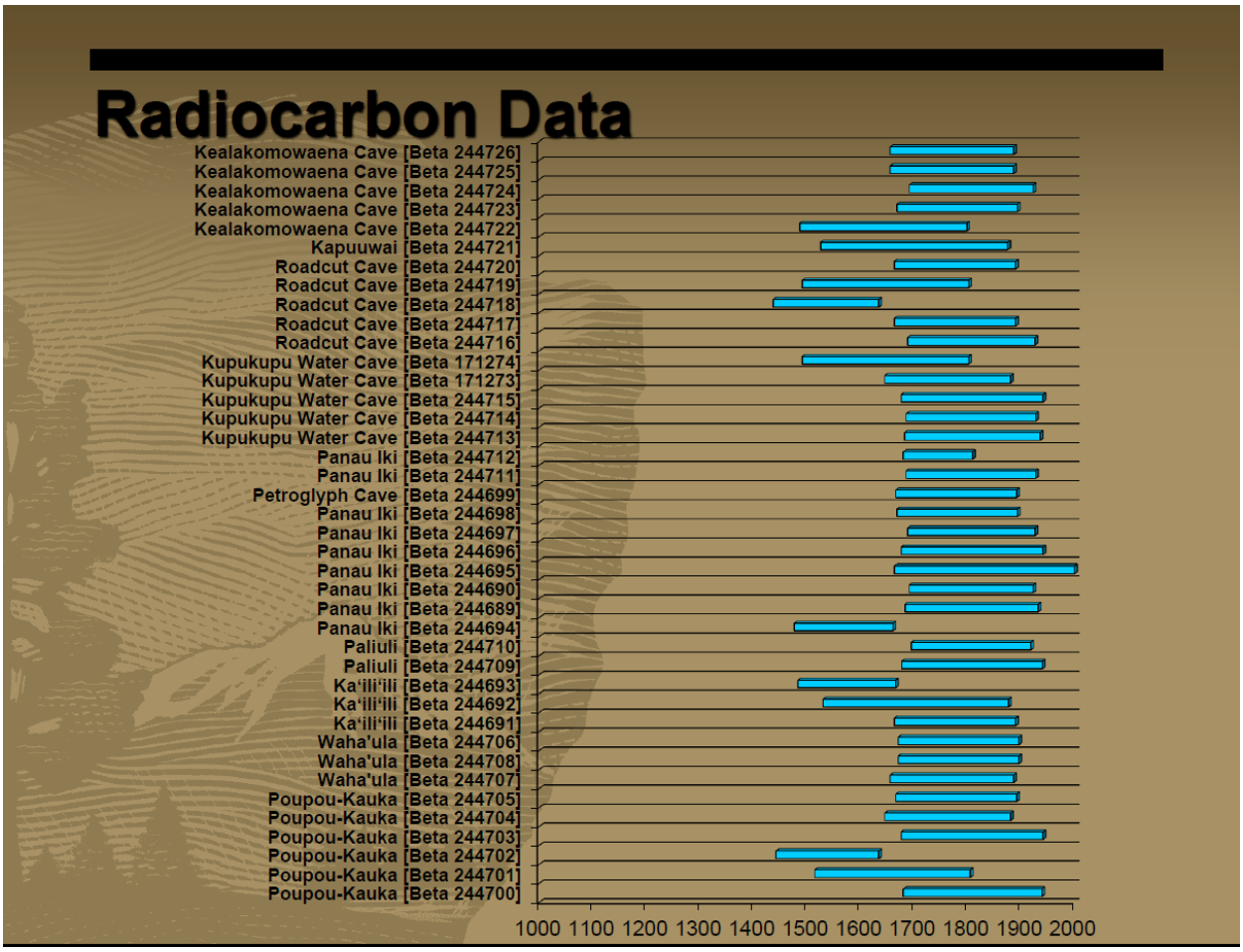
Most of the eruptions have occurred in Kīlauea in clusters that span centuries. As Don was saying, the explosions were often followed by periods of calm and quiet. For 300 years, between A.D. 1500 and 1790, these types of events were fairly common. The 1790 eruption, however, was the most lethal known for U.S. volcanoes.



Coinciding with this explosive phase is the spread of Hawaiians into this part of the island. In this slide we see the human signature as it spreads across the landscape. [The blue dots mark] house sites, trails, agricultural fields, and resource areas showing up [within] what is now the park boundary.



Radiocarbon data from the park supports evidence on the ground that Hawaiians are beginning to move into this part of the island in the mid 1400s, with a large cluster of dates from the mid 1600s through the historic period, suggesting a wide presence across Puna and Kaʻū.

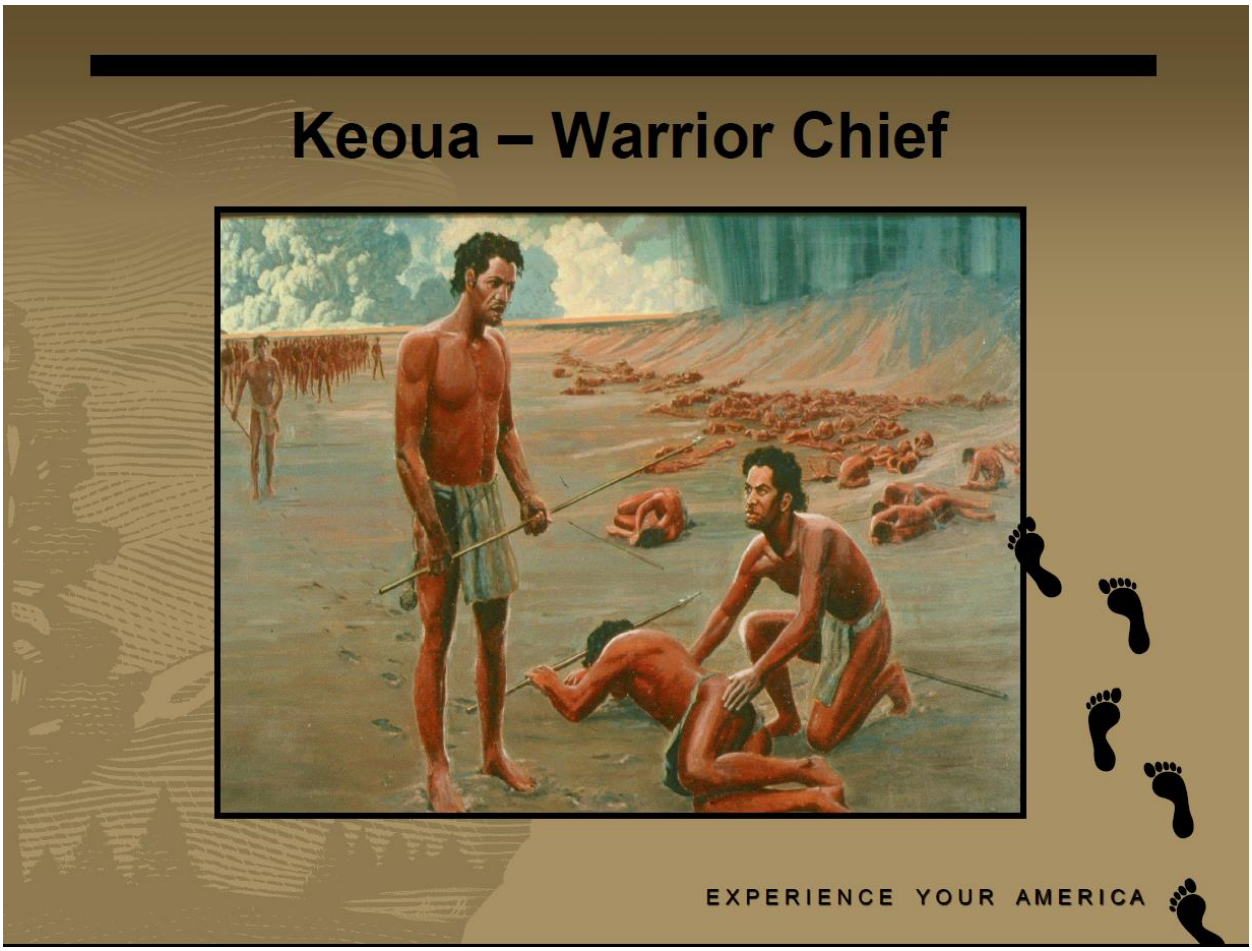


The expansion coincides with explosive phase of Kīlauea between 1500 and 1800. So people were living, working and [traveling] in the shadow of a dangerous and explosive volcano.

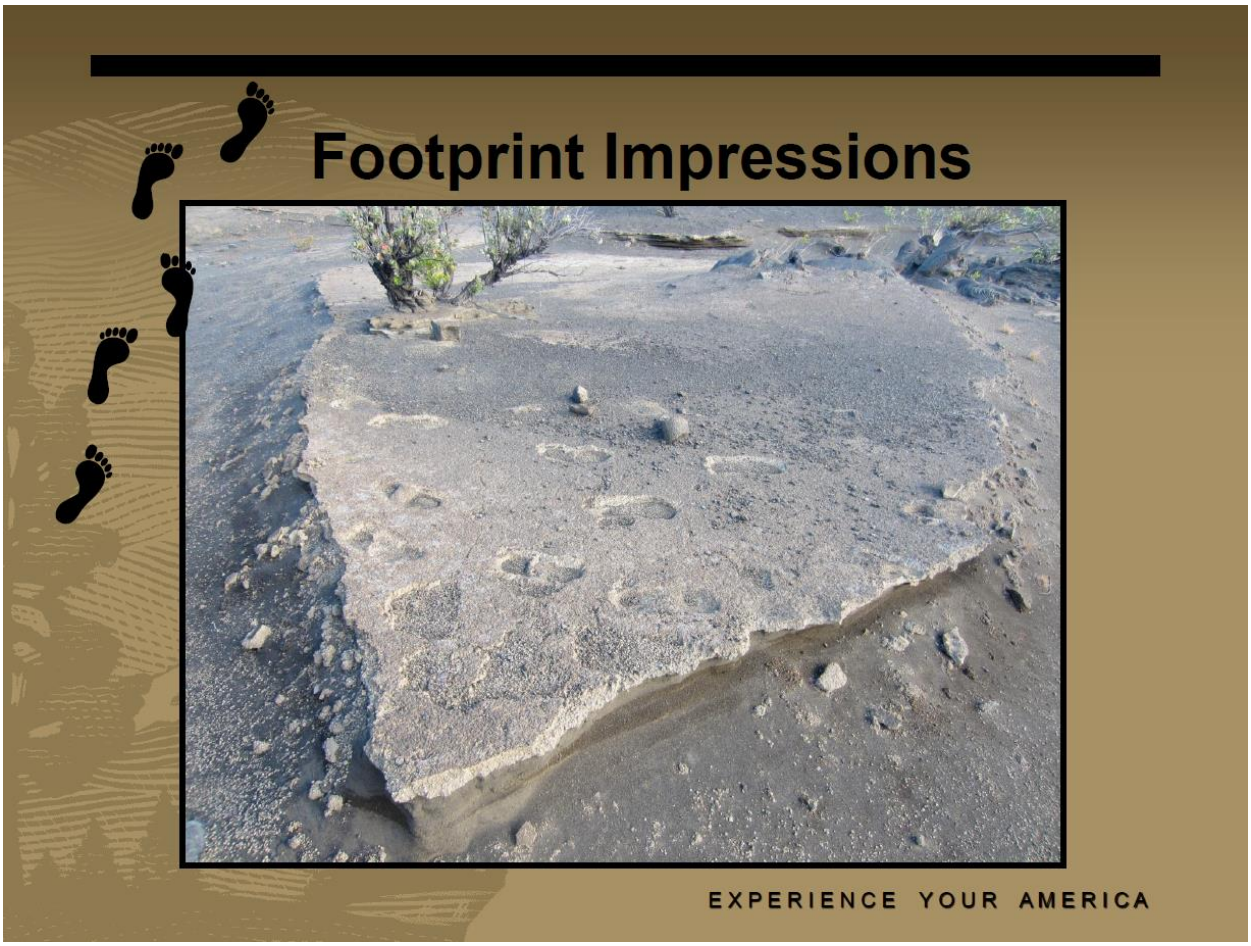
Kīlauea did get dangerous. In 1790, a group of warriors under the direction of Chief Keoua fell victim to the explosive volcano. Keoua and his warriors were heading back to his home district of Kaʻū when they camped overnight at Kīlauea near a heiau dedicated to Pele. That night there were a number of earthquakes. Fearing somehow they had angered Pele, Keoua decided to remain there for several days to distill offerings in an attempt to appease her.

Upon leaving Kīlauea, Keoua split his army into three different companies that left the crater at different intervals. The first company had not gone far when the earth started to tremble violently. Volcanic ash and hot gasses exploded out of the caldera and a huge dense cloud of ash, sand, and rocks were ejected out of the crater and rained down for miles around.

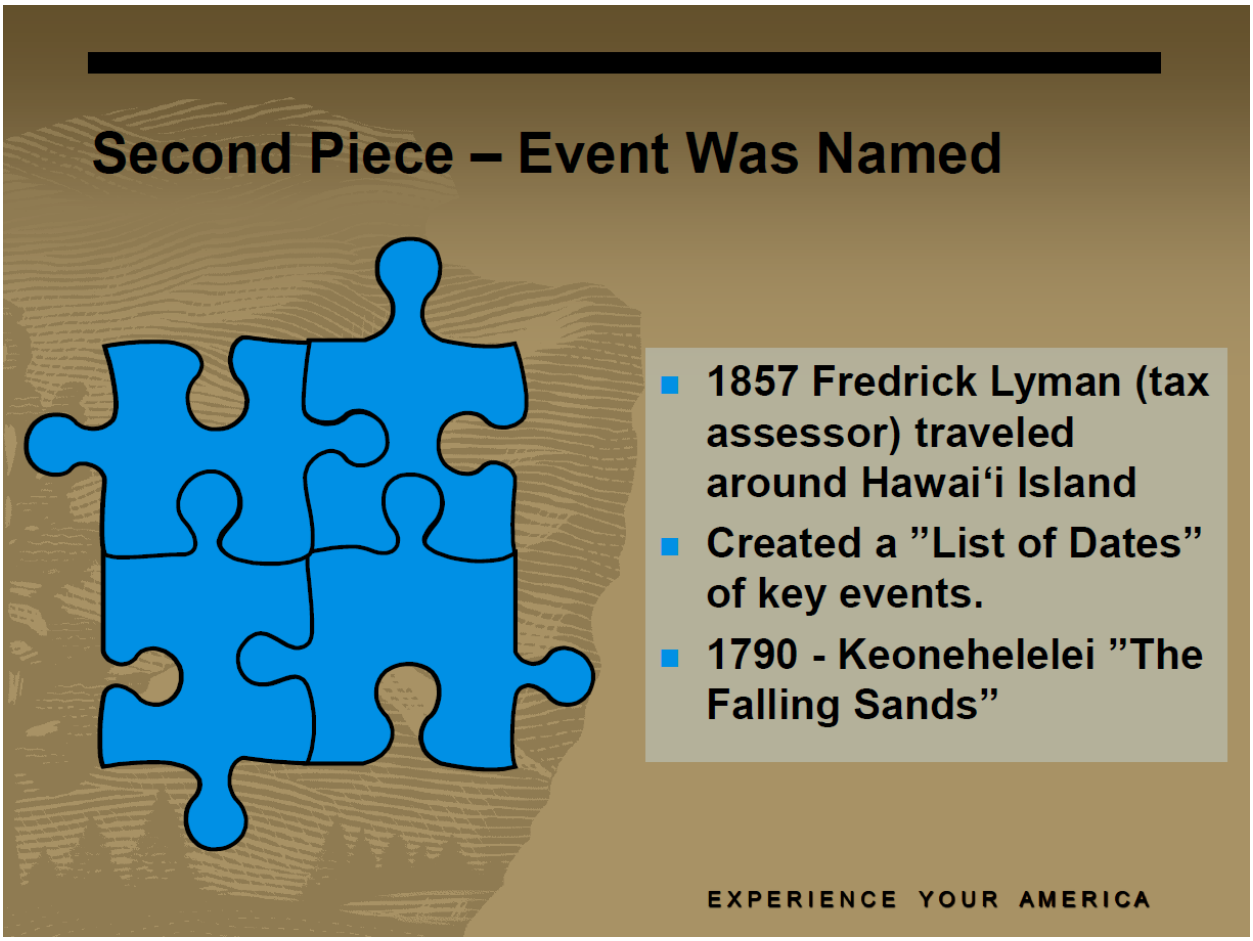
Unable to escape, all the individuals in the second party died. The first and rear company survived the catastrophe because they were not in the path of the explosion.



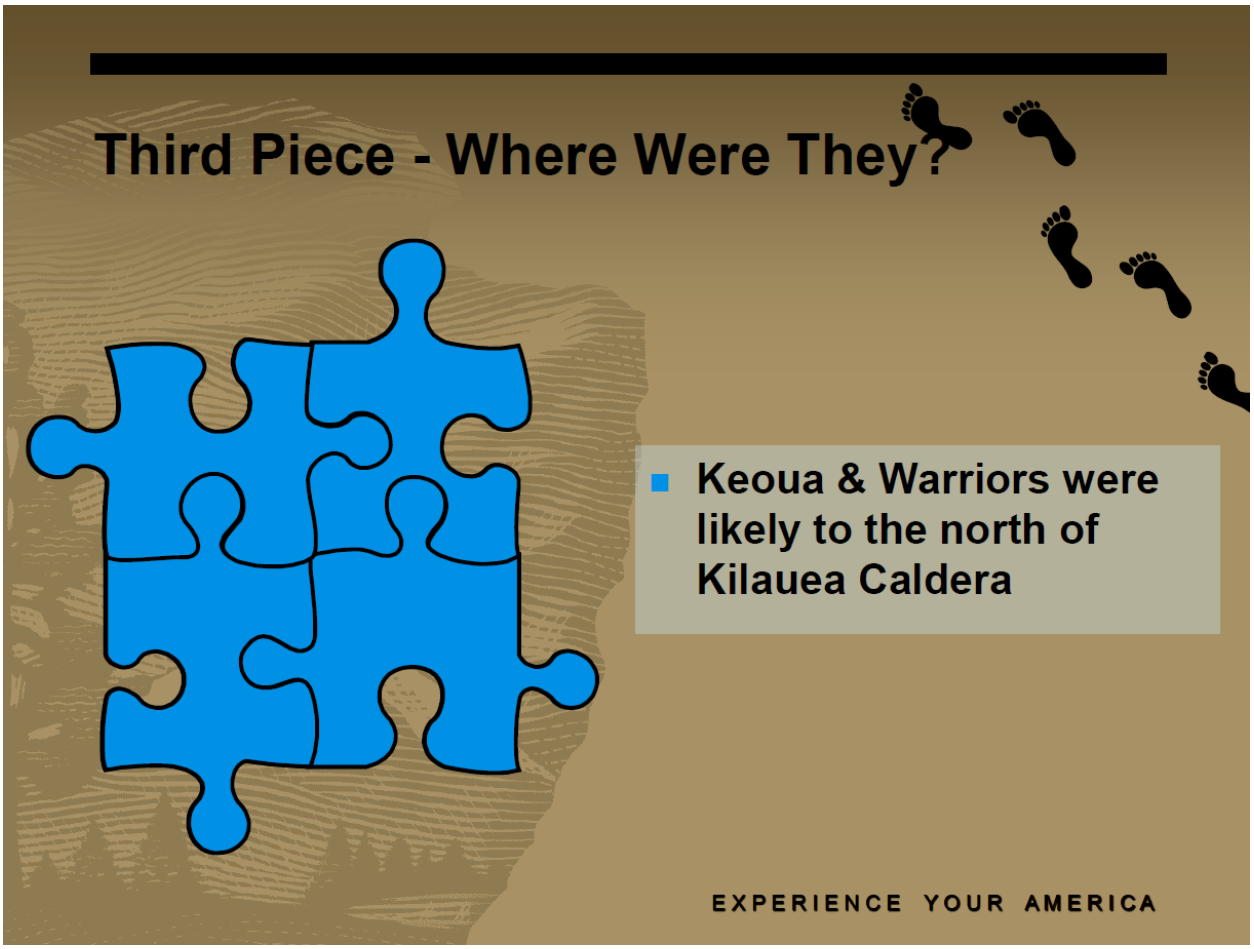
The ash provided an excellent medium in which footprints have been fossilized. In 1921, Thomas Jaggar suggested that footprints were made by Keoua's surviving warriors as they continued onto Kaʻū, but that was purely speculation. Recent research indicates that the history of the Kaʻū Desert is much more complex and that the footprints may also be from others that commonly travelled throughout this area.



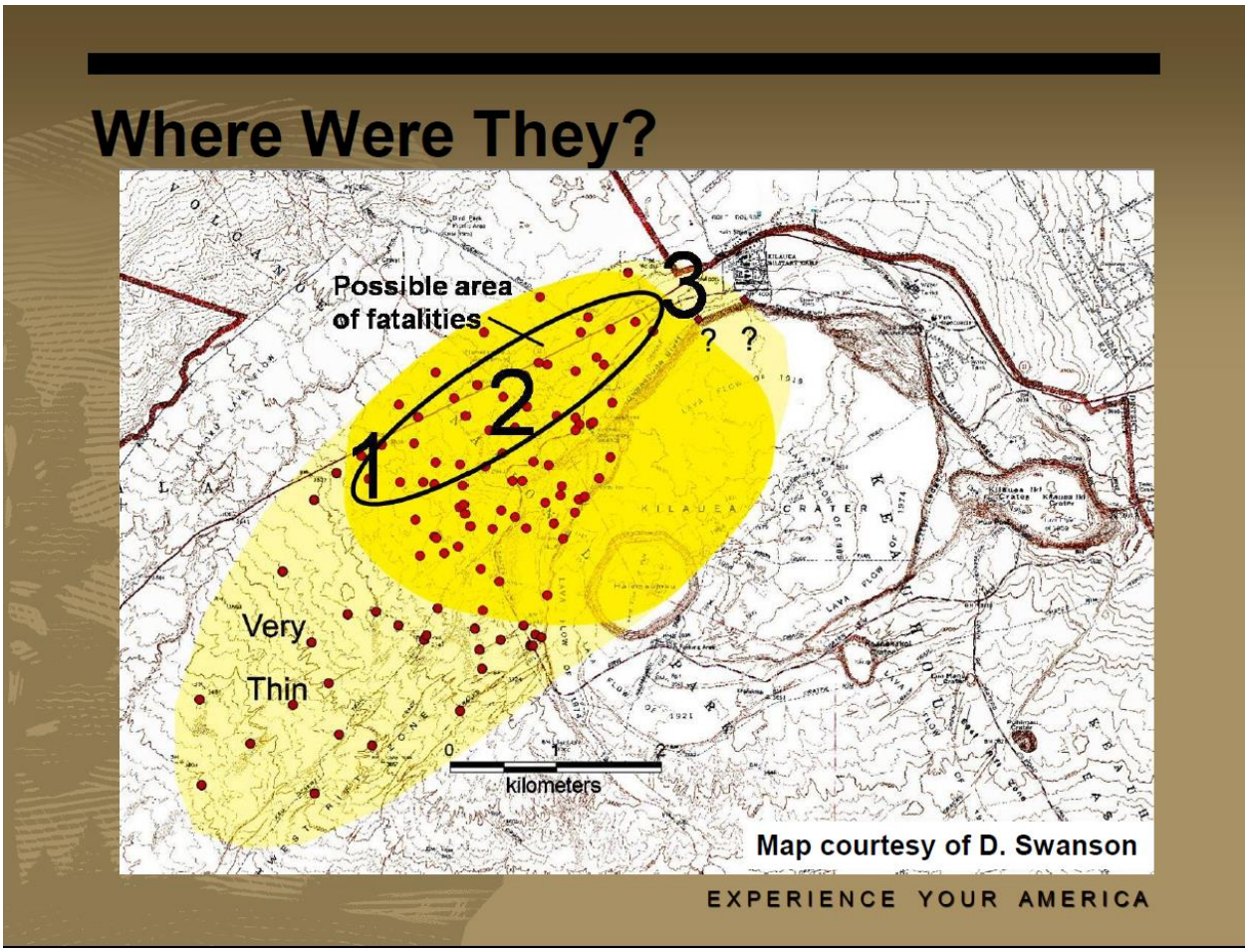
We know from [kingdom tax] court documents that this very eruptive event was called Keonehelelei, which means the falling sands. The name was found in a list of dates compiled in 1857 by Frederick Lyman, who had interviewed Native Hawaiians in an attempt to gage their ages for tax purposes. Because many people did not know their chronological ages they associated their birth with important events, and Keonehelelei was identified as occurring in 1790.



Geologists have carefully studied the probable direction of the pyroclastic surge that took the life of Keoua’s warriors and determined that the troops were likely to have been to the north of the caldera, southwest of what is now KMC [Kīlauea Military Camp].

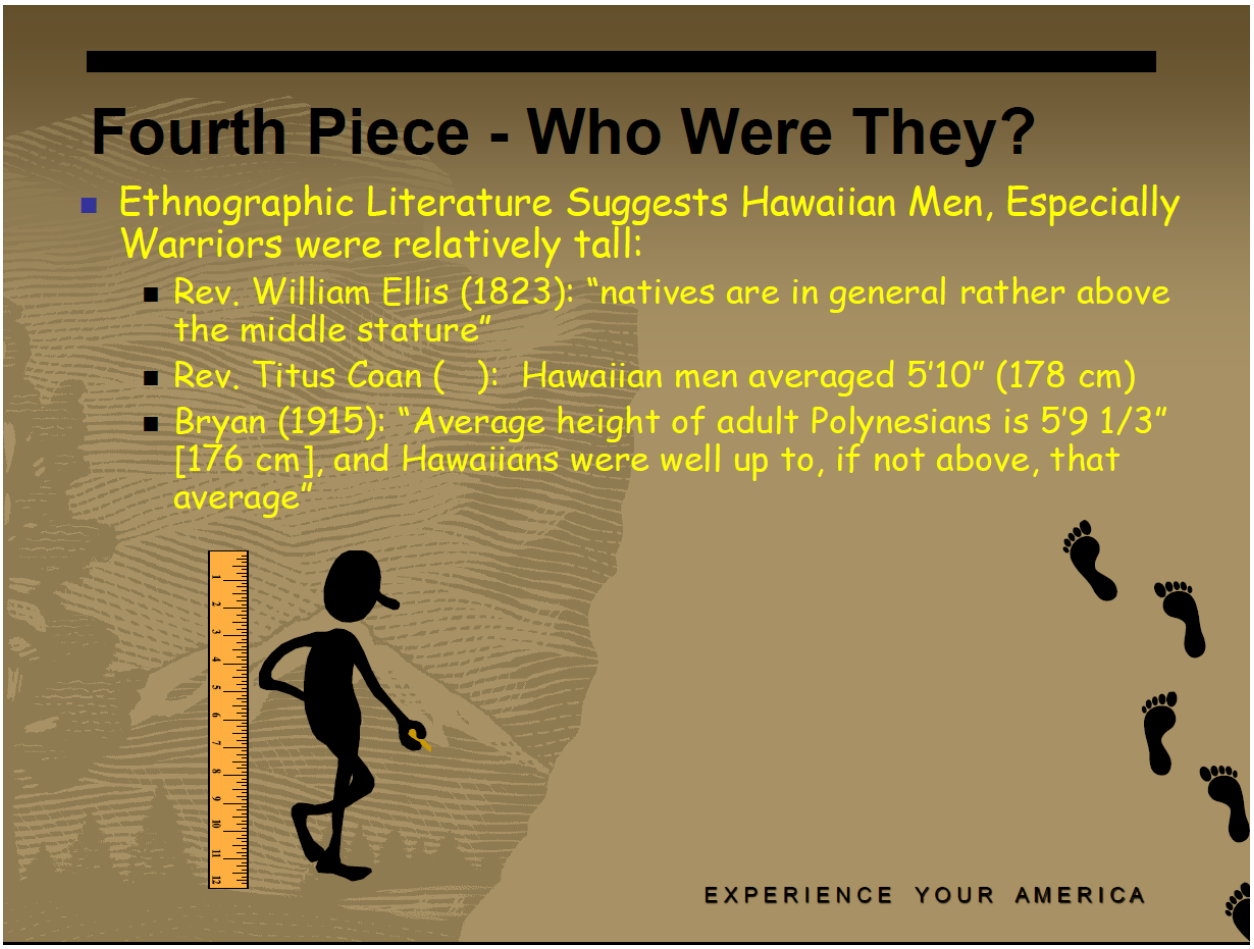


This is a map from Don [Swanson], where the numbers one and three represent the first and third groups of warriors that safely dodged the pyroclastic surge. Number two represents the second, unlucky group that was killed. Curiously, not many prints are found in this area.

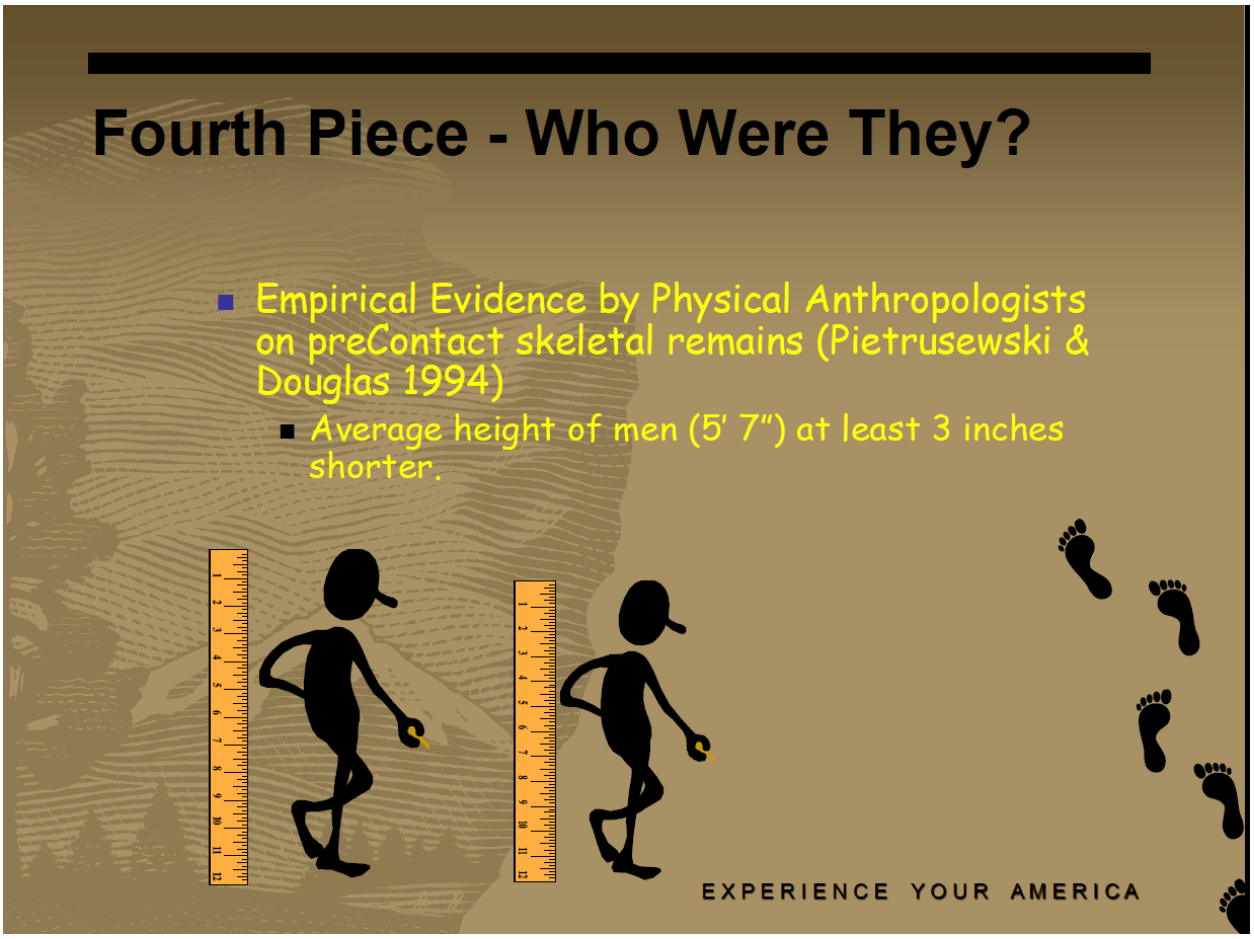


The footprints themselves can tell us a lot about the people who made them. Two sets of data have been collected: a small set in 1991 by the Cultural Resources Program, and, more recently, a much larger set was collected by Don and his researchers. Both datasets document the size, number and direction of the footprints.

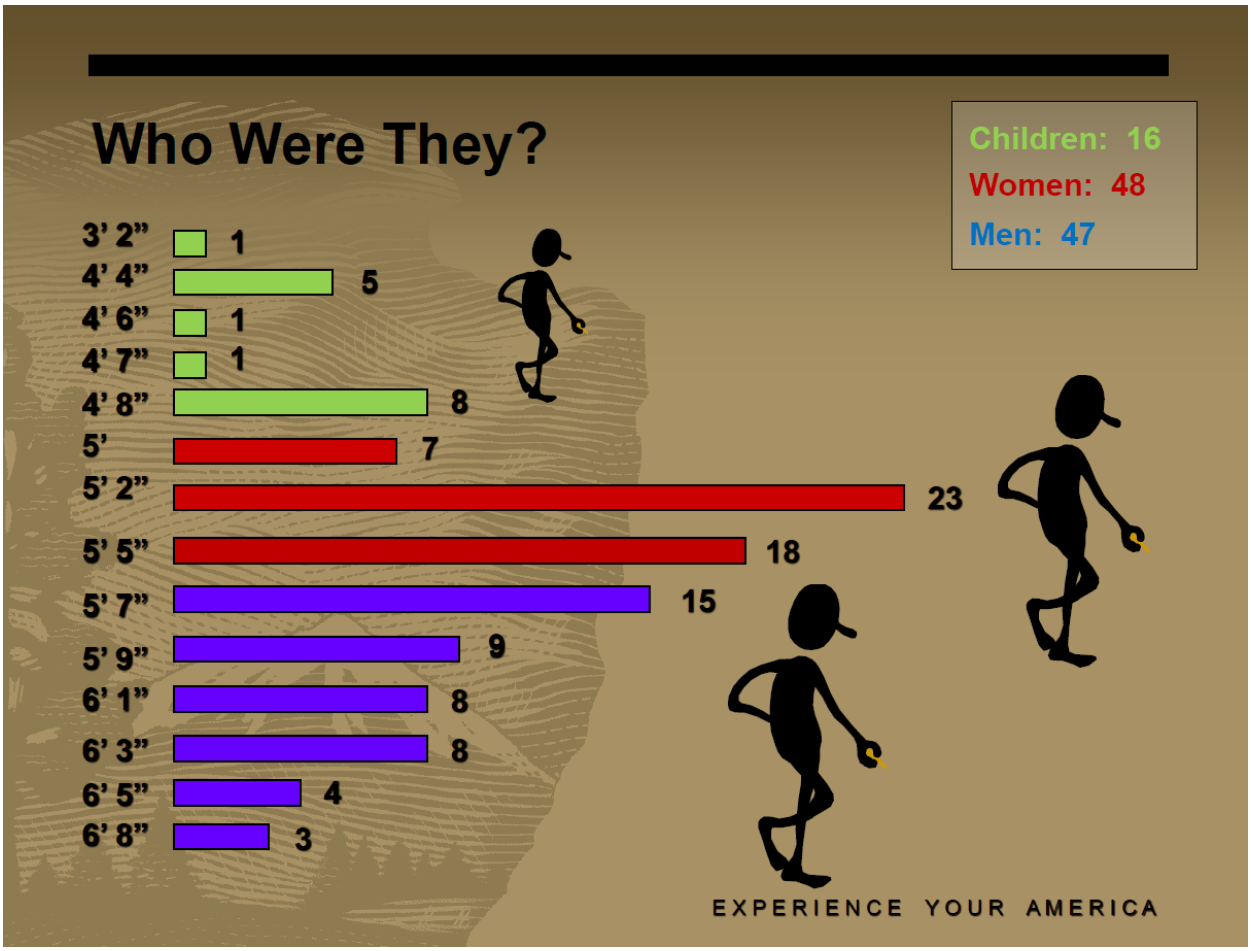
The next few slides graphically depict the results [of these footprint studies].



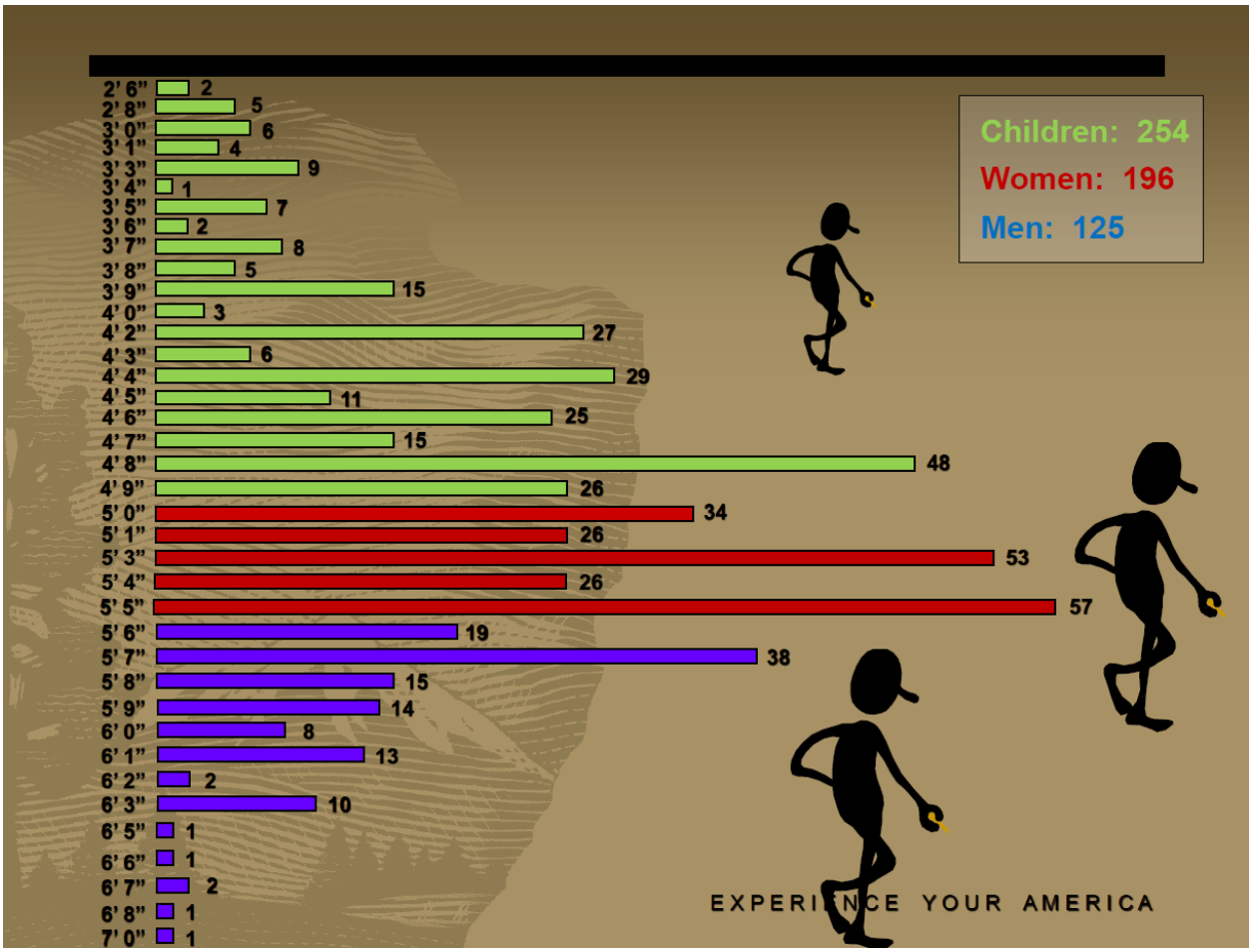
First, this is what the ethnographic and the osteological record says. Pietrusewsky and Douglas [1994] did a lot of skeleton measurements and came up with an average height of men—five foot seven [inches]. The ethnographic literature suggests that Hawaiian men, especially warriors, were relatively tall. This is from quotes [by] Ellis [1825] and Coan [1882], who put Hawaiians at between five-nine and five-ten.



The osteological data suggests that Hawaiian men were closer to five-foot seven-inches, which is about three inches shorter [than the literature suggests].



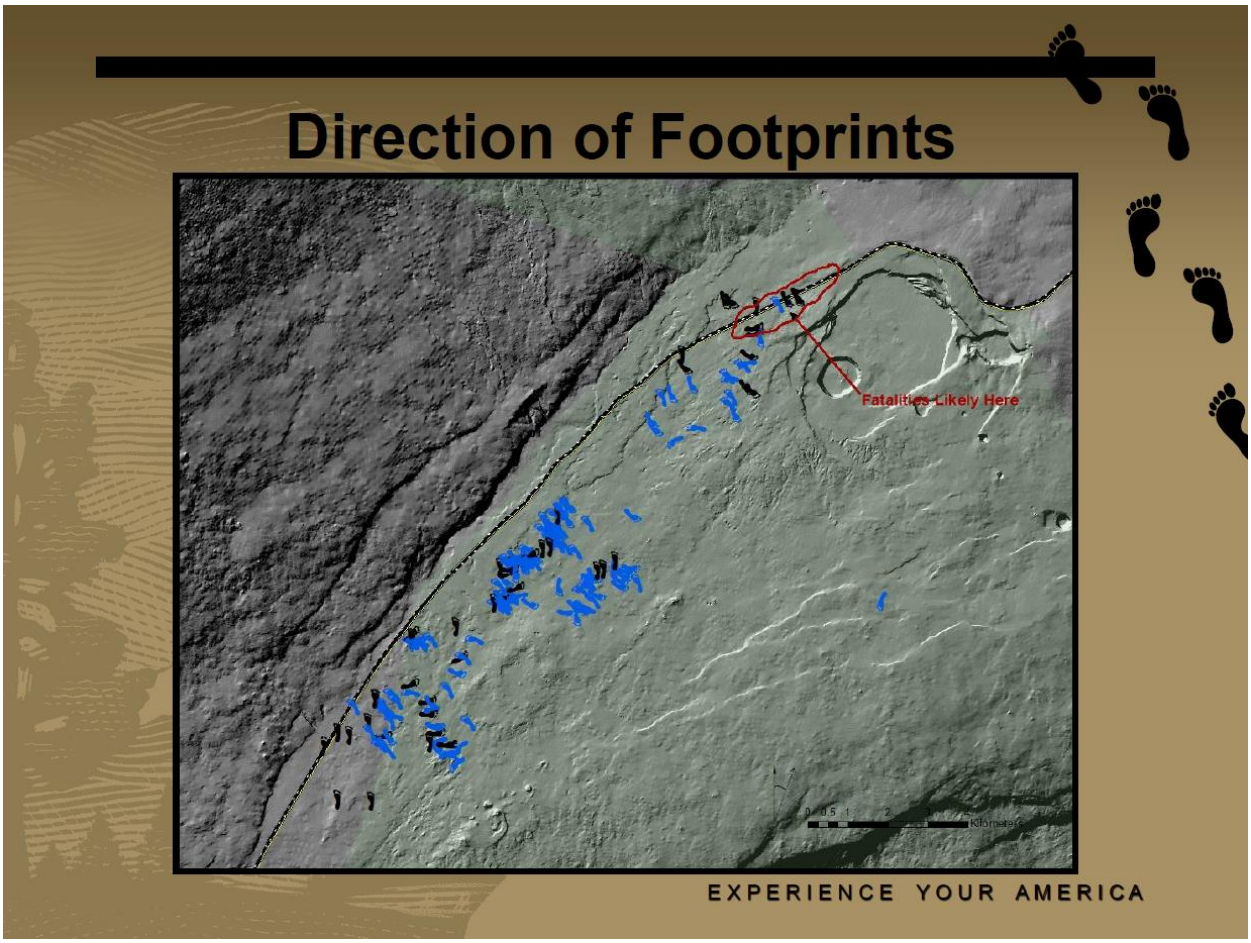
This slide shows some of the data that was collected by the [NPS] cultural resources staff, basing the height of men and women on the osteological data provided by Pietrusewsky and Douglas [1994]. I calculated the height of the individuals using a formula that was proposed by Don, where foot size equals 15 percent of the body height. The result suggests that men and women were equally represented, and less than a quarter of the prints were likely those of children.



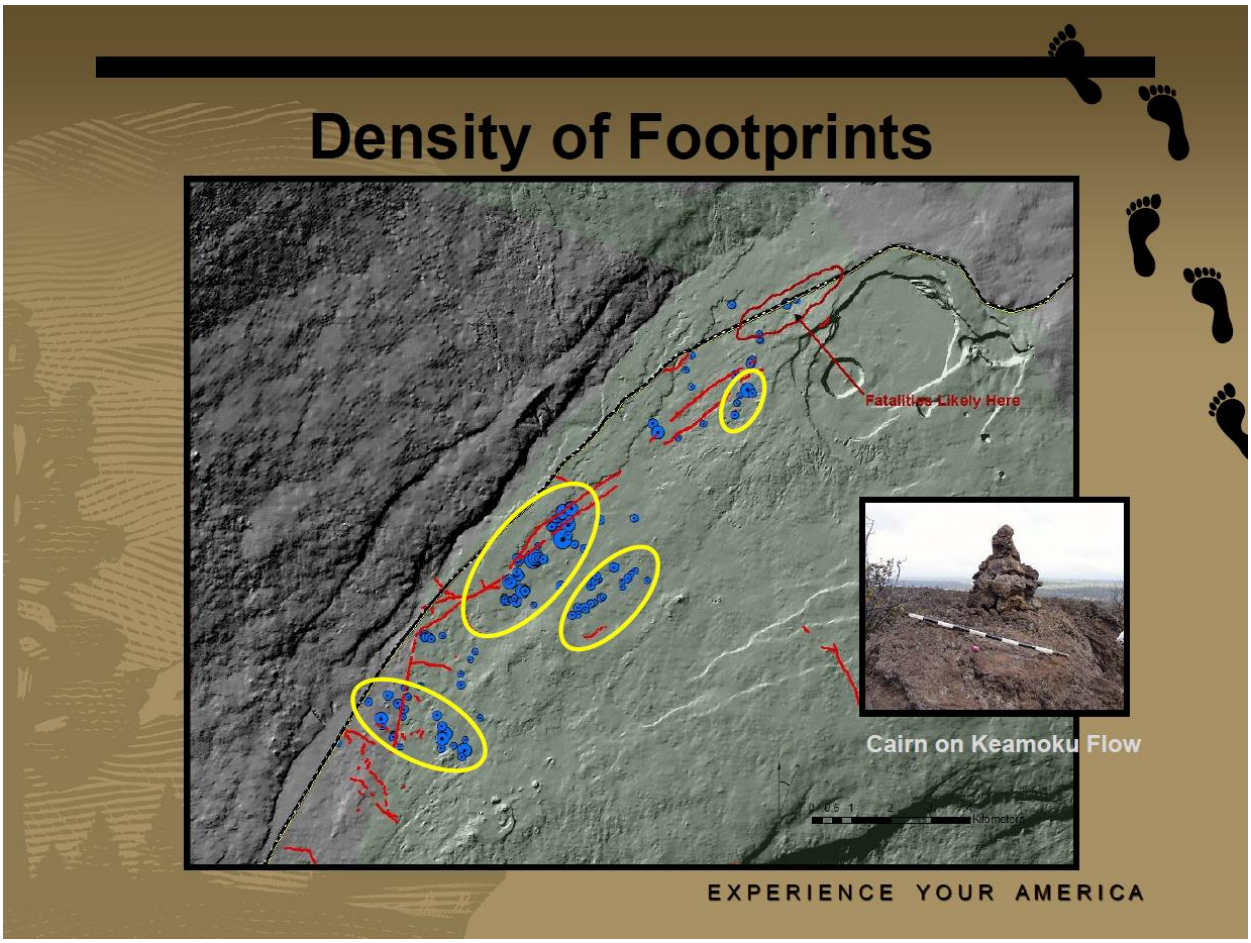
This is Don's data, which is much larger than the data set that we had, and Don's data suggests that the ratio of men and women were equal or similar, but what is different is the greater number of children represented, which is interesting. I don't really have an answer for that.

We do know that there were not only men but also women and children walking through the desert, through the red ash.

So where were these people going that were crossing the desert and why did they choose this route? The footprints are found in two separate ash layers separated by 97 years of sand dune. The prints in both of these layers go both towards the crater, which is shown here in black, and away from here shown in blue.

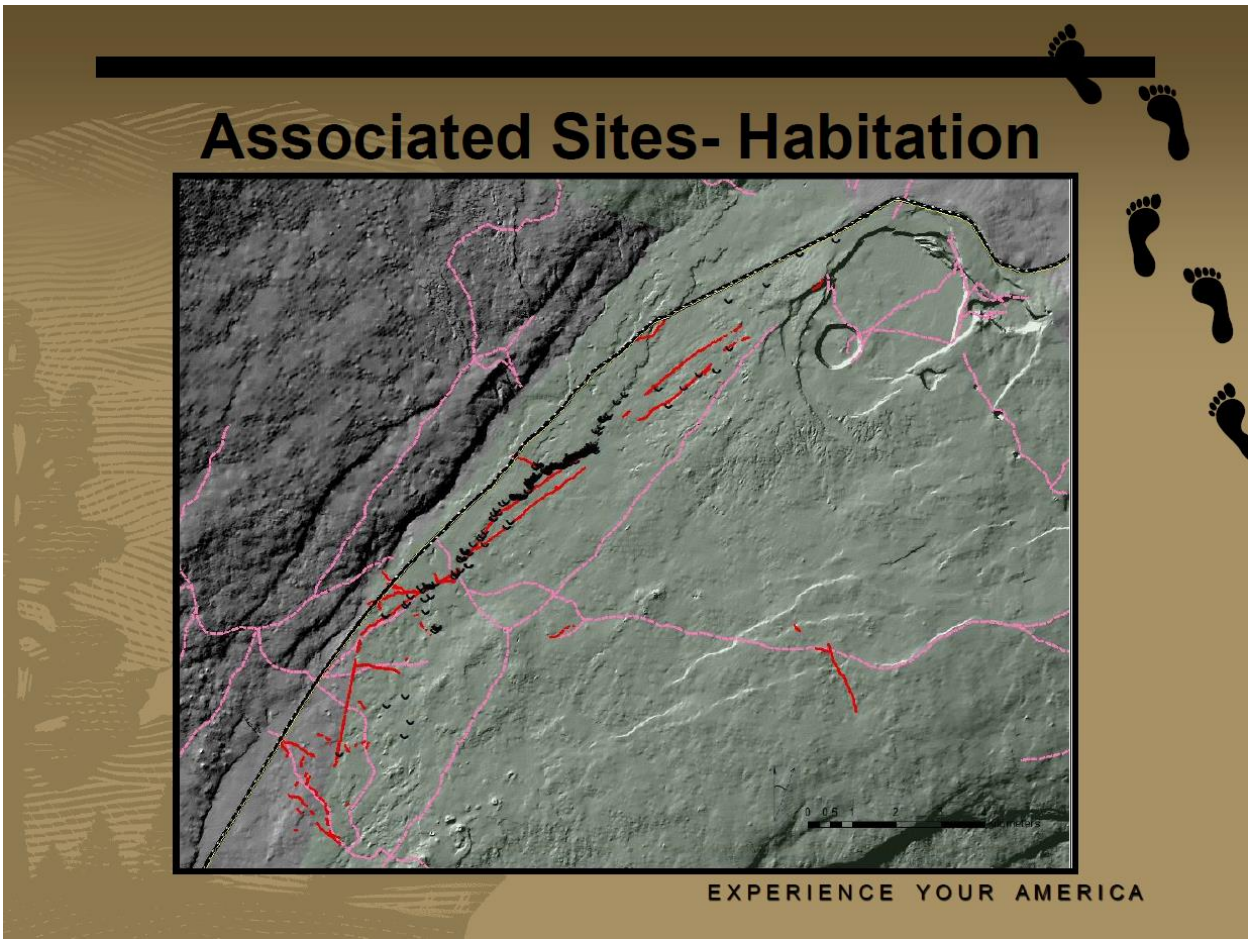


It's been suggested that the prints that head away from the crater are those of Keoua's army and the prints that go towards the crater are from his fellow warriors who returned to retrieve the bodies. While a plausible suggestion, there is no evidence to [support] this theory. In fact, many of the prints also head east and west, and the majority of the prints are not concentrated in the area where geologists suggest the deaths took place or the immediate vicinities themselves.



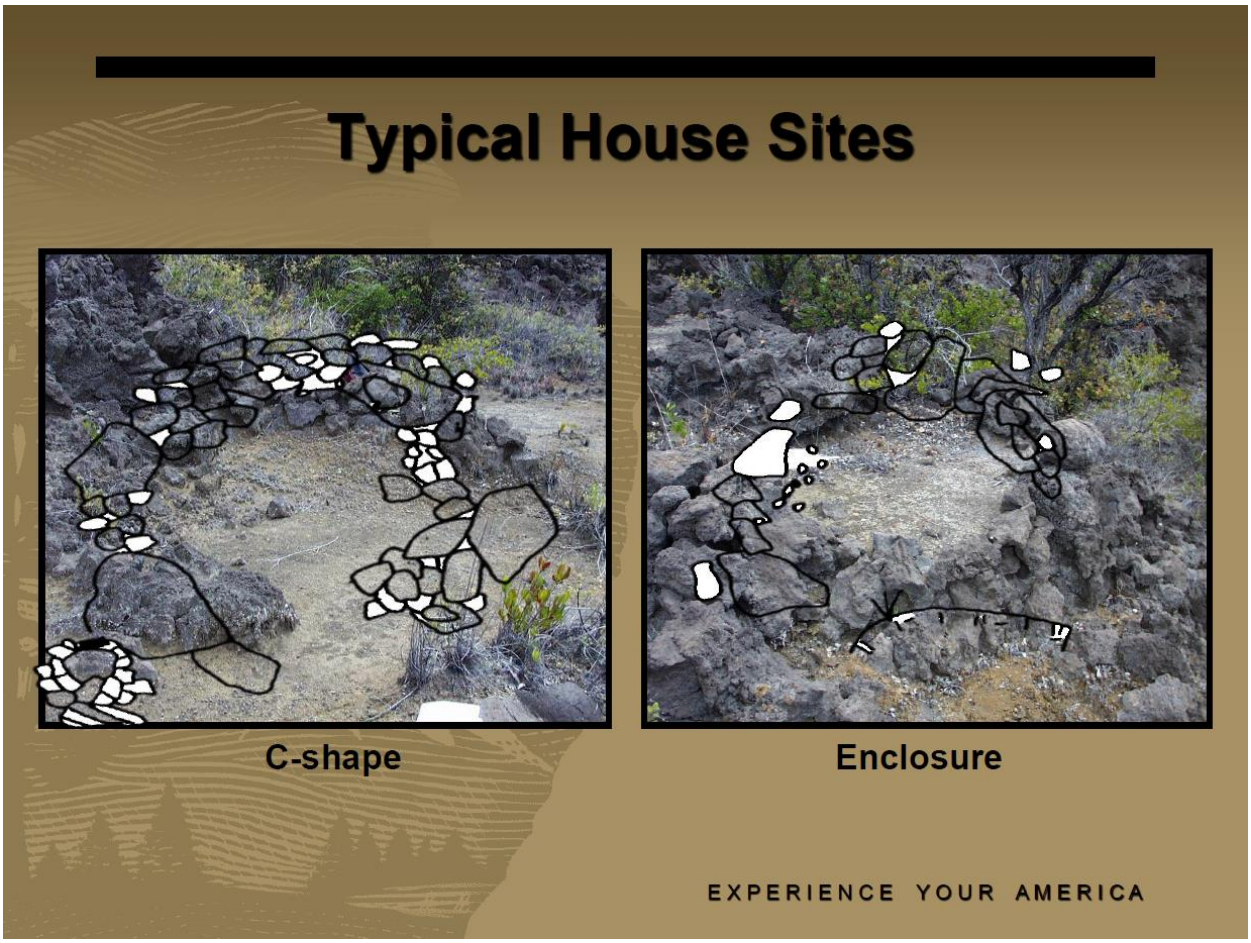
Four areas have a higher percentage of footprint impressions. These are circled in yellow. What is interesting is that, when we start to overlay the archeological data on this map, we see that many of the prints correspond to locations of old trail systems, including a string of cairns along the trail.

So people who were making these footprints were clearly following known trails through the desert. They weren't just going back and fourth through the caldera, they were also taking routes that took them both east and west.



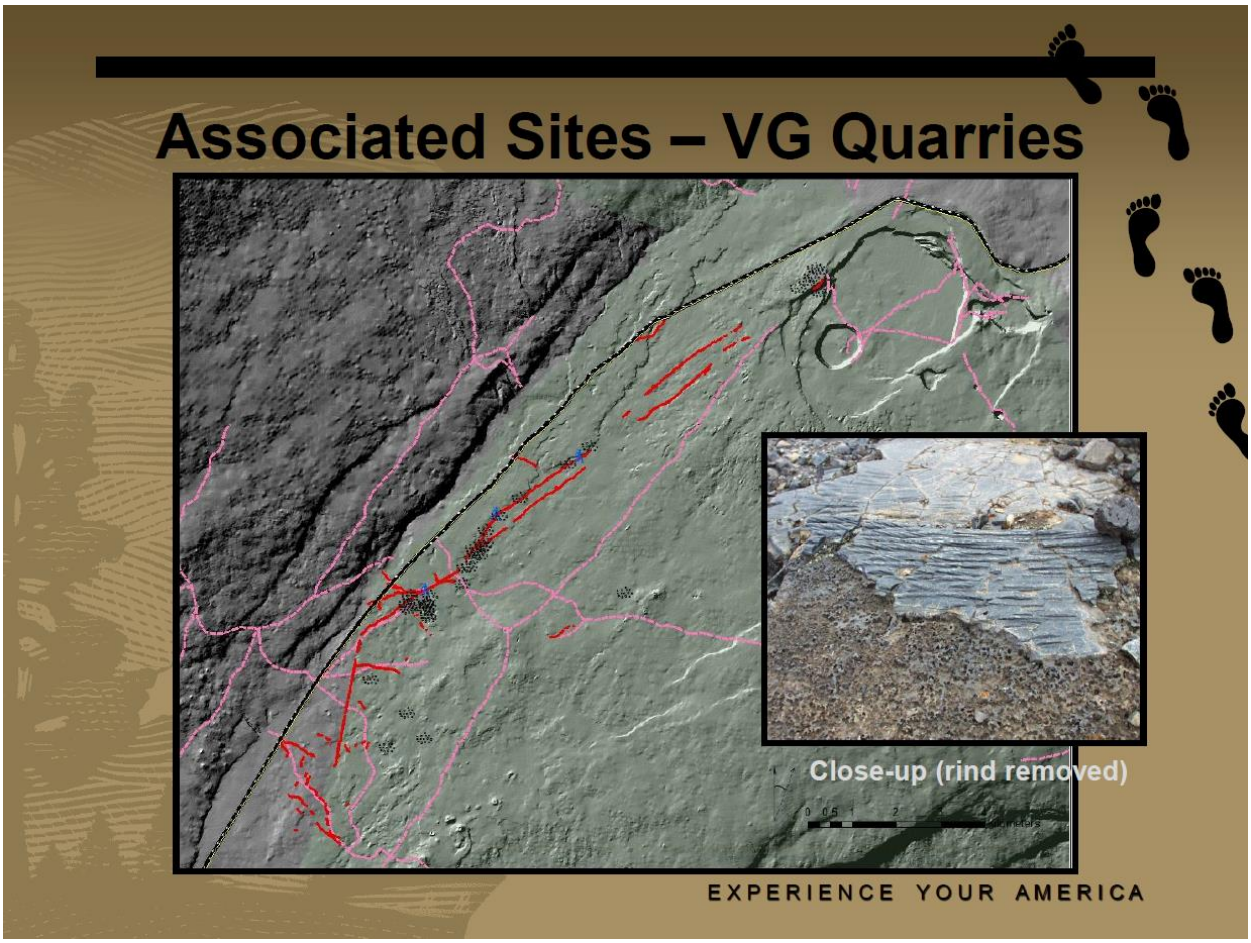
Also associated with the trails are over 200 house sites, you can see that in the black. These structures are usually single- or double-stack continuous stone walls built in a curved or semi-circular form. The walls function as excellent wind breaks.

The house sites are found along the edge of the Keamoku lava flow and are made from ʻaʻā rock. The Keamoku flow is a distinctive flow and was likely used as a visual boundary to navigate through the desert. The ʻaʻā provided material to construct the shelters and the inlet areas in the flow provided protection against the desert wind.

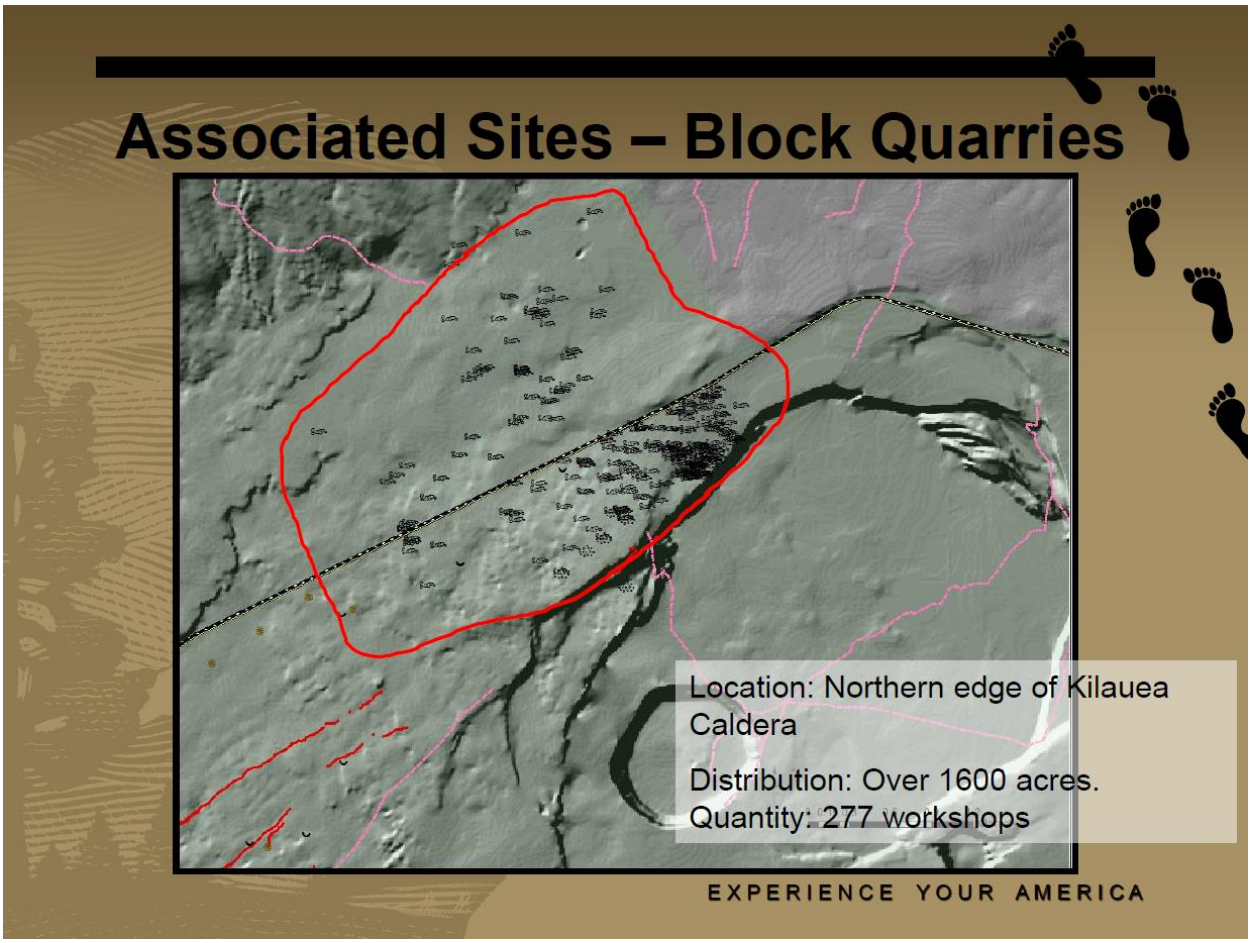


Excavations at two of these features indicate these structures were built before the 1790 eruption and during periods of calm between explosive events.

People were also gathering raw material here. Volcanic glass quarry rock areas have been identified in the trail system. Volcanic glass is used to make cutting tools. There doesn't appear to be any reworking of the material at the sites, suggesting that the material was removed and modified elsewhere.

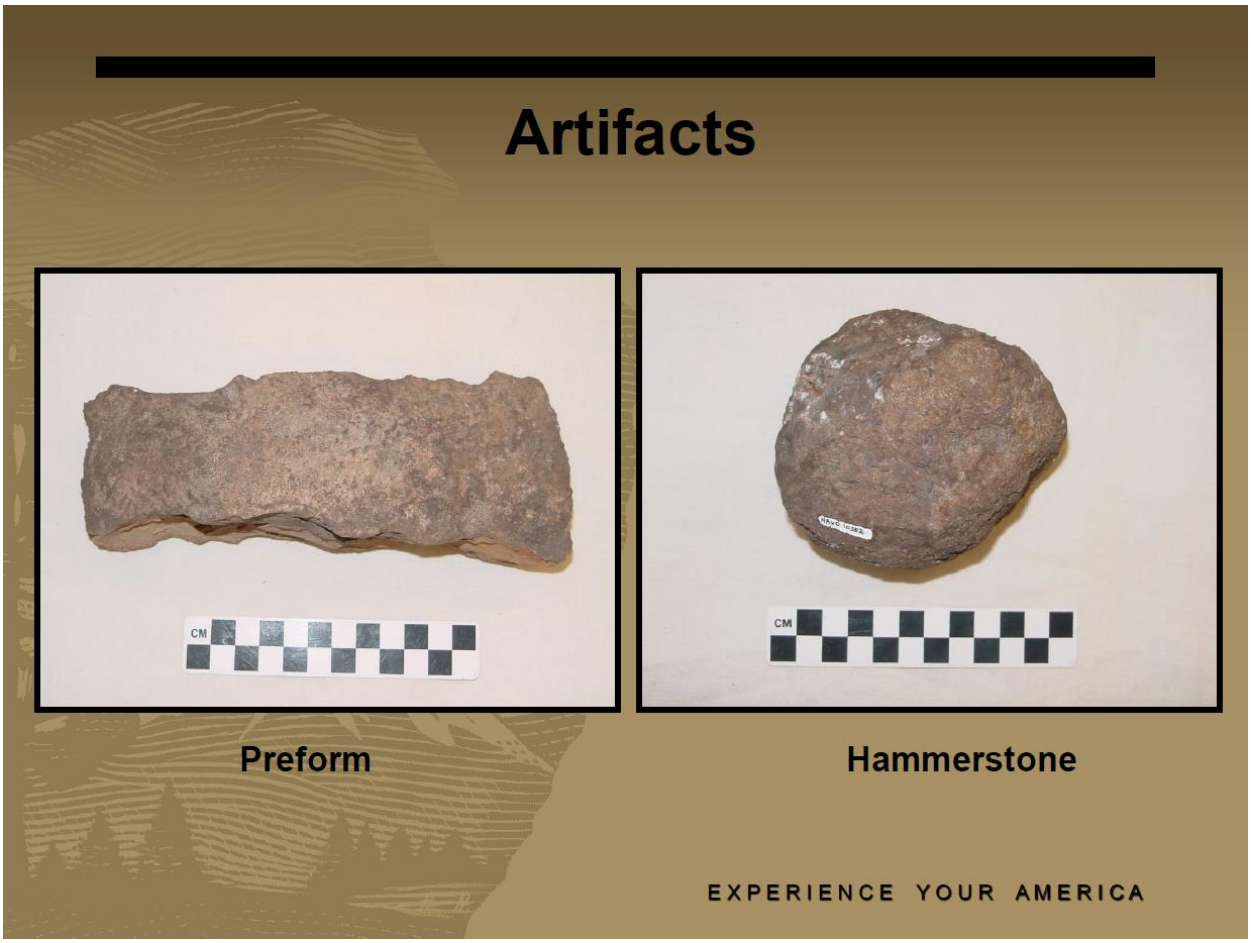


Finally, we have identified the large basalt quarry, which covered over 1,600 acres in the area located just north of the caldera, right in the vicinity where geologists believe Keoua perished. This site is comprised of over 277 individual workshops, where fine-grained basalt rocks are modified and shaped into stone tools.

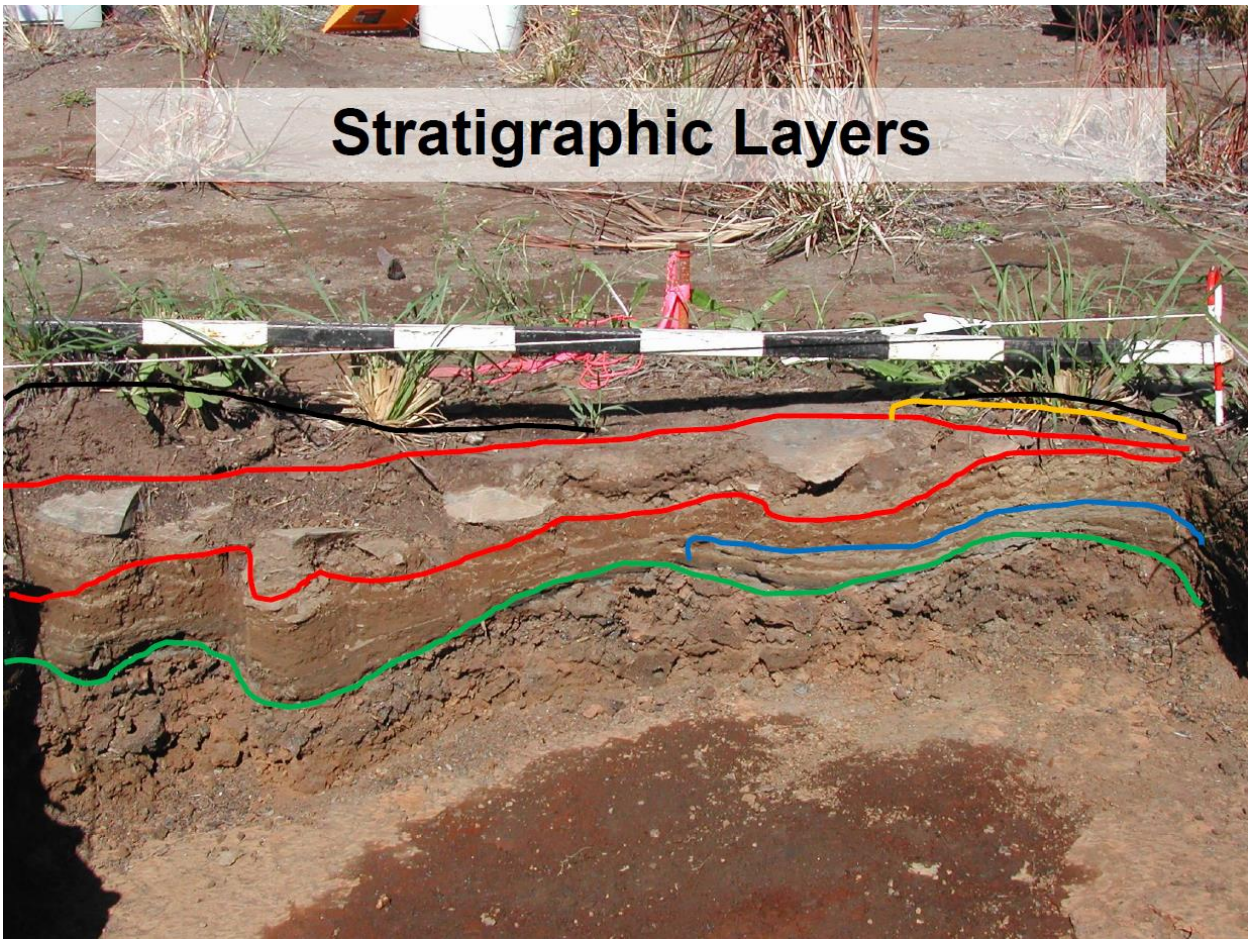


The site was formed after material was ejected during explosive eruptions from the summit area. The quarries represent the debitage, or the refuse rock, which is left over from the working of lithic rocks that have fallen at or near the site of the original location.

Also associated with the workshops were stone adze preforms and hammer stones. Preforms are the unfinished stone tools, which were left behind at the site either because a flaw was discovered or part of the tool broke off, marking the artifact—making the artifact no longer useful. And hammer stones are the tools that are used to shape the adze.



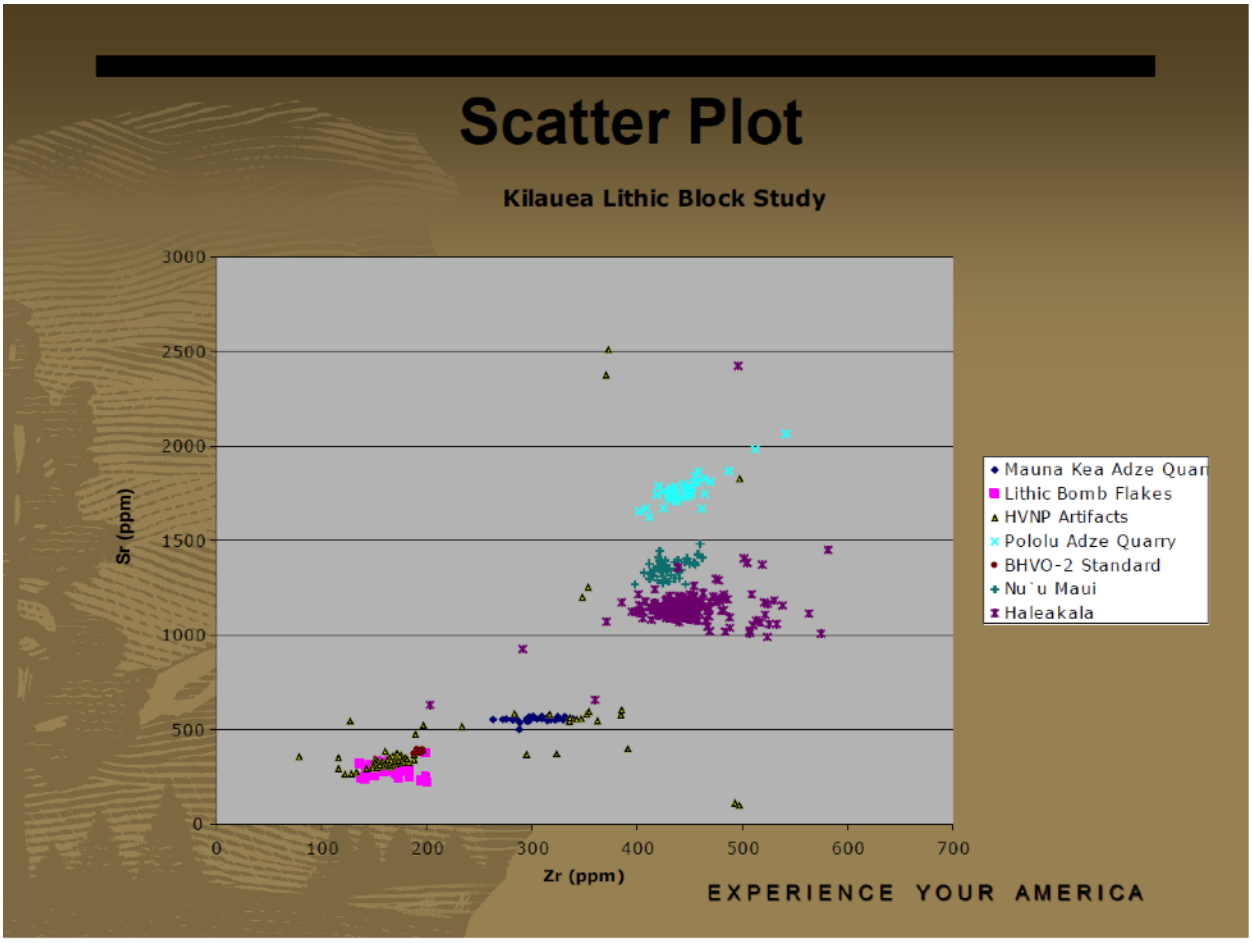
We conducted test excavations within selective workshops to try to determine the age and nature of the deposits and understand when and how the site was formed. We were able to correlate the stratigraphic layers with known geological events. The results suggested that the workshops were established in the late 1500s, but sometime before 1790, and that Hawaiians were selecting and working the stone material between erupting phases, likely within days after the ash and ejecta blocks fell to the ground.



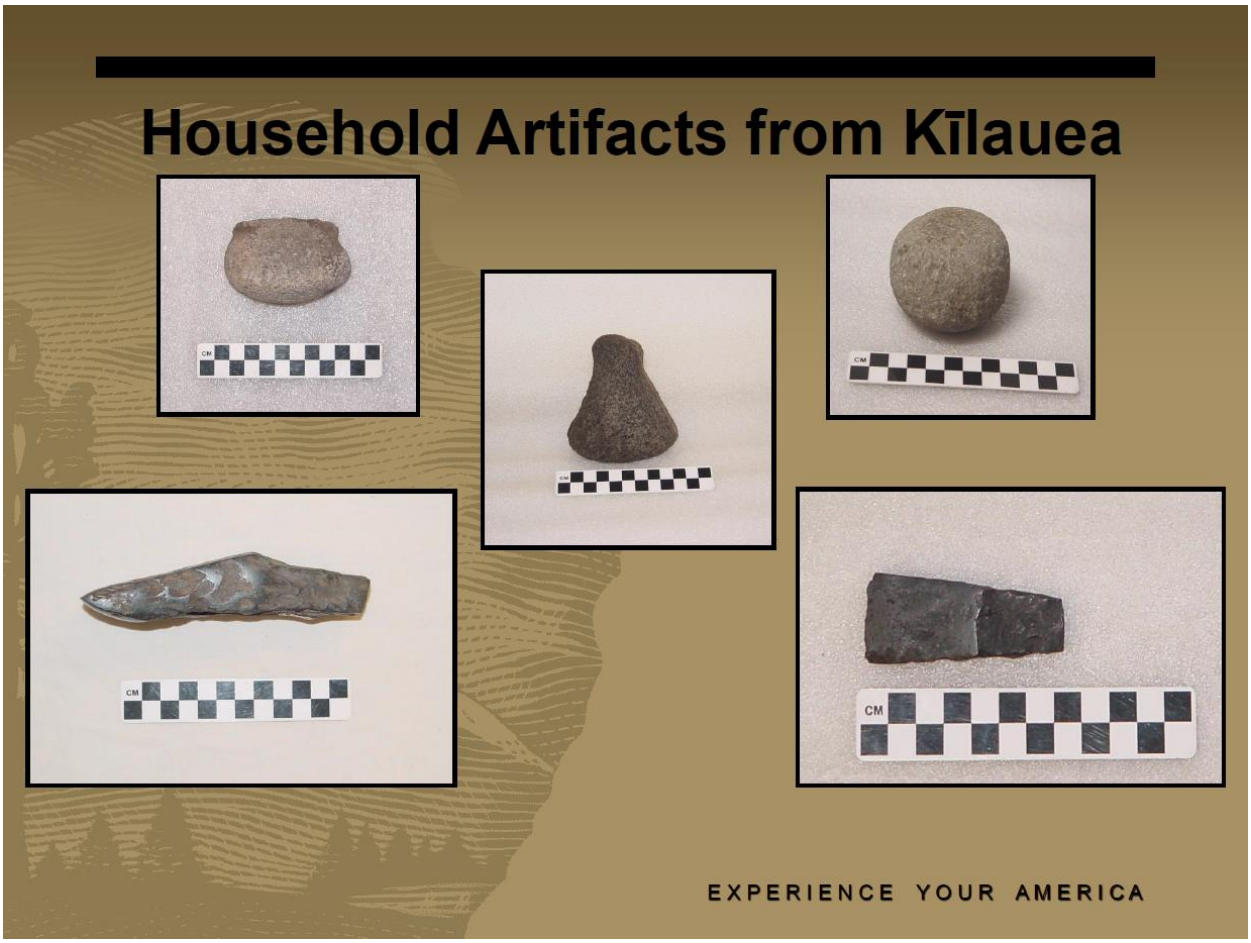
During the summer of 2007, we worked with the University of Hawai‘i at Hilo and students from Na Pua No‘eau on a joint project. One of our goals was to better understand the geochemical signature of the Kīlauea quarry and to analyze the stone artifacts throughout the park in an effort to understand where the material came from.

Lithic flakes collected by the students and 66 artifacts were analyzed using the university's EDXRF [energy dispersive x-ray fluorescence] spectrometer. The artifacts included stone tools such as poi pounders, cooking stones, adzes, hammerstones, and slingstones.

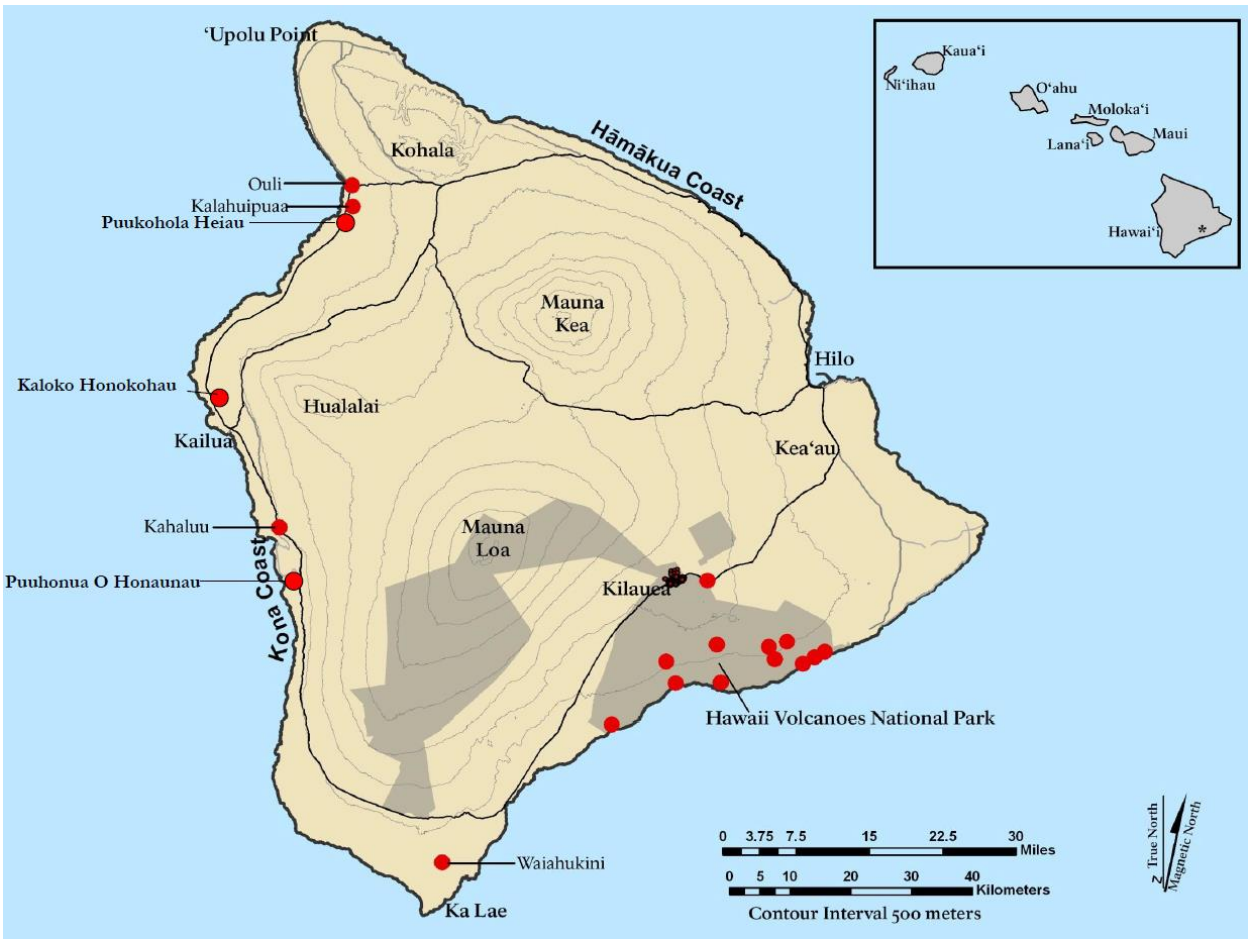
Analysis of the lithic debitage indicates the flakes [all] have similar geochemical signatures. This is an interesting find because the nature of the ejected material from the summit during an explosion isn't uniform in composition. The results indicate that there is preferential selection of similar blocks for the manufacture of stone tools in the area.



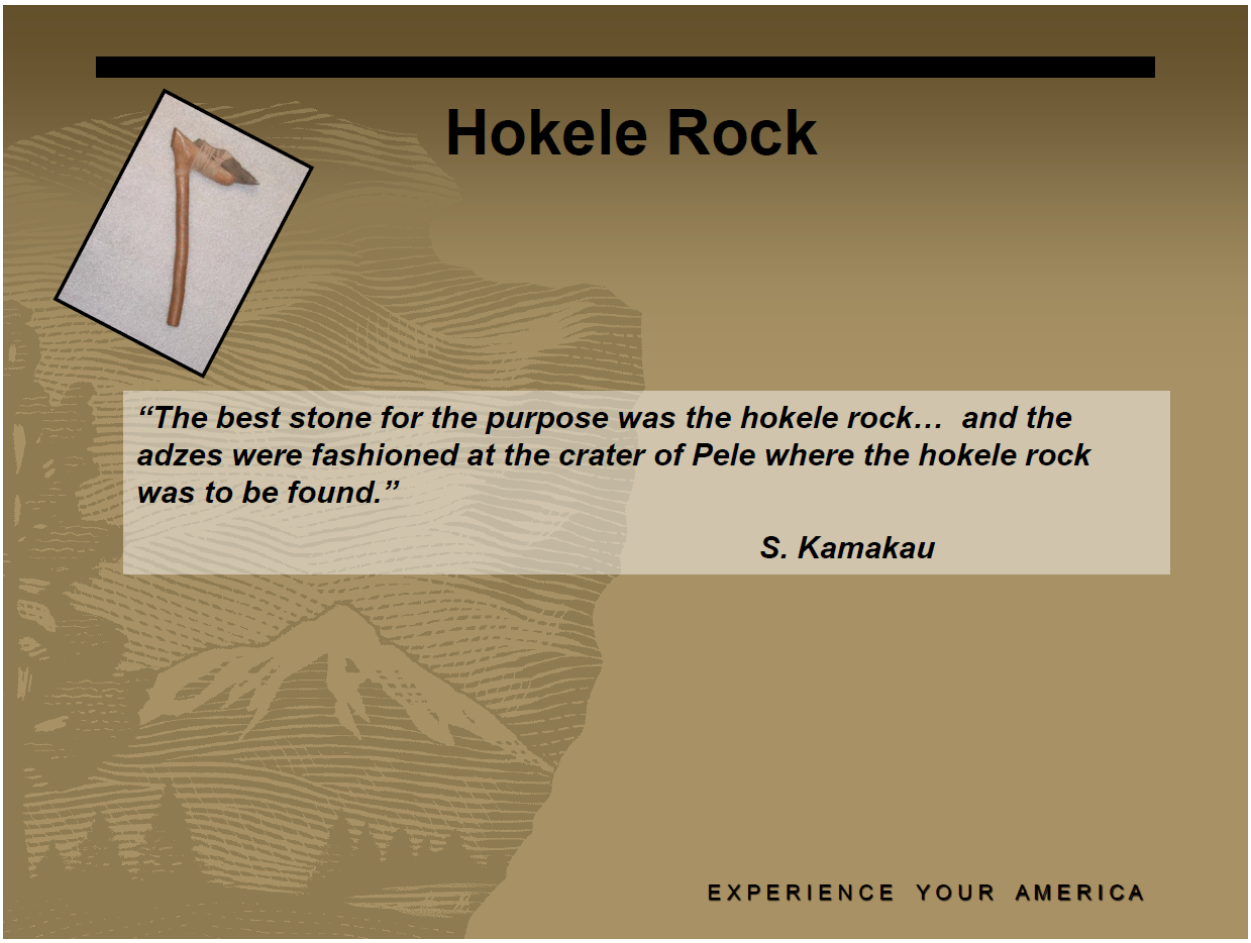
The Hawaiians were looking for specific basalt material amongst the many available blocks to make their stone tools.



The results of the project also showed that most of the house artifacts that were analyzed in the study came from this quarry site. In fact, 77 percent of the artifacts were made from material from Kīlauea.



As a result of this project, we now know that stone tools from Kīlauea material have been found at [more than] 21 locations.



Looking at the ethnographic record, [the Native Hawaiians] were able to find a name for the rock that was found at the Kīlauea quarry. Kamakau called it the "hokele" rock.

So, with one more piece of the puzzle in place, we now know that there are a number of resources in the desert; that trails provided convenient access connecting Hilo to Kaʻū and the caldera; that [the] volcanic glass that was critical for making tools attracted Keoua and others to this area—some of whom could have contributed to the prints we find in the desert.

We may never find all the pieces to the puzzle, but, working together, archeologists and geologists have found many intriguing parts.

Questions:

Q. Jade, most of those workshops are pushing the lithic blocks from 1790 and a little bit later, is it known that lithic tools were being made elsewhere in Hawaii at that time or is this just something local to Kīlauea?

JADELYN. I know that Peter is in the room and he might be able to answer that better. It appears that tools were being made [throughout] the late historic period. Kīlauea was just one source. Peter might be able to explain and have more information on other sources.

PETER MILLS: We still find koʻi [adze] made where, sometimes, when you get them under the microscope, you see signs that they were actually sharpened with metal files, where the sharpening lines (striations) are so perfectly uniform you can see they've been ground down with a metal tool.

I do think that there were probably, historically, a number of different sources that were still being used in koʻi manufacture. It wasn't that iron came in and immediately replaced all stone tools.

I would say that as far as the particular geochemical signature of volcanic debitage (chipping debris from adze manufacture) that the Kīlauea blocks belong to, it's a shield-building lava that is relatively low in trace elements like strontium, zirconium and niobium that we often use to discriminate one source from another, and it is, consequently, less distinct from more evolved magmas. It would be over-reaching to say that we are doing a good job of discriminating the Kīlauea source from potentially similar sources in the islands with EDXRF alone.

So I think we do a lot better job with our EDXRF sourcing, as John Sinton was saying, of determining where things *aren't* from rather than saying we know that they are from one specific lava flow and no other. I do think that with Kīlauea, the volcanic signature that we can detect with EDXRF overlaps with a number of other known sources. I would love to know what adzes were coming out of Kaʻū and South Kona (Mauna Loa shield building lavas) in terms of geochemistry there and whether we can discriminate between those two sources and Kīlauea sources with EDXRF.

But yes, it's definitely nice to have this signature with a very low tholeiitic kind of rock that's coming up from the bottom, it is very consistent.

JADELYN: And it makes sense that materials—native materials—will be collected at that point because it's available and it's good stuff.

Thank you.

(End of presentation.)

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Rising Mist: Ohu Aela I Uka

Speaker: Kuʻulei Kanahele, Edith Kanakaʻole Foundation
Monday, January 28, 2012

Introduction by Pua Kanahele

Aloha, again. I'd like to introduce the next speaker. She is Kuʻulei Higashi Kanahele, familiar name. She is my daughter-in-law. She has her Masters in Hawaiian Studies, which she actually translates very, very well.

She just finished a book on all of the Pele chants from all of the newspapers and any of the books that were printed. So she pulled out all these chants and printed a book on that, on the particular chant that she's going to be publishing.

She also has in the works, as far as publishing is concerned, and it should be out soon, something that is called "Ku Makou." It has to do with the Pele and Hiʻiaka saga. What she is doing with the saga is pulling out and looking at the travels of Hiʻiaka. She goes up to Kauaʻi and comes back down, pulling out all the place names, defining all the place names, looking at all of the rains and the wind that has to do with those particular places and identifying them, as well. So it's going to be a great book that she'll have out.

She also, when she was going to college, [analyzed] the story from the newspaper [by] Poepoe [on] Pele and Hiʻiaka.

So she's done a lot of work in the Pele and Hiʻiaka saga and tried to understand that particular saga and [is] trying to understand, more especially, the Papa Hulihonua part of it, which has to do with the Earth and the earth movements from that point of view.

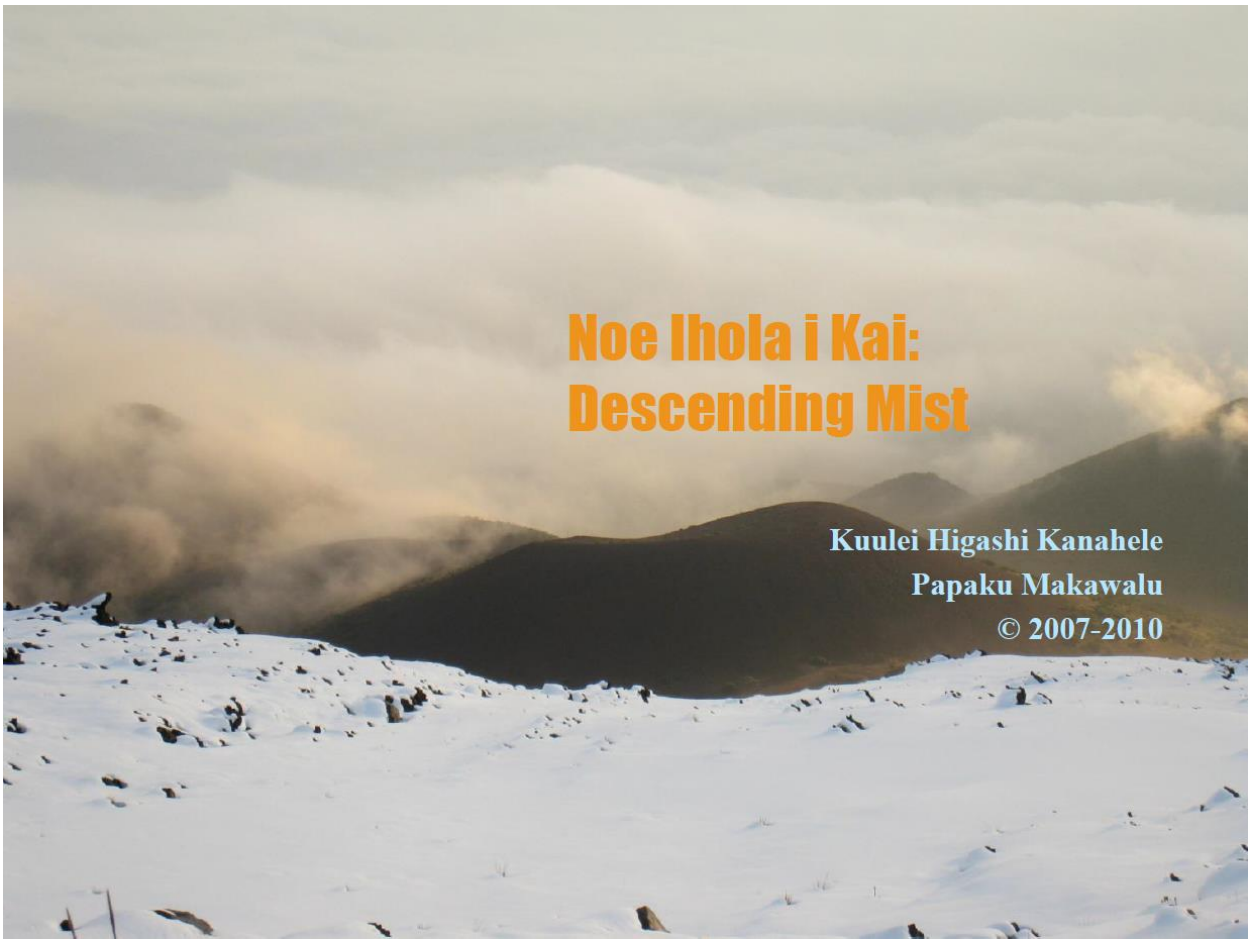
So this is Kuʻulei. She works with me, as well as Kalei and a group called "Papaku Makawalu," and . . . we . . . take the chants and redefine the chants, bring them up to date, bring the use and the meaning of it . . . so that it is relative to us today.

So this is Kuʻulei.

Ku‘ulei

Aloha kākou. Today I was asked to talk to you about mist and the way our ancestors thought about mist and the importance of mist in our forest here.

From our chants, how Aunty said this morning, we gain all our information from chants and . . . the chants name two main types of mist. One of the mists is called “‘ohu,” and ‘ohu we define as mist that rises. Another of our mists is called “noe.” Noe is mist that descends back down.

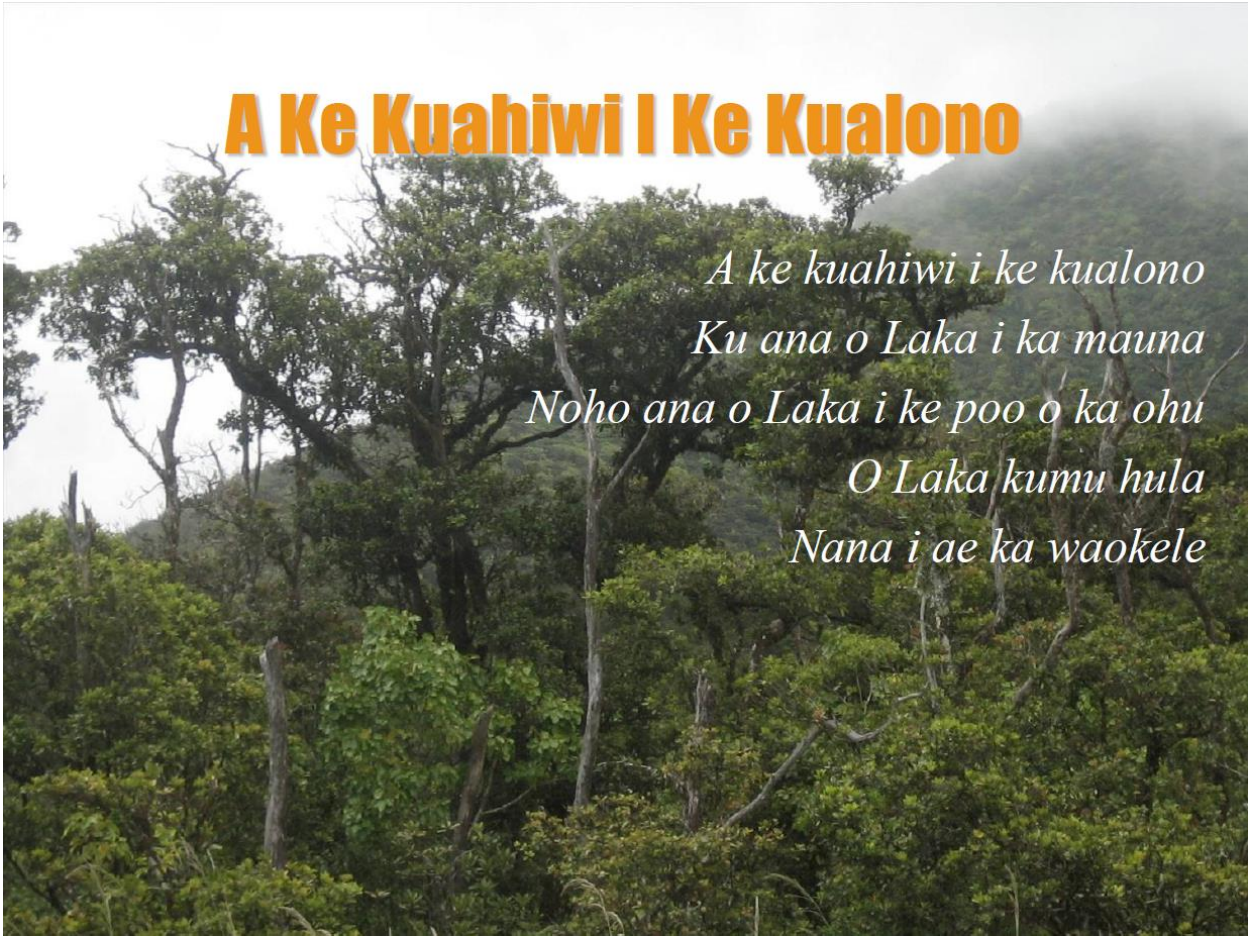


The reason for this differentiation is because these two mists, especially in our chants, come from two different sources. Hawaiians are very specific as to what they name things depending on the sources.

For example, we have all our rains; we have over 500 names for different kinds of rain, depending on if they fall straight down, fall sideways, fall lightly, fall heavily. So because of that we have our different names for mists and these are only the two main names of mist. As we get more specific into mist we will find many more ways mist was made.

So this chant we pulled information from is called "A ke kuahiwi i ke kualono" and I'm going to first talk about ʻohu, which is our rising mist. This is a chant from the Pele and Hiʻiaka moʻolelo legend. This is only the first five lines of that longer chant. It goes:

A ke kuahiwi i ke kualono
Ku ana o laka i ka mauna
Noho ana o laka i ke poo o ka ohu
O Laka kumu hula
Nana i ae ka Waokele.



Like Aunty said this morning, the first line of every chant is important. It tells you what the chant is about. This chant is about "A ke kuahiwi i ke kualono" and it sets the stage for where this mist is found: on our mountain tops and on our ridges.

The second line, "Ku ana o Laka i ka mauna," literally translates as, "Laka stands on the mountain." When we say, "Laka stands on the mountain," the imagery presented here is not of a female standing on the mountain—we're talking about the element Laka.

The element Laka, as we learned this morning, if you look at the name itself, the picture of Laka, we can see what kind of energy this deity is. The Laka energy is about water, it's about mist.

[The third line of the chant,] "Noho ana o Laka i ke poʻo o ka ʻohu," literally [means that] Laka sits as a source of ʻohu. This line tells us here that Laka is the ʻohu. Laka is that mist that we see in our forest, in our canopies out there.

One interesting aspect about ʻohu, if you look in our dictionary, the first entry, the first definition of ʻohu is simply mist. That is all it says.

The second definition, the second entry under that definition, if you go outside—if we were to all go outside right now—and exhale, what would you see? See that mist you see coming out of your mouth? That is ʻohu.

So what our ancestors did in applying the same name to those two actions shows how they saw it as related. Human beings expelling breath into the atmosphere is the same action that the forest is doing when it expels [mist]—when it transpires.

The tree has that same kind of action. Or, the humans have the same kind of action as the tree does in the forest. It provides that mist, that water to go into the atmosphere.

That is why, when we define ʻohu, even though the definition in the dictionary only says mist, that is how we know when we're translating chants that ʻohu is that mist expelled or transpired by the canopies, so it rises.

The next line is "O Laka kumu hula," and this line has several different ways we can interpret it. Literally, in "O Laka kumu hula," Laka is the hula teacher, and in our mist we know Laka as one of the deities of hula.

Why is she a deity of hula? Because Laka is this tree that we see here. This tree, this ʻōhiʻa, is venerated by a lot of hula dancers. Laka is the tree itself and what the tree does in the forest and is what hula does. Hula tries to imitate that movement of the tree in the forest, the bend and the sway of the limbs of the branches. So "O Laka kumu hula" has many ways you can interpret it. Laka is the hula teacher; Laka is the tree itself. The final definition of kumu is "the source." Laka being this hula deity is the source of hula. The ʻōhiʻa tree by its movement in the wind is the source of hula.

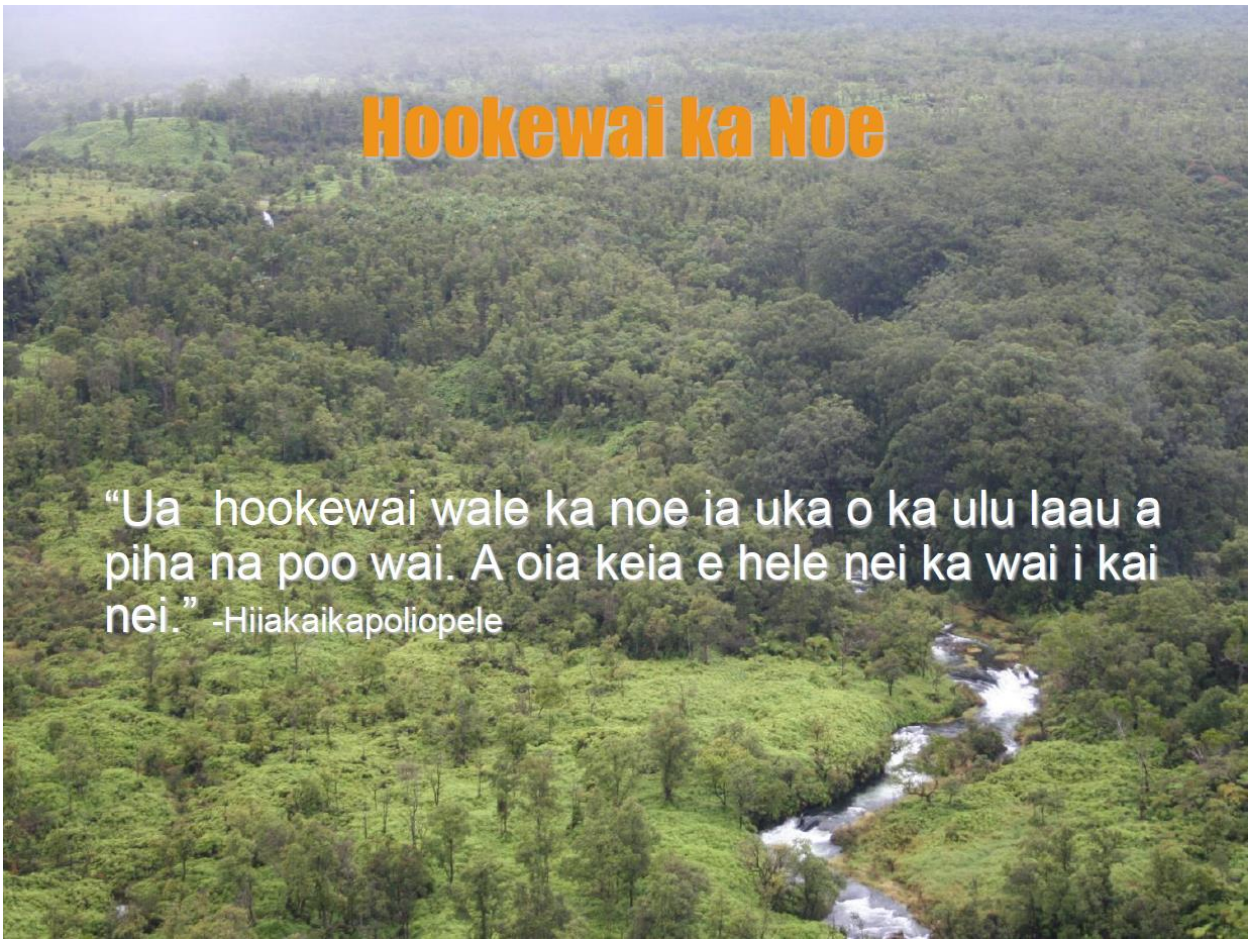
[The last line of the chant is] "Nana i ae ka waokele." It is she, it is Laka, [who] steps through the forest. Laka does this in her forms as the ʻōhiʻa tree, she is a kumu hula and Laka does this as her kinolau, as her ʻohu form. So we see Laka's presence throughout the forest, throughout the waokele.

So this is just the recap of Laka. Laka is the ʻōhiʻa, the kumu hula, and Laka is also that exhalation of breath. She is the transformation of the trees, she's the ʻohu that we see rising from the canopy.

Here is just a shot of our island. Sitting in our ʻohu, we have our mountains rising above—Mauna Kea, Mauna Loa, Kīlauea behind, Kohala and Hualālai. So that is just a short synopsis of ʻohu in my 15 minutes. So we know that ʻohu rises.

Another mist that our chants describe is "noe," and noe descends. So with the combined presence of ʻohu and evaporation from the ocean and other water sources we have, then we have precipitation. Part of that precipitation is the noe and that is the mist that comes down.

Taking a quote from Hi‘iaka in the Poepoe version of the Pele mo‘olelo, we see that “Ua hooke wale ka noe iuka o ka ululaau a piha na poowai. A oia keia e hele nei ka wai i kai nei.” Hi‘iaka said this when she was travelling on the coast and a fisherman stopped her and was wondering why [was a] stream flowing because there hadn’t been any rains lately.



So why is the stream flowing? In his mind there [had] been no rain, so there [was] no source of water for this stream. What Hi‘iaka tells him is this: the noe, the mist in the upland is what is supplying the forest and recharging our ground water. “A piha na poowai”—recharging the ground water—and this is what is causing the water to flow to shore.

Hi‘iaka understood and she is informing this fisherman of the value of mist in our forest. It’s not the heavy downpour of rain that supplies our ground water, it’s the constant presence of mist that we have up there.

The mist, if we take a look at this word, hookewai. Hookewai is a soft kind of drip we have, and I believe science calls it “fog drip.”

Anyway, kewai, I believe, now in our modern day we can define it as fog drip. This is the mist that is collecting on our vegetation, on ʻiliahi, pūkiawe and the pretty lehua. It is also the mist that is collected by the mosses. Huluhulu waina.

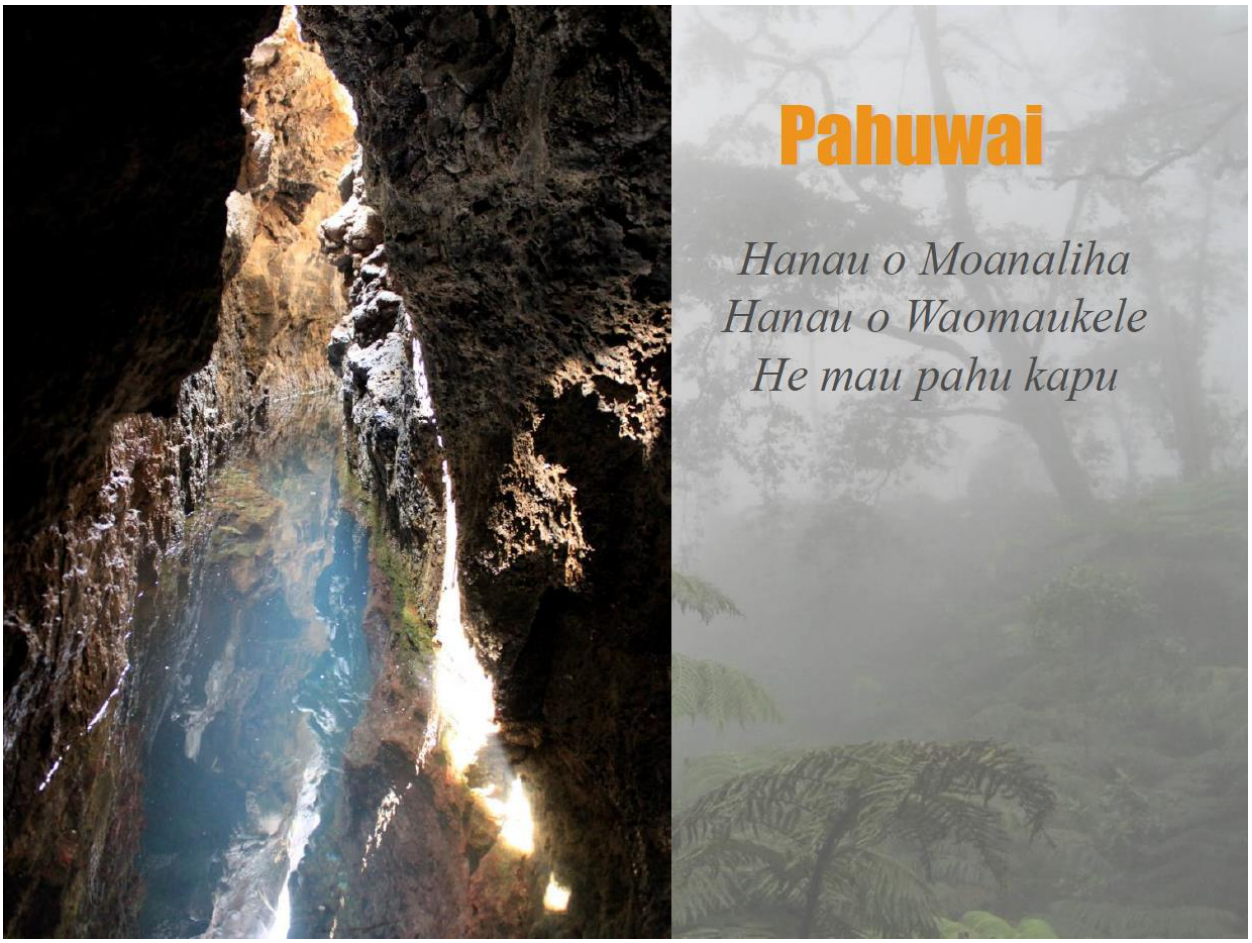
We know that it is the kewai, the fog drip, that is . . . feeding the root systems of these plants and also filling up our groundwater supply.

This is a line from the Kumulipo, and . . . this line occurred after the birth of Kane and Kanaloa, which are our deities of water. After the birth of these water deities we have:

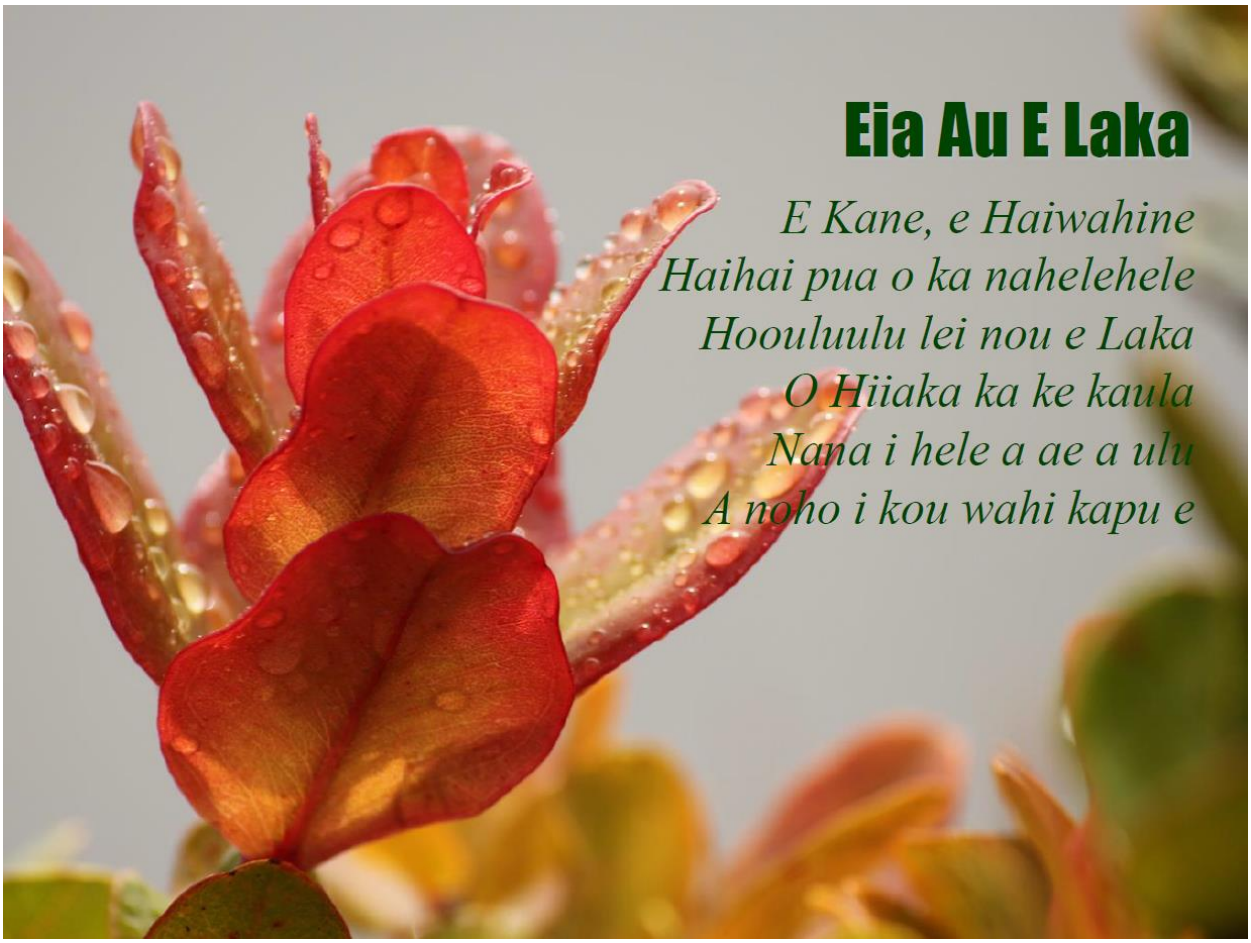
Hanau o Moanaliha
Hanau o Waomaukele
He mau pahu kapu.

So we have the water and now we have the birth of the receptacles holding these waters. We have Moanaliha, which is our deep subterranean underground water source. We have Waomaukele, which is a familiar term: this is the water source in the forest. We have two receptacles of water here in our Hawaiian environment: underground water, and our forest acting as a sponge that holds all this water.

These are sacred pahu, sacred containers. If you can imagine pahu literally as a drum, you take off the top and that's the image we have of that bowl.


Pahuwai
Hanau o Moanaliha
Hanau o Waomaukele
He mau pahu kapu

So what is the connection between . . . noe and . . . Laka and . . . Pelehonuamea? We're talking about conversing with scientists and Hawaiian practitioners; we have this chant "Eia au e Laka."



Laka in some moʻolelo, some versions of the Pele moʻolelo, Laka is Pele's daughter. How Aunty Pua said this morning, you know, some times the chants, you have to interpret it literally, . . . so the lay person can get an idea of what the composer is chanting.

So on the surface level, Laka is Pele's daughter. When you dive deeper, you begin to understand the different layers of the way the elements play with each other, the relationship the elements have with each other.

So another example is how Kanehoalani, in the genealogy, was Pele's dad. What is the significance of naming the sun as a father to Pele, to the lava itself? So in our stories we can see that our ancestors viewed the sun as the father, as the larger volcano in the sky. Pele being his daughter in the genealogy is the representation of that sun, that heat, that volcanic energy here in the earth.

So when you look at relationships in the story, Pele has a mother, Pele has a father, Pele has sisters and brothers and daughters. Once you go deeper you begin to see why they were labeled as siblings, why they were labeled as relatives, because you see the play that these elements have with each other.

So in our stories, Laka is Pele's daughter, "Eia au e Laka," and she has a relationship here; this is a chant about Hiʻiaka, Eia au e Laka:

E Kane, e Haiwahine
Haihai pua o ka nahelehele
Hoouluulu lei nou e Laka
O Hiiaka ka ke kaula
Nana i hele a ae a ulu
A noho i kou wahi kapu e

So we see that same line we saw earlier in the Laka chant "Nana i ae ka waokele." We see that here in the second to the last line, "Nana i hele a ae a ulu." This line is referring to Hi'iaka, O Hiiaka ka ke kaula

"Nana i hele a ae a ulu." We have that relationship between Hi'iaka, who we know as Pele's sister, and Laka, and what is their role in the forest when we see a chant like this?

So we are addressing Laka. "Here I am, Laka"; "Eia au e Laka," and we addressed the other forest deities, and then we see the growth of the flowers and we're picking the flowers to compose this mele. But what this chant is also talking about is the role of Laka as mist in the forest and the role Hi'iaka has of kihoihoi, of restoring the [burned] forest back itself after a lava flow.

We do know that it is Hi'iaka's function to restore the forest. So Hi'iaka is the new forest growth. The Lohi'au is growing up. We see that Laka's mist is essential for that new forest growth to come up. So that is what this chant is talking about. That is the role of mist in our Hawaiian forest.

That is all I have. Mist 101. Any questions?

Oh, that is not all I have. I made a thing. So here we have noe coming down, 'ohu coming up and our kewai feeding our forest and our water supply.

Now that is all I have.

Questions

Q. I have a question. You know the [volcanic gas] plume we have coming out here [from Halemaʻumaʻu Overlook crater], is that the realm of Pele or is that Laka?
KUʻULEI. That is Pele. That plume is the result of the magma. Actually, the plume itself, we have different nomenclatures for the fire, the smoke itself, so we have nomenclatures like Kukamahuiakea, which is referring to the vog itself or the smoke itself. So we have that kind of smoke. We also have smoke that originates underground from the magma, smoke that originates from lava and smoke that then interfaces the wind. So the plume smoke, I believe, is Kukamahuiakea, because it is the smoke from lava, not from magma. So the whole different smoke and the whole different entity.
PUA: Then once it mixes with the air it's ʻuahi, it's a different name. It is a Pele thing. She's talking about a weather system that is coming from Laka; we also have a weather system that comes from Pele.

Thank you.
(End of presentation.)

Waipiʻo: The Bend in the Water

Speaker: Kaeo Duarte, Kamehameha Schools
Monday January 28, 2013

Mahalo, Jim, for bringing me back. Actually, I haven't seen Jim, Frank, and Andrea; it's been at least ten-plus years since I was an intern here under Jim. In a lot of ways, mahalo for having me, [my time as an intern] actually influenced a lot of what I do as a hydrologist.

Mahalo, Kuʻulei, you did exactly what I hoped you would do. I purposely asked her to switch because I knew she would do a much better job with her photos and discussion of some of what I wanted to talk about a little bit.

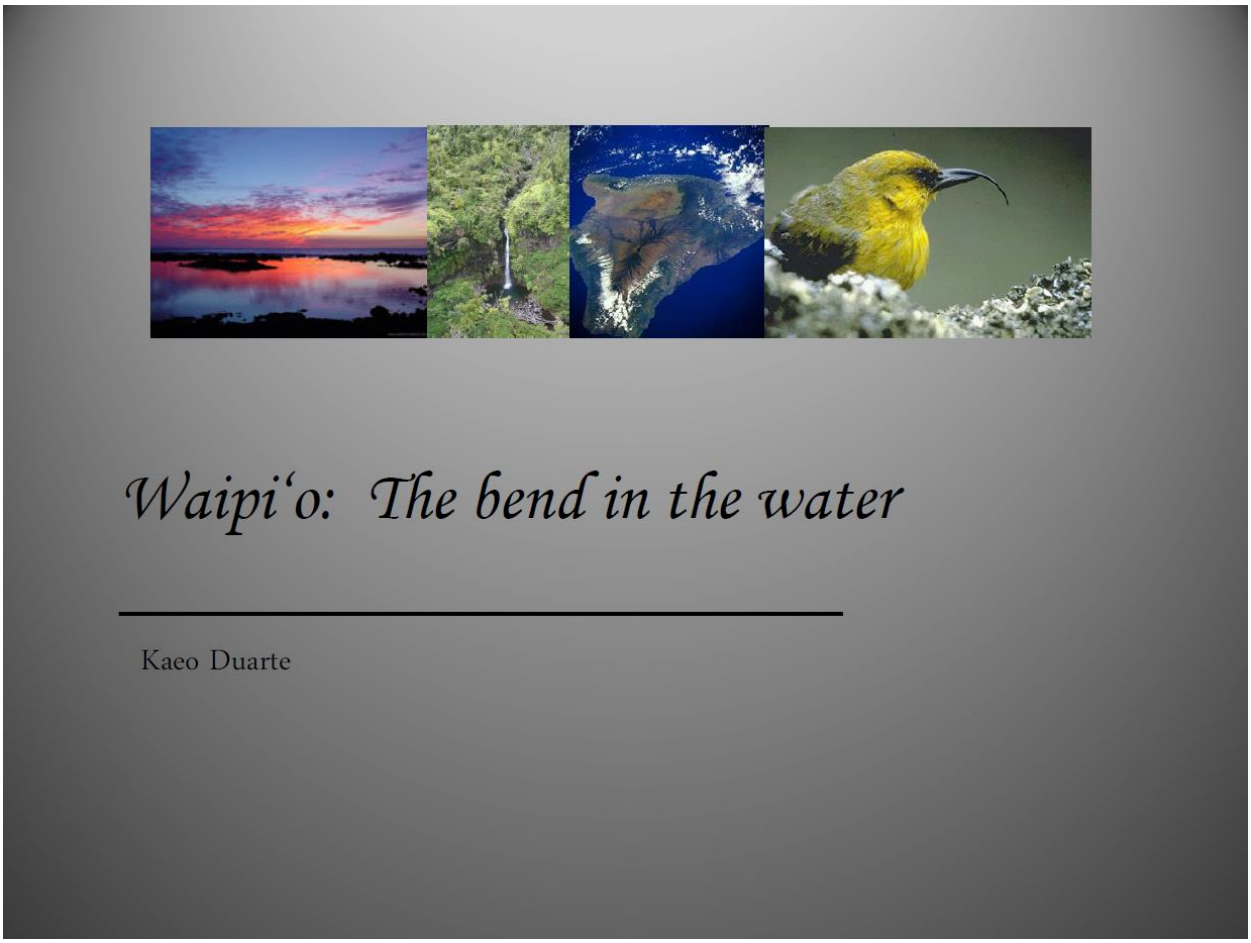
In fact, I think the Papakū Makawalu team should be photographers on National Geographic; their pictures are so much better than anything I could ever do.

So it was here, on Kīlauea, when I was between degrees and I studied geology as an undergraduate [in addition to] hydrology. Actually, a big part of my talk today—my main focus—is ground water hydrology, which, in the science world, is called hydrogeology, which means study of earth and water.

In the Hawaiian conceptions, too, I think it's the union of earth and water. [During] the talk I'll try to focus on . . . that union of earth and water and the life it brings forth, and how it influences what I do and how I do what I do.

Jim asked me to talk about the hydrologic cycle. I'm not going to do that. Kuʻulei did that, I think, much more beautifully than me. But [I will] sort of take off where she took off [and talk about] how it influences me and what I do.

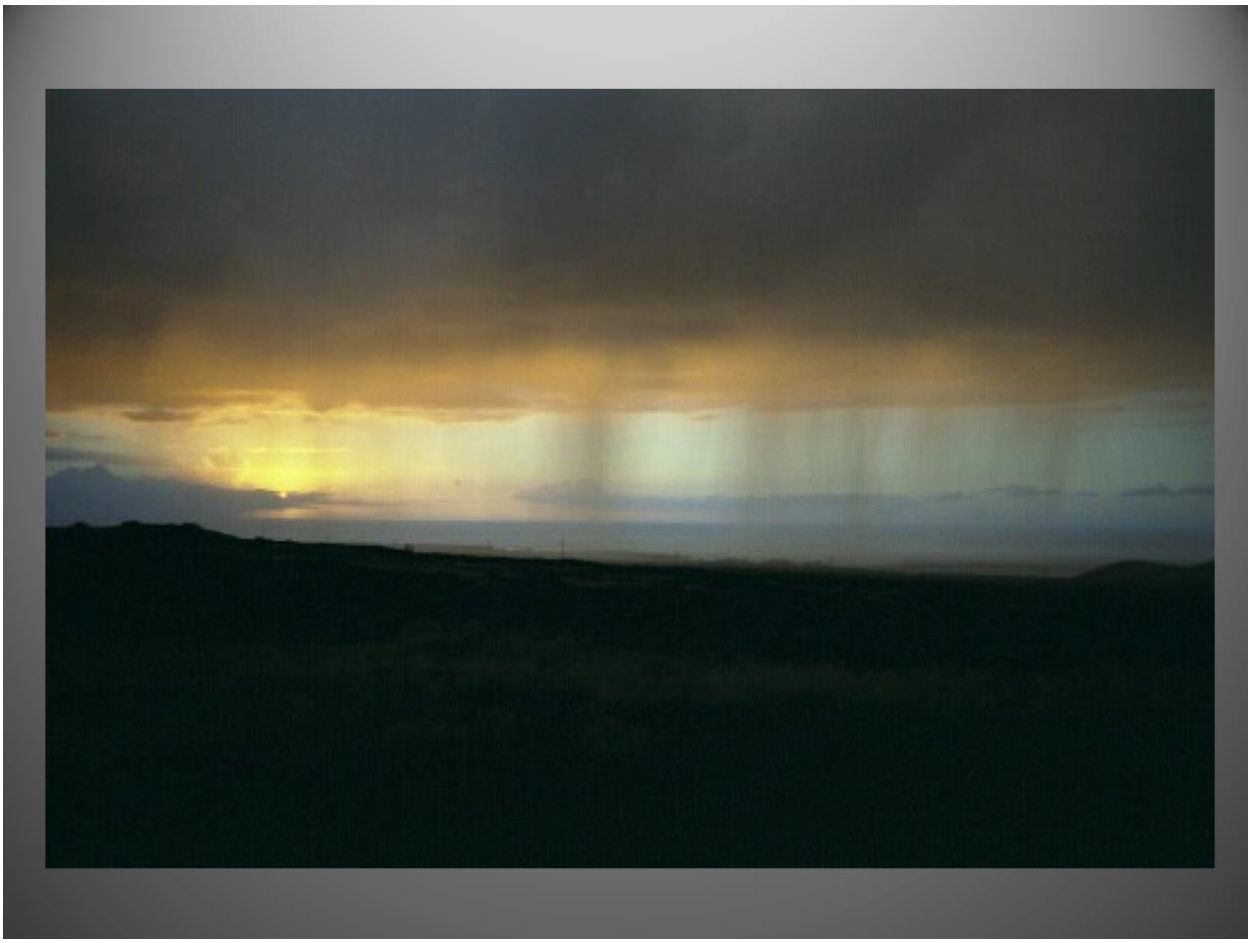
All the scientists in the room can moan [that] I'm actually an engineer, not a scientist. Science is the systematic study of nature, really, in a nutshell. Engineers . . . try and apply that knowledge to solve problems. A lot of what I do today is, as manager and engineer for Kamehameha Schools, I work with water issues that (indiscernible).



So, why do I call the title of my talk “Waipi‘o”? Throughout my journey I’ve had different mentors over the years. Actually, Jim was a mentor and [that] involved a lot of beer—an underlying theme with most of my mentors.

What is the hydrologic cycle? One kupuna (elder) I had talked to, I asked, “what is the [Hawaiian] word for hydrologic cycle?” He said, “Waipi‘o” . . . He explained [that] pi‘o is a curve or an arch. You think of cycle, in fact, Ku‘ulei, your last line was absolutely perfect, the curves or pi‘o as an arch is one way of looking at it.

Even though it’s not particular to Waipi‘o Valley, on this island you could describe it as water in its different forms as it bends, as it bends from rain, or from clouds [and] transforms to rain, [and] that rain will transform itself to surface water. It can bend, transform itself to groundwater, in [the] form of a waterfall.



To use this valley, this is the Lumahai, Kauaʻi, we didn't want to make it all about Waipiʻo Valley. You can see embedded in here is all the stuff that Kuʻulei talked about. Back here [out of the image] is Waiʻaleʻale [and the stream is] the different bends the water will take. Very literally, in the bend of her stream, in the water, wai hī, that seeps out of the mountain, and the kēwai, the ʻohu, the noe in moanaliha, wao nahele, and so forth, and actually the rainbows you see here, which is the bending of light in water, through water.

So in this one picture itself, many of the manifestations—that Aunty [Pua] and Kuʻulei talked about—in the physical world—and what the kupuna I talked to talked about—is many piʻo, or bending the water, takes as it moves through our ʻaina from the heavens.

So what I wanted to do in 15 minutes is not necessarily talk about all of this, which is really, in Western terms, the hydrologic cycle, what hydrologists study or ecohydrologists or geohydrologists study, in the many different forms. So this theme itself is a whole branch of science. Groundwater is a whole branch of science; people dedicate their whole lives just to that piece.

The water in the forest in ecology is a whole branch of science, just around that part. The discharge to the ocean, whether it's the estuary or groundwater, submarine groundwater discharge, whole branches of science, just for those different pieces, those different piʻo of water.

Because the time is so short, I'm just going to kind of touch on how both traditional knowledge and the study of science, or the tools I've learned in my journey from Western schools, as well as what I've gained from tradition influence what I do and how I do it. Not that I just want to talk with you about myself, but Jim had asked for me to talk, sort of, about how that manifests itself in the current day.

So if you look at the two [terms], science or traditional knowledge.…Science … is the systematic study of the natural world. Tradition is that which is handed down from generation to generation, and knowledge, which reflects a worldview, [and] necessarily reflects the culture and the religion, … is a reflection of the nature of the people passing on this knowledge.

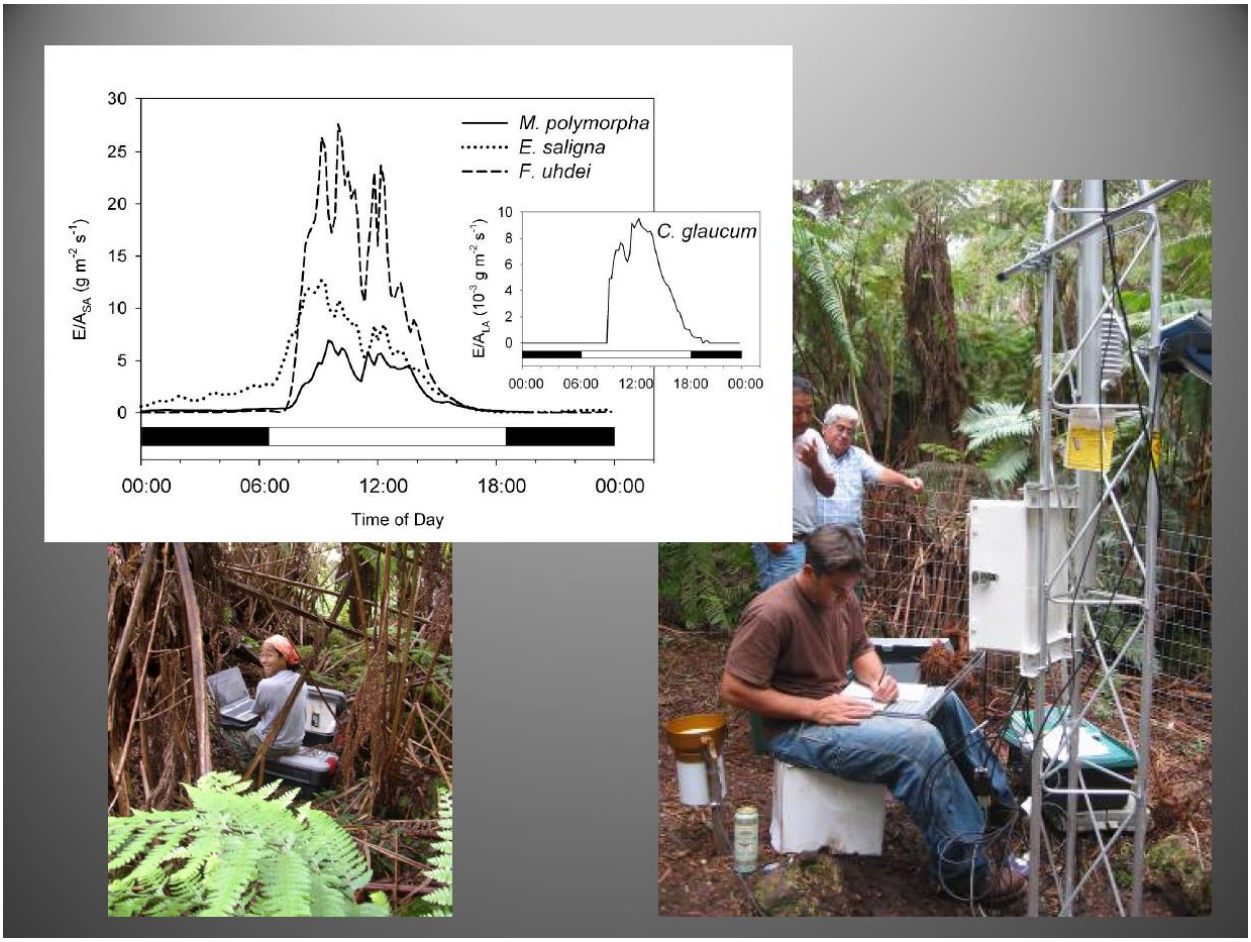
So, for me, it is not necessary to discuss if we [Native Hawaiians] did science—of course we did science. Anyone who systematically studies the natural world is doing science. ….

Traditional science is the systematic study of the natural world that is influenced by a worldview that is Hawaiian. My knowledge of science or my knowledge of traditional knowledge isn't perfect, so … I don't have perfect knowledge of either. My journey is trying… to gain different types of knowledge [in both worlds] and, as an engineer, apply that to different problems and solutions.

So here is one [example]. I'm going to try and start mauka (inland), and work my way makai (seaward). As I started [to say] earlier, … Aunty Pua talked about how Pele is the fluid form . . as it moves from deep in Papa. Geochemically, she is the transmitter of bringing nutrients and minerals to the Earth's surface.

Water itself, pure water, cannot give life. It has to be the union of water with nutrients, either through plant roots or through transportation. So water, really, through its journey, . . . is the vehicle for the transmission of life …

So it's really that union, and Aunty [and Ku'ulei did] a much better job than me, of [describing] the union of Papa and Wākea, of Kāne with different forms of Hina, Laka, Lea, and all these different other forms . . . that brings life.



So here, this is a study I did. I'm just going to try and breeze through different ways in which that knowledge informs why I study things. This is a study I did; this is Honaunau Forest in Kona. That is ʻōhiʻa, that is eucalyptus, and that is like an ash, and that is hapuʻu.

This is a study just to understand . . . the use of water. You [often hear] about [how] native forest conserves water... When I first started studying all these things I realized that nobody had actually proved that. So this study is using scientific methods to describe the water use by native and nonnative plants.

All you have to know (when looking at this graph) is that this is ʻōhiʻa [*M. polymorpha*], this is eucalyptus [*E. Saligna*], and this is one part of the amount of water [used by these plants; E/A_s is sap flow per sapwood area]. So, ʻōhiʻa used half of the amount of water as eucalyptus and one quarter of the amount of water of [tropical] ash [*F. uhdei*] (Kagawa and others, 2009).

So as a result of this study, the one thing that I wanted to bring about—and some of you have heard this story at other talks I've given—but it's a nice, simple example of how tradition and the part of me that is Hawaiian influences what I did. This wasn't put into my methods when this was published in an international journal, but the location of this site was truly given to me by an ʻelepaio (flycatcher).

The story goes…Imiola [a coworker], here, and I looked for stations. We did one study in native forests, [and] one study in nonnative forests. We go into forests, we do our—I do my pule [prayer] to myself for guidance and so forth. We walked in many different locations, spent about half a day looking for the right spot. Right behind here [is] the large koa tree that fell down on the ground.

All the time we were there, birds were way up through the tall trees in the forest. We sat down on the koa log. We sat there, and then an ʻelepaio landed at our feet. That doesn't happen that often at these places. Landed at our feet, we looked at each other and said okay, this is the place; this is where to place the station.

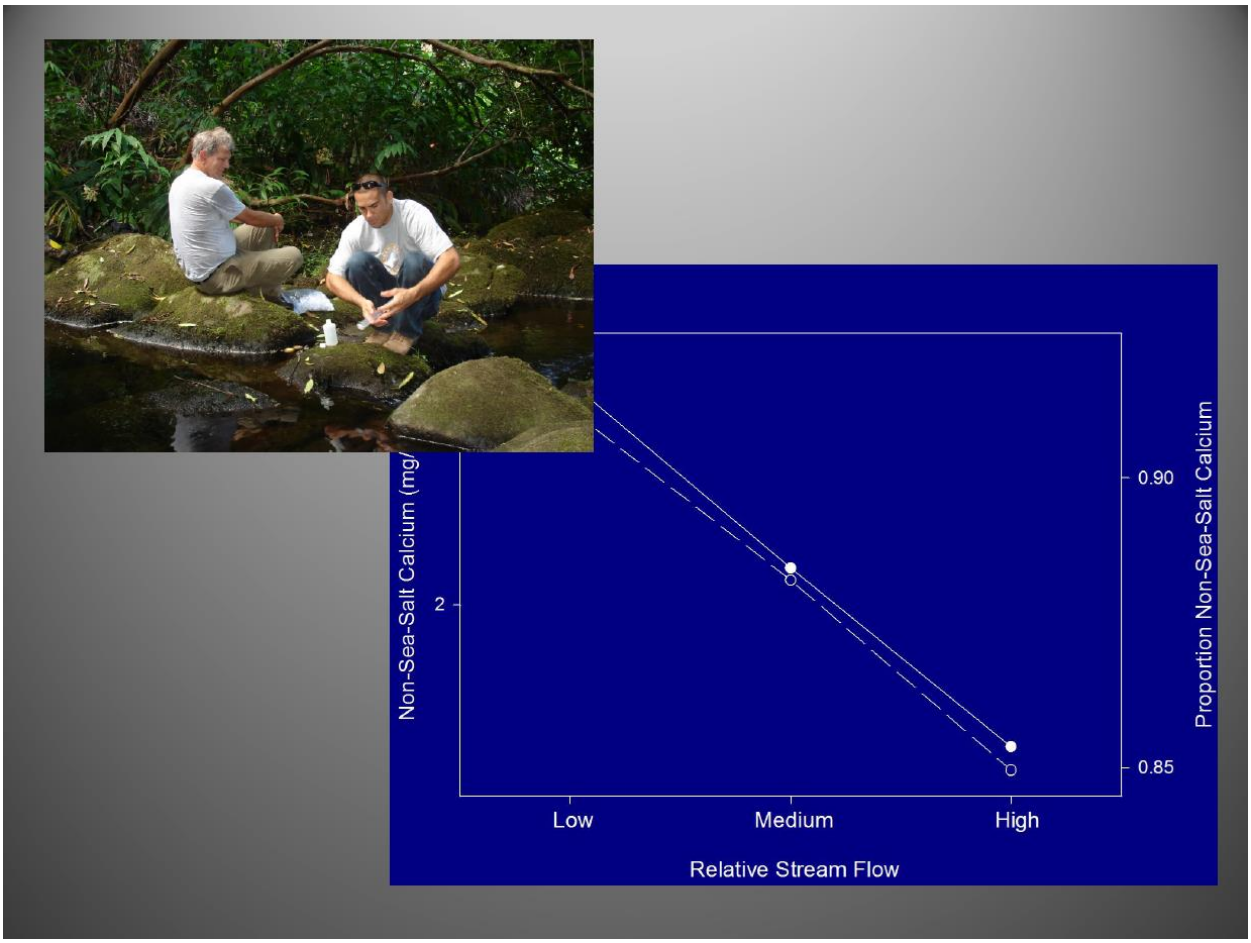
Later that same day we drove to the nonnative forest, which is all [tropical] ash and eucalyptus, no native trees there, no native birds. The same thing, we drive, we look, we drive, we look, we drive, we look, we stop, an ʻelepaio flies out of nowhere, lands at our feet.

That study went on for two years; no other bird ever flew out of the tree for two years. It was only on that day.

So again, it wasn't in my methods, but truly location of this [study]—and Imiola, neither of us are as gifted in hula and oli as others in this room—but, it wasn't even a question; as soon as it landed there the decision was made this is where it goes.

The second station we didn't even talk to each other, when the ʻelepaio landed, he went to the truck [and] got the stuff, so I just set it [up].

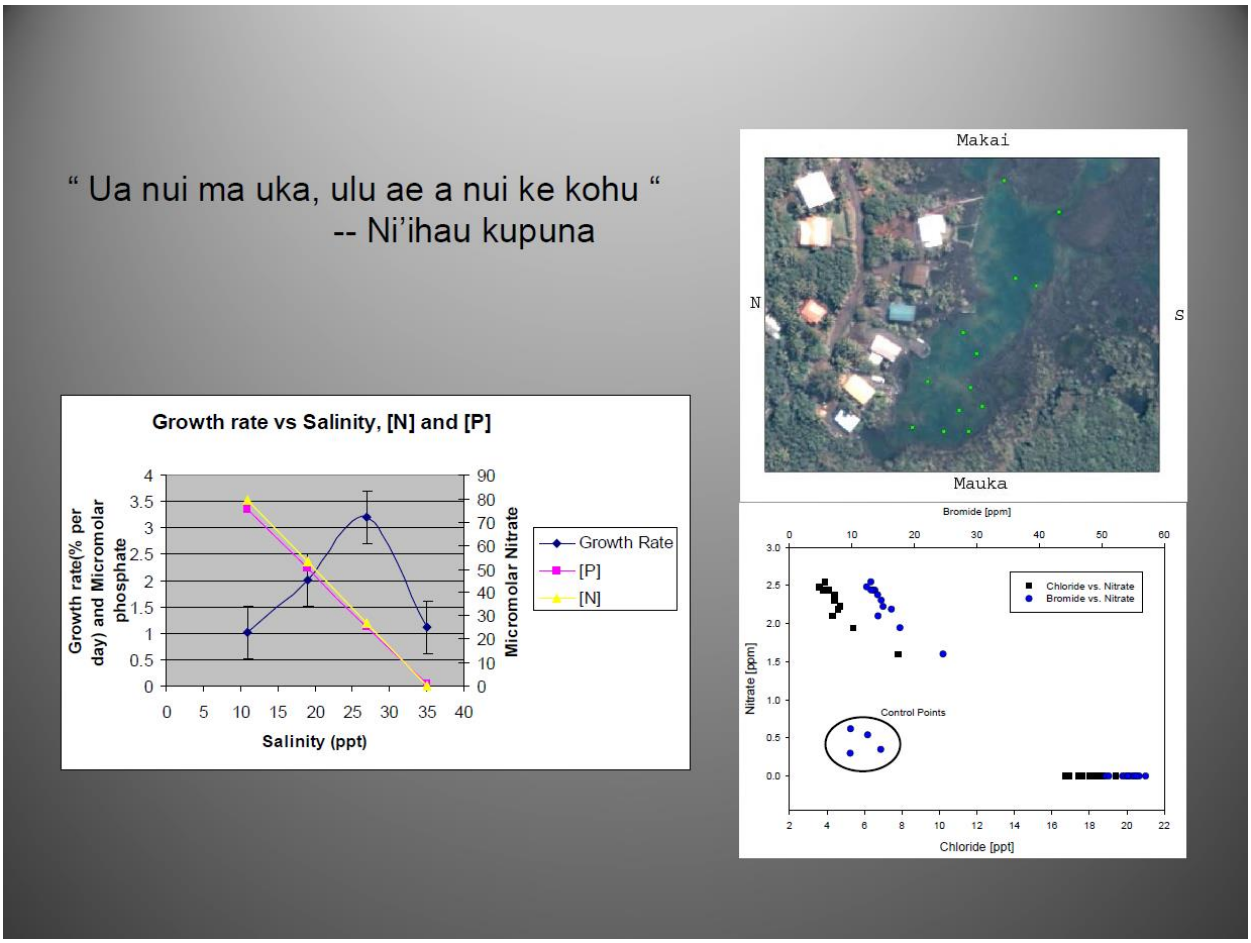
[This next slide shows] Imiola again—he probably doesn't know he's in these talks today_and there is Peter Vitousek, who you folks know. I put this [photo and plot] in because, as you journey from mauka to makai, [as in] this study here, this is Waiʻāpuka Stream in Kohala, [where we were] studying the nutrients in the streams and their effect into this dryland agriculture (Palmer, 2009). Again, why it's important is the water itself, again. It gains that life-giving nutrients, fertilizer, if you will, as it travels through pōhaku (rock), through lepo (soil) and so forth.



So the water that falls just directly in a stream, it doesn't really interact with the nahele, with the forest, with the litter, with the lepo, is going to be nutrient poor. For that water that moves through the forest, through the rock, has longer contact with Papa, if you will, gains in nutrients. That is what you see here. That is basically what this thing says. That is what that study was.

So, literally, as this moves from mauka to makai, … that water is a transmitter of those nutrients. So I take the term, "'ai pōhaku," (to consume rock) very literally. … As water moves through our system into agriculture, into the oceans, and fertilizes our reefs—remember now the sea water is very nutrient poor—most of the nutrients maintained in our reef ecosystems [are] coming through the travel of wai-a-Kane through Papa and all the way out to different forms of the forest and picking up those nutrients on its way to the ocean for man's uses and for our natural ecosystems.

So as we head more makai, this is in Kaloko on the Kona side, actually I'll skip over that one and jump to this one here, which is a very short time, I jumped all the way to makai already. This is the makai end, where you see basically a plot of [nutrients] as the amount of fresh water increases, the groundwater discharges to the ocean, how it effects our near shore environment.



This is how growth rate of manauea, … limu [seaweed], … is influenced by the discharge of groundwater. If there isn’t enough groundwater there, it dies off. If it’s too much, too much pollution, then it dies off, also. Then, of course, limu, diatoms and others, and coral, are the cornerstones of our ecosystems.

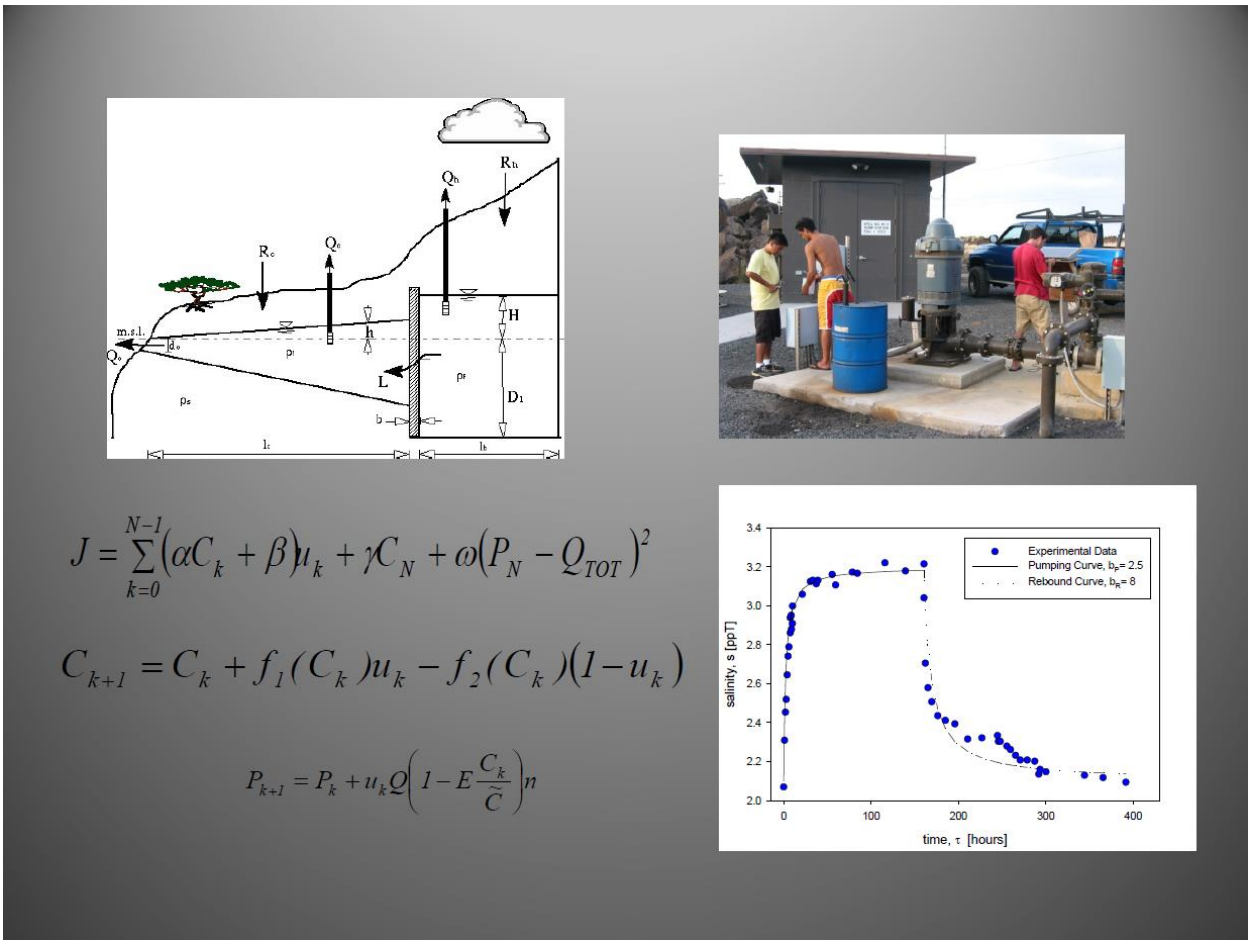
Remember now, those nutrients came from that pōhaku, which came from Pele and [were] transmitted via the vehicle of water. So union of geology [and] hydrology very much directly feeds ecology, so that you have people like Peter Vitousek, who spend their whole life studying the cycling of nutrients in our ecosystems; again, another cycle, another piʻo.

So what I want to get to here is, this quote here means—. . . my Hawaiian is elementary—but in a conversation with a kupuna from Niʻihau, talking about random things, and she said this, “Ua nui ma uka, ulu ae a nui ke kohu,” while we were talking about food or something like that. For me, it struck me that there is so much embedded in this offhand comment from this kupuna from Niʻihau. What it means is, when it rains mauka, the kohu grows makai. She was specific. She went on to say that roughly two weeks after it rains mauka Niʻihau, the limu kohu [grows]—we can go pick limu kohu.

That simple statement is an understanding of [how], when that rain falls in the mauka of Niʻihau, the path it takes, the nutrients it takes, . . . fertilizes the kohu to grow. [It] is a pretty strong statement that Western science is only now [knowing], through the field of ecology, . . . where to put their pieces together and that very offhand statement by kupuna from Niʻihau, … is what [studies] like this try to quantify.

I think that is the value of science. Science can help you, again, [it's through] systematic study that allows us—it's a toolbox—we use a toolbox to apply science to try and mitigate problems we may have as a state, these islands.

Two minutes. So my last two slides . . . are more engineering: taking knowledge and trying to apply it to problems based on both traditional and more Western scientific methods.



I put these equations here not to look smart or anything, because these equations are just equations we came up with. This is Kaʻūpulehu in Kona and a very rough cartoon of our high level aquifer and coastal aquifer and so forth like that. What is pertinent here is this curve, which is piʻo. These equations are just a mathematic way of describing these piʻo.

What this [slide shows]—I guess I'm the only grad student that didn't wear [a] shirt—but [by] studying the effects of pumping—pumping in the ground aquifer—[we see] how that Moanaliha in the coastal area responds to that pumping. This is an increase of salinity as you pump over time and this is how that aquifer recovers when you stop sucking on the straw.

Why is that important? You suck too hard, you get saltwater [in the well]. Also, if you suck too hard for too long a time you actually decrease the amount of [fresh] water [delivered] to the ocean, which can affect the coastal ecosystem and so forth.

This is so we can inform our decisions [about] how we use water. Another point I want to make, connecting it back to the connection between hydrology and geology, is [how] these piʻo

are completely dependent on the pōhaku. So the geology, the earth, completely dictates the shape of those piʻo.

If I did the exact same experiment in Lihue on Kauaʻi, where [the soil] is … more thickly eroded clay-type layers, this thing [the aquifer] may respond like this but it will take years to recover.

So again, the movement of Kanewai through pōhaku, lepo, Papa, is very much determined by this. It's kind of based on "Big Fat Greek Wedding," where they say male, Kane, is head of the household but the woman is the neck [that turns the head]. That is pretty much how it works here. So Kane may be head of the household [as] water, but Papa is the neck. How Kane moves is dictated by geology.

That is why a lot of what I learned here, Jim, with you, [during] the year I spent here, influenced greatly what I do. When I look at a system for hydrological reasons, the image that comes to my mind, as I go to places in Hawaiʻi, and [as I study] what I think water is, is very much influenced by how I think the geology looks. So watching, in action, an aquifer being built . . . allows me, as a hydrologist, to try and put in my mind, okay, how is that water [moving], how would the water move through that [rock], and how would that affect timing, delivery [of nutrients] and so forth?

I'm going to skip down for time reasons. I think that's my time. So some of this is a bit destroyed but where I'm pointing, again this is the top of volcanism, hydrology is very much, for me, the union of the two and how the two together really brings life to these islands.

Mahalo.

Questions

Q. Throughout the coastline, do you see much variation of the amount of coral or flora that may suggest large influxes of fresh water from lava tubes?

KAEO. Oh, for sure. There are [indications of this variation] in the more recent studies in the infrared [imagery]—yes. Actually, the freshwater correlation is negative at coral; coral doesn't like too much fresh water. It's more [active] in salt water, [and] dies in too much fresh water. Yes, you can definitely [find fresh water discharging from lava tubes] and a lot of fishermen and divers, they can tell you [where] along the coast [that happens]. [On] an island like this, which is much younger [than the other Hawaiian Islands], of course, more point sources are discharged [and] are much more common, whereas if you go to East Oahu or so forth and you do the same studies, [you find] a much more dispersive type of discharge of water as it makes its way to makai.

Q. Just curious. How did you measure the intake of water from those different types of vegetation?

KAEO. Oh, the first site?

Q. Yes.

KAEO. …. We didn't use [common] kind of the models of evaporation so we directly measured the flow of water through the [indiscernible; trunks] of the trees. [We used different probes for] different plants —kind of [a] thermocouple probe. You can measure over certain depths of the tree [from the center to the outer surface of the tree trunk] and then integrate it over the circumference [over the cross-sectional area of the tree trunk] and, over a long amount of time, you can directly measure the uptake of water.

Thank you.

(End of presentation.)

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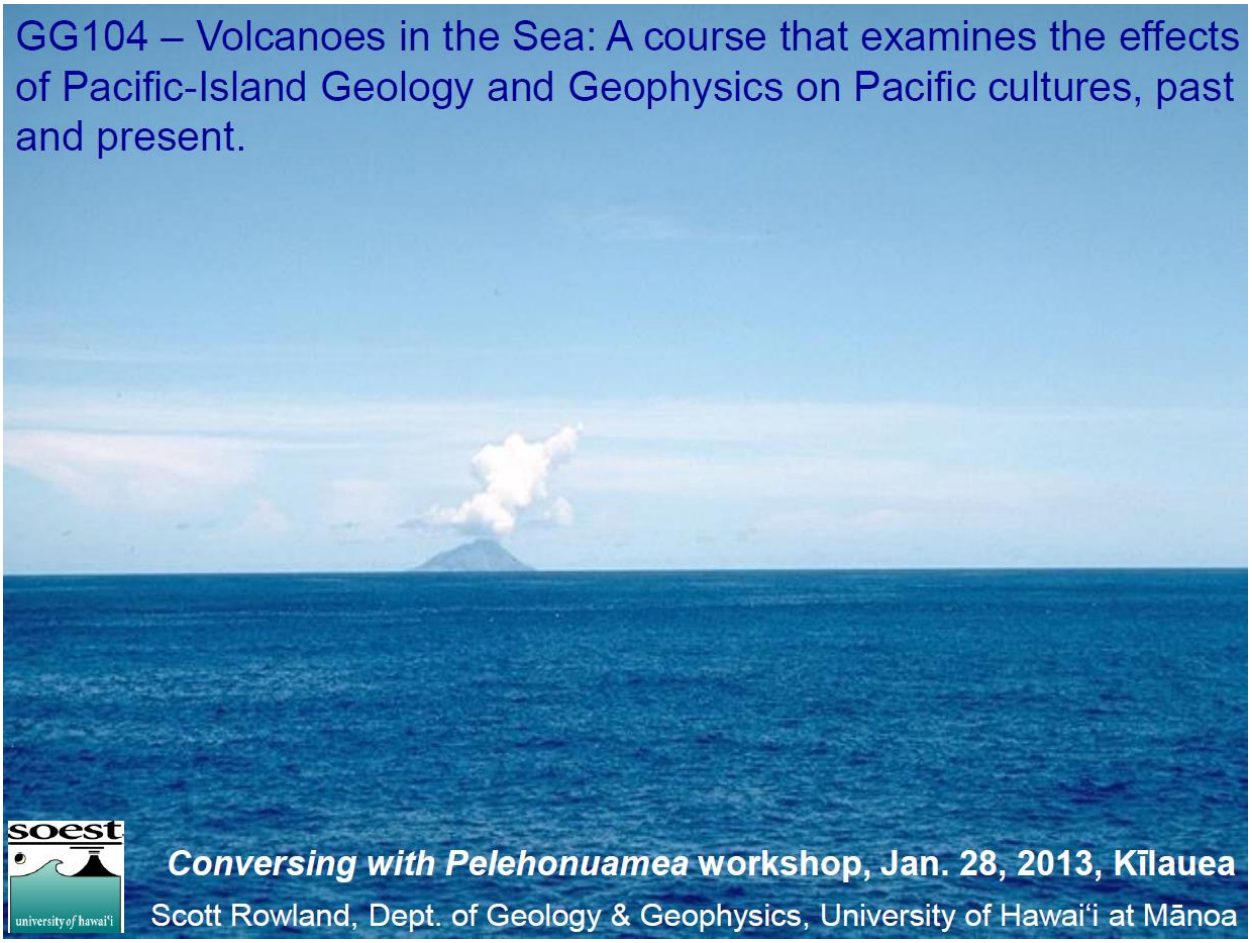
GG104—Volcanoes in the Sea: A Course that Examines the Effects of Pacific-Island Geology and Geophysics on Pacific Cultures, Past and Present

Speaker: Scott Rowland, University of Hawai‘i at Mānoa
Monday, January 28, 2013

Aloha, good morning. I’m a user of all this wonderful information that the folks in this room have generated and discovered. I have not made any of it myself, but I’m fortunate enough to have been given a chance to put together a course that I wanted to put together.

It looks at how the physical nature of the Pacific Islands and, in some cases, the Pacific Rim geology, has affected the people who live in these places and has affected their everyday lives, the materials they had to use and also [how it has] affected some of the stories that they tell.

So it’s an introductory geology and geophysics course.



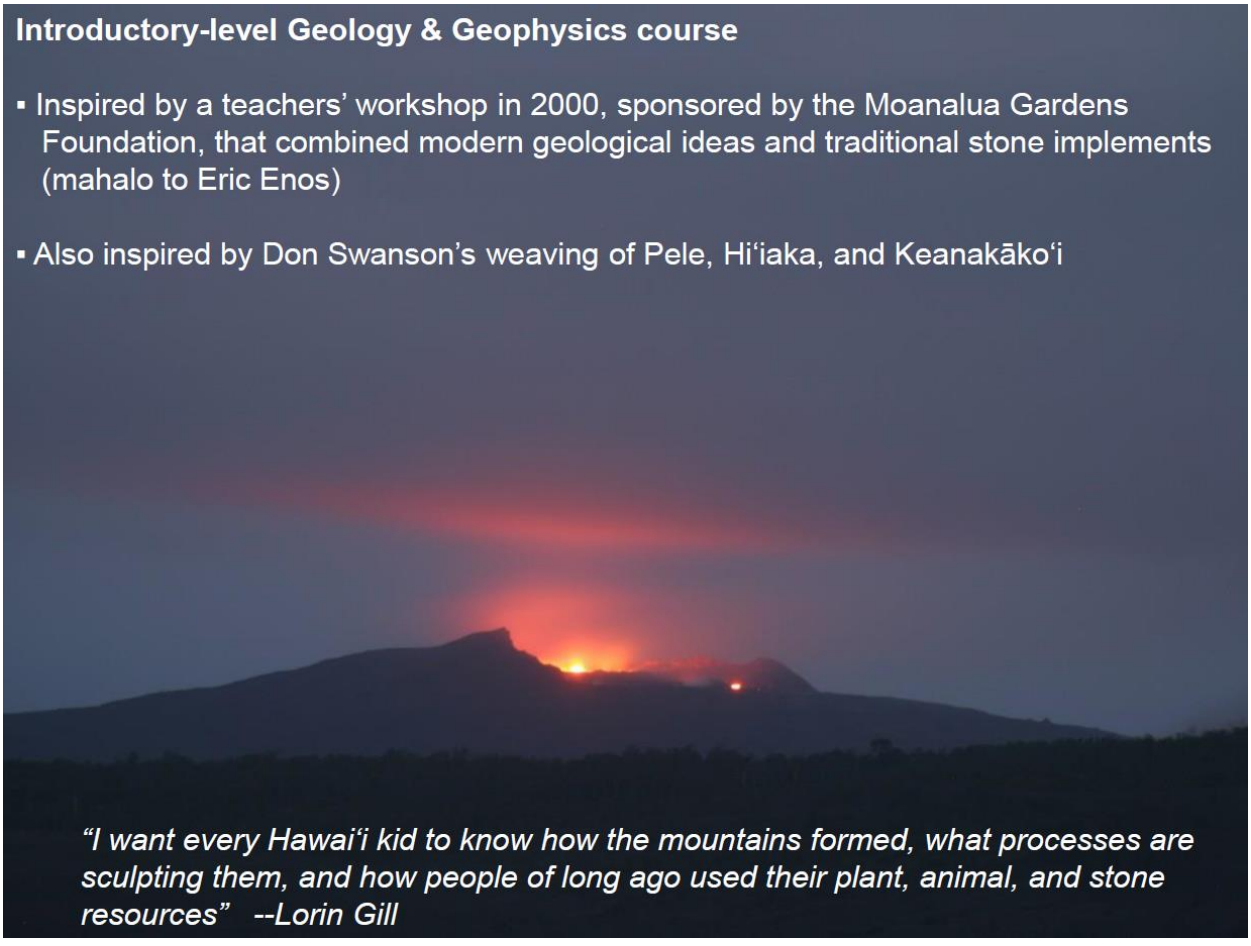
Again, because it’s not a required course, I don’t have to worry about completing anything specific in it. I can change it around at a moment’s notice if something happens, such as the Tohoku earthquake and tsunami.

The idea for this came from a teacher's workshop that Lorin Gill and the Moanalua Gardens Foundation put together back in 2000. What Lorin wanted to do was to give these [K-12] teachers an introduction to, sort of, the modern way of thinking about Hawaiian hot spots, tectonics, and volcanoes and things, because he recognized that a lot of the materials they had for their training were kind of outdated.

He also wanted to tie together traditional ideas about geology and, in particular, this fellow named Eric Enos, who lives out in Waiʻanae and does a lot of traditional stone implement-making himself, and he gets kids to do it. During that one-day workshop I realized that there is a really great connection between these things. So the specific stone that you collect to make a poho pōhaku, for example, you don't just grab any stone, you grab the right stone that has the right properties.

Those right properties are what us nerdy geologists would talk about, vesicles and porosity and all that kind of stuff, but there are really practical reasons why they work for certain implements or not.

So I started thinking that would be kind of a cool thing to include in regular geology classes. Then I heard Don Swanson a few times give the presentation that he gave you folks a couple hours ago, looking at traditional Hawaiian stories and tying it together with very careful volcanological work. So that made me think that there is even more stuff to do.



Finally, Lorin Gill, who kind of got me into geology in the first place, although he didn't really realize it, said this about a year or so before he passed away. I didn't quite quote him correctly, but basically, the idea is that there are so many people in Hawai‘i, kids and grownups, who really don't understand how the mountains are formed, what processes built them, what processes are breaking them down, and what uses people in the past found for the rocks and plants there. It's such wonderful information—[both] the traditional information and the more scientific information—that the more people that can learn this stuff, the better.

So I'm not going to read through all of this. Again, it's a one semester course, 15 weeks, two lectures per week. There is a lot of stuff. I'm lucky enough to have a number of guest speakers, who contribute a lot of really cool information. I haven't quite gotten to the point where I can have all guest speakers.

GG104
TYPICAL SYLLABUS
(condensed)

- Intro. to plate tectonics, hotspots, magma
- Hawaiian volcanic eruptions and products
- Traditional and modern uses of stone (Eric Enos, Earl Kawa‘a)
- Hawaiian and Western science (Sam Gon)
- Tracing stones in the Pacific (John Sinton)
- Pele's travels and rejuvenated volcanism
- Pele, Hi‘iaka, and Keanakāko‘i
- Volcano deities elsewhere in the Pacific
- Surface water, groundwater, Lono, Kanaloa
- The healing stones of Waikīkī (Babette Galang & Kathleen Kang-Ka‘ulupali)
- Earthquakes (causes, sizes, effects)
- Tsunami and orphan tsunami in Japan and elsewhere
- Mauna Kea glaciation and volcano-ice legends
- Types of islands in the Pacific, and how they affect cultures (high vs. low, old vs. young, steep vs. flat, wet vs. dry, coral vs. lava, etc.)
- "Fished-up" and "Thrown-down" island-formation stories
- Shorelines, climate change, sea-level change (Jane Ta‘afaki-Sam)
- Soils, island age, and possible effects on cultural development "The Wet and the Dry"
- Field trips and a final project to make a traditional stone implement

We spend some time talking about plate tectonics and hot spots for a couple reasons. One, we're going to be talking about islands in the Pacific. These are intro[ductory] level students. They may not know anything about geology. So you can't just jump in and start talking about ‘a‘ā and pāhoehoe flows and hydromagmatic eruptions, you have to start from somewhere.

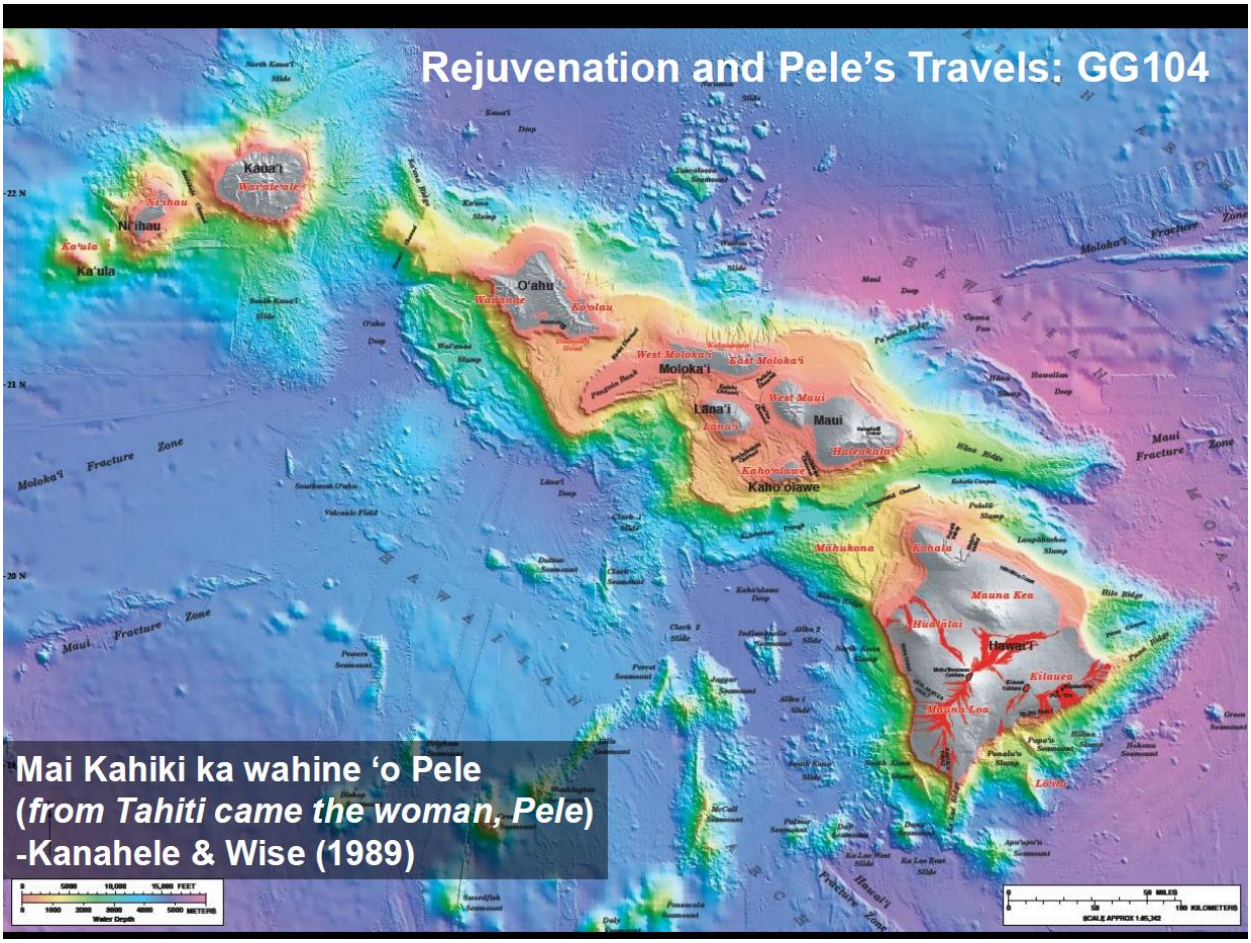
You also need to know what is our place. Where do we exist in the larger Pacific? Of course, talking a lot about eruptions and stones is important if we're going to start talking about traditional, as well as modern, uses of stone.

This course talks not only about traditional ideas and how traditional peoples are affected by living on the Pacific Islands, but how do modern societies deal with living on Pacific Islands. Sometimes we don't deal with it so well, and it's important to know how people dealt with it, in many cases, much better in the past.

Again, I'm not going to read through all of these. The final project of the course is to make something out of traditional materials using only traditional techniques. So we go out to Waiʻanae and collect our pōhaku. Then they have a whole semester to make these projects. Some students just go crazy and do beautiful work, some wait until the night before it's due. That is the way I was sometimes. This is one of the more impressive pōhaku that one of my students made last semester.

I also try to take them out in the field, to go on field trips, to see loʻi, to see volcanic features. We're on Oʻahu, so it's all old stuff.

This is a Pelehōnuamea workshop, so the two main topics where she comes in are listed here in yellow. I'll talk about one of them because Don has already done a much better job with the other one.



This is the idea of rejuvenation and Pele's travels. [There have been] a couple of questions and people have talked about this previously already. I think geologists understand quite well how Hawaiʻi volcanoes evolve up to a point. They understand Hawaiian volcanoes start as relatively small seamounts on the ocean floor. They grow up, become big active

volcanoes, such as Kīlauea and Mauna Loa, and then they kind of die off. They erupt less frequently; the composition of the magmas change a little bit—Mauna Kea, Hualālai, and so on, and then they start eroding. Eventually they weather down to atolls and then seamounts again.

However, some Hawaiian volcanoes come back to life and, in some cases, it's more than two million years after they have basically died off [that] they come back to life. That now is referred to as "rejuvenation." You may have previously heard it called "post-erosional volcanism" or "secondary volcanism." I think "rejuvenation" is a much better term and it may have been John Sinton who coined this, I'm not sure. It really does give the sense of the idea that the volcano has died and come back to life.

You can find, in many places, . . . the idea that the Hawaiian Islands are old, up in the northwest Hawaiian Islands, Niʻihau, Kauaʻi, and they get younger towards the southeast. A lot of people have looked at this and said, oh, traditional Hawaiians recognized plate tectonics, they saw this.

FACTS AND DETAILS website:

The possibility that the Hawaiian Islands become younger to the southeast was suspected by the ancient Hawaiians… in the legends of Pele, the fiery Goddess of Volcanoes…
The mythical flight of Pele from Kauai to Hawaii, which alludes to the eternal struggle between the growth of volcanic islands from eruptions and their later erosion by ocean waves, is consistent with geologic evidence obtained centuries later that clearly shows the islands becoming younger from northwest to southeast.

http://factsanddetails.com/world.php?itemid=2212

VOLCANO WORLD website:

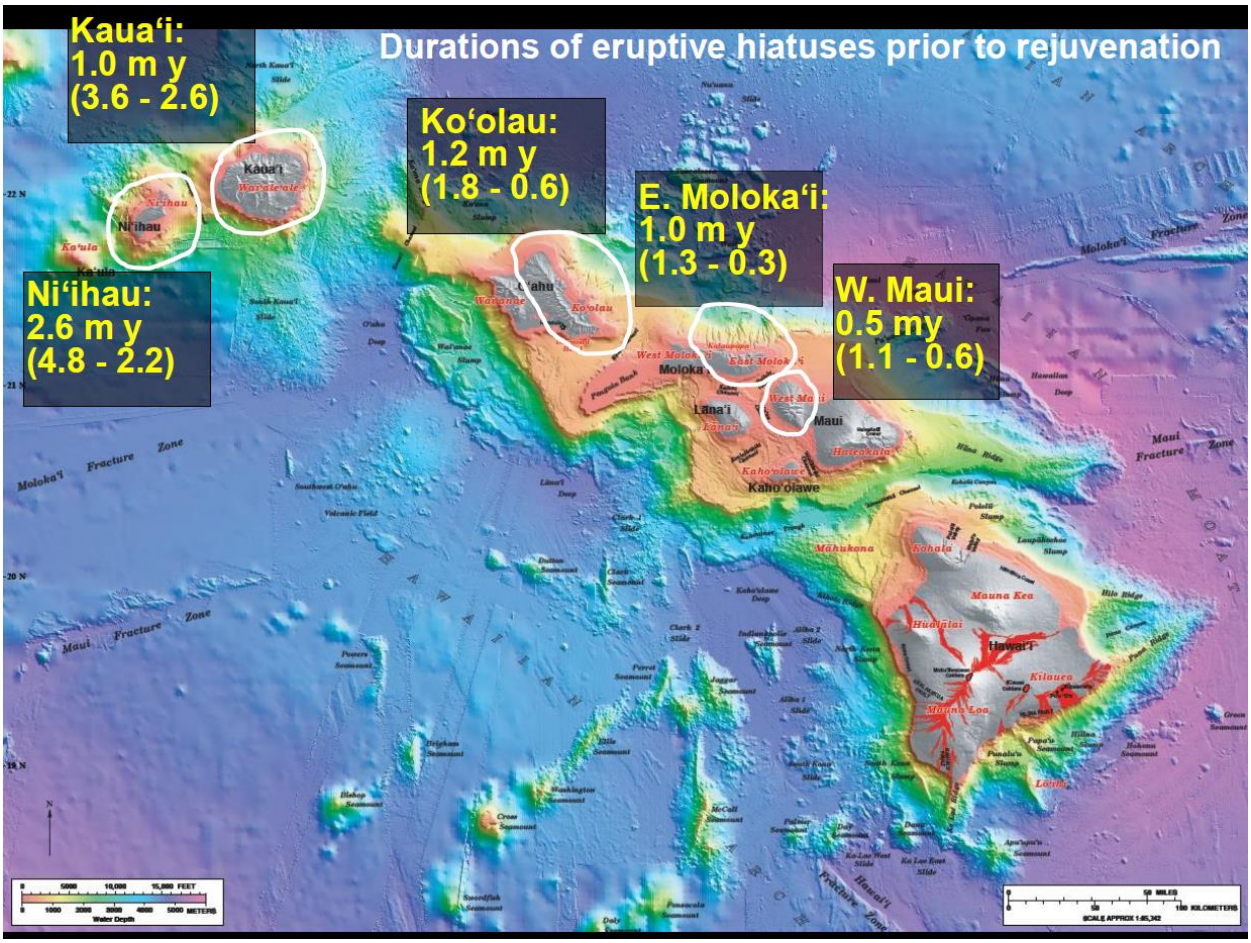
The old Hawaiians noticed that the Hawaiian islands showed an obvious progression from old (Kaua'i) to young (Hawai'i). They attributed this to the southeast-ward travels of Pele, the goddess of volcanoes, in her search for a home.

http://volcano.oregonstate.edu/book/export/html/111

I don't want to say that is incorrect, especially since I wrote this one about 20 years or so ago, but I think there is a more interesting way to look at the movements of Pele and geology, and I think it fits a little bit better with the idea of what Pele was doing as she travelled, as well as the order in which the islands were actually built in the traditional stories.

So instead of forming islands, we're going to look at the rejuvenation idea. So here is a nerdy geology slide. Here are the five Hawaiian volcanoes that have accomplished this

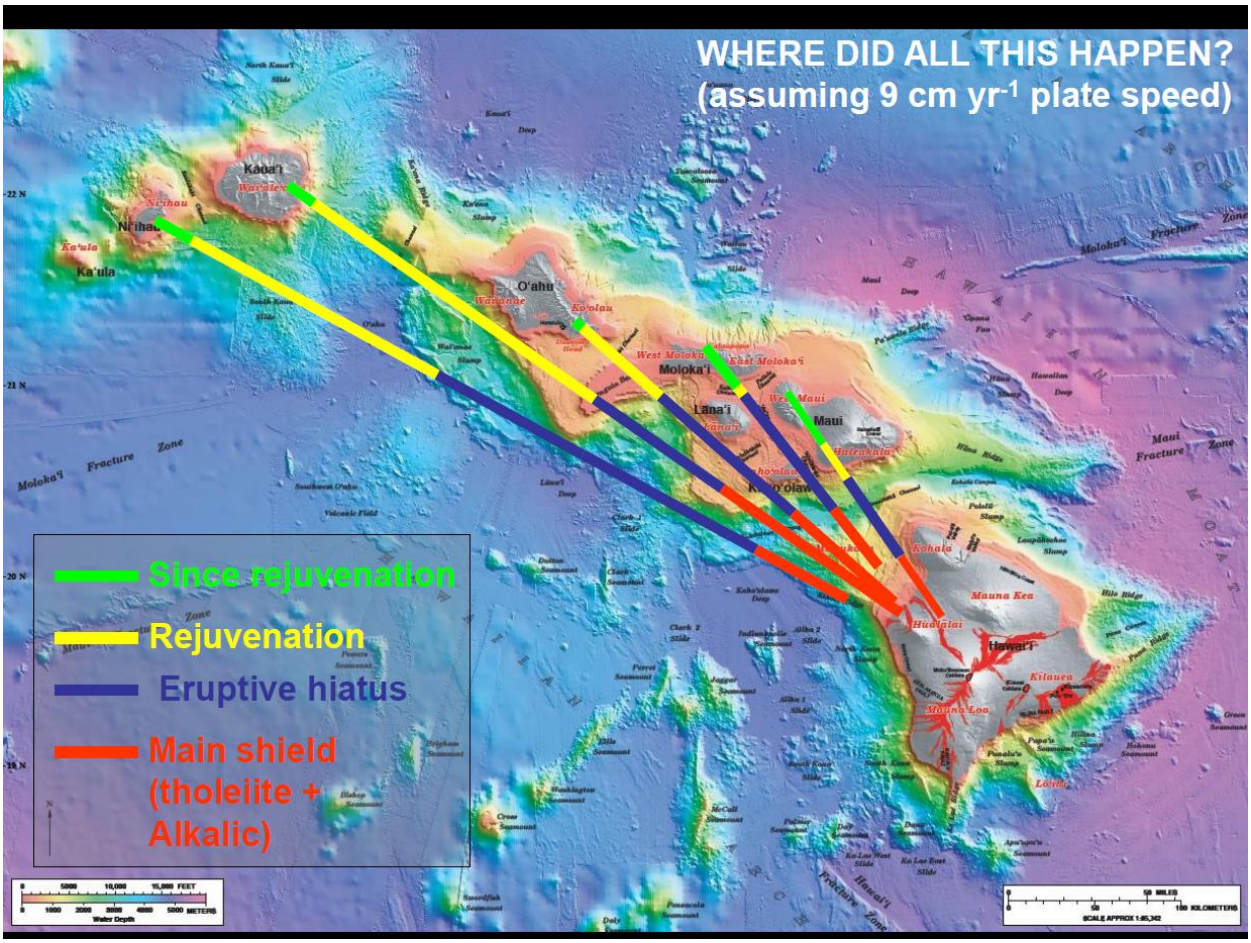
rejuvenation activity. Some [have rejuvenated] in a really big way, [and] some not very much at all.



These numbers basically just give…the number under the volcano name is how long the island didn't do anything volcanic between the end of its main growing stage and the start of its rejuvenation.

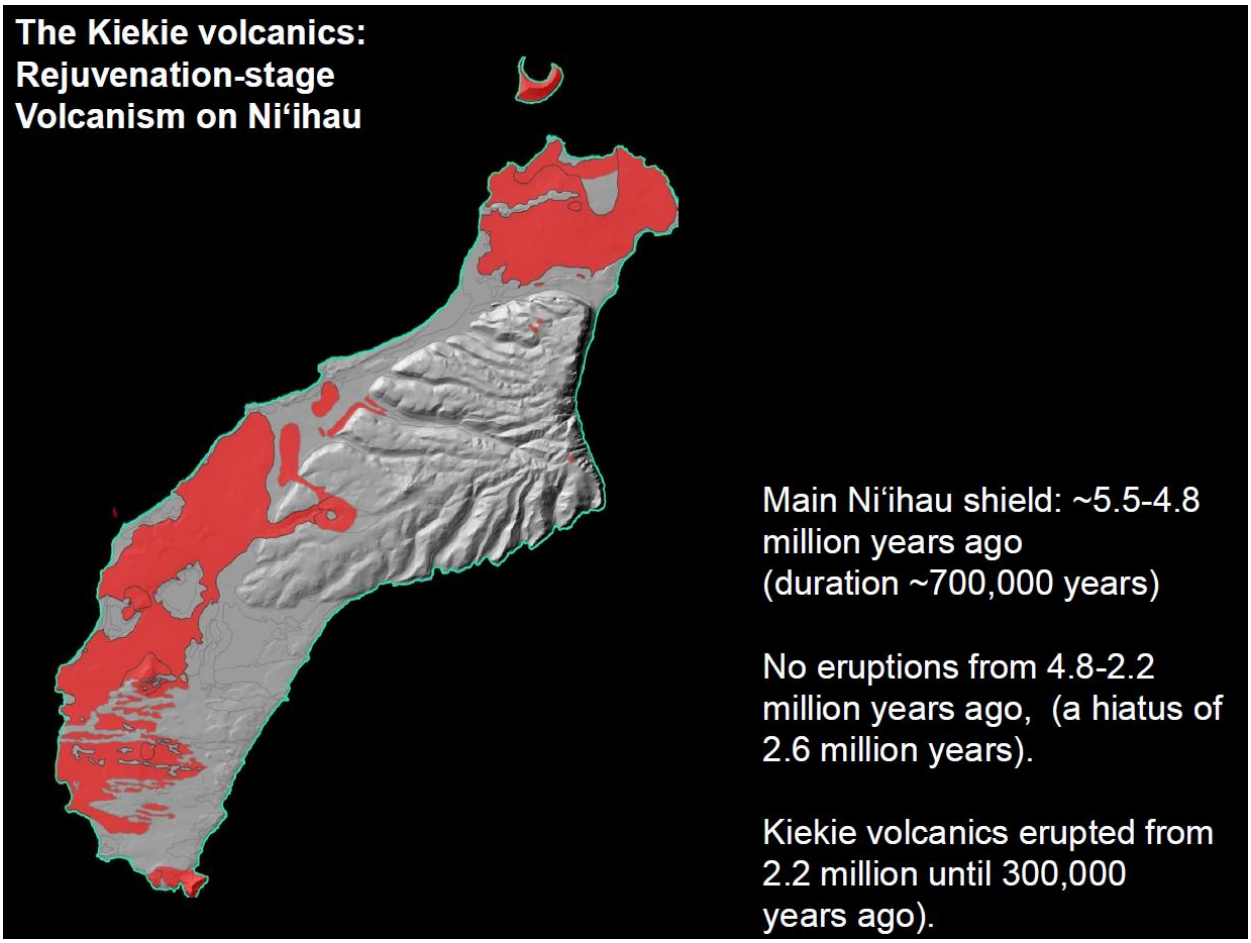
Kaua'i was basically quiet for a million years. Ni'ihau was quiet for 2.6 million years, between the end of its growth and it coming back to life. Ko'olau a little over a million years and so on.

This is not something that every old volcano has done. Some of them do it, some of them don't. Geologically, it is a really interesting problem. Why this actually happens is something I don't think we can say we really understand. So, that's one reason it is kind of an interesting thing to look at.

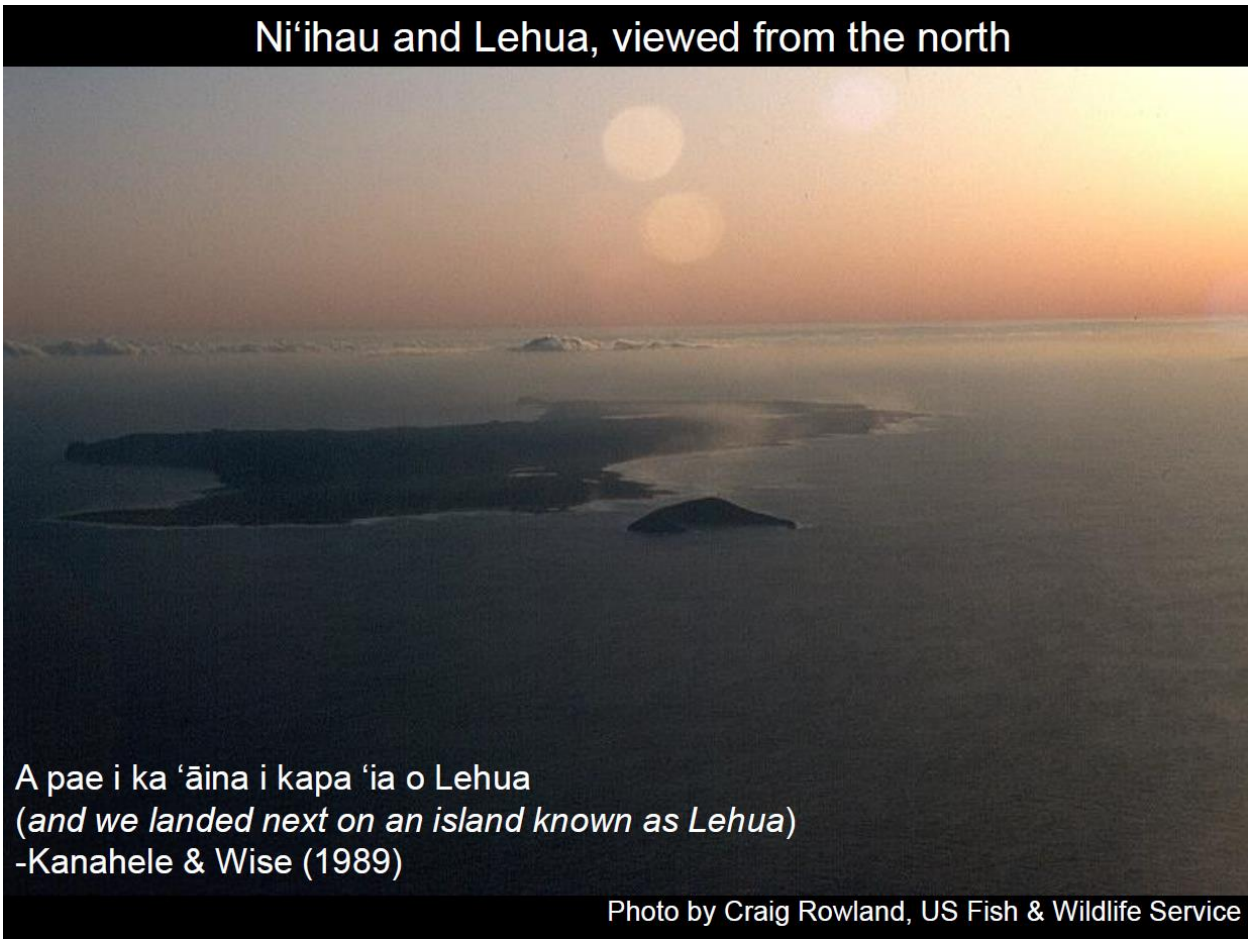


And then, if you very simply figure out where this was going on, you can come up with a graph such as this. So the yellow bar indicates where these various volcanoes were when they went through this rejuvenation stage.

They start doing it somewhere around here. They assume the hot spot is down here. Again, this is kind of the nerdy geology stuff.

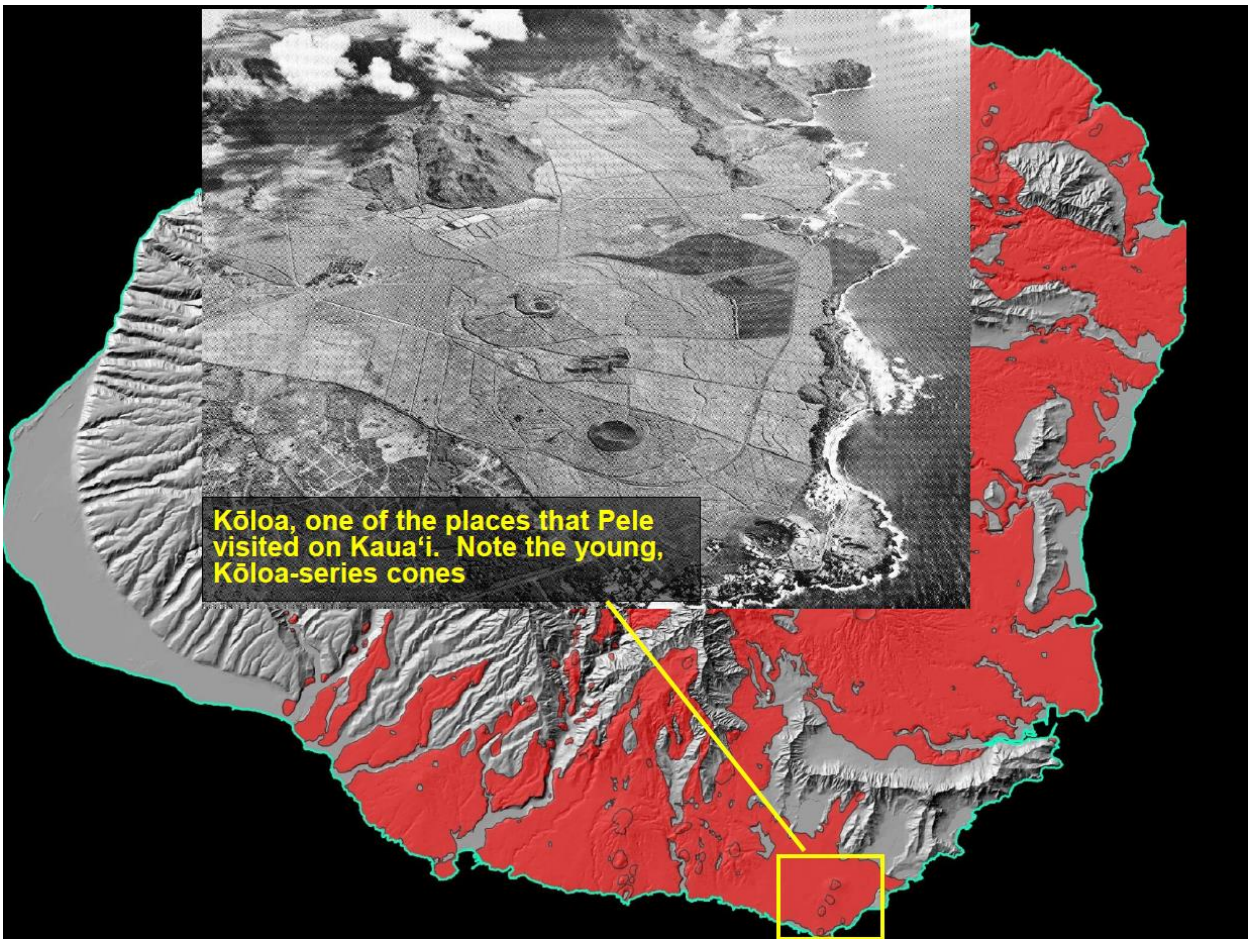


Where does Pele come into this? Here is a geologic map of Niʻihau. The red indicates the areas of Niʻihau volcano where rejuvenation stage lava flows and ash have been identified. So, most of Niʻihau, particularly the highlands, is this old, old shield volcano. There is not very much of it left.



Lehua, up at the north, and all of this area here and this little guy down here are all rejuvenation stage things. They are called the Ki‘eki‘e volcanics.

Lehua is an important place. This is one of the places where Pele stopped and visited on her way down the island chain.

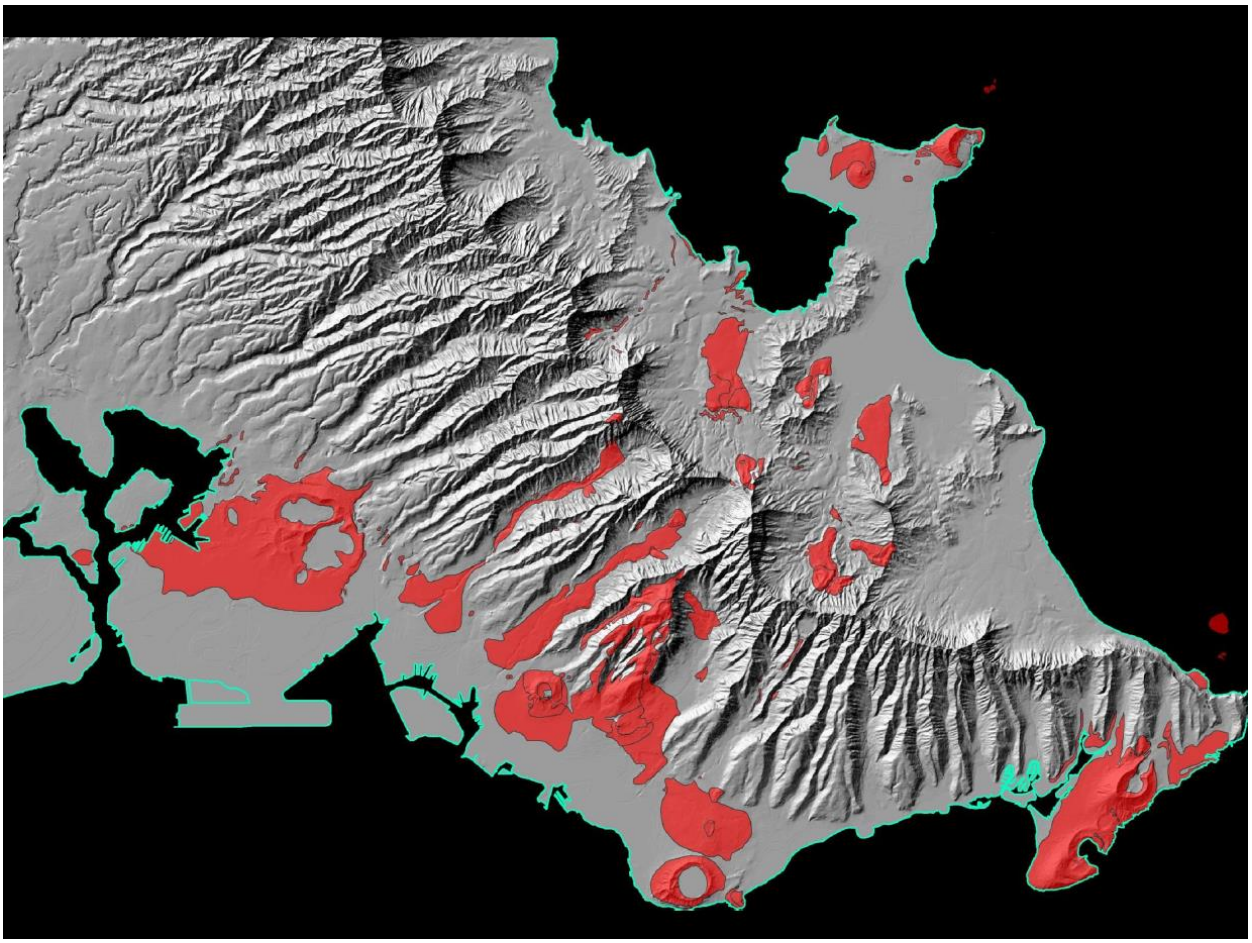


We move onto Kauaʻi. Kauaʻi's got a huge amount of rejuvenation stage activity. Most it concentrated here on the east side of the island.

If we zoom in down here, we come to—this is an old photo, obviously, but—the area called Kōloa. In fact, [the rock of] this rejuvenation stage volcanism on Kauaʻi is called the Kōloa Volcanics.

In this old air photo we can see one, two, three, four volcanic vents. Remember, most of Kauaʻi is really old so you're not going to expect to find volcanic vents that will survive, but these guys are here. This is an area where Pele visited on her travel down the chain.

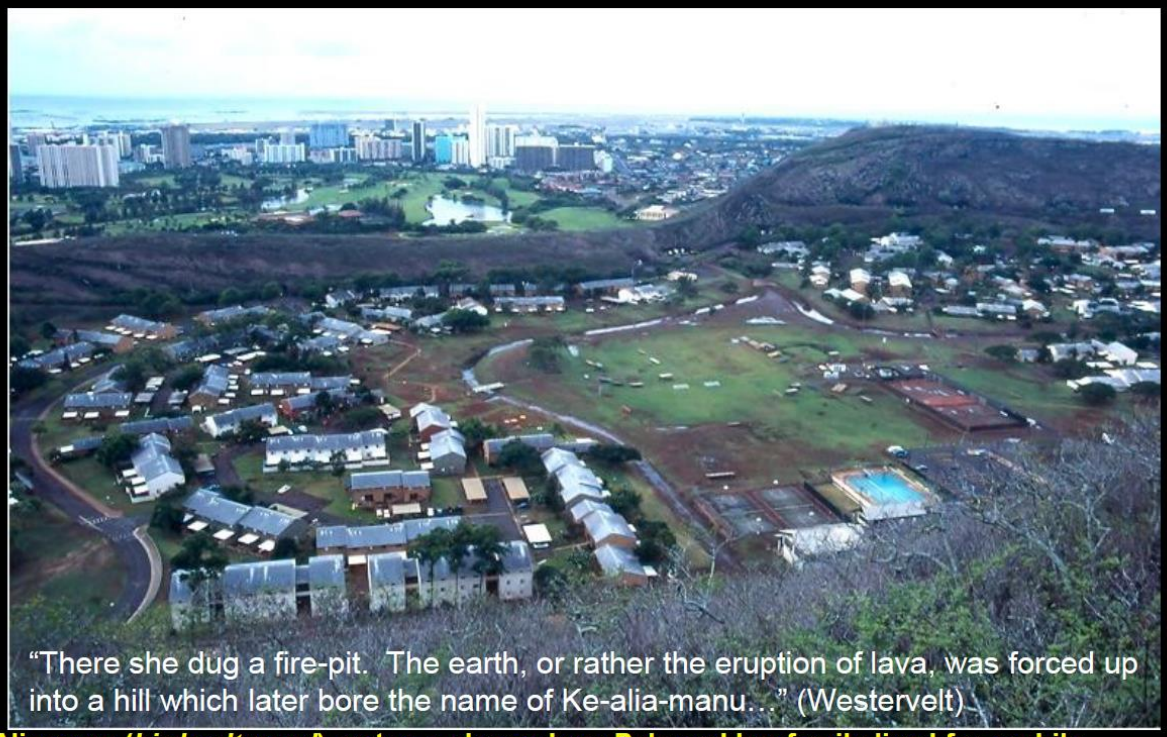
It's not the only place she visited on Kauaʻi, so I don't want to be saying that all of these rejuvenation vents are the only things she visited, but certainly some of them are.



We move onto Oʻahu. Many of our famous landmarks in the Honolulu area are rejuvenation stage vents. It turns out these are similarly places where Pele visited on her way down the chain and, in particular, many of these are places where she and her sister were fighting, basically. Pele was trying to find a home and she would start digging and she would hit water and there would be a violent flash and she would have to move on.

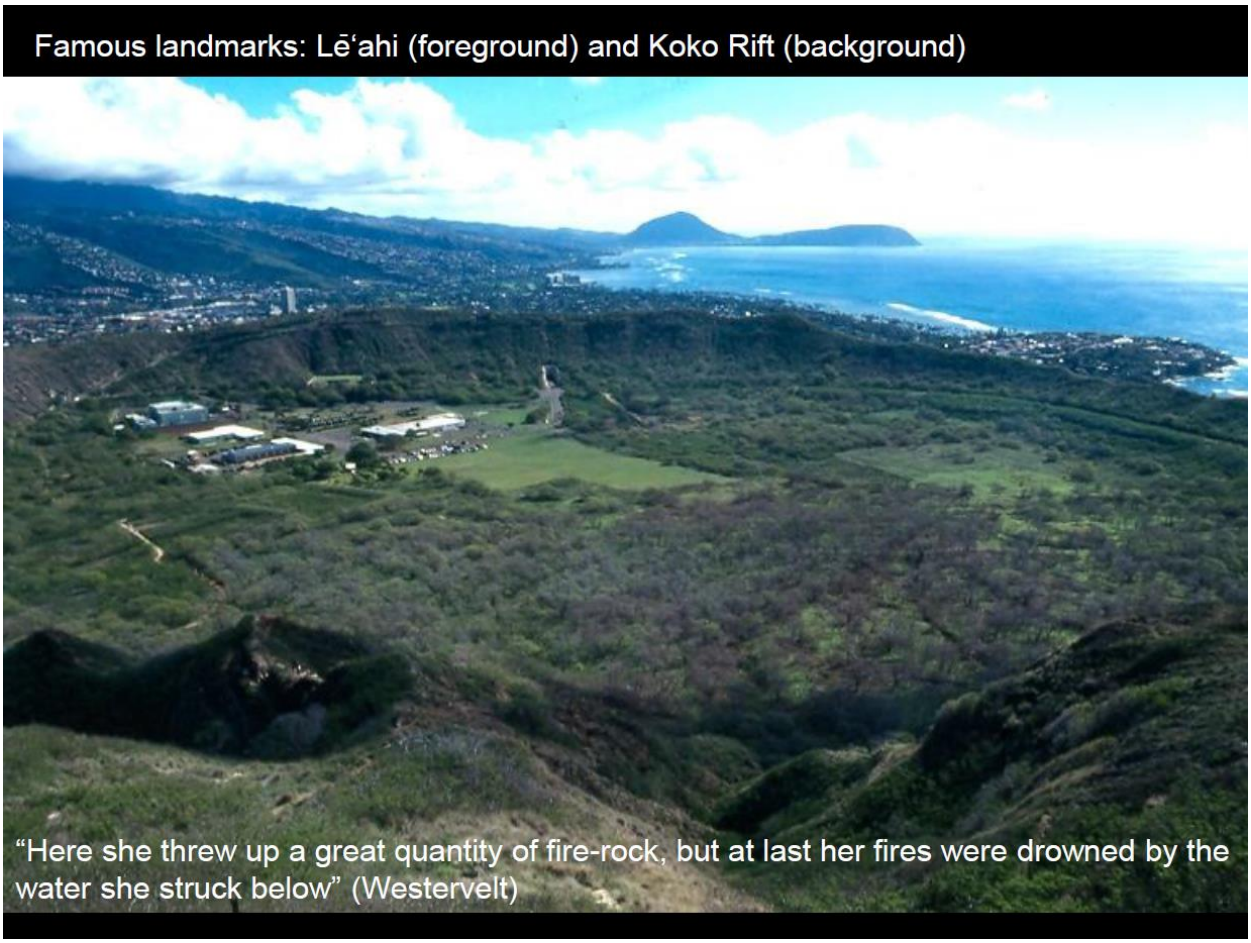
So this Āliamanu area out in Makalapa, [these] are rejuvenation stage cones and they are places where Pele and her sister were fighting.

Āliapa‘akai (*salt pond*) crater - known as Salt Lake today. Pele dug the crater, and some salty mucus from her eye fell here (Pukui *et al*., 1974 Place Names of Hawai‘i)



Aliamanu (*bird salt pond*) crater, a place where Pele and her family lived for a while. "When they left, Pele dropped some salt, and the pet bird of Hi‘iaka, Pele's favorite sister, escaped…" (Pukui *et al*., 1974 Place Names of Hawai‘i)

Similarly Lē‘ahi, also known as Diamond Head, and this is—sorry, Don, it's a Westervelt (1916) quote, but it is kind of the same idea—a battle between [these] elemental water forces and lava forces.



Finally, out here, the Koko rift, Hanauma Bay, Koko Crater side, are also significant with respect to Pele.

Many (but not all) of the places on the older islands that are associated with Pele, and especially with Pele fighting Nāmakaokahaʻi, turn out to be locations of hydromagmatic rejuvenation-stage volcanism.

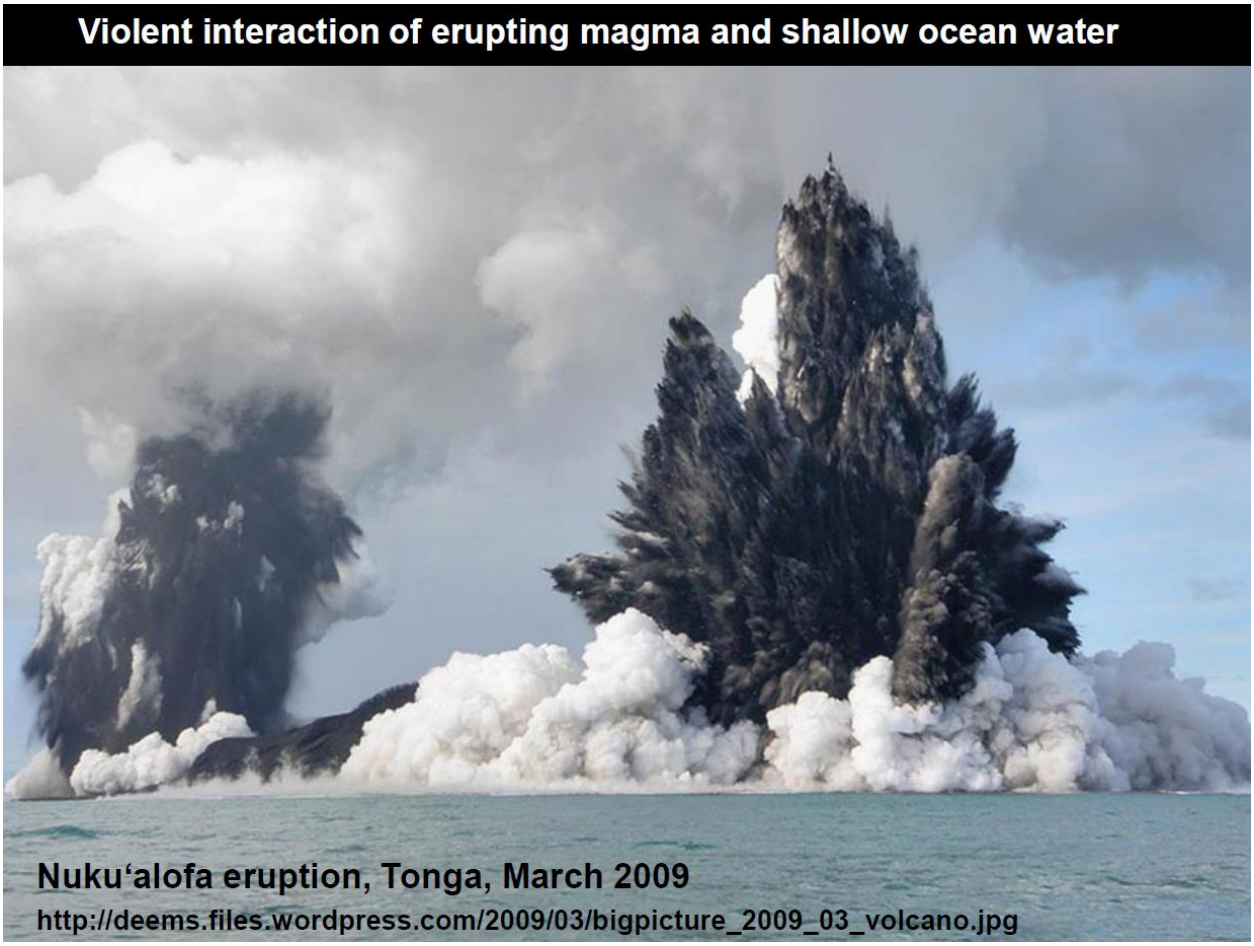
The youngest is the Koko rift on Koʻolau (~40,000 years old), so nobody actually saw the eruptions. But past generations undoubtedly witnessed violent hydromagmatic eruptions, perhaps in Tonga.

So rather than plate tectonics, I've chosen at least to talk to my students about this idea: that many of these places, which are young and hydromagmatic vents, places where water and magma interacted violently not very long ago, turn out to be really significant with respect to where Pele was on her visit down the chain.

How would this happen? Well, of course traditional people were very smart so they could recognize a volcano—that is not super hard to do. Certainly, no one was here to witness [the eruptions], however. The youngest of these is at least 40,000 years old, so it's not as if anyone was able to see any of this activity happen.

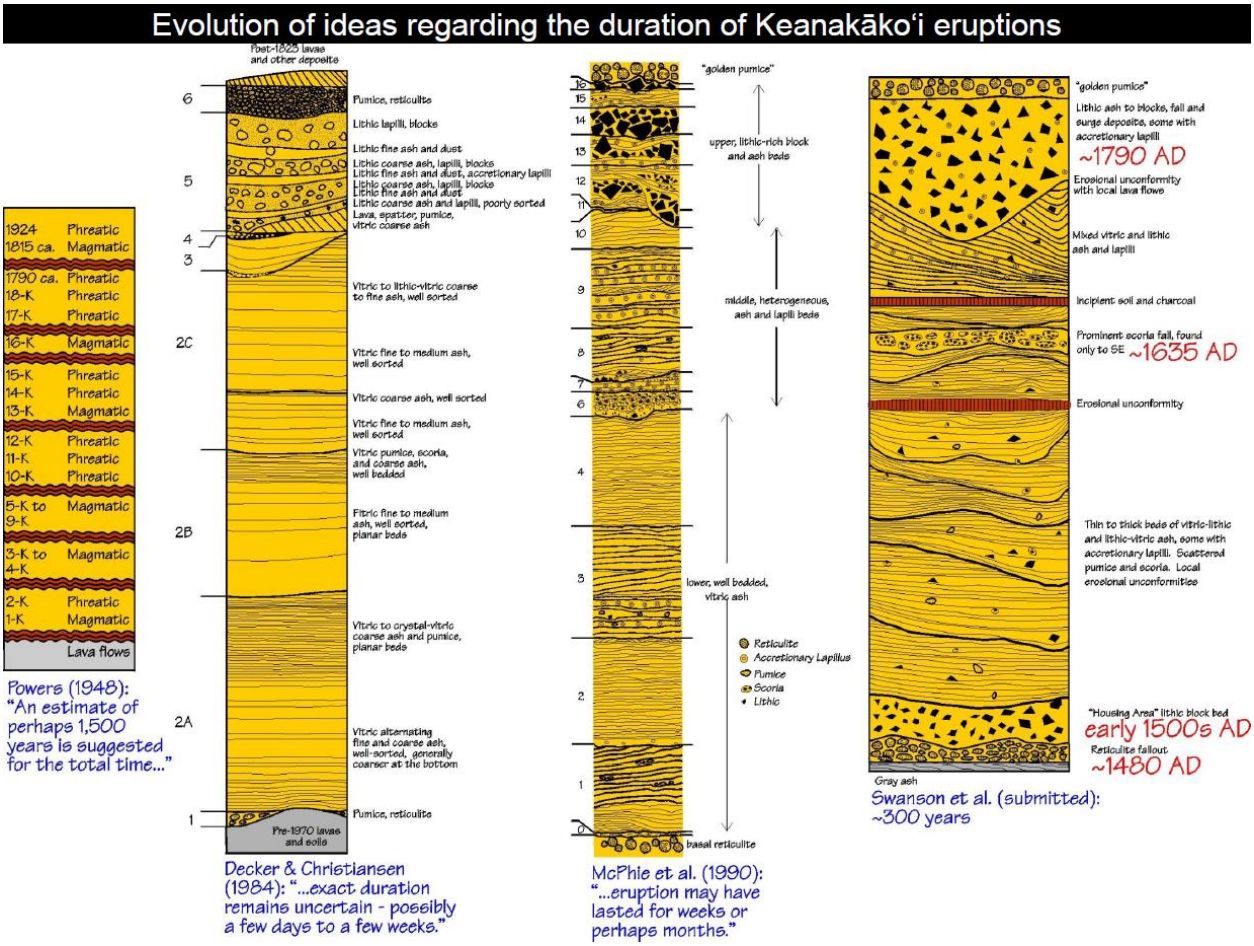
Now and then, there are hydromagmatic eruptions on Kīlauea or there are lava flows going into the ocean and it's explosive, so, again, they are familiar with that type of thing. Perhaps also, though, there was some memory from stories of other places in the Pacific that Polynesian people had visited, at which there is much more common violent interaction between erupting lava and the ocean.

So in Tonga this kind of eruption takes place every two or three years and Polynesians have come through Tonga, perhaps 1,000 years before they got to Hawaiʻi, but there would have been this memory of the kind of activity going on.



Then, Pele reaches her home eventually, and, in the class, we then move onto the Don Swanson story, which I’m not going to tell because he already has done that. In addition, and Don touched on this very briefly, not only is it a great tie-in between traditional stories and very careful geologic work, it also tells a story of the evolution of Western thinking about this particular eruptive sequence.

I’ve put together this diagram, way too tiny to read, but basically these are three examples of vertical sections through this Keanakāko‘i deposit. They were put together in 1948, 1984, 1990, and it says “submitted,” [but] this is a bit of an old slide, so [that study has been] published now.

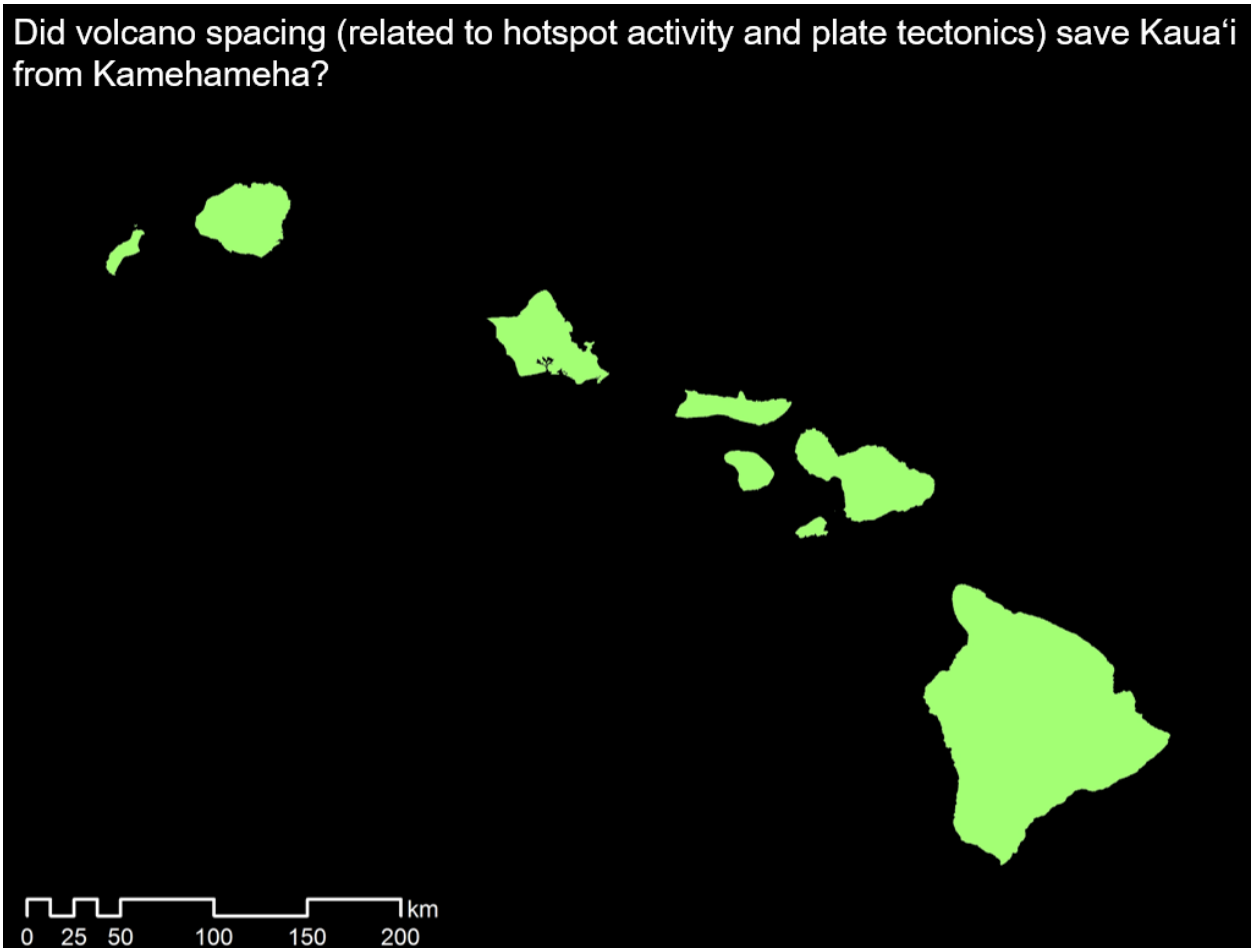


Essentially, the duration, the initial duration [of events that produced the Keanakāko'i deposit] that Powers proposed was 1,500 years, and he based that on these red layers here, which he thought were soils, and he had an estimate for how long soils would take [to form].

Then, as Don mentioned, as our "modern thinking" came along [in] 1984, they estimated a few days to a few weeks [for the formation of the Keanakāko'i deposit]. Then, in 1990, weeks or perhaps months. Now, we're starting to swing back, not this far, but now we're swinging back to about 300 years.

So the evolution of our thinking has changed in a Western sense, as well as Don's cool work on tying together traditional Hawaiian stories.

Then, because I'm teaching a class, I can wave my arms, I can ask them questions like this and I put it on a final exam once, just to see if they . . . think about it.



And that’s the end. Thank you.

Questions

(none)
(End of presentation.)

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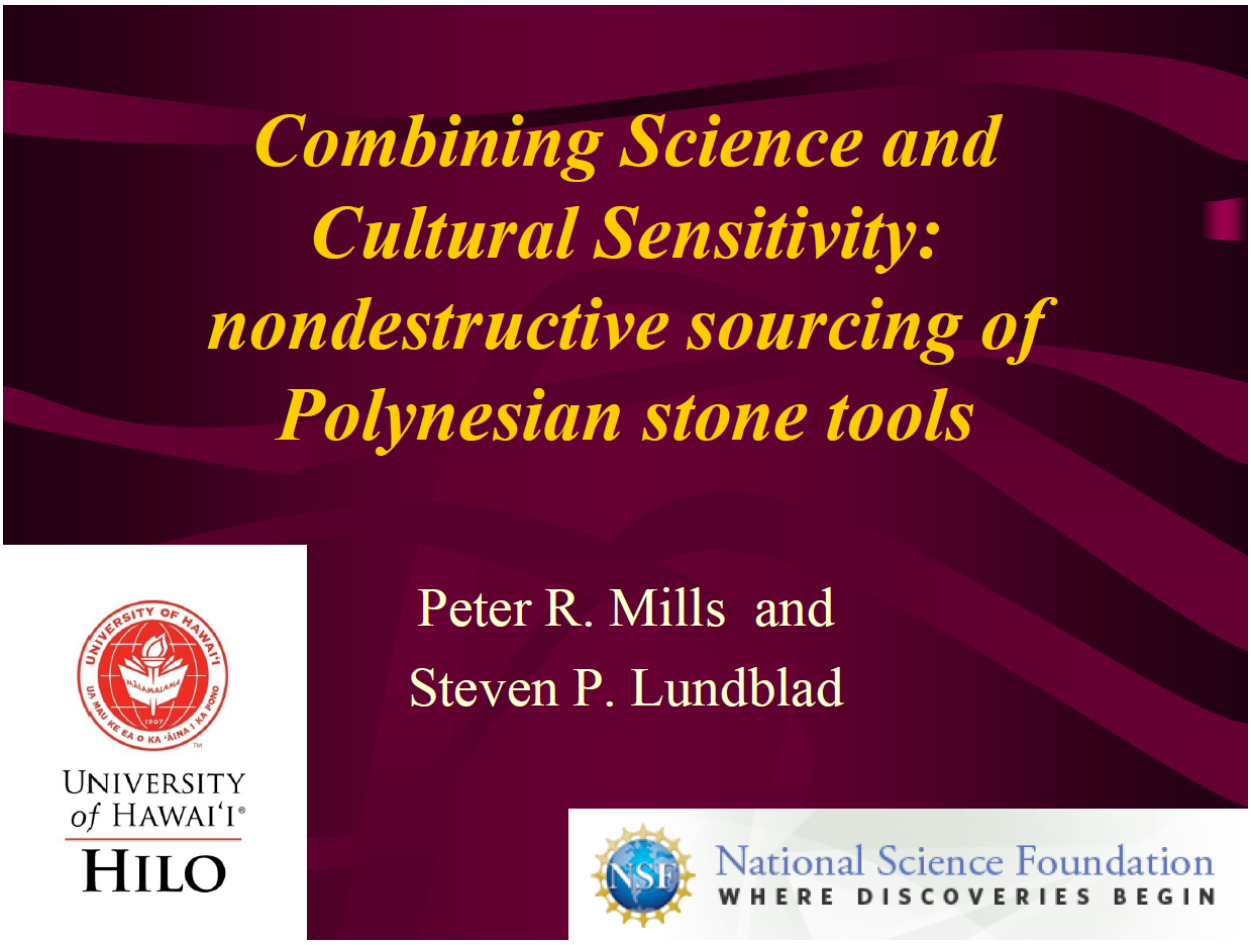
Combining Science and Cultural Sensitivity: Nondestructive Sourcing of Polynesian Stone Tools

Speaker: Peter Mills, University of Hawai‘i at Hilo
Monday, January 28, 2013

Aloha Kakou. My name is Peter Mills. I'm the first guy whose name is mentioned up there [on the title slide, with Dr. Steve Lundblad, in UH Hilo Geology]. This is a project that has been going on for ten years. There are so many people to mention and thank, who have contributed to it, that it is really impossible to put everybody's name up there.



Ten years ago, I wrote a National Science Foundation major research instrumentation grant for a kind of spectrometer at UH Hilo that is called an energy dispersive x-ray fluorescence spectrometer or EDXRF for short. I've given talks to a number of people sitting in this room that I know.

A lot of people I've seen here know Ken Hon, who is formerly with USGS, a guy who was my Co-PI (primary investigator) on that grant, and we hired this other guy named Steven Lundblad, who came on board. Steve came out of the University of North Carolina at the time; we hired him to help get the machine up and running and calibrated. He was so good that UH

Hilo gave him a faculty position, too. The two of us have been working together constantly since that point in time and it's been a really productive relationship.

So I never just like to say, "put my name up there." He's the geochemist; I'm the archeologist. I always feel that I spend my life tinkering with things that other people know more about.

As an anthropologist I'm always studying other people's cultures and sometimes my own, but, for the most part, it keeps some level of humility in what I know. I never see myself as an expert and I think that is healthy. I always see myself as sort of a student of something that I can always learn more by listening to other people.

[gap in audio recording]

. . . . This is particularly true of Native Hawaiians' knowledge of geology. In order for Native Hawaiians to have located deposits of dense, fine-grained basalt that would make excellent tools, they were making careful observations of their environment. By studying the stone they selected to make tools, we are developing a better understanding of their ancestral knowledge. The knowledge they developed from careful observation of their environment of geology, fisheries, star patterns, agriculture, medicine, and many other aspects of Hawaiian culture is science, and I really do hate the idea that science is a Western thing. I think that Hawaiians were incredibly capable geologists, very observant of their natural world, and incorporated that knowledge into their daily lives. I think we are developing a better understanding of the geological things that they knew from this project.

Okay. Most of what we spent our time focusing on over the last ten years has to do with these things that are called koʻi or adze, and when they end up in archeological sites, very rarely do they look like this [photo of a large complete koʻi that is finely polished], completely whole, but this is [what they would look like at the beginning of their use-life, before they had been broken, rejuvenated, and eventually worn down to the point that they would be thrown away]. The stone was quarried from somewhere; very dense, fine-grained stone was usually chosen.

They were flaked through a process that lots of people in the mainland called flint knapping, a very awful term here, because there is not really a lot flint here. But basically by knapping [hitting] the stone, and every single time they hit it they were taking a risk that the thing was going to crack right through the middle.

If you understand fracture physics, there is this horrible thing called end-shock, which means you hit it in one place and it breaks in another where you didn't plan to have it break. I always suggest that flint knapping, as people call it in the mainland, is the origin of swearing.

I've been making stone tools for over 30 years myself and I've really gotten into that. In fact, the way I got to Hawaiʻi was that I came out here for a friend's wedding in 1988, who was doing his Master's thesis on adzes from the Mauna Kea adze quarry. I was working on ground stone axes at the same time in the American Southwest in the same M.A. program. Within about an hour of landing in Honolulu, I was on a flight to Hilo, then in a rent-a-car, and up to the Mauna Kea adze quarry within a couple of hours of being here. I was just absolutely blown away by that place.

So in some ways I have this special connection in my own personal life to the Mauna Kea quarry in terms of how I ended up here because of that place.

Really, in archeological sites, most of what we end up with is not the finished adzes, but the remnants of where they've been chipped or flaked and reworked.

So here [on the slide] you basically have two flakes detached from the sharp cutting edge of the koʻi. Right there and here you can see where Native Hawaiians have been rejuvenating

that edge, another form of rejuvenating [as opposed to the rejuvenated states of volcanism], where, in fact, they are taking flakes off to basically reshape that adze's cutting edge where some damage has happened to it. These two flakes re-fit [so we can tell they came off of the same adze].

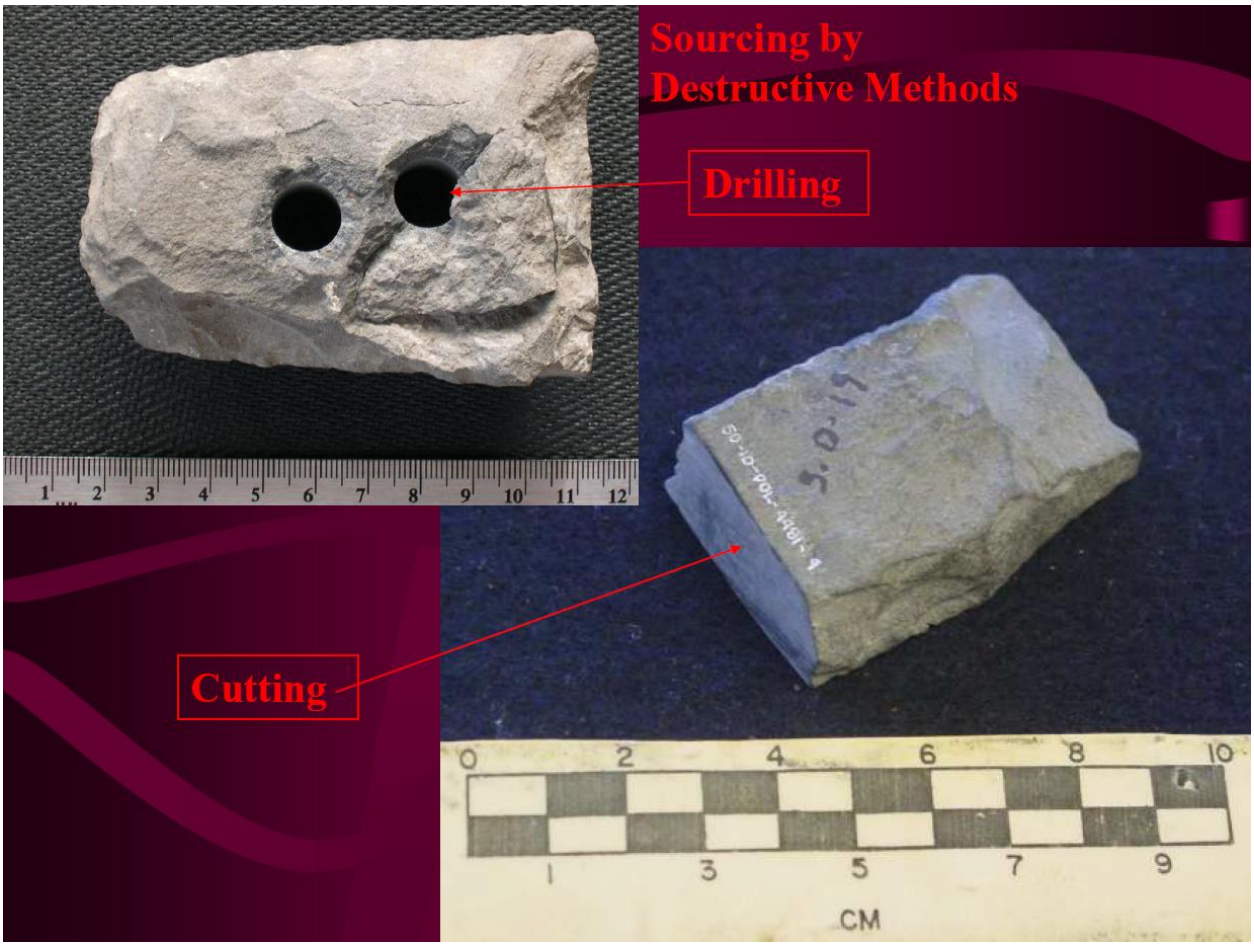
Here is a close-up view of this one flake. You can still see, right off the sharp edge, places where it had been in contact and something slightly abrasive. So that [the abrasive striations] are use wear on the edge.

So we end up, in some cases, with hundreds of thousands of these chips in sites, as well as the finished adzes—all of which contain geological information on where they came from.

[Some might] look at Hawaiian volcanism and say, "oh, it's all the same hot spot and it's all the same." You know, it's coming out of the same place and you think it's homogenous. Well, it's not, because of these factors such as shield building phases versus post-shield building stages to rejuvenation. There are these chemical changes that happen in [a] relatively predictable manner in terms of what is in the lava, going from stuff that is called tholeiitic, which is usually low in some trace elements that I'm really interested in, like strontium-zirconium, to having alkalic lavas, which tend to have higher concentrations of some of those same elements.

In the way that these things had been studied before we showed up with EDXRF, the most typical way to do it was optical petrography, which looked at the mineralogy of the rock. Here you see a sample of that [photo of an adze blank that has been cut in half on a rock saw in

order to make a thin-section]. This is an adze blank. It was never finished. It was excavated from Pololu Valley in the 1970s at UH Mānoa.



At that point [1970s and 1980s], people were trying to understand where adzes were from by basically making thin sections—sorry, cutting them in half, basically—and grinding down a thin little section out of them in order to figure out what the mineralogy is, hoping to match up sort of mug shots to figure out which thin section looked the most like another, which is actually a pretty reasonable way to start making inferences about where a particular stone could come from.

This is, again, an important issue: "science" and "sensitivity" can mean so many things. Sensitivity can be referred to analytical precision and analytical accuracy in science, but I want to talk about cultural sensitivity here.

This is again, the issue here with looking at these materials is that, if this rock had survived without it being cut in half like a bread loaf for a thousand years and [then] to get it to study it through science, if the main approach to study hundreds of thousands of these things is to cut them in half, well, there are a number of people who might feel differently about that, particularly the descendent communities, right?

This is where the issue of Western science and native science might end up starting to butt heads a little bit in terms of ways to approach things. Nothing against geologists, I love you all, in fact, many people in the room here, but geologists love to grind things up and pulverize

them and turn things into plasma beams that get down to parts per billion analyses for different things to figure out where they're from. It's a great way to learn with great analytical precision and analytical accuracy where something is from.

What we have to realize in anthropology, and in the world that we're working in when we're talking about indigenous knowledge and Western knowledge, is how to find a happy medium between those two. Do you really need parts per billion when maybe parts per million can do? Is it really necessary to go to a destructive technique right away?

What you see on the top left is another example of destructive sampling [for WDXRF, or wavelength-dispersive XRF]. Instead of cutting, sometimes rocks are turned into powders and holes will be drilled into artifacts in order to look to see what is in them.

There are things that you can learn about where a rock is from by doing this destructive sampling, [such as isotopic analyses or more precise major-oxide analyses], that there is no way we can answer [non-destructively] with the [EDXRF] machine that we've got at UH Hilo.

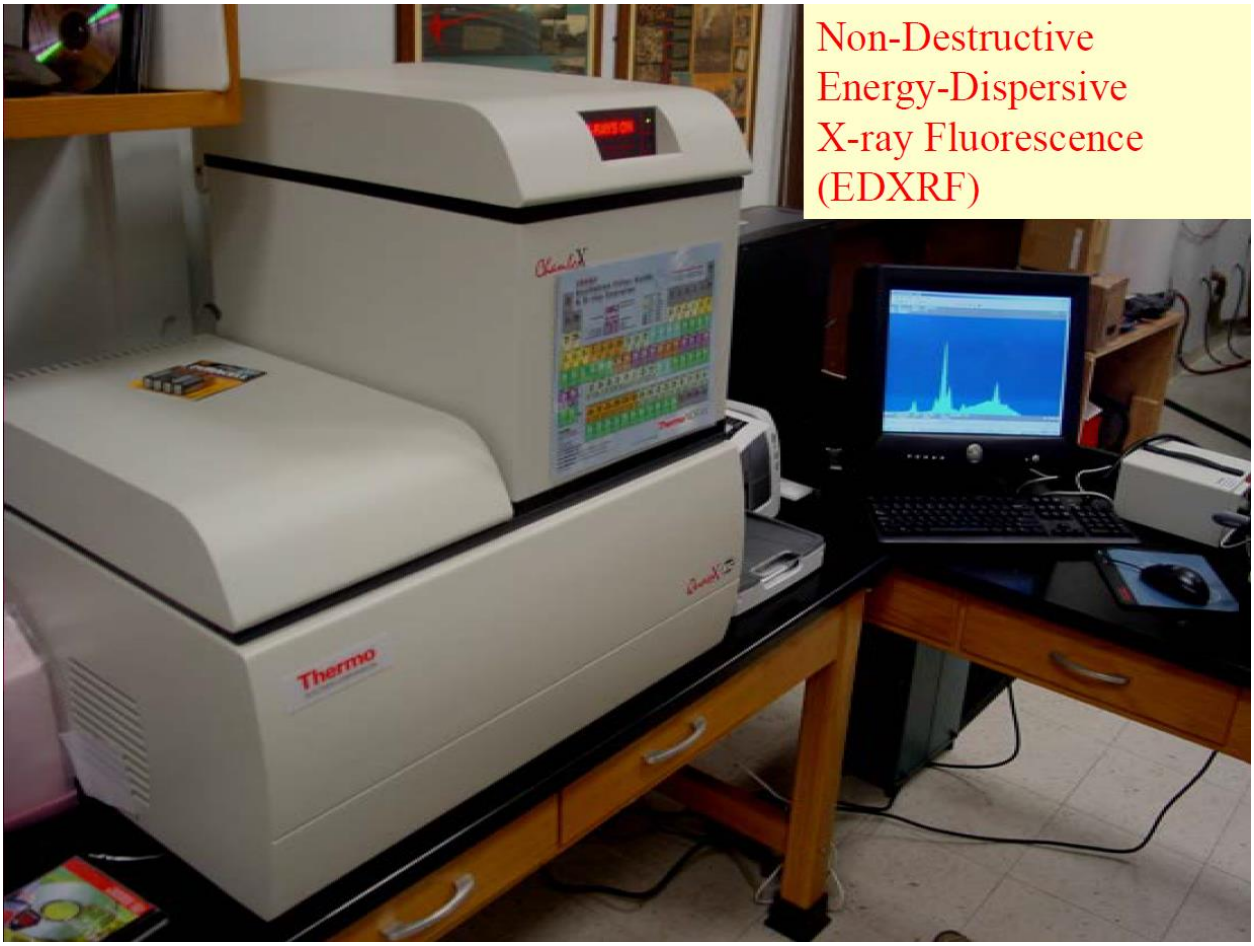
So I don't want to pretend that having [the] non-destructive approach that I'm talking about today answers all the questions. It does not. In fact there are many things, as I said earlier, that we can't answer with EDXRF. I think we do a much better job at telling you where a rock doesn't come from than saying, "Yep, a hundred percent, this is right from this source." But we can end up answering lots of questions non-destructively.

The approach that I think we should take, when we're designing our modern ethics, in terms of approaches, is that if you can analyze something and answer research questions non-destructively, let's start there. Let's figure that out.

In fact, that is pretty much where all of us end up. I work a lot with John Sinton, [who is] in the room. We do lots of analyses completely non-destructively, and some of our collaborators choose to go to him to [use WDXRF] to answer other questions that we can't.

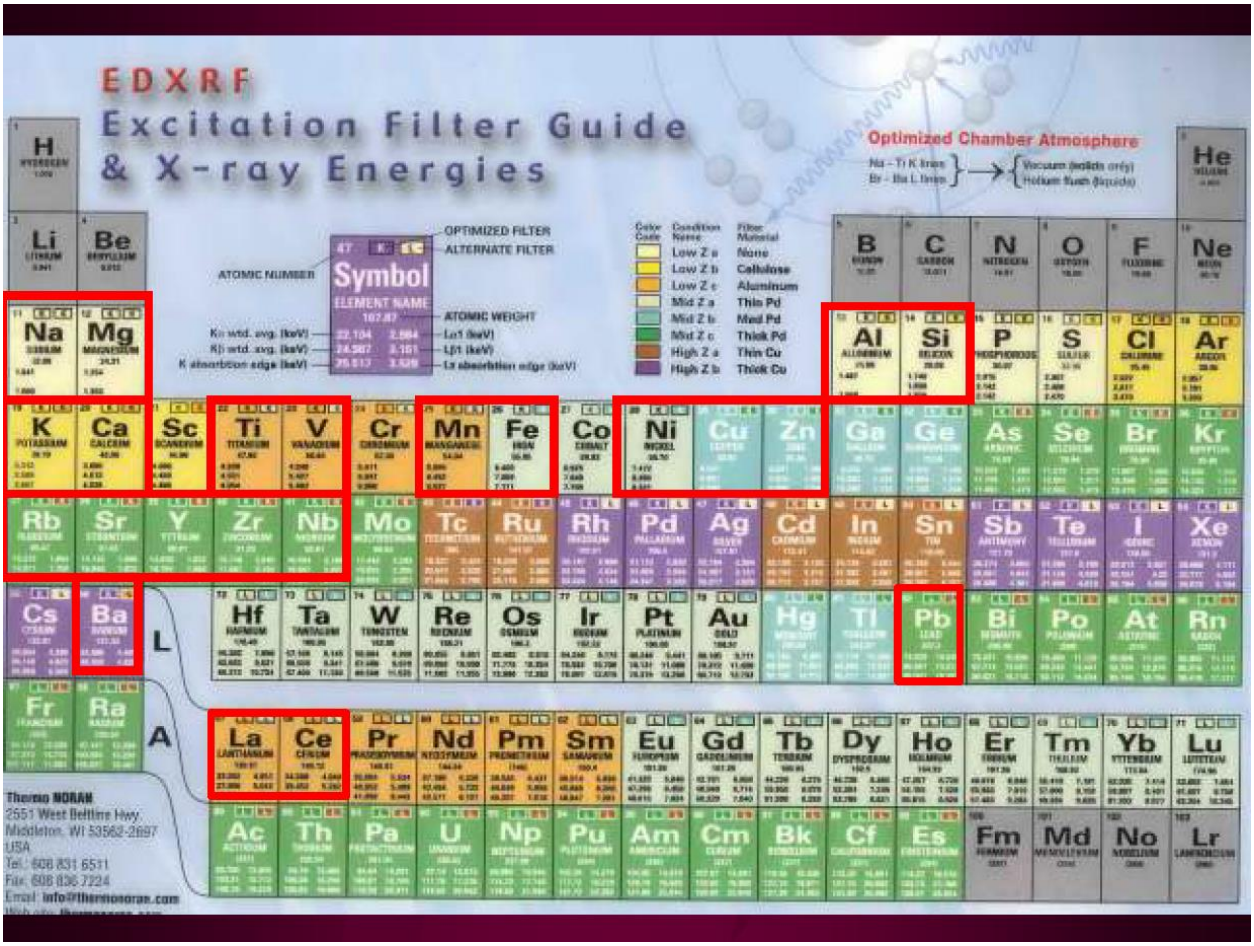
There are also ways to do non-destructive analysis, which basically results in very, very minute fragments being taken out. Things like different techniques of inductively coupled plasma mass spectrometry (ICP-MS) you can get very small fragments and not end up needing to do the bread-loaf cut or unnecessarily large drilling.

So this is the [EDXRF] spectrometer we got back in 2003. It's run for ten years now. We kept it on a service contract and if breaks down we fix it. It has run for ten years and basically we got a special chamber on here, a large chamber, so we could put whole things in it like poi pounders, and large adze, without having to cut them to put them into the chamber, which again would have been counter-productive.



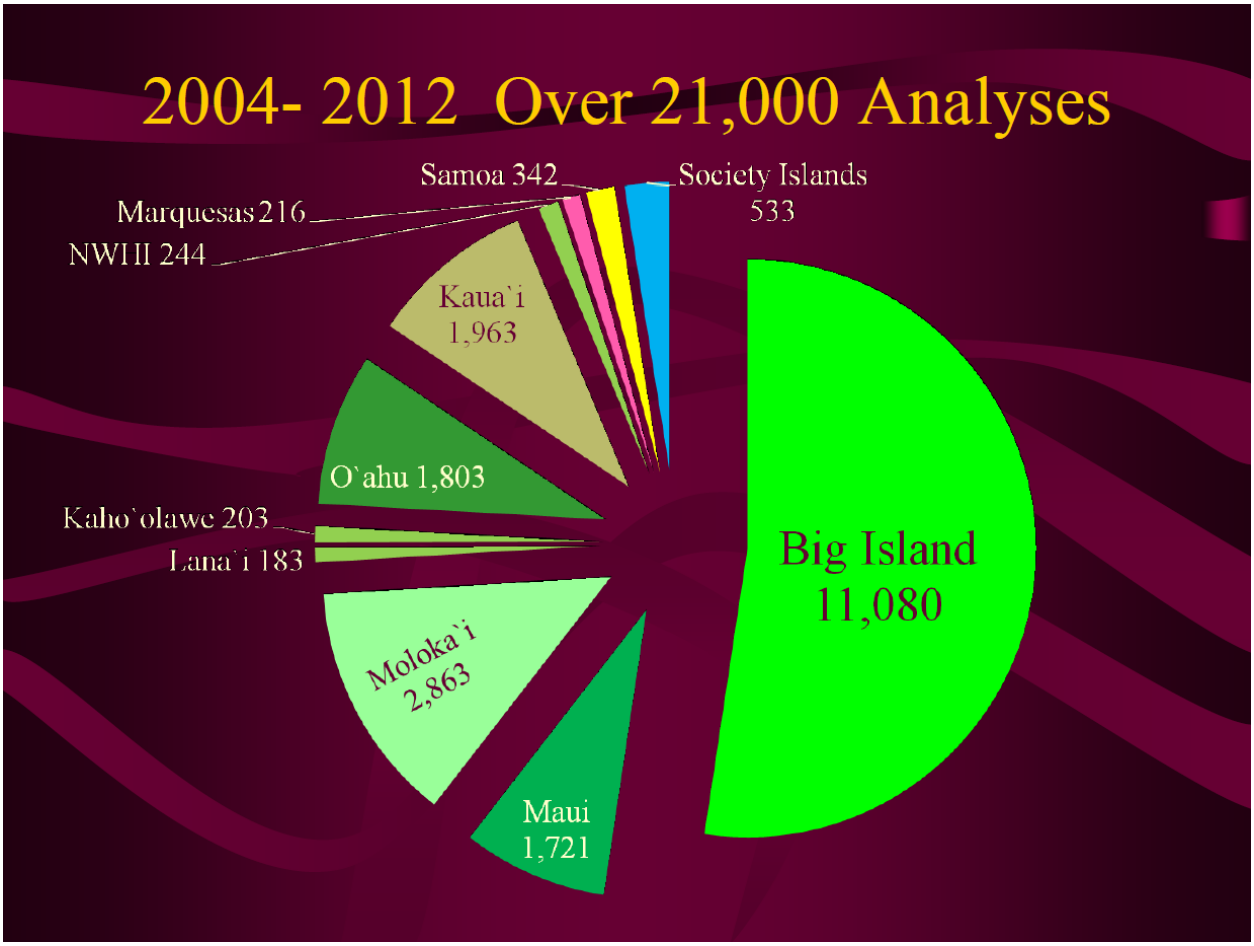
We just got notification last month that the company that makes this is no longer [going] to service it anymore and it's now an obsolete piece of equipment. So we're now in the position that, by 2014, we're going to have to write another grant to get another model to keep our sort of research line going. It's been a great ten years. I really, really like what this machine has done.

Basically, what happens is, you put a sample in, [and] you hit it with x rays, which don't harm the structure of it at all. The x rays that hit the rock cause the atoms in the rock to generate their own x rays, and, based on what elements are there, they'll give off characteristic range of spectra, which you end up seeing—this is a quick display showing different peaks for different sorts of elements that you have right there.



In the end we can tell you what elements are [in the sample]. We go after a range. The ones in red right here on the periodic table, the elements that we analyze with the spectrometer—this group right here, are rubidium, strontium, yttrium, zirconium, and niobium—is real sweet-spot that we can do just about as well as most other techniques that are out there.

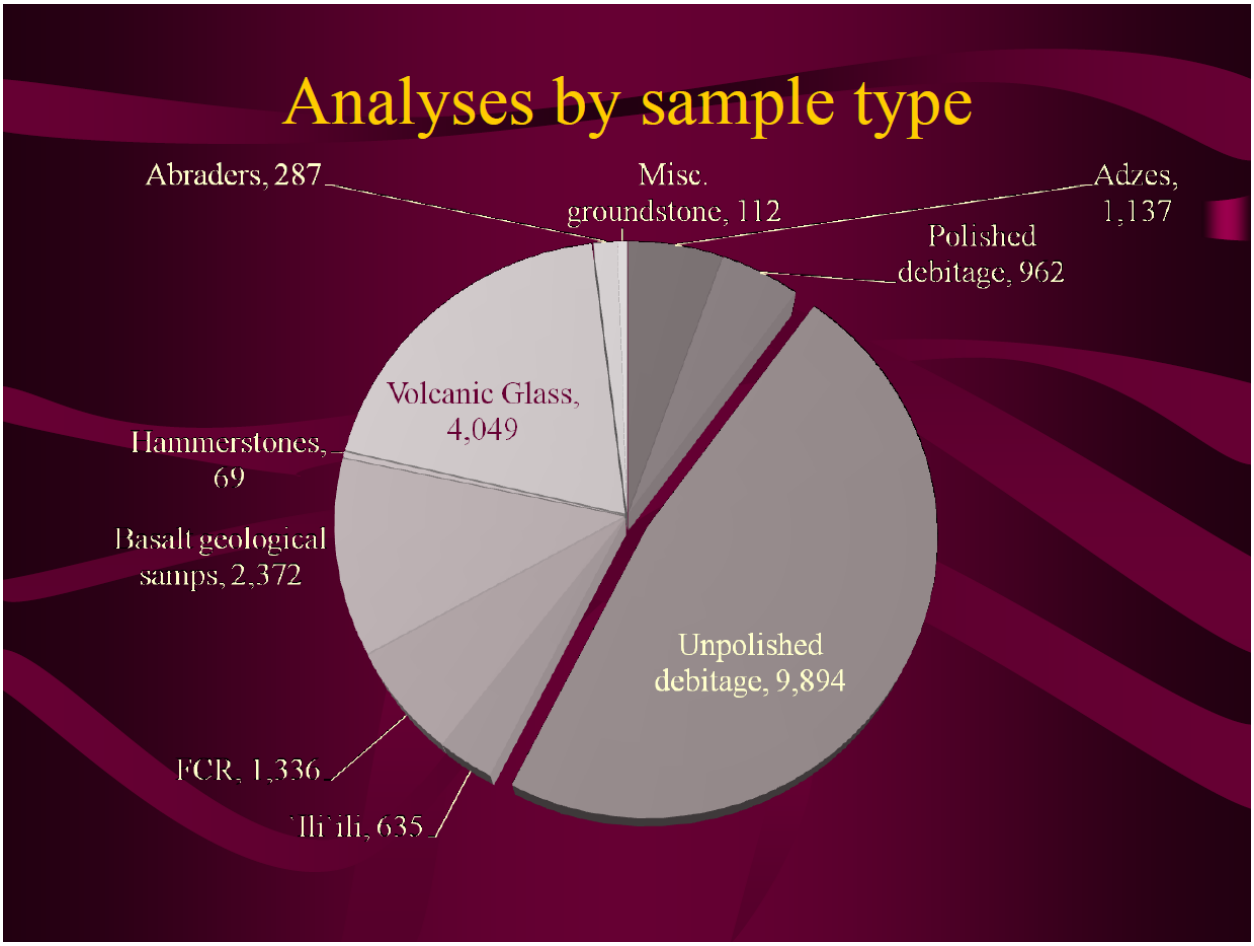
We get some really accurate data on those. So we choose to focus on those a lot for what we put together. Today I'll show you some graphs, some scatter plots, just sort of strontium versus zirconium, which are two of the ones we really focus on a lot. [But] we actually look at a much broader range than that.



So far what we've run since we got the machine set up, we've run about 21,000 samples through this machine. We can load 19 samples in overnight and one geological standard. So it's better than the hand held versions, which you have to use by standing there and holding, or setting on [a] tripod.

We can basically run 19 [samples] overnight, and as a consequence of that, we've run about 11,000 samples from the Big Island, about 3,000 from Moloka'i, 1,800 from O'ahu, 1,900 from Kaua'i and Maui. We've run some from Samoa, from the Society Islands, the Marquesas, Northwest Hawaiian Islands, Kaho'olawe and Lana'i; sort of spreading out the samples that have run through the machine.

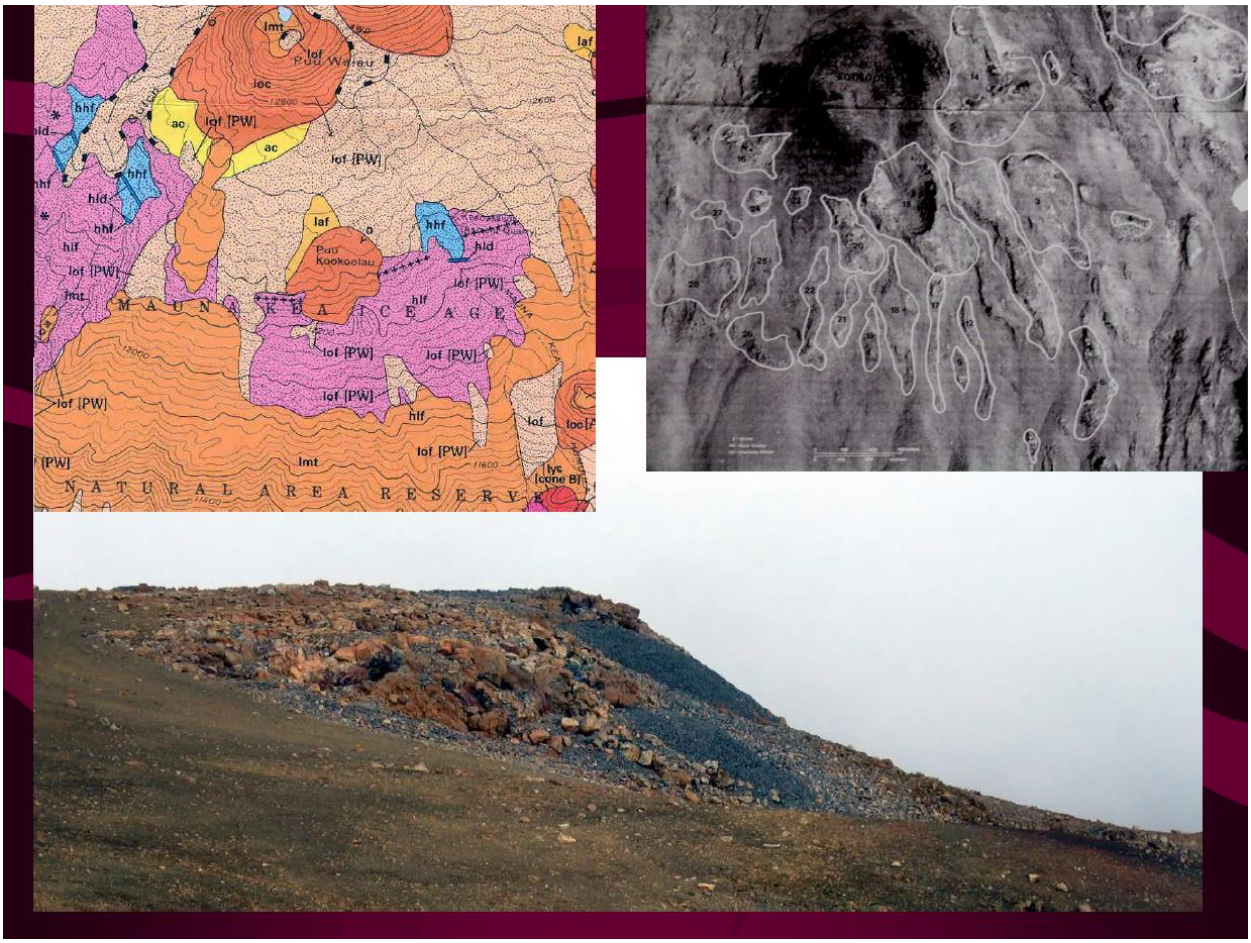
In terms of the sorts of things that we have analyzed, most of what we've run has not been finished adzes, but the chipping debris that's left behind from making them. Right here we've run polished chipping debris, which have come off a finished adze [polished flakes]. Most of these [unpolished flakes] are coming from adzes that are being made. These [polished flakes] are coming from adze that had been finished but are being rejuvenated.



We've run abraders, hammer stones, other sorts of geological samples. One of the sports that we invented we call "gulch slogging," which is to go out and collect ʻiliʻili from a gulch and to just look at the hard dense rock that comes out of a particular gulch to see what the [geological] profile for a particular catchment would be. This doesn't tell us where it came out of the flow, but it shows us what you end up with by the time you have dense hard stone at the end of the drainage on the beach. We have fire-cracked rock and ʻiliʻili and all sorts of things that we have run through.

For those who don't know it, this is the Mauna Kea adze quarry [photo of a large chipping debris pile, or 'debitage pile']. This is one very small portion of it, but right here is the chipping debris that is left behind. Anybody who goes there and understands almost getting up at 12,000 feet and above, how difficult it is to reach this place and the amount of work that went into just creating this pile.

It's right off of the hiking trail up to Lake Waiau, so lots of people see this particular pile, but what most people don't know is that pile is sitting right here and these white lines on this aerial photo [demarcating quarrying activity]—sorry, these white lines on the aerial photo here are covering seven square miles around Puʻukoʻokoʻolau, or pretty much most of this purple area here, these escarpments cover the area where there are similar piles that are all stretched along there. It's an absolutely enormous complex with a huge amount of stone-tool making up there.



Also, when we use the word quarry in the Western sense, it's not a good term to define how Native Hawaiians view this place. You say quarry, you picture the movie "Breaking Away" in Indiana and a kid on a bicycle in a limestone pit. This is a sacred place and actually before we started this project, one of the things that I felt I needed to do was, I went and spoke to Aunty Pua. She directed me to Kekuhi.

Steve Lundblad and I learned a genealogical chant, [that starts out]

O hānau ka Mauna a Kea,	*Born of Kea was the mountain,*
O Puʻu aʻe ka Mauna a Kea.	*the mountain of Kea budding forth.*

We went up and basically did an ʻawa ceremony before we gathered any geological samples there. Not because I'm trying to take on Native Hawaiian religion myself, but because it is the appropriate way to approach the place, that the intent has to be there to do it in a way which is acceptable.

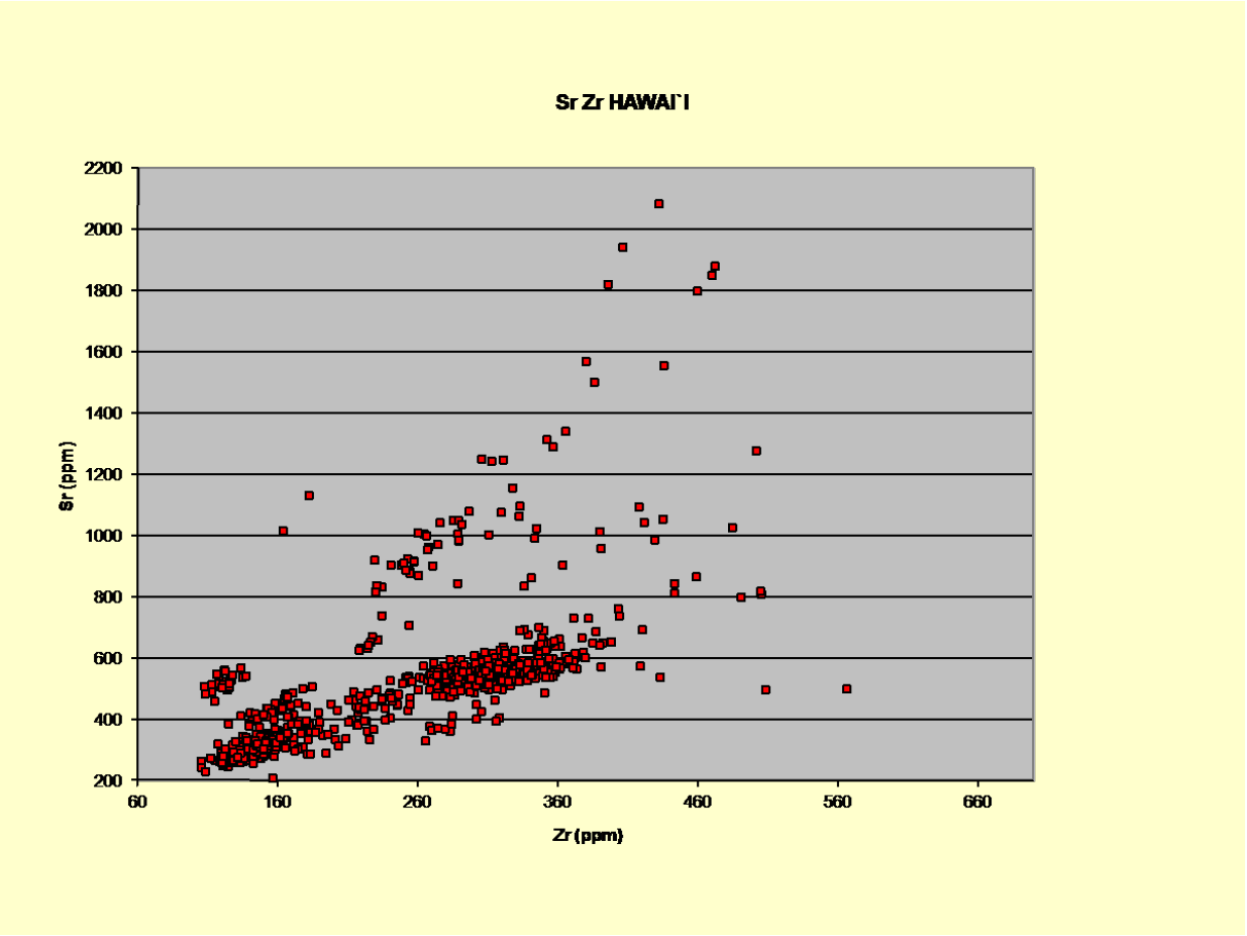
That said, I have to relish that the most important job we have with having this machine at UH Hilo is not just the articles that Steve and I are publishing, but it is the students that we are working with and creating an environment for them where they feel comfortable with their traditional cultural background [and] to engage in the kinds of research that we are doing.

That, to me, is the gem of this project in terms of having [these students]—we have had a number of student collaborators—we've published about two articles a year; we have lots of

student authors on our publications with us. I'd encourage you to go on the web page and see some of those. In fact, I think Jim was kind of enough to stick one of our articles from a year or two ago in your pamphlet.

Okay. So, right here, the thing that we gain by losing a little bit of analytical accuracy with the machine is massive sample size. It would take a lifetime of doing high-level ICP-MS to generate this many little dots on a scatter plot.

What you are looking at here are the numbers of adzes and polished flakes that have come off of the Big Island that we've analyzed over ten years, lumped together. You can start to see how they're clustering in different places.

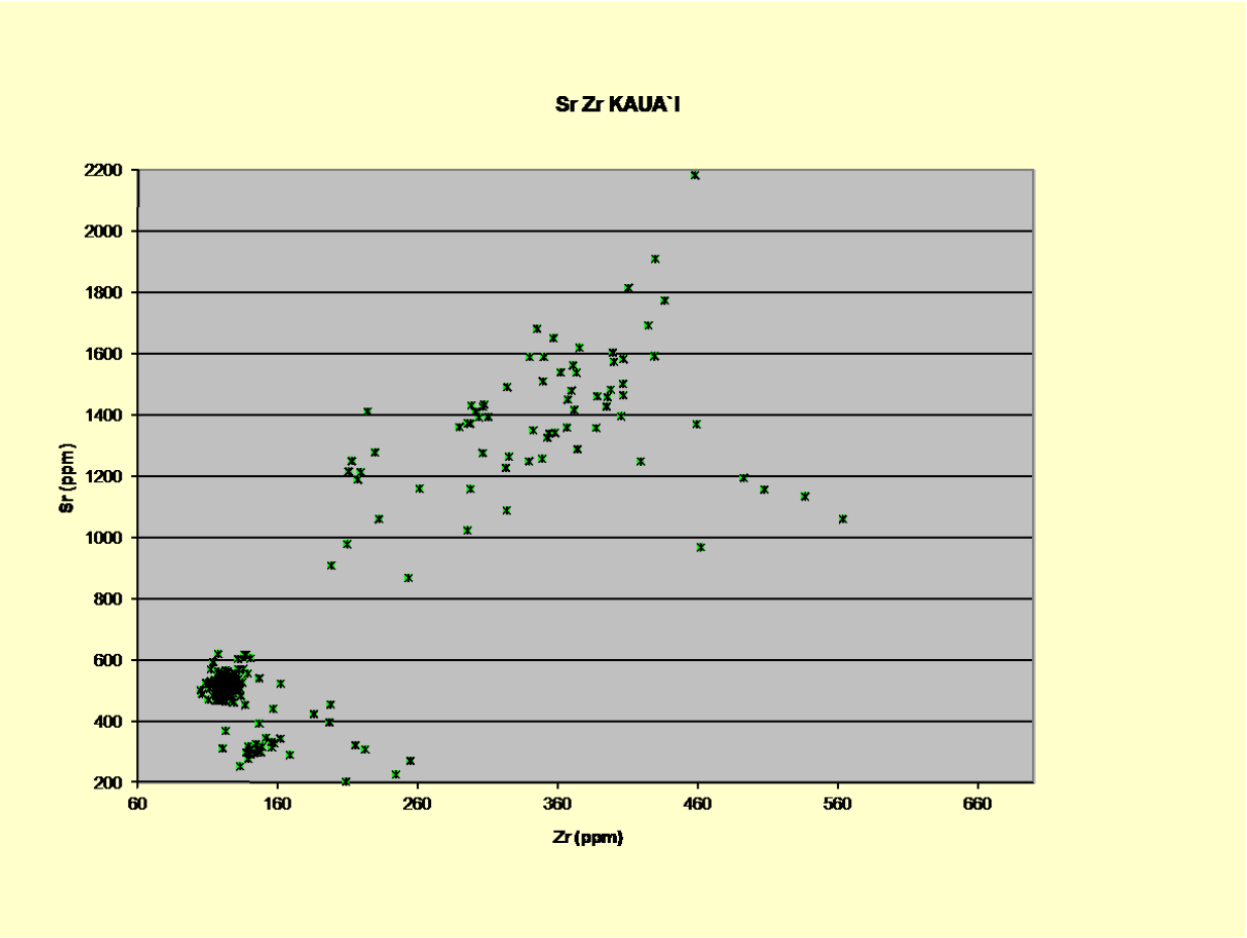


Basically, the Mauna Kea cluster is right here, and I can't swear to you that every single thing that fits in that cluster came off of that adze quarry, but I can tell you that cluster makes up about 50 percent of the stuff that comes off of the Big Island.

There is another cluster down here that matches pretty well with what Jade [Moniz-Nakamura] was talking about earlier in terms of the Kīlauea, all sorts of volcanics. We've got this neat other little cluster over here. See how it is all sort of by itself? If we just analyze ten samples or so you wouldn't see how tightly defined this little cluster is, but by the time we've analyzed thousands, you can start to see these clusters that show up that wouldn't be visible otherwise.

So, large sample size does gain you a great deal [of context]. I'll come back to that one that is sitting by itself.

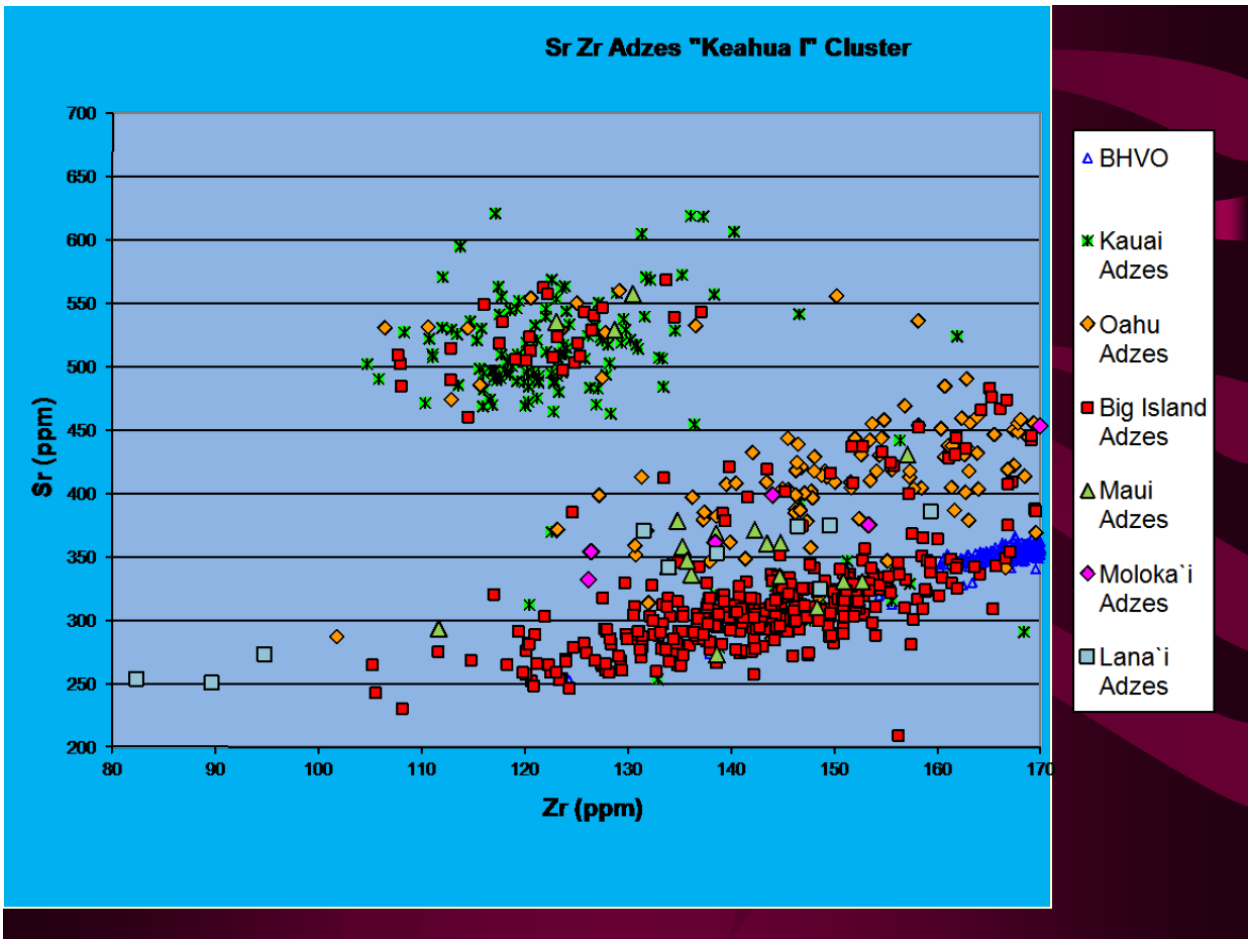
This is Kauaʻi. See that cluster [an empty circle where Mauna Kea should be]? This is really fascinating to me. Here is where the Mauna Kea quarry is and this is ten years worth of running adze from Kauaʻi from various sites. We don't see Mauna Kea showing up on Kauaʻi, which is something we didn't know before this project began.



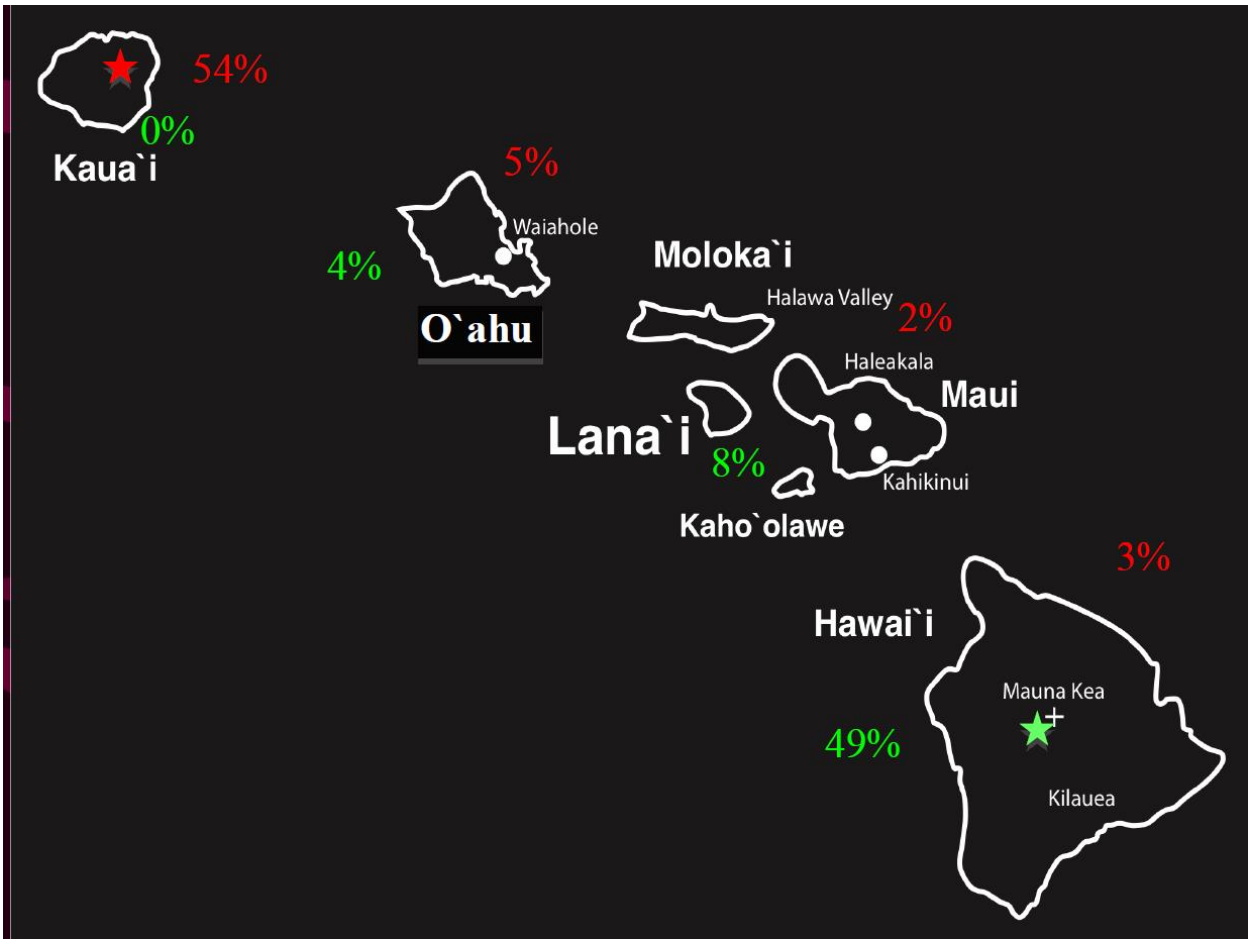
So far, out of everything that we've run, basically you have what we were just hearing about, this rejuvenated volcanism that is going up here, which is the Kōloa volcanic series.

We have a range of different things down here that fit in well with the Waimea Canyon series and there is one rock type that shows up over on Kauaʻi that is basically off in its strontium and zirconium ratios a little bit but [many unknown samples from Kaua`i] just nails it [the small anomalous geochemical cluster with the irregular Sr/Zr ratios] time and time again. Well over half the samples from Kauaʻi fit right into that one particular source, which we really knew almost nothing about before this project began.

There was one sample that was run—in fact, John Sinton ran a sample that was labeled as "Keahua I" [Sinton and Sinoto, 1997]—and it turns out, that is an incredibly important source for koʻi on the Island of Kauaʻi that we didn't know about before this began.



By the time you look more closely at this, this is where this Kīlauea cluster is, [and] you can see that Kauaʻi source, again, going between the different islands. Each island [on the scatterplot is represented by] a different color. We keep on getting a few from other islands that fall out there, including [the] Big Island.



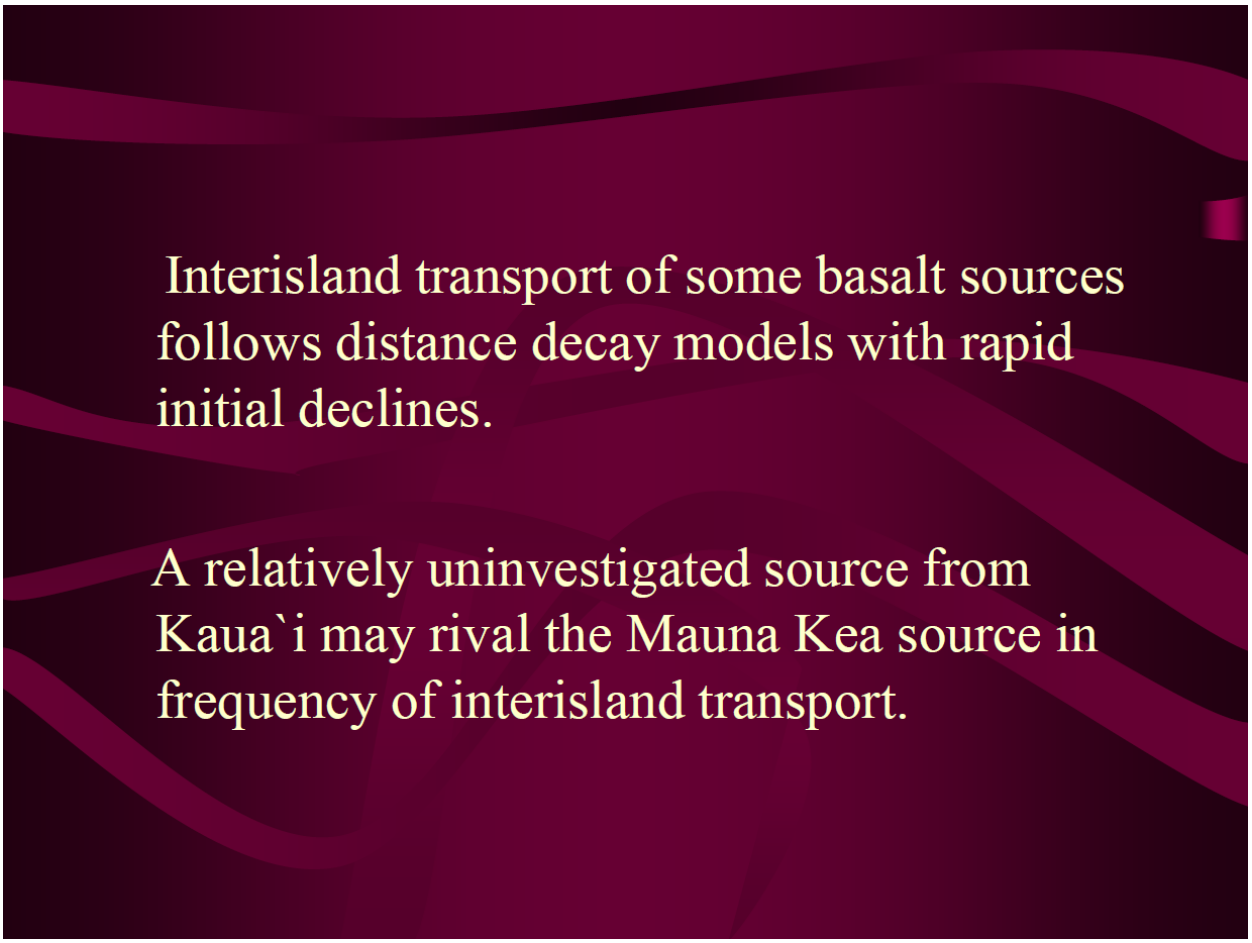
So we can't say for certain, but it is starting to lead us in the direction that we've got this Kauaʻi source going all the way through the Hawaiian Islands, even though we don't see the Mauna Kea source going in the other direction, which is not what any of us would have guessed when this project began.

If you take a look at those two percentages from those two different clusters, again, about half the stuff on the Big Island has come [from]… Mauna Kea. By the time you're over to Maui County it's about at eight percent, about four percent for Oʻahu and still some Mauna Kea clusters showing up, [but] none [from Mauna Kea are found on] Kauaʻi.

In the opposite direction, we've got 54 percent of that Keahua I on Kaua`i, very quickly dropping off again [once you leave Kaua`i], just like we have for Mauna Kea [by the time you get to Maui] down to five, but still three percent.

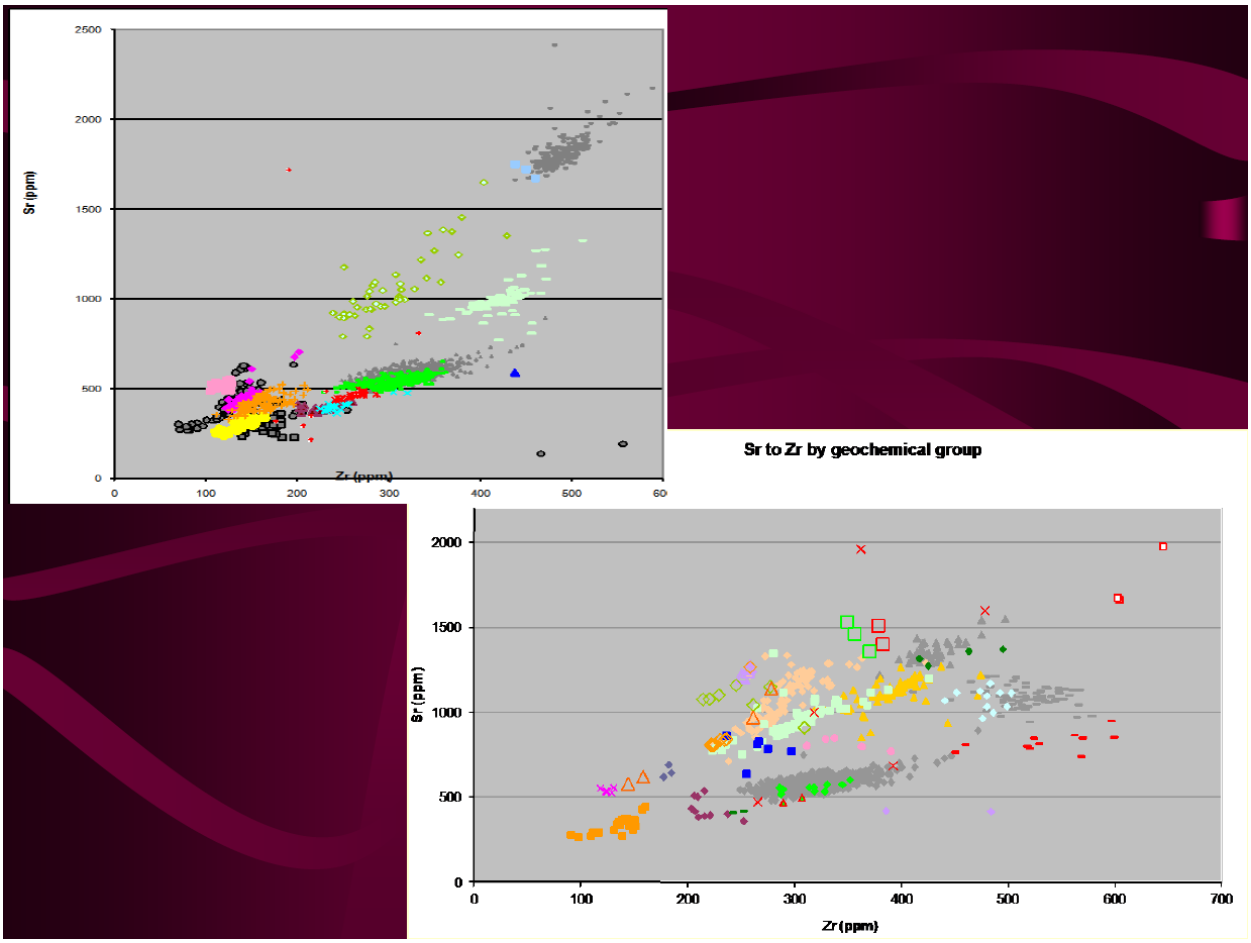
The site I was showing you, well actually, the site where most of the stuff from Kauaʻi came out of [on the Big Island], is basically right next to Lonoikamakahiki Heiau. I'm not certain that same cluster will be showing up through all of the loʻi and all of the dry land taro fields, but it may be showing up around the chiefly centers, and so it is associated more with chiefly travel than sort of common economics between different makaʻāinana.

So inter-island transport in some of the basalt sources follows a distance decay model. You can see a rapid drop off in terms of the stones that are being used on each island [as you go to the next island], and there is one relatively uninvestigated source in Kauaʻi that may rival the Mauna Kea source [in its frequency of inter-island transport].



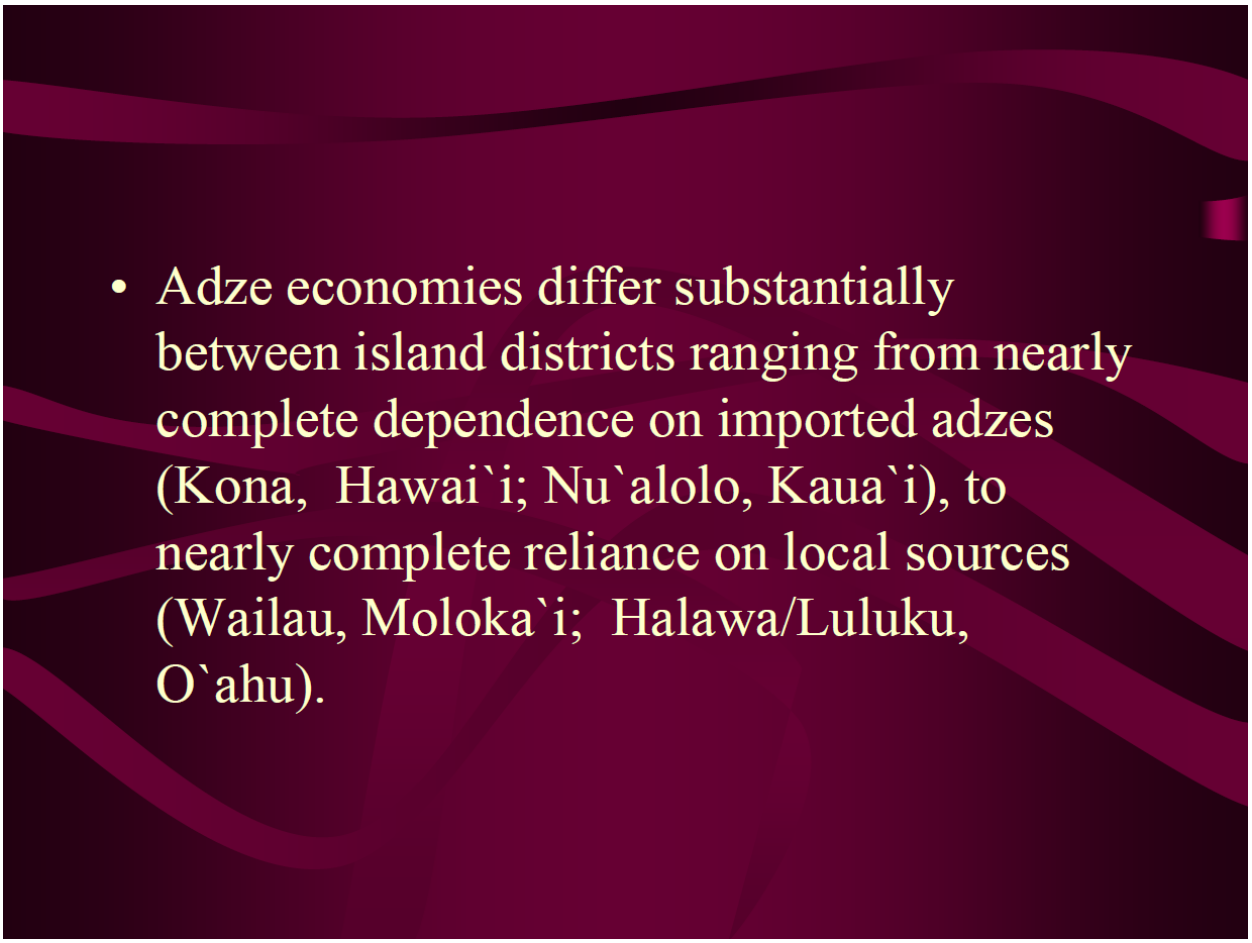
Eventually, we want to see if we can demonstrate with other analytical techniques whether or not we are confusing the Kaua‘i or Mauna Kea sources with other sources that are mimicking them, if it’s culturally appropriate.

To take a look at patterning in adze production on two different islands, something else I want to show is that, on the Big Island, what you‘ll see is that there is a great deal of clustering around particular sources of stone that match up; [people on the Big Island tended to make adzes out of specific quarry sources].



When you get over to Maui on the [southwest] rift zone of Haleakalā, what you basically see is a big spread of very similar stuff, but not all from the same exact geological source. So in some cases, like the Big Island, I think what we're seeing is that there are very specific quarries where people are getting their stones from and, in other cases, like Maui, you have good enough quality rock that people would rather gather from a number of very different flows that are all sort of geochemically related. So that is something else to add.

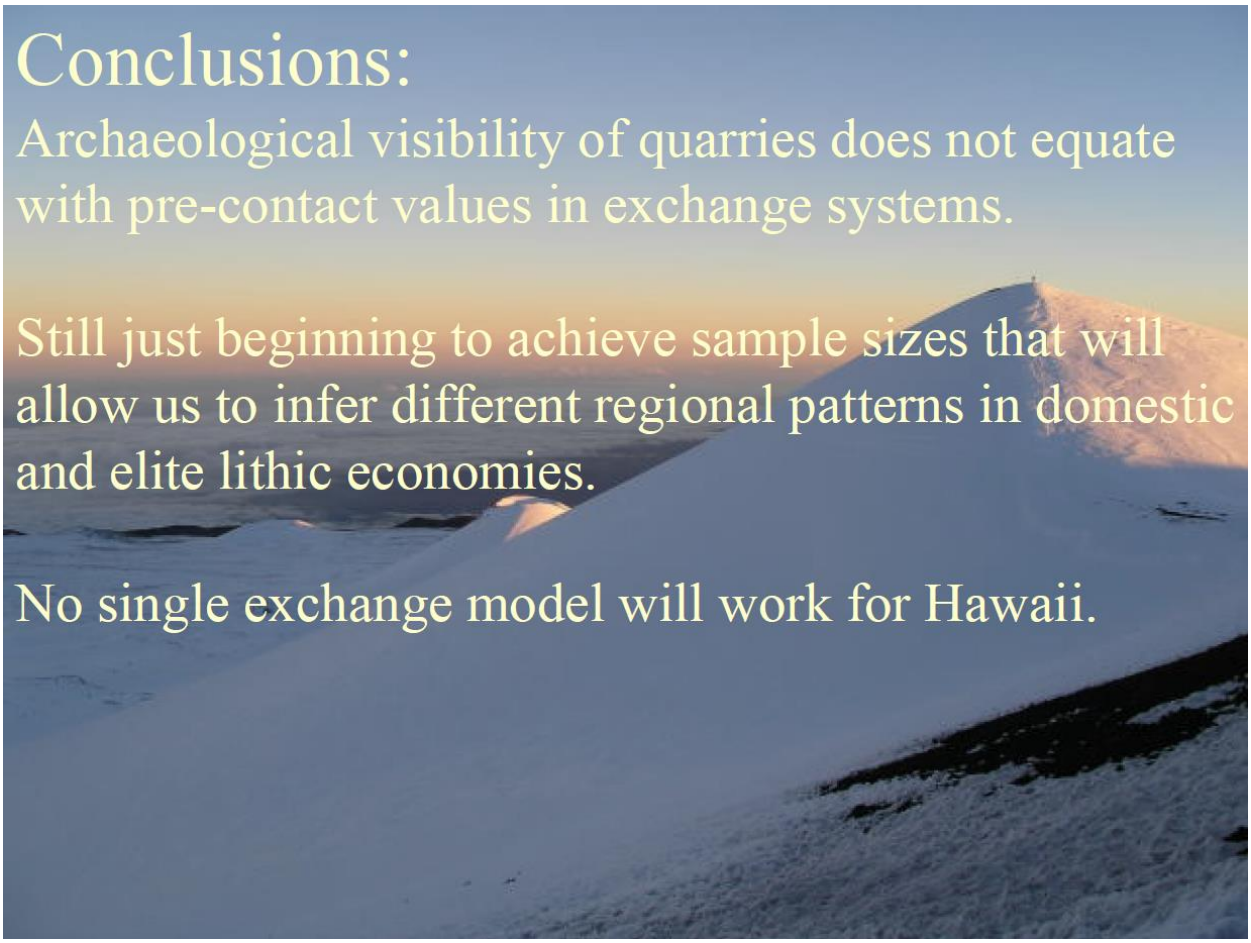
So adze economies can differ substantially between island districts, ranging from nearly complete dependence on imported adzes [to nearly complete reliance on local sources]. We see that, for instance, for the stuff we've run from Kona in particular. [Around] Hualālai, we're just not seeing adzes made out of Hualālai volcanics.



In fact, everything that is on Hualālai seems to be coming in from other ahupuaʻa and even other moku, which is telling us a great deal about economics between the aliʻi at that time.

Then, in other cases, like if you're looking at Wailau, Molokaʻi, or Hālawa-Luluku on Oʻahu (where the H-3 project ran through), almost all the adzes seem to be made from local sources. So we see differences in where adzes are coming from.

So just to conclude, archeological visibility of quarries doesn't necessarily equate with how significant they were in contributing to the overall exchange system. We see the Mauna Kea quarry because every single rock that everybody chipped up there is still visible. You can still see the scars and the rock faces.



Somewhere like, basically, the Wailua River drainage over on Kauaʻi, erosion has probably hidden things that were very large quarries that we can't see anymore.

[We are] still just beginning to achieve sample sizes that will help us infer regional patterns and [understand] how adzes might be used in elite economies versus common ones. I don't think it's good anymore to talk about a single kind of exchange system or how these ahupuaʻa economics worked in a single model. I think adze economies would be different based on the geology, which Native Hawaiians understood very, very well, and we're just learning about [it].

Geologists generally don't pick up a rock and say, "how well does this turn into an adze?" That kind of knowledge comes from centuries and generations of working with material, and it's a combination of those two things—[geology and ancestral knowledge]—that we need to pull together.

Mahalo.

Questions

Q. I've always wondered about [how] western Molokaʻi was called Kalua Point and we know there are a few quarries over there but they're not very big. I'm wondering do you see Molokaʻi material very often in the assemblages on the other islands?

PETER. I think we're seeing, well, just as an example, the Big Island, one of those elements [that] we do very well is called yttrium. Yttrium is an element that, in older rock as it weathers,

can basically concentrate in the core of the rock through spheroidal weathering. So yttrium is elevated on some older islands but not so much on the Big Island.

So one of the things we've been seeing, for instance, the assemblage in Kona at Kahaluʻu right next to the Lonoikamakahiki Heiau, we have a number of samples there with elevated yttrium and a good Molokaʻi signature.

I think those things combined would suggest that we do see Molokaʻi [material] turning up at least around the aliʻi centers on Kona. We have similar examples of that on a number of sites, Honaunau and other places. So, yes, I think it is showing up off-island.

The other thing to say, though, is that we just had two undergrad students, Lokelani Brandt and Pulama Lima. Katie Mulliken is another student who is working on this, too, [on Hawaiʻi Volcanoes National Park Assemblages]. Loke and Pulama are both great students working on assemblages from east Molokai, which isn't known well for adze making, but it's pretty clear from the work they did that, [on] east Molokaʻi, they were making adzes right out of Hālawa Valley, and [we are] seeing very little stuff even from west Molokaʻi ending up in east Molokaʻi.

So even though we might see Molokaʻi stuff, west Molokaʻi stuff, moving off island, we're still seeing the situation where there is good enough quality stuff in east Molokaʻi that there is not a big draw for the stuff on the west side of the island to make it to the east side.

Q. Running samples through the EDXRF, do you need to worry about positioning . . ., that you have a specific kind of sample topography that [may affect] your results?

PETER. Yes. Here are the things to say. One is that when we—what we're doing is, we're realizing that our sample topography isn't prepared like pellets just like the sample topography, which is perfectly flat, perfectly homogenous and that is what you basically need for really good data to come off of a lot of techniques.

So when we did our cluster for the Mauna Kea adze quarry, we ran through about a thousand flakes from excavations at the adze quarry. They were collected by the Bishop Museum in the 1970s, [and they] weren't perfectly flat and homogenous. We saw how big our cluster was when we did that.

So we're defining, sort of, our expected cluster size given the imperfect nature of the samples that we've run through, but we all put them exactly the same distance away from the beam. We try to aim for the flattest surface possible and so when we run stuff through, we're trying not to run cupped surfaces or something where there is a big difference in terms of distance from the beam or the shape and the surface from what we do.

The nice thing about adzes is they're ground flat. When we do the adzes themselves there is a nice surface, basically just like a pellet.

Q: Do you take your samples back?

PETER. Absolutely. I'm not a collector. So basically, the nice thing about this, with 21,000 samples, is we're not building up a museum. Mostly what we do is, we analyze collections and return them.

In fact, our most recent NSF grant [is] basically setting up [a] conveyer belt between the Bishop Museum to bring samples over and return them to where they came from. The few times when we haven't taken samples back [is because] there has been cases when something has come out of bedrock and where, in order to create a slab, like [in] geological samples as opposed to an artifact, we haven't taken that cut slab instead back to the site where, its presence would look more foreign than its absence.

(End of presentation.)

Suggested References

Mills, P.R., and Lundblad, S.P., 2014, Current perspectives on Hawai‘i’s stone tool economies: Journal of Pacific Archaeology, v. 5, no. 2, p. 30–39.

Sinton, J.M., and Sinoto, Y.H., 1997, A geochemical database for Polynesian adze studies *in* M.I. Weisler, ed., Prehistoric long-distance interaction in Oceania—an Interdisciplinary Approach: New Zealand Archaeological Association Monograph 21, p. 194–204.

Pelehonuamea II

Speaker: Pualani Kanahele, Edith Kanakaʻole Foundation
Tuesday, January 29, 2013

Yesterday I talked about Pelehonuamea. I introduced two of Pele's genealogy. The first with Haumea and Moemoeaʻaliʻi as parents and this set of parents were Earth deities. Haumea is Mother Earth, and all of the children were born from different parts of the mother, however, Pelehonuamea was born the way man is usually born, that is from the vaginal area. This, of course, was a metaphoric birth, but nevertheless coming from the inside of the Earth out, like the birth of a child or menstrual period. The exercise for this genealogical chant was to uncover the layers of chants and discover the possibilities concerning Earth elementals or deities.

We talked about the second genealogy and Pele's relationship to Kaikahinaliʻi, tsunami, and Kānehoʻālani, the sun. The reason for the second genealogy was to show that there is more than one truth and not one absolute identity in comprehending an elemental deity.

I spent some time [studying] the migration of Pele from Tahiti and Bora-Bora. And finally ending with the kanawai of Pele and giving credit to those who recorded the movement of magma [and] observed the eruption, the devastation and the necessity of recovery.

From the short lecture yesterday, we learned how information was transferred generationally. We also learned that, in order to interpret the metaphor, there had to be an understanding of the layers before deconstruction and reconstruction [when] adequate elucidation was possible. The genealogical chants were to establish Pelehonuamea's energy source, which is Pele, magma/lava. Another review for yesterday was the parallel knowledge of how migratory chants track both Pelehonuamea's myth, as well as the movement of the natural phenomenon. Pele's kanawai was to show the expertise of honing in on the sacred path of Pele's southeast journey. The fact is that, as island people, we pay deference to the material from which our islands are made. And we should continue to be environmentally attuned to the volcano, as were the ancestors before us.

The objective among some of us today is to continue expanding the perimeter of information we possess on Pelehonuamea.

Without the critical focus on the elemental form, Pelehonuamea means other things to us besides red, earthy substance or magma. Pelehonuamea also means land or ʻāina. ʻĀina is a little different from just land. ʻĀina is that place that grows food and feeds the organisms occupying that space. That is all part of Pelehonuamea's image.

Another image of Pelehonuamea is the mountains or the making of the mountains, crevices, the vista of puʻus, whether they are indented or filled at the top. This landscape is Pelehonuamea because they are all products of Pelehonuamea.

Another product of Pelehonuamea is the heat that rises into the atmosphere from a volcano or an erupting area. The byproduct[s] of this activity are clouds and rain. Pelehonuamea has a weather system that is produced by heavy eruptions, and the rising of steam transforms into clouds, then clouds into rain.

Uahi a Pele or vog is the smoke of Pele. Mahu is the steam that comes straight off of the lava or magma from underground hot spots. The jet steam that shoots out of the volcano is also mahu. Mahu is steam and gases. Uahi is that steam that is diluted by air.

Again, the primary image of Pelehonuamea is magma and lava. I think that, despite the multiple images we discussed of Pelehonuamea, the most important is that she does produce

material to build islands. The existence of all living organisms needs land and Pele produces that land space.

How do we know all we do of Pelehonuamea, the fire goddess? We know all of this because these images of Pelehonuamea stimulate remembrance of chaos creating beauty and inspiring composition of chants, of happenings and tumultuous changes of the landscape. We know because we live on volcanic islands and have experienced the eruption, vog and the smell of sulfur for many generations.

At this point I'd like to introduce the genre of "Hulihia" chants. Hulihia are eruptive chants, it describes eruptions and different phases of eruptive outbreaks, flare-ups, explosions, et cetera. Many Hulihia chants include an eruption from the dim past then a migration of eruptive phases. It is a way of honoring the homeland and stating the fact that the Pele continues.

We will examine this Hulihia chant, [of] which [the] title or first line is "Hulihia ke au ka papa honua o kona moku." This hulihia elaborates on the above-ground part of the eruption. First lines are used in place of titles, since older traditional chants didn't have titles. I will list a few lines below from 22–40 of the Hulihia, then translate and do brief interpretations of them.

22. Ka wahine ʻo Pele i hiʻa i kāna ahi	*The female Pele lights her fire*
23. ʻAʻā pulupulu, kukuni wela ka lani	*The tinder alights burning up to the sky*
24. He uila kuʻi no ka honua	*A lightning strikes from the earth*
25. Hekili paʻapaʻina i ke ao	*Thunder burst in the air*
26. Pōhaku puoho lele i luna	*Rocks explode, flying upward*
27. ʻŌpaʻipaʻi wale ka mauna	*The mountain slams together*
28. Pipili ka lani, paʻa ka moku	*The sky clings to the land, holding it in place*
29. Nalo Hawaiʻi i ka uahi a ka wahine	*Hawaiʻi hidden in the volcanic smoke*
30 I ka lili a ke akua	*In the reverberation of the goddess*
31. Ke lauwili nei ka makani	*The wind begins to twist and turn*
32. Hoʻanoʻano mai ana nā ʻeho	*Heaps of stone are tossed about like seeds*
33. Lapa uila hekili wāwahi ka lani	*Lightning flashes, thunder shatters the firmament*
34. Kū loloku ka ua i uka	*The rain is torrential in the uplands*
35. Kuʻi ka hekili neʻi ka ōōlaʻi	*Thunder cracks, the earth trembles*
36. Lele kapu i kai	*The ocean alignment has been made sacred*
37. Hiki lele ai i lalo o Kānelūhonua	*Shock waves reach down to Kānelūhonua*
38. ʻO Kānepuahiohio wili	*Kānepuahiohio twists*
39. Wiliʻia i uka, wiliʻia i kai	*Twisting upland, twisting seaward*
40. Wiliʻia i luna, wiliʻia i lalo	*Twisting above, twisting below*

Lines 22 and 23 are indicators that this chant is being described as an above-ground volcanic activity, as mentioned before. The fact that a fire is lit and firewood is being used, that [it] reflects in the sky, is a hint of the above-ground action. The idea of "hiʻa ahi" is to rub two sticks together, a very human function for lighting a fire. The lighting of a fire needs air, kindling and spark. All of this is hiʻa. The lighting of the fire of Pele is the presence of burnt kindling, the cool air blowing over the live volcano landscape and the spark of heat ignites: fire!

Lines 24–26 describe the eruption we see near the shore at Puna, with an explosion of mahu and gases sending lightning and rocks flying through the air like it was a handful of sand being tossed. The explosion is caused by the pressure of mahu (steam, gases). When mahu is

expelled [it] is almost immediately diluted to uahi. Uahi thickens, sits on the land, like the sky has fallen, [and] Hawai‘i is lost in the smoke of the volcano as described in lines 28–29. The pulsation of the volcanic heat rises and the air begins to twist. The space is electrically stimulated and thunder cracks and dark clouds gather from the rising steam into the cool air, forming clouds and releasing pelting rain upland. Thunder cracks again near the surface of the Earth and the land trembles. Lava moves in the direction designated, southeast. The tremor is felt down deep in the Earth. Whirlwinds begin extending themselves upward, downward, upland and seaward.

The account of the above chant was experienced generations ago and composed generations ago, yet are known today—same sight, same feeling, same explosive portrayal of Pele's energy [that] is coupled with the Puna coast eruption in the 20th and 21st centuries. It is completely awesome, like experiencing a quantum leap from the past to the present, and very possibly, the future, with words and visuals.

There are two nomenclatures in this part of the chant that warrant explanation. Kānelūhonua is found in line 37 and Kānepuahiohio is in line 38. Kāne's energy is heat of the atmosphere and of the Earth. When deconstructing both nomenclatures, (1) "lū" has to do with instability, and (2) "honua" is Earth; therefore, Earth heat, which is the [cause] of the instability of the Earth. Name two is, again, Kāne as heat with (1) "pua," something that emerges, a thing beginning to appear, (2) "hio," gust of wind, (3) "hiohio," inward breath, and (4) "puahiohio," whirlwind, gust of wind; accordingly, Earth heat is the cause of winds whirling.

On the opposite chant spectrum of Hulihia there are the Kūlia chants. Kūlia balances out the scale of chants: where one is tumultuous, the other is healing; however, sometimes using the same elemental forms as the eruptive chants. The other difference between the two chants is the fact that Kūlia is a prayer chant asking for good health and Hulihia is a respectful description of an eruption, almost celebratory. Both kinds of chants are intrinsically involved with eruption and healing of the land. Destruction and benevolence from the natural world is a theory that our ancestors understood, hence the kanawai.

Here is a short version of a Kūlia:

1. Kūlia e Uli ka pule iā Kananaola	*Strive Uli send the prayer to Kanaloa*
2. Kūlia iā Kealohilani	*Strive towards Kealohilani*
3. ʻImihia kupua o luna nei	*Search intensely for the gods above*
4. ʻO wai kupua o luna nei	*Who are the gods above*
5. ʻO ʻĪliouliokalani	*It is ʻĪliouliokalani (dark dog cloud of the sky*
6. ʻO ʻĪlioʻehu, ʻo Kūkeaoiki	*It is ʻĪlioʻehu, and Kūkeaoiki (red dog cloud, small Kū cloud)*
7. ʻO Kūkeaoloa	*It is Kūkeaoloa (long Kū cloud)*
8. ʻO Kūkeaopoko	*It is Kūkeaopoko (short Kū cloud)*
9. ʻO Kūkeaoawihiwihiokalani	*It is Kūkeaoawihiwihiokalani (lenticular Kū cloud)*
10. ʻO kanaka o ka mauna	*It is the upright clouds in the mountains*
11. Nā hoa o ka ulu lāʻau	*Companion of the forest*
12. Na Keolani	*For Keolani*
13. I kū ai e Laka	*Who was soaked by Laka*
14. ʻO Makaapule	*It is Makaapule*
15. Kahe ka wai o Nahoaliʻi	*The water of Nahoaliʻi flows*
16. Nei wale ka pili mokomoko	*Like indistinct sounds associated with fighting*
17. Wawā o kūpinaʻi	*The unbridled sound echoes*

18. ʻO Kūwawā	*It is Kūwawā (tumultuous sound Kū)*
19. ʻO Kūhailimoe	*It is Kūhailimoe (visionary Kū)*
20. ʻO Haʻihaʻilauāhea	*It is Haʻihaʻilauāhea (heavy rain and wind)*
21. ʻO nā wāhine i kapakū	*It is the females who were overwhelmed*
22. I kapa ʻeleʻele	*Who were draped in black cloth*
23. Na ke aloha i kono e hele	*Because of compassion I was invited to come*
24. Hele mai au ʻo Hiʻiaka	*I, Hiʻiaka, have come*
25. I ke aloha a ka hānau	*To effectuate the restoration*
26. Hānau ke ola	*Life restored*
27. E ola hoʻi	*Life returns*
28. A ola, a ola ē.	*Live and flourish.*

I think it's beneficial at this point to include a Kūlia because it invokes a set of elemental deities for the benefit of restoring life. We will keep in mind that all elementals are capable of both benevolence and chaotic destruction. The restoration of life included in Pele and Hiʻiaka usually has to do with vegetation and land.

This saga includes the stunted romance between Pele, Lohiʻau and Hiʻiaka. The above Kūlia chant was one of the many Kūlia chants used by Hiʻiaka to bring Lohiʻau back to life. The elementals summoned for this resuscitation were cloud forms and rain. Mainly the source of life-giving water and health was the object of the prayers.

The two deities initially prayed to were Uli and Kanaloa. A short hint into the probable reason to summon Uli is because she is the goddess of a healthy environment. The blue of the sky, the blue of the ocean and the green of the forest are Uli. Kanaloa is the god of the ocean and also fresh water found in the aquifers and the basal [groundwater] lens. These are hints as to how some of the elemental deities were/are used. There are also cloud deity forms, both dog [ʻilio] as well as Kū clouds as stated in the Kūlia chant.

I'd like to introduce the Kumulipo genealogical chant. This chant is outside of the Pele mythology and saga genre. It is a genealogical chant of living organisms of the Hawaiian universe. Tangible life in the Kumulipo begins with the coral polyp, then the worms—both ocean and land—and then it advances to describe the ocean shell creatures that live in the reefs and coral bed. Then the bigger creatures in the ocean are listed. The winged creatures are next. After 2,200 lines, the Kumulipo ends after including the birth of gods, stars, and man. The Kumulipo is not like a genesis but it is the ongoing process of births and life cycles. The overall theme seems to be interdependency of water and land.

The use of the Kumulipo at this junction engenders two vital details that are not common knowledge. The first two lines of the Kumulipo are:

1. ʻO ke au i kāhuli wela ka honua	*At the time of change when the earth was hot*
2. ʻO ke au i kāhuli lole ka lani	*At the time of change when the sky was clothed*

The method I've encouraged for interpretation of a chant is to allow the first two or three lines to set the focus for the whole chant despite the length of the chant. The Kumulipo has over 2,000 lines—it is extensive. One of the things we have to keep in mind when translating or interpreting chants is to identify the birthplace and lifestyle of the composer. The composer, or composers, of the Kumulipo were intelligent Hawaiians not only trained by, but liv[ing] in association with, the class of other erudite Hawaiians. The composers were raised on volcanic

islands. To compose the Kumulipo one has to be intimate with the environment. The first two lines are created by one who is descriptive and intimate with environmental images. These two lines are very familiar descriptions of an eruption. These two lines also parallel lines 28–29 in the above Hulihia chant.

Throughout the Kumulipo, the one word that is constant is "hānau" or birth. Fresh water is a necessary element for [the] process of birth. The underlying motif for the first eight sections of the Kumulipo has to do with fresh water. It seems to be the necessary ingredient for life for most organisms. These are inclusive of both land and ocean creatures.

Kumulipo also houses pauku, or repetitive phrases, comparing the creatures of the ocean with those of the land and their dependency on fresh water.

1. Hānau kāne iā Waialolï	*Narrow tributaries are fertile*
2. ʻO ka wahine iā Waialolā	*Broad estuaries harbor fertility*
3. Hānau ka ʻakiʻaki noho i kai	*The ʻakiʻaki seaweed is born at sea*
4. Kiaʻi ʻia e ka manienie ʻakiʻaki noho i uka	*Guarded by the manienie ʻakiʻaki in the uplands*
5. He pō uheʻe i ka wawā	*Darkness gives way into activity*
6. He nuku, he wai ka ʻai a ka lāʻau	*Fresh water is the nutrient for vegetation*
7. ʻO ke akua ke komo, ʻaʻoe komo kanaka	*Elements (gods) penetrate, where man cannot.*

Lines 1–2 emphasize the value of water: whether in a narrow stream or broad river or estuary, there are rich nutrients found within. The narrow is compared to maleness and broad to femaleness. The dualistic nature of genealogical chants is obvious. Lines 3–4 regard the plant life dependent on the ocean and compatible species upland from shore. The regenerative process that gives way to spawning or egg-bearing creatures is mentioned in line 5. Water is the food source for vegetation as reminded in line 6, and, finally, it is not in accord with man's capability but the god, which is water.

The two vital details concerning the Kumulipo are the facts that it begins with a volcanic scene as described in lines 1–2, and that there is an urgent concern with fresh water throughout the first 8 sections. Fire and water represent land and life. The first two lines are about heat that produces water—heat and water produce life. Births, lots of births, life!

The Hulihia chant mentions, in line 34, "ka ua loloku," which is very heavy rain, and this is one of the results of a hulihia eruption. Despite the fact that it is a chant of the volatile earth, it still produces the rain that heals the damaged earth. The Kūlia chant also looks at water as the lifesaving element. The consciousness of fresh water and how to find it was very much a part of the longevity of island life and was so noted when these chants were composed. The Hulihia, Kūlia and Kumulipo all recognize the value and function of water to life. Accordingly, there were two elements that concern the ancestors, the composers and the Hawaiians responsible for the health of man and land, and these elements were the making of land and the presence of water. Both of these include Pelehonuamea.

We'll investigate Hiʻiakaikapoliopele (Hiʻiaka), the youngest sister of Pelehonuamea. Hiʻiaka is found in the same birth chant we explored yesterday. Hiʻiaka's birth is "hānau ma nā poho lima a ma ke ʻano me he hua moa ala."

The above Hawaiian quote says that "Hiʻiakaikapoliopele was born in the palm of the hand in the shape of an egg." So she is an egg child, not born from the mother, but is born as an egg. Hiʻiakaikapoliopele translates literally as "a favorite reflected in the bosom of Pele." I liked what Kaeo Duarte said in his talk yesterday: "The rising magma has to bring up a lot of the nutrients from the inner ground and when it becomes lava or ʻaʻā, the ground itself is very nutritious." Voila! This is the most compatible interpretation of Hiʻiakaikapoliopele, her intention and function.

Pele and Hiʻiaka complement each other; Pele makes land and Hiʻiaka causes growth. This is the process prescribed by the "kīhoʻihoʻi kanawai," that is, the law of quick restoration.

Hiʻiaka, the egg child, energizes the regenerative process. There are other native stories around the world that include an egg child. She is a healer of the land devastated by a new lava flow and she causes new growth. That is her function as the egg child belonging to the Pele family; she reflects the nutrients found in new lava flow.

Her function is actually stated in two lines found in kū ahu, or altar, chants:

1. ʻO Hiʻiaka ke kāula	*Hiʻiaka is the seer*
2. Nāna i hele a aʻe a ulu	*As she travels things will grow*

Kāula is a seer, a prophet, a magician. (I'm afraid we lack the proper word to describe a kāula at Hiʻiaka's level.) Hiʻiaka is the seer of the family; the seer in this case is the healer, that causative of growth. One of the important growths is the ʻōhiʻa. ʻŌhiʻa is the tree that will rapidly restore the new lava land to forest.

ʻŌhiʻa is the dominant canopy in our native forest. It is one of the fastest hardwood growths on new lava. Because of this, the ʻōhiʻa is very often coupled with the stories of Pele. I mention the ʻōhiʻa, because in the hierarchy of native Hawaiian vegetation, it is the pinnacle. It is indeed worth mentioning. Also, because the ʻōhiʻa is the tallest tree in the forest, it has the reputation of attracting the clouds that descend upon the upper forest in the afternoon and this is the water that penetrates the uplands and fills the aquifers. In one of the Hiʻiaka stories she relates that it is the afternoon mist that fills the streams and the aquifers. The other value of the ʻōhiʻa is that it seems to have some quality of being fire resistant, [and] therefore, has earned the stories of being the favorite of Pele.

"Ke haʻa lā Puna i ka makani," "Puna dances in the breeze," is the translation of the first line. Puna, the name, signifies that it is the easternmost point in the archipelago. There is a Puna on Hawaiʻi Island, Kauaʻi and Maui. All three Puna are in the east. Puna means spring, that is, water well spring. The suggestion of Puna, besides the first to receive rainfall from the east, is also the first to taste the moaʻe, or trade wind, from the east. It is a Hiʻiaka metaphor of spreading seeds and ensuring rainwater for growth, medicine, and purification. Being the easternmost land in the archipelago conveys the reminder that Puna, Hawaiʻi, entirely belongs to Pelehonuamea because that is the sacred path of the deity of Hawaiʻi's volcano. The land is "he kua ʻā kanawai," which strongly suggests that the land is hot and alive with magma.

The other implication for "Ke haʻa lā Puna" is the birth of hula, that is, it is the first mele hula or dance chant. The word "haʻa" is "to dance." "Ke haʻa lā Puna i ka makani" can also be translated as "Puna dances with the wind." Basic imagery of dance movement is found in this mele hula. Hula begins with the movement of the sun, the wind, the sounds, growth on land and in the ocean. Hula is ritualized as it personifies nature. Like nature, hula is rhythmic, inclusive, transformative, physical, spiritual, healing and, above all, it is Hawaiian.

The story for "Ke haʻa lā Puna" is that after Pele returns from Kauaʻi to lower Puna and asks one of her sisters to dance the hula, Hiʻiaka takes the challenge because she has learned the hula from her new friend Hōpoe, who is of Puna. Accordingly, it is Hiʻiaka and Hopoe who are credited with the first hula. The part of nature that hula personifies is Pele and Laka, and the dances are dedicated to Hiʻiakaikapoliopele.

Below is "Ke haʻa lā Puna" for your perusal. The Hāʻena, Puna, Hawaiʻi, is where the first hula is performed by Hiʻiaka and Hōpoe is the teacher of the hula. I will underline all the hula terms and (or) movement.

1. Ke haʻa lā Puna i ka makani	*Puna dances in the wind*
2. Haʻa ka ulu hala i Keaʻau	*Moving through the hala grove at Keaʻau*
3. Haʻa Hāʻena me Hōpoe	*Hāʻena and Hōpoe dances*
4. Haʻa ka wahine	*The woman dances*
5. ʻAmi i kai o Nanahuki	*Revolving at the sea of Nanahuki*
6. Hula leʻa wale	*Perfectly pleasing, the dance*
7. I kai o Nanahuki	*At the sea of Nanahuki*
8. ʻO Puna kai kuwā i ka hala	*Puna's sea resounds in the hala grove*
9. Pae ka leo o ke kai	*The voice of the sea is carried*
10. Ke lū lā i nā pua lehua	*The lehua blossoms are scattered*
11. Nānā i kai o Hōpoe	*Look toward the sea of Hōpoe*
12. Ka wahine ʻami i kai o Nanahuki	*The dancing woman at the sea of Nanahuki*
13. Hula leʻa wale	*Perfectly pleasing, the dance*
14. I kai o Nanahuki.	*At the sea of Nanahuki.*

The last chant to discuss is "Kua loloa Keaʻau i ka nāhelehele hala." Kua loloa is a mele hula, it has a hulihia accent. It is the inundation of Panaʻewa forest and Puna from Keaʻau to ʻĀpua point. It basically covers the whole ʻāpana of Puna.

The familiarity of Hulihia chants are present in "Kua Loloa" with words such as smoke, steam, ashes, fire, rolling rocks, and, finally, Puna is falling, falling, nothing left but ashes. I'm guessing that the eruption of Panaʻewa is about 1,000 years old. I don't think the chant is as old as some of the other Hulihia chants that include migration and Kahiki as the homeland. In the story of Pele and Hiʻiaka, Panaʻewa, the forest, challenges Hiʻiaka for dominance of the forest and Hiʻiaka calls upon Pelehonuamea and all the dog clouds, Kū clouds, [and] other forces, and the battle is on. Below is the chant:

1. Kua loloa Keaʻau i ka nāhelehele hala	*Keaʻau is a long ridge of hala forest*
2 Kua hulu Panaʻewa i ka lāʻau	*Panaʻewa's back is covered with growth*
3. ʻIno ka maha o ka ʻōhiʻa	*The grove of ʻōhiʻa trees is devastated*
4. Kū kepakepa ka maha o ke lehua	*The grove of lehua stands crooked*
5. Poʻo hina i ka wela a ke akua	*Ashen is the heat of the goddess*
6. Uahi Puna i ke ʻolokaʻa pōhaku	*Puna is smoky from the rolling rocks*
7. Nā peʻa ia a ka wahine	*The borders are set by the goddess*
8. Nānahu ahi i ka papa o ʻOluea	*The plains of ʻOluea are burnt wood*
9. Momoku ahi Puna, hala i ʻĀpua	*Puna is charred embers all the way to ʻĀpua*
10. A ihu ē, a ihu lā	*The flow heads this way and that*
11. A hulihia lā i kai	*Twisting it moves toward the sea*

12. A ihu ē, a ihu lā	*The flow heads this way and that*
13. A hulihia lā i uka	*An upheaval towards the uplands*
14. A ua waʻawaʻa	*It is desolate, uninhabitable*
15. A ua noho haʻahaʻa	*Flattened out*
16. A ua hele heleleʻi heleleʻi.	*Falling, falling, nothing but ashes.*

One note of observation; when the introduction of Hiʻiakaikapoliopele was made, the emphasis on the fire diminished a little and restoration was given front stage with the eruption. The fire didn't diminish, but the need to restore and the consciousness of water became more evident in the chants. Investigating more chants is needed to substantiate this observation.

Questions

Q. Can you say a little bit about the origins of the chants, what we know, where they came from? I mean, what we know about where these came from or how they came to us?

PUA. The chants are included with different versions of the migration of the Pele family. Despite the fact that the story may differ, the chants remain the same, which tells us that the chant is the thread of the story. Who actually composes the chants? Don't know. I don't know that this was important. The chants don't have names to them. To me, the great thing about not including names is that it takes away the time factor. Once you put a name on it, you have a time. The value of this is that the chant itself remains timeless.

The composers were concerned with the kind of eruption that occurred. When observing an eruption today or when looking at a photo, we may see some of the same images as were projected by the descriptive interpretation of the chant.

Some of the chants, especially the Hulihia or migratory chants, include portions of an older chant that they update by adding the present eruption then going back to honoring the gods/goddess [and] their functions and actions of what they represented. I think they do this to show a continuum of the movement of magma, some background, as well as the migration of the myth of Pelehonuamea.

I don't think the composers migrated with the eruption; I think they migrated with knowledge of eruptions and did some research by sailing up the chain of islands and back down. (I say this because Mokumanamana or Necker was visited a lot. I know that the manamana, or uprights, were set up by people of this caliber, fire people or sun people.) They, the composers, were familiar with volcanic islands and the elemental deities who represented the land features.

Did I answer your question?

Q. You did. Thank you.

Q. These are uniquely Hawaiian chants, right?

PUA. Absolutely. As I said, some of these chants migrated; however, they no longer belong to those islands they migrated from because there is no familiarity of those people with the chants [or with the] language or style it was composed in. So what I'm saying, I guess, is that the people who migrated with the chants were the practitioner, caretaker, and expert who owned the chants, and whatever they evolved into, so did their possessions, knowledge, practices, et cetera. The chants were one of their working tools; it was necessary to bring them; . . . they didn't have a choice because it was in their heads anyway. These people and all they brought with them became Hawaiian.

Q. Did the chants evolve in that maybe [indiscernible] and then something happened and they added to it?

PUA. Everything evolves. And for the migratory chants, the continuation of the journey was added and Pele settling in Hawai‘i at Kīlauea was certainly an addition.

Q. They kept growing this –

PUA. They evolved, growth and growing, yes. Some chants need to be updated with ongoing eruptions. They may keep some of the old chants intact, but add to it to show movement and new composition of new eruptions, that is, they did not change the chant, just added, like, a second verse.

One of the things that I asked Tim yesterday is to be able to view some of the eruption videos that happened within my lifetime. Today we're not composing as much as we should be composing, and so people 100 years from now, 400 years from now, are not going to have a clue concerning this magnificent eruption from 1983 to today [2013] or have an idea of the hulihia this eruption has caused because we are not composing. I have an idea that this eruption isn't as memorable as the 1868 eruption in Ka‘ū, but the longevity of this eruption from 1983 certainly is chant-worthy.

So we need to start composing. They don't allow us to go right by the flow and watch the flow go by as we used to do or watch the big things that are going up there. So we cannot get it first hand. We have to look at and talk about securing videos of these flows. Kamoamoa, Pu‘u ‘Ō‘ō, Kapoho are all Hulihia type of eruptions [and] we should compose chants for them; those kinds of things we should write about. We must continue to create historical poetry about our land changes, et cetera.

Q. Obviously we've been focusing, the last few days, [on] chants relating to volcanism, so are there more Pele chants than any other, or are we sort of focusing on that?

PUA. Yeah. Who is the most important Hawaiian you know in our history? Kamehameha. There are a lot more Pele chants up and beyond the Kamehameha [chants]. There are a lot of Pele chants, which means there were a lot of people focusing on this elemental form. There are a lot more Pele chants that do not include eruptions. There are chants of rituals, hula, place names, relationships, hierarchy, love, weather, wind chants, and others.

I'll talk a little bit about the practitioners and then maybe you can understand the reason for the number of chants—they were kind of obsessive about this particular deity. They were obsessive because they had to deal with growing islands. They were obsessive because they kept track of fire movement with the sun and the movement of the sun.

The uprights you see on the islands throughout the Pacific were probably set up by fire people as they moved from one volcanic island to another, taking these chants of fire with them because of their relationship to the fire, their relationship to the movement of the sun—yeah, the volcano and the sun. So they're marking the sun.

They continued to compose with compositions of movements, of migration, and information of who was on the canoe and who was the one that steered the canoe, navigated, turned the bow of the canoe and pushed it out to sea—those kinds of things—were included in the chants. There are also notes of the names of the canoe, possibly where they took off from, who the sharks were that followed them. They sailed and kept track of shark movements in relationship to the volcano.

They have a thing with sharks that is part of the volcano story. They probably had the biggest number of names of sharks. Sharks that migrate from Tahiti up here migrate back and forth. So the sharks are very much part of volcano story.

Yes, they were obsessive and they composed and composed. I'm sure we lost some of the chants but we still have a good amount of chants intact.

Q. So that doesn't necessarily point to a lot of the chants originating on this island? The people wouldn't be seeing these sorts of things we were talking about and describing?
PUA. Yes. We do have chants from other islands of the Pacific and other islands of this archipelago. But I think it was the people of this island that eventually inherited a lot of these chants. And we do have chants of this island. But you are correct that we don't have enough of the chants described from this island, but we do see volcanic activity as they described. Kuʻulei, how many chants did you collect?
Kuʻulei Kanahele. I don't know, there are about 400 pages of chants.
PUA. There are 400 pages of chants, some short, some long, intermediate.
Q. I'm new to the Hawaiian Islands, so this may be obvious to some of you.
PUA. Aloha and welcome.
Q. Thank you. Are the chants religious in nature or verbal storytelling or verbal history or all the above? Can you speak towards that?
PUA. When using a chant for storytelling they use it with a narrative. The chants are really put together to maintain particular events. They would not use a Hulihia or Kūlia for storytelling or entertainment. They used chants to teach a lesson. Chants were for recording events. They do have prayer chants and some of the chants list rituals and how to conduct them and the reason for them. Offerings were given, so, in this way, it is sort of religious. However, some people give offering not as a requirement, but as a respect for the presence of the entity. The rituals and hula were done in a reciprocal nature. As far as the idea of religion is concerned, it was not a large structured system of dos and don'ts. If you deconstruct the word "religion", you have "religio" or "religare," which means to bind back to, to be diligent. If this is the religious reference, then yes, it is religious in nature. It was also more of an occupation. And occupational information was passed down within the family.
Q. You've mentioned a few times that chants are not composed in modern times. Why did the Hawaiians stop composing the chants and when did that happen?
PUA. The chants are not composed as often as should be in modern times, as far as this eruption is concerned. My mother composed chants for eruptions during her time. My sister and I composed chants, just not enough.

The language was sort of taken away from us. My mother's and father's generation was not allowed to speak the language in or around school. If a child didn't have a proper English name, the school gave you one. In many cases children were punished for speaking [Hawaiian] in school.

Christianity has a lot to do with moving people out of this frame of mind. Change of lifestyle, believing that what was handed down was not worthy of today's lifestyle. College education was the pursuit of the forward thinkers, therefore, Hawaiian cultural beliefs didn't have a place in today's world. In fact, we should be ashamed to be Hawaiians. But we have recovered!

So we just stopped speaking it and gave in to the force. Luckily some of us had very, very proud and stubborn parents and grandparents who maintained the ancestral wisdom.

It's kind of a sad thing for me to talk about. In the late 1800s, we had a few writers that were very adamant, in the 19th century, about writing everything, and so they wrote, wrote, wrote, very urgently. They used the newspapers, they wrote books, articles—all in the Hawaiian language. Therefore, to retrieve that information we had to learn the language again. We get a lot of information from that, but we also have families who maintained certain kinds of information.

Today, because the language is really part of our school system now, we will continue to speak the language because everybody is cool with ethnicity. It was a horrible time, when people sort of lost their souls or who they were and [the school dictated] what was right to continue and what was wrong; . . . the big brother expression "I know what is good for you" was a dominant factor in the "correct" social structure. In many parts of the world this still exists, but it's a horrible thing for people to lose their identity.

For now, for this particular eruption since 1983, we want to compose chants for this eruption but we can't get to the eruption. Like we used to walk up to the rocks, watch it flow and watch it explode in the air and stuff like that and then write, compose about it. We can't do that anymore. So that is why I'm going to Tim about getting some videos. We have technical people now. We can do it technically.

Anyway, if we want to know what the weather is, we pick up our smartphones or we listen on the radio—it is a modern thing. None of us needs to be experts on the weather; somebody tells us what it is going to be.

Today it's all about technology. We still have experts.

Q. But before, in the cultures, I guess my question is, how did everybody, truly everybody, think about it because water and weather and wind and –

PUA. Was all one and the same.

Q. Was all the same and [indiscernible] and so affected everybody's lives, so was everybody a student, knowledgeable, or did you go to the weatherman?

PUA. No, we had different levels of knowledge. It depends on which occupation you were in. So if you were a fisherman, you were excellent with the weather that concerned you. If you were a farmer, that is what you are concerned with and that is the weather you were smart about. It depends on what side of the island you live on, whether you live in Puna or Hilo or Hamakua or you live in Kona or Kaʻū—you have different weather systems.

Q. Mauka to makai?

PUA. Yes. If you're living in Kona you have a different system from Hilo. If you live in Kaʻū and Kohala, which are the ends of the island, they have a different kind of wind system and rain system. Kohala and Kaʻū leeward and windward are just over the hill, whereas [in] Kona and Hilo windward and leeward are two high mountains apart. So 90 percent of Kona is leeward and 100 percent of Hilo is windward. In ancestral time, persons known as Kilolani were perhaps your best overall weather person and a prognosticator as well. So it depends on where you are. So you have different levels of understanding weather, and occupation was a big part of that. Nobody really knew the overall weather as well as the Kilolani.

Q. With the reverence and respect and mahalo to the community to the happenings, the volcanic happenings on the island and the reference to Pele, did the Hawaiians ever try to impact or redirect flows that may have threatened villages, or did they just kind of let nature take its course and wherever Pele wanted to go they would happily accept that? I guess, is there any kind of a conditional kind of hazard –

PUA. No, there was no sense of redirecting. Pele could go wherever Pele wanted to go. The other thing is, we do have stories about redirecting, it is more a kaiʻokia. It's one of the kanawai that I talked about yesterday. What kanawai is that? He kaiʻokia kanawai [the sea-separating edict, p. 29].

So we have stories—somebody was telling a story yesterday. You hear stories about people in Kona or Hilo or Puna who . . . I think it was Jane that was telling us the story. Jane, are

you here? [She] was telling us a story about how a particular home was saved because of the kindness of [one] man. Were you telling us that story?
JANE TAKAHASHI. That is my grandfather. I was told that story by people in the region.
PUA. Yes. Tell us that story, because we are talking about redirecting [and] that is one of the stories.
JANE. Well, during the Puna eruption of 1955…
PUA. Can you hear her? Jane, you have to speak louder with your outside voice.
JANE. Okay. I was told this story by several people who heard about it. Kepa was one of them—Kepa Maly—[who] was telling the story to one of the tourists at the [Kīlauea] Visitor's Center. [I heard the story] again, later on, when a Hawaiian man moved a shed onto my property and we were talking about where we came from and who our families were.

When I told him that my mother was a Nihara from ʻOpihikao, he said, "Do you know the story of your grandfather?" I said no. He said, "Well, let me tell you the story of your grandfather."

He said that during the eruption, this old woman came into the village and asked one of the farmers for an orchid for her hair. The farmer said, "Go away you dirty old woman." The next farmer, she asked for water and again got the same kind of response. The third farmer was my grandfather, who said, "Hele mai, hele mai," and gave her food and clothing, [and] invited her into his home.

In gratitude she said, "Plant ti leaves around your house." He was very puzzled and disturbed because it was at night and here he is being asked to plant ti leaves, but he did. The next morning the flow had stopped a few hundred yards from his home.
The house is still there today. I forget the [distance]—I thought it was about 100 yards, but I'm not sure.
PUA. It was ʻOpihikao?
JANE. Yes.
PUA. So we have a number of these stories around the island about just that, about planting ti leaves or acts of kindness. That is the only redirecting I know of.
Q. You call boundaries.
PUA. Boundaries, yes. Remember the kaiʻokia kanawai. An ahupuaʻa name in Kona is Kaʻūpūlehu? The name is really Kaʻulupūlehu, the same kind of story of sharing with an unknown woman, planting the ti leaves, and voila, the property is spared. The story is about sharing breadfruit with an old woman.
Q. I recall yesterday Kuʻulei was talking to us about the idea, or I forget if it was an oli or a law, that if you could smell sulfur or if there was that presence of activity that would be a place that you could no longer be in and you wouldn't return until life returned? Is that a law or old story?
PUA. It's a law.
Q. That's a law?
PUA. Yes. A law of nature, it's called "Kua ā kanawai." "Kua ā" literally means the burning back or the hot back. So the idea is that if the land is still or even hints that it's still hot, then you don't build there, you don't think you need to live there permanently because it's still hot and it will erupt sometime in the near or distant future.
Q. What do you feel about these stories about the woman, the old woman, the white dog that have been reported seeing or picking up a woman who then disappears from your car?

PUA. … It's all right, but I believe the other story—the other story about the good deed and the ti leaf planting that I understand. The whole idea of picking up an old woman, carrying her in your car, smoking a cigarette. Yeah! It's not the kind of story I would compose a chant for.

Talk about reverence or revering, yesterday when we were up here at the Uēkahuna lookout, and there were a bunch of children running around there making a lot of noise, [it] seems to me that is irreverent. This was never a playground for us. When we were little children, not very many people came up here anyway, that wasn't their place to be here. So they only came when they were doing offering or when they were doing ceremony to honor the entity or to watch an eruption.

To hear them playing and running around and yelling and stuff like that, that was shocking to see them doing that. There is less education for places like this, [which are] so sacred to us, and there should be education in the area of respecting land. It's like going to church and running around between the pews playing hide and seek.

Yeah, that was irreverent to me and that was out of place. I didn't like it.

I grew up here, I was born and raised. My family has been here since the late 1800s. I did the same field trip as a kid, going to Waiākea Schools. I came up here, I walked. You're right, it is a big difference; we never did that. There was no running, no screaming. I don't know if it's the culture in the schools [that] has changed, but we came up, we did the Kīlauea Iki hike and we did all the stuff here and I don't ever remember any of that going on.

PUA. I think a lot of schools that came and had guides went through a different education with the guide. …

Q. Even on the trails that only go to Puʻu Huluhulu [indiscernible] over there, we're always taught, you shouldn't be louder than the forest. So now you go walking through there you see groups of people just screaming, talking loud, kind of off.

PUA. And now that Merrie Monarch [Hula Festival] is coming around, there will be a difference set for reverence.

[start of an open discussion]

COMMENT. I've been thinking about your talk about getting videos from Tim, and getting videos from Tim is like looking at a fraction of what you should be seeing.

PUA. Exactly right! Why should I be describing the image when I cannot feel the quake of the earth under me or smell the mahu, the sulfur, or feel the heat of the emerging source, or hear the thundering explosion or know the velocity of the large stone being tossed out, or hear and see the lava as it pushes out of the earth, or the hot air reverberating out into the atmosphere, et cetera? How will I be able to use the right words to describe the eruption, words like hikilele? But it is better than not recording I think.

COMMENT. It's a failed imitation.

COMMENT. You're not feeling the earth, you're not smelling the earth.

PUA. You don't see that. I don't make the rules about going up there, somebody else does.

COMMENT. There should be rules. There should be exemptions.

COMMENT. I think this is a good opportunity for a partnership with EKF, HVO, and NPS, to be able to pair up with Tim, maybe Kuʻulei could go with Tim one day, even have a space like [indiscernible] have an office. We don't have the budget, we don't have the money to pay them, but they have a space. So if you provide a space at the observatory where they can feel free to come and do their own observation and write their own oli/chant, new chants.

COMMENT. It's not without precedence. In the 1970s there was Mrs. Ballesteros, right, who would come over dressed in red head-to-toe and the observatory said . . , "We'll take her out to the eruption."
PUA. Yes. She was indeed an exception.
COMMENT. Just standing at Uēkahuna [Bluff] and Wahinekapu and hearing all the crashes and sounds.
PUA. Exciting.
COMMENT. Or even just going with them to collect gases and then driving past, you know right [on] Halema'uma'u Road down there, the Pele's hair and the amount of Pele's hair that is down there is incredible. Just for you folks to see that collection of stuff and be able to write new chants for that kind of thing.
COMMENT. So it's a new job for Tim.
PUA. Oh, he doesn't mind.
COMMENT. It wouldn't have to be just restricted, say just to the videos or the people going out and experiencing it, to keep harping on Tim's example, what did it feel like to stand next to the Kamoamoa fissure eruption, something that you can express that can't be seen in a video or the sound, what did you feel when the ground is sort of shaking beneath you and you saw the fire coming out of the ground, that sort of thing. It sounds like exactly the sort of imagery and spirited feeling that needs to go into a chant that's never going to be captured by a video.
COMMENT. That is also something that a composer needs to be involved with for themselves in order to fully reflect what they're experiencing.
Q. I was just asking Keola: what is the—how old are those terms "Pele's hair" or "Pele's tears"? You don't see—I wonder, what [is the] Hawaiian word—you don't see that word in chant.
PUA. Yes, they don't have that word in chant, those words in chant.
Q. Is that a recent vocabulary in English, Pele's hair and Pele's tears?
PUA. And then the other thing is that we might not be looking for it in chants. Sometimes we can read chants over and over and come up with one interpretation, but when we think about going to look for something and go back to the same chants and then see something else in the chants.
COMMENT. Maybe those kinds of words come from Western documentation, where somebody says, "those natives call this 'Pele's hair'" or 'a'ā, pāhoehoe terms. So they may not be in chants.
COMMENT. We can refer to her having tears. Who brought that, who invented the Pele's tears and Pele's hair?
PUA. The descriptions they're looking at, they're looking at the objects and it looks like tears.
COMMENT. We called this something else.
PUA. Pele's tears, I don't know if we actually concerned ourselves with Pele's tears or Pele's hair.
COMMENT. Sounds like cooperative research.
COMMENT. Exactly.

[end of open discussion]

Q. I have a question. In the old days were there kahuna that were equivalent [to] us as volcanologists [who] would start to forecast the eruption based on, let's say, increased gasses or earthquakes or seismicity?
PUA. What they saw in the air, the amount of uahi in the air, the color of the rising sun, the amount of earthquakes, visitations, swelling of the mountain, those kinds of things.
Q. So they would make predictions about pending activity?
PUA. Possibilities, yes, for eruptions.
Q. What can you say about, for example, eruptive activity at the different volcanoes just on this island, for example, Hualālai versus Mauna Loa and Kīlauea in regard to Pele? Sometimes the volcanoes erupt simultaneously, sometimes not?
PUA. I don't know a lot about the Hualālai eruption and I only know that Hualālai seems to have very explosive eruptions and there is not a lot of information about that in our write-ups. It was sort of a different migration to Kona. The names were a little bit different. So we really only have one big story that has to do with eruptions at Hualālai. Most of the eruption, most of the stories and the chants, come from Mauna Loa and Kīlauea.
Q. So can I follow up? When the eruptions are happening simultaneously at the two volcanoes, like in 1984, so I guess some people have this picture of Pele living at one place, now Pele is occupying two places?
PUA. Not just about the occupation, not just about above ground or underground. … Pele is where the lava/magma is, if it is two, three, or four places. Yes!
Q. About the 1984 eruption, there was the big fireball?
PUA. ʻOakakalani, yes. ʻOaka. ʻOaka is when there seems to be a gas that pushes out and then there is a big explosion, so all you see is a big white electrical ball like lightning and then it moves from Kīlauea up to Mauna Loa. Fabulous!
PUA. Where were you?
Q. Royal Gardens, watching all the flows come down from Kīlauea.
PUA. Not a good place to be. Was it early in the morning? One ʻoaka we saw was kind of early in the morning.
Q. This one was about 8:00 at night. Came from the ocean, makai but overhead towards Mauna Loa and bright enough so I could see my shadow on the ground.
PUA. Nice. That is what we call a ʻoaka, the gasses escape and forms a huge electrical ball of white and it moves.
Q. Nighttime, daytime, anytime?
PUA. Anytime, yes. The one we saw was actually in the 70s, when the floor of Kīlauea was erupting, it went from down here below the [crater rim?] and right up to Mauna Loa. So there is an attraction for it between volcanoes.
Q. He said it's white, so is it glowing white like at night or is it white in the daytime like [indiscernible]?
PUA. White in the daytime. It's an electrical ball, if you can see lightning during the day you can see an ʻoaka.
Q. White like a light or white like –
PUA. Light, white like the light, like a lightning. That's a ʻoaka ka lani.
Q. Wow.
PUA. So the idea of "ʻoaka ka lani, neʻi ka honua" when ʻoaka appears the earth begins to tremble.
PUA. Thank you for your questions.

Q. Got plenty more.
PUA. That's the kind of questions I like to answer.
Q. Good.
Q. How does ʻoaka differ from maybe, I don't know, the phrase akualele?
PUA. Akualele is a personal messenger. Akualele flies low over the trees or vegetation to seek out something or someone, it can have a blue glow and a tail. It is man oriented. ʻOaka is elementally oriented and is large and moves from a hot spot to a hot spot.

(End of presentation.)

Traditional Place Names in Hawai‘i Volcanoes National Park

Speaker: Bobby Camara, National Park Service
Tuesday, January 30, 2013

Good morning. This is an impossible task, 10 minutes for a “Portagee” from Honoka‘a to talk about place names in Hawai‘i Volcanoes National Park [laughing].

Those of you who know me, know me. Those of you who don’t, you‘ll probably figure it out. I’ve worked in the park for 30 years off and on. I’m going to retire in June.

My background: I was born and raised in Honoka‘a. I went to school at Oregon State for a couple of years, then came home and went to [University of Hawai‘i at] Mānoa before Hawaiian studies existed. There was an ethnic studies program, but no Hawaiian studies.

I’m interested, and have always been interested, in everything to do with culture and natural history of Hawai‘i. So the classes I took were very broad, far-ranging, geology, biology, archeology, anthropology, [and] ethnobotany.

Back in those days, I’m kind of dating myself, I had some really, really excellent teachers; people who are now—most of them are dead, but when people read books now and it will refer to people [who were] kind of at the top of the list for various disciplines.

One of the things that Keola Awong and I have worked on over the years, along with Pua and other people, has been researching place names—traditional place names here in the park. I’m not sure why that happened. I’m interested in history, I enjoy—really enjoy—doing research, and when various editions of the park brochure came out we tried to put the names on the brochure as best we could. Sometimes we ran into trouble with people in Washington, D.C., because there is a very clear process for using names in Federal publications.

There are—just as background, I am very low tech, this is my power point. You can come up and look at them later. I have files, drawers full of papers, little bits and pieces of research. The two primary organizations that determine official place names are the Hawaii Board on Geographic Names and the U.S. Board on Geographic Names.

The Hawaii Board is part of the Department of Planning and Economic Development on O‘ahu and it’s led by Arthur Buto, B-U-T-O. Anybody interested in all this stuff, come see me and I can give you contact information or you can just [search using] Google and it will come up.

So, the Hawaii Board is composed of people from DLNR (Department of Land and Natural Resources), OHA (Office of Hawaiian Affairs), Department of Hawaiian Homelands, UH (University of Hawai‘i), and the Department of Accounting and General Services, State [indiscernible], as well as a representative from [the] Bishop Museum. They meet, they discuss things, they send off their recommendations for official place names to Washington to be reviewed by the U.S. Board of Geographic Names. If the U.S. Board agrees, then they will list names, official names, in their database—the Geographic Names Information System, or GNIS.

They’ve got a great web site, you can go search any number of place names and they‘ll give you the proper name, alternate names of when things change, if they did. Things like Halemaumau/Halema‘uma‘u. The proper name, the official name for that feature is “Halema‘uma‘u Crater,” which in my mind is redundant, because we know that Halema‘uma‘u is a crater up there, so why add crater after it? That is something that can be addressed later.

There are—over the course of the development of the park, in the old days not much was known of traditional place names. Certainly, many traditional names have been lost just through misuse [and] old timers passing that were depositories of knowledge.

So a curious mind like I have, you're reading things and you'll come across a sentence, one line in a book that will say "we descended to a place called Kukamahuakea." Where is that? That name I found in "Kamehameha and his warrior Kekuhaupio" by Desha [2000, p. 280].

To understand or figure out where that place is (they're talking about volcano), imagine you're at the [Kīlauea] Visitor Center; you're driving on the road towards KMC [Kilauea Military Camp], [and] just past the Visitor Center the road goes down the hill. Take away all the trees, because this was in the late 1700s when these people were walking after the explosions in 1790, Keonehelelei.

So that descent that they are talking about is, I believe, going down that little pali, there is a little gulley there that has been paved over. The word Kukamahuakea is the broad spacious place where steam rises into the ground. What a more perfect description of what we call "steaming flats" today.

So finding things like that and being able to figure out where it is, for me, is really, really fun and sometimes challenging. I think today with technology—this is on purpose. . . I think today a lot of people don't look outside. You're driving around, you're trying to use your GPS to tell you where to go, and by doing that you don't really know where you are, literally, on the road, on the island. Knowing landscapes intimately is to me a critical part of the process.

Hawaiian place names were given, very often, based on attributes of the place. Kukamahuakea, it's not just any old string of syllables, it's descriptive of that place.

Another name I found in the Boundary Commission testimonies, which is this fantastic body of work that was put together in the 1870s by the Kingdom of Hawai‘i Boundary Commission. UH Hilo has microfilm copies in their collection. The Commission of Boundaries was set up to describe the boundaries of ahupua‘a, all through the State.

[In] the one for Keauhou, there is one reference to a pali, Paliolapalapa, the jagged top cliff, which is, as it turns out, when you're leaving the park and you come to the stop sign on Highway 11, across the road, if you haven't noticed yet, there is a fault scarp in the ‘ōhi‘a trees across the street that runs in both directions. You kind of lose it when you get to the Volcano School of Arts and Sciences. It kind of disappears over there.

That gully, which is now disguised, pretty much, by all of the vegetation, has a name, a very specific name, Paliolapalapa.

So all of this stuff banging around in my head, all the reading and research that I've done, Keola and I put together various proposals to clarify place names in the park. Nāhuku, Thurston Lava Tube, we wanted to honor that place with a Hawaiian name besides Thurston Lava Tube, which is a commemorative name, you know, named for Lorrin Thurston, who was instrumental in putting the park together.

We unfortunately were not able to find a name for the cave. Keana Kakina was one Hawaiian name that we found, but Kakina was apparently the name for Lorrin Thurston, Lorrin Thurston's Hawaiian name. So, you kind of get into this thing.

Other research that I've done using Boundary Commission Testimonies: for Keauhou, there is a big, big lava tube, the ‘Āinahou Ranch Cave. [In] the Boundary Commission Testimonies, main entrances [are described for] that cave. In all of the research that I've done [on] caves, the entire underground conduit did not have a name; entrances or sky lights had specific names. You can follow it all the way down and all of the openings have names.

So we were trying to figure out what to do with Nāhuku. We looked in "Place Names of Hawaii," which was written by Pukui, Mookini and Elbert. The first edition did not have the listing for Nāhuku. The second and subsequent editions did.

The only surviving author on that is Esther Mookini, who lives on Oʻahu. So I called her. People are kind of shy about calling people sometimes, not me. I said, "Kiki, you know this book, 'Place Names of Hawaii,' how did that come to be?" She said, "Oh, the three of us got together and kind of divided up the state according to who knew which area best. We just started writing down names. Then UH Press called us and said, 'okay, we're ready to print,' so we put all our stuff together and handed it in."

It wasn't this big systematic thing; "Place Names of Hawaii" is not meant to be an encyclopedic collection of all Hawaii places. It was what they were doing at the time. Of course, now, in retrospect, we would stand there thinking they should have done this, they should have done that, but at least they did something. It is a really good starting point.

It's also important to remember that it's not the be-all end-all; it's not the final word on place names. Subsequent editions, they pretty much did the same thing, adding in. Nāhuku: Kiki thought came from Mary Pukui, because she is from Kaʻū and she did the Kaʻū area, and maybe [it was an] oversight [that] it wasn't included in the first edition, [so] they just added it in to the second.

"Nāhuku" means the protuberances. So the stalactites and stalagmites that used to be in that cave (people kind of absconded with them over time), that is what Nāhuku means.

Apparently, yesterday, there was a little discussion about Lōʻihi and that name. Digging around my files this guy, K.O. Emery, who was—I'm not sure what he did, maybe he was an oceanographer, [because] he wrote a paper of submarine topography south of Hawaii that was published in the Pacific Science, volume 9, number 3, in 1955 (Emery, 1955).

So between June 29 and July 2, 1954, there was a cruise offshore the southeast part of this island, [and] five seamounts were located during that cruise. There had been little bits and pieces that were done previously, and so, Emery wrote off to Bishop Museum and was replied to by Mary Pukui and Martha Hohu. Emery described the characteristics of these seamounts—just to get it straight, so the five are: Wini, coming to a point or conical; Lōʻihi, to extend, to be long; ʻĀpuʻupuʻu, all on top is little hills; Pāpaʻu, to be shallow as water. So that the Pāpaʻu is the shallowest one and Hohonu is the deepest. Hohonu is deep in the ocean.

So those five names were given to these five features. He asked a question, he received a polite response. There apparently are no letters from Bishop Museum or [from] Mrs. Pukui to Mr. Emery saying "here you go," but in the introduction [of Emery's paper], [it says that] the Hawaiian names for the five seamounts were kindly supplied by Mrs. Mary K. Pukui and Mrs. Martha Hohu, Bernice P. Bishop Museum, Honolulu.

Today we know more, and I'm sure yesterday's conversation included ideas about why Lōʻihi might not be an appropriate name and what might be the better name. There is a mechanism to deal with all of these things: it's to put a proposal together with as much documentation as you can get, [and] submit it to the Hawaii Board on Geographic Names. If they have questions they'll contact you and then they will send it off to Washington, D.C., when they're satisfied with their recommendation.

The packet presented needs to be as complete as possible and needs to follow certain rules or protocols that the Hawaii Board has, and that includes using proper diacritical marks. They don't want places names after living people; they'd rather have names be in Hawaiian, rather than not, and there needs to be consensus in the community.

That last one I think is the most difficult thing to do sometimes, because in the case of Nāhuku, Thurston Lava Tube, Keana Kakina, it's like, what are we going to do here? There are

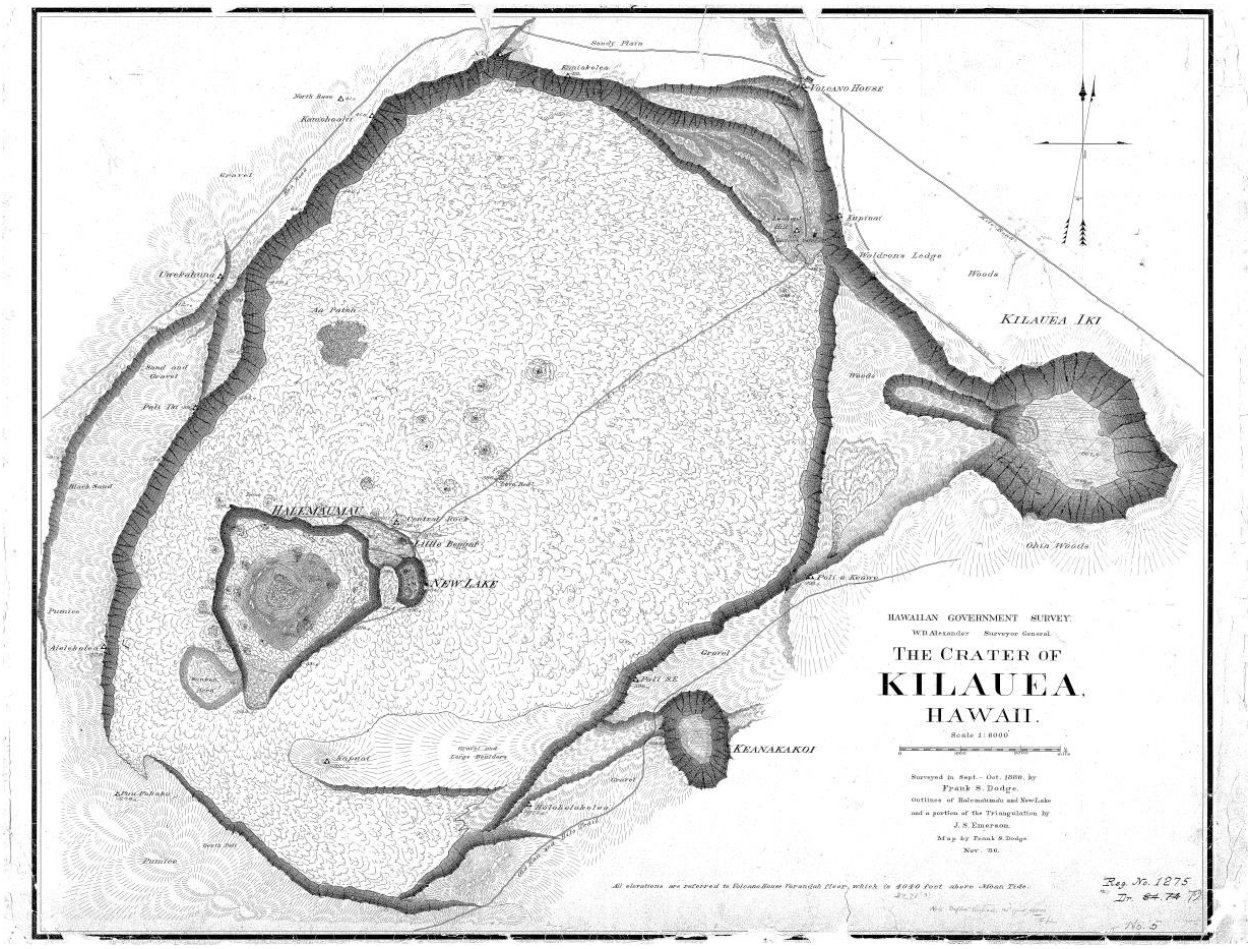
those who think that Thurston Lava Tube is a perfectly valid name, it fits into the history of the park, and we should keep it that way.

There are others who think that if there is an English name for a feature and there is no Hawaiian name that we know of, maybe we can give it a Hawaiian name.

So all of these things, you know, it's not just simple, go look it up in the book, write it down, give it to the board and they'll say "okay." It's a little bit more complicated than that.

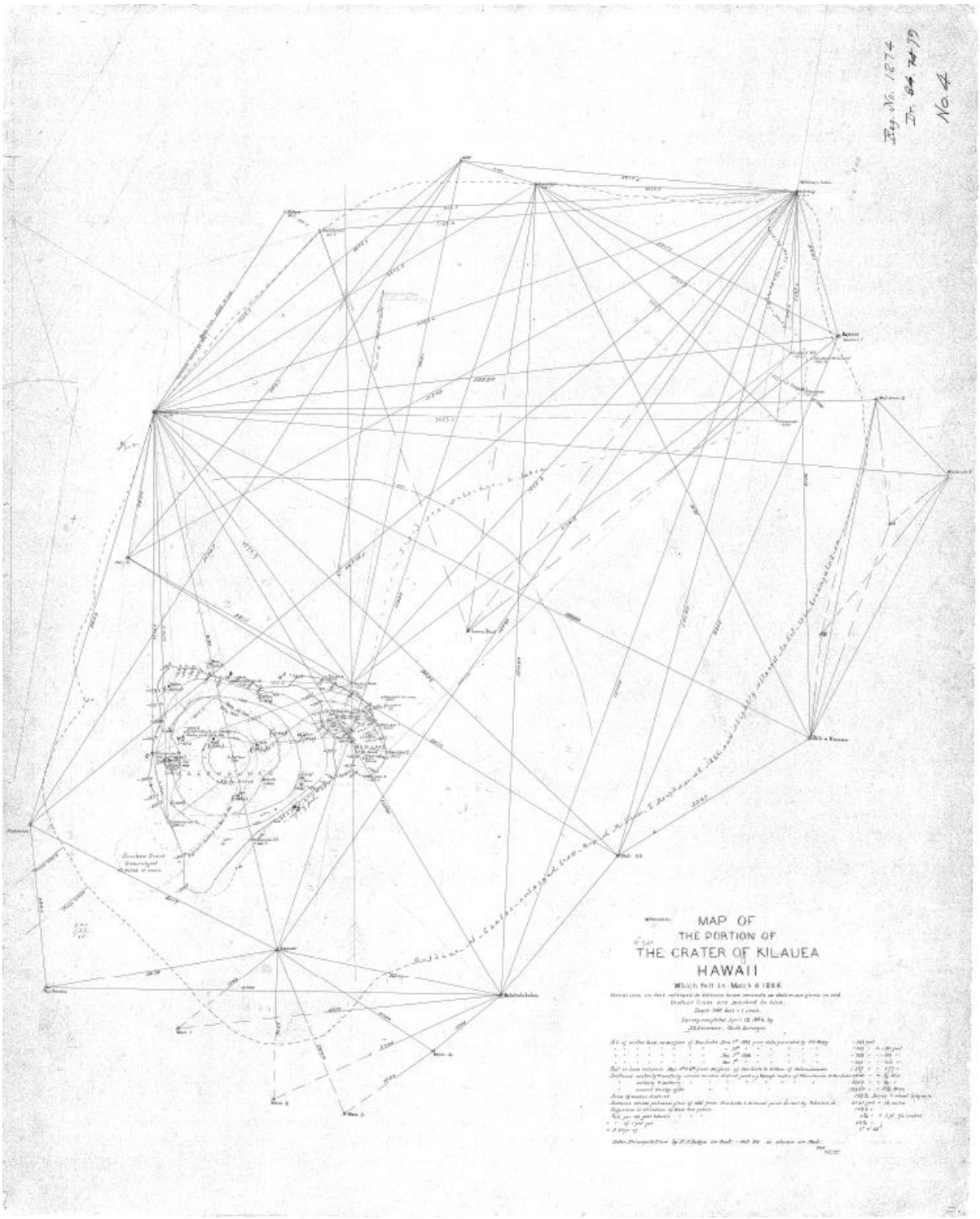
One thing to think about now, also, having watched all of the lava flows happen on the coast, those flows have buried places that no longer exist, in my mind. There is a completely new landscape down there; new points, new bays, new hummocks, new everything down there. It's my feeling that at some point, probably when the eruption ends, whenever that may be, the shoreline's ethnography, somebody may decide that the bays and points need to have new names, because they are new features.

We may decide that this point over here is kind of where Kupapau Point was, but a little bit further out into the ocean, so maybe could name it Kupapau, or not. It's not my place to say who is going to decide how to do all that stuff. [But] I think it is an important thing to think about.



The Hawaiian culture is not something that is locked up in a cabinet or in somebody's file drawers. To make it vibrant and living we need to be conscious and aware of the need to, I guess, keep current with place names and through research you can find names for old places.

These two things are here. This bottom map was drawn in 1886 [Dodge, 1886]. One of the things I like to point out, this place called Waldron's Ledge, which I think we call Waldron Ledge today, is right next to a place labeled over here Kūpinaʻi. If you look up Kūpinaʻi in the dictionary it means to echo. If you have ever sat on top of Waldron Ledge or been on the floor talking back at the pali, that is what it does—it echoes, your voice echoes.



This is, I don't know what it is called officially, these are all survey [triangulation] points with lines that were shot from this point [Emerson and Dodge, 1886, Reg1274]. Everybody else has come up with a proper map. If you come up here and look more closely, every datum, I guess, has a name rather than a number. This one is "Waldron 2," this one is "Kupinai," right next to Waldron's Ledge. This one is "Pahoehoe." This one is "Lava Bed."

So if you look at this and you think, cool, look at all these old names, they're old names, but they're not necessarily old places. You have to kind of be informed about stuff like that.

Of course, there are different traditions; different districts have different names for different things; different families call things different names. I think that was one of the problems that we had when we were doing the place names research here, too. We talk to one family and they call it this; we talk to [another] family and they call it that. What do you do?

I think, in the case of the park, it's possible with some creative sign writing to acknowledge that there are traditionally multiple names for some places.

Questions

BEN GADDIS. At what point does a place name become a geographic name? Take your map that you have, you write down there, I think, properly, "South Lake" and those were places for a while. At what point does it convert, should it convert?

BOBBY. I think when it lasts long enough. So many features—if we started naming things in and around Puʻu ʻŌʻō we'd go crazy. This lake is active and then it goes away and is buried by that lava flow and that cone builds up and it falls into the lake. So it's like, give it a rest and wait until we're done.

To be considered an official geographic name, what I said earlier, it needs to be approved by the U.S. Board [of Geographic Names] and I don't know that the Hawaii Board would forward—the Hawaii Board doesn't initiate names, they receive comments or requests from the community or various communities. Things like "New Lake," "South Lake," simply weren't listed because this was before the U.S. Board existed.

Does that make sense?

BEN. In a way, but those are also examples of features, as you point out, that are transient that probably wouldn't be listed even today.

BOBBY. Yes. But it's important to know those [names], because if you go back and read whoever was working up here, then they're going to refer to "North Lake" and "South Lake," but if you don't know, it's like, "where is this?" So I think it helps having that kind of mindset, and some people [then] are able to visualize places [in the past].

I've been places one time out in the park, down the pali, across the lava flow and kind of looking for that one tree with the branches that are all facing this way, because right next [to it] I know it's this really cool place. I don't have a map, I don't have a GPS, I have my eyes and my memory, which so far is working okay.

So, again, it's paying attention to what is out there, not necessarily what is in your own handheld device.

Q. Has the process for naming new features changed, like Kukamahuakea, but nothing has been named, well, I don't know if that is true, but it doesn't seem like things have been named recently.

BOBBY. As far as I know, I think the last names were Kupaianaha and Puʻu ʻŌʻō, at least in the park. The eruption is too dynamic yet, right now, nothing has been submitted. There is no organized process to do that.

Q. How were those names chosen? We sort of heard this morning—Pua was talking about how she had suggested a name and it wasn't accepted.

BOBBY. People are fond of talking about the Native Hawaiian community and there is no such thing. There are Native Hawaiian communities, Native Hawaiian families, everybody with different opinions and ideas, which is as it should be.

So you folks should all know this, but probably you don't know this, when the eruption began 1983, January 3, eruption begins, look on your topo map. Inside the letter "O" of the word "flow" is where the eruption started, and [the vent] became Puʻu O, for the letter "O" in the word flow.

Then "O" means to continue or endure, I think, if you look up in some dictionaries. So we thought Puʻu O is not a bad name. Then certain people in these communities found out that we were calling it Puʻu O and [said that] those haole people up on the hill named it that and so you better come up with a good Hawaiian name. Then it became Puʻu ʻŌʻō, for the bird, who used to live there.

Then Kupaianaha, kind of the same thing: wondrous, surprising. It wasn't really surprising to me. There are people. Today I think it would be kind of challenging —hang on a second.

Laura?

LAURA SCHUSTER. Yeah, I was going to say that some of the newer Hawaiian words that were recently established were the names of the parks, where [in those names] the ʻokina is, and then they counsel [park staff and Hawaiian communities].

BOBBY. Yeah, yeah.

LAURA. So that changed, at least, looking at the Hawaiian language.

BOBBY. When I started, not when I started, probably in the [19]80s, maybe the early [19]90s, Mardie Lane and I sent off brochure copy that included all the diacritical marks and, much to our surprise, it was printed. This was before Congress changed and corrected the names of this park, Haleakalā and the west Hawaiʻi parks to include the diacritical marks, because our legislation, when we were created, did not include those diacriticals.

So it literally requires an act of Congress to change the spelling of a place and name. I still believe that Hawaii, the name of the State, legally does not have an ʻokina. So that is probably more trivia than you wanted to know about.

So, yeah, there was an act to change the spelling, or corrected the spellings. Then the park brochure [was printed].

JEFF SUTTON. This is just kind of more of a philosophical comment, and that is the notion of letting things kind of settle down before you just run in and start putting sticky notes on everything, name this thing, that thing, so on and so forth. I can see why you want to do that, but it's a little bit like mowing the lawn or doing the dishes or something; unless you wait for another 30 years or whatever it's going to be for the eruption to finish out then it's not going to get done.

Just an example of that in 2008, when this new vent opened up there was kind of a little bit of an e-mail exchange amongst . . . folks that were going out there on a daily basis and said, "What shall we call this thing? Shall we call it anything just for our own internal housekeeping, nothing official?"

One suggestion was brought out, how about it's on the east side [indiscernible] Kukina and somebody else said, you know, that feature, it looks like it shut down but we'll just leave it as an overlook and just shut up already and lets be done with it.
BOBBY. Four years later.
JEFF. Yeah. Almost five.
BOBBY. See, in my mind, when I look at that it's . . . "Halemaumau." That is what is erupting.
JEFF. [Inaudible] If you want a name.
JIM KAUAHIKAUA. I think the important thing to emphasize here is that we're [HVO] not naming them for everybody. We're giving them working names.

…

Any more questions, comments?
KEOLA AWONG. Another thing I think we ran into, Bobby, was using diacritical marks and then going to the kupuna group, and then some kupuna saying, "what is a diacritical mark?" [They] never had [used them] in the newspaper and this is all new age [modern] Hawaiian language trying to standardize things.

Then we had the U.S. school guys and the board [say], "oh, no, we have rules, we have to use the diacritical marks."
BOBBY. Then what do you do with Halemaumau, versus Halemaʻumaʻu?
Q. Who cares?
BOBBY. Were both names used? Was one used when it was erupting actively, was one used when it wasn't erupting?
JIM KAUAHIKAUA. That is an important thing about the whole GNIS thing is that they can only have one name.
BOBBY. Right. You have to pick one. You're forced to.
Q. I think if you are looking for that context you can go to that Web site and you can see the other names that are acceptable.
JIM. They're not acceptable. They're alternatives.
BOBBY. Alternative names.

It can be cumbersome and confusing and frustrating, but I think in everyday usage I kind of go back and forth: Halemaumau, Halemaʻumaʻu. It depends on what mood I'm in.

Then there is the official publication thing, which sometimes drives people up a wall, too. It's like, why do we need these? What if it's not listed? What if it doesn't appear in the GNIS?

I just dug up a letter from Roger Payne, who used to be the boss of the Geographic Names Information System, [which states that] if it's not in the database, you can't put it on a map. So that was, I think, in 2004. I don't know if their policy has changed since then.
Q. Also, I think that it deals with what you brought up about the language, that gap where the language wasn't really used by the native people. So then the other question that came up: was there a group of kahuna that was kind of [authorized] to watch the flow of activity in everything? I'm bringing it back to why Pukui used the word, the name "Nāhuku" to describe the thing inside of there [formations inside of lava tube caves]. Then the other name, the Mau, Mahu?
BOBBY. Kukamahuakea?
Q. Yeah. Those are features of that area. For instance, it's looking up a mountain, I'm sorry, looking up and saying it's amazing. "Kupaianaha" means to be amazing. For me, listening to that name, it doesn't tell me anything else except that the amazing is defined by whoever defines amazing. It doesn't give me any kind of something to grab on to know what is going on with that

particular area. The ʻōʻō, just the birds in the area, it doesn't tell me anything outside of that versus what is really going on with the activity of the flow. You know what I'm saying?
BOBBY: Yeah.
Q. Kind of like, that's why it's really important for us to get this group together to haku mele, so that we can actually start, you know, like some places are named after Kane, these Kane names, Lono names, and everything like that because of what is going on in that area. So we as people coming later on and that is what we have to do, we have to remember we have to throw that name over there so that when the rest of us come after, then it kind of gives us a kind of an idea of what was going on. Even though the names maybe appear similar to back there we might use it over there so they can say, okay, this is how it is all kind of coming together and everything. We don't just name things just because. Has to have purpose.
BOBBY. And thoughtful.
PUA. There is a four line chant that talks about Kukamahuakea. It tells you how sacred it is.
BOBBY. Cool. Do you think it's that place over there?
. . .
PUA. It says Wahine Kapu.
BOBBY. Excellent. It's a cool thing. Some people may ask, well what does it matter? It matters. It really, really matters. We may not be able to explain why, in scientific terms, it matters, but I think culturally from the perspective of the place, it is really, really important. Kauʻi was talking about [how] names should not be given out frivolously or without thought and [that] long term, generational-term consequences need to be considered. Once you start using a name for a place, it's kind of hard to take it back. Certainly names change.
PUA. Except for surfers.
BOBBY. Yeah. I have notes in my office that I forgot, people today, Queen K Highway, A Bay, Mahiʻula, where is "Mahiʻulua"? Oh, Mahaiʻula. Stuff like that. I'm hoping that everybody—Camp K [instead of Kulanaokuaiki] on the Hilina Pali Road? People in this room, you folks working in this park, you better learn the place names and how to say them properly. If I hear you on the radio I will call you up.
JIM. For us, the names that you guys sort of put together for areas up here, is there a definitive source one can look at?
BOBBY. No.
JIM. Secret?
BOBBY. No, it's not secret; it's just little scraps of paper here and there. We haven't been as systematic about it. I have some, Keola has some, [but] there is no [dedicated] staff person.
JIM. Your retirement project.
BOBBY. I'm retiring. HVO and HAVO can jointly fund a position and maybe with EKF. We can do a whole place name study. That would be awesome. I'll put my name into that starting July 1.

Yes, like Kukamahuakea, it actually tells you where it is in the chant. It's just four lines. That is a cool thing, just seemingly insignificant little things. You're reading the book and if your mind wanders, you'll miss it. Then you go back and say, oh, wow, look at this, this is kind of cool. Yeah, it's a really, really cool thing.

Thank you for asking me to come and talk about it. I hope this is useful.

(End of presentation.)

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Open Discussion of Pelehonuamea with Pua Kanahele

January 29, 2013
Jim Kauahikaua: All right. We're going to use the next half hour for a few more questions for Pua and Ku'ulei.

JIM. I have one to lead off. . . We want to know [the] frequency of what happens? So for example, big eruptions, it would be useful to us to know … the dates of them, obviously, but if we can't know that, then we would like to know whether they have happened in the past. Same thing with big earthquakes, for example, the 1868 earthquake we talked about before—was that a unique occurrence?
PUA. You know, I don't know that; only because if someone had written a chant or composed a chant about that whole affair then it would be easier to trace. Then there would be other chants using the same kind of language, but I don't know that.

So in the Hulihia chants they seem to have an occurrence because they're using some of the same language but they may be using different place names. So that is really all I can tell you about that. I cannot say yes, no, maybe so.

So the other thing is that we really haven't looked for that in chants. As I said before, sometimes we don't look for certain things in chants but they are there unless somebody makes us conscious of it and then we go back and look for it. Then we may find it.

So, again, if you're looking for that kind of re-occurrence, yeah, they if you go back to chants and look for that.
JIM. You mentioned in your book there were four or five Hulihia chants?
PUA. Actually, we have – I don't know how many Hulihia chants, she's [Kuʻulei is] going to (indiscernible)
KUʻULEI: [more than five]
PUA: Lots of Hulihia chants, and some of them are used all over, and over again, certain portions of it, but there [are] lots of them.
Q. So is there a number of chants that you guys are aware of, is it in the hundreds, is it in the thousands, just total? Do you guys have a number of that?
PUA. No. She [Kuʻulei] is the one that actually does that.
Q. Does the Hawaiian culture have a calendar that they follow?
PUA. We do. Yes.
Q. And is that visible within the chants, a sort of dating mechanism?
PUA. There is not so much a dating as we follow the lunar calendar and so it doesn't have whether it's Tuesday or Wednesday, but it has the moon phase and what you do in the moon phase. So it has two things, one is the moon phase and the name of the month of that moon phase.
Q. Can you distinguish one year from another like we do in a season calendar?
PUA. No. That question would have been good yesterday because the girl who actually does the moon calendar was here yesterday. She is good at it. I should ask her.
…
FRANK TRUSDELL. Can you speak to the name of Mauna Loa's summit caldera, Mokuʻāweoweo?
PUA. What do you want to know about it?
FRANK. Well, it has some sort of ʻāweoweo, if you know the fish, and you kind of know that it flashes from red to silver.

PUA. Yes, it has to do with the colors. . . . The fish and then there is a taro and there is other kinds of things that name ʻāweoweo, but the mountain stuff has to do with the color and probably a color on its eruptive phase.
FRANK. So might that be the flash, you know, how the fish flashes from silver to red, is that maybe a description of ʻowaka?
PUA. Could be a description of ʻowaka. I only know ʻowaka is white.
Q. Are the chants, are the Hawaiian chants, universally known throughout the island chains, as you go, I guess to the Northwest; where you have less volcanic active volcanism, do the Pele chants, I guess, tend to be fewer out in Oʻahu—more, kind of, rain centric?
PUA. Pele chants are—a lot of it has to do with this island because it is the most active, but we do have chants about the other islands as well, and some of the eruptions that happen on that island or some of the migrations that are happening on that island with the movement of lava flows or the movement of magma.

We don't have a lot of, say, Pele chants active as far as Leʻahi is concerned (Leʻahi is Diamond Head). As far as Diamond Head is concerned we don't have that kind of chants recorded for that.

So all it tells you is that these people who are recording the chants are recording live chants but they came at a particular time where they don't really see the eruptions for these different places. They only have a sense that these are volcanic islands. So they know which islands are eroding, which islands are not from their experiences.

So they can compose chants to that but they cannot tell you what the eruption at Leʻahi was or what the eruption at Ālia Paʻakai was like. Ālia paʻakai is –
Q. Salt Lake.
PUA: That crater [on Oʻahu]. We do have the migration chants that touch upon all of those craters or Mokapu.
Q. Puowaina, Punchbowl [is another].
PUA: Those names showed up on the [screen] yesterday when we were talking about [volcanic] rejuvenation.

. . .

PUA. Yes. All the volcanic names are there. These people who are migrating are conscious of all the volcanic activity and so when they compose the story of Pele [and] where she goes to—in her sea form she goes to Kauaʻi, when she meets this man and then she has an affair with him.

And so all of our lives we were calling him a boy-toy. We got the idea of the rejuvenation. Sounds more intelligent than "boy-toy."

It also has something to do with the Kīlauea Crater that is on Kauaʻi. So going back up there and where she stays for awhile, she calls up all of these winds and all of these different kinds of weather systems and then she comes back to Hawaiʻi. Then she sends her sister Hiʻiakaikapoliopele up there to fetch the boy-toy, to bring him back.

That is the way they—that is the symbiotic relationship between the two, where she goes and she erupts and then Hiʻiaka comes along causing all these rejuvenations of green earth, of vegetation, and they start regrowing again.

So that is what they're doing with this particular story—Pele and Hiʻiaka story.

Did I answer your question?
Q. Yeah, mostly. Are there island-specific chants or are they, kind of, the same chants [but] they have gone throughout the entire chain, [or] they are just [for the] Big Island, [a] chant that was specific for the Big Island and Oʻahu . . .?

PUA. Most of the island chants have to do with this island, as I said, because this island is active. The Oʻahu chants, we really don't have chants for the other islands, as far as eruptions are concerned. What we have are just, kind of, history that touches upon certain land features on the other islands.

We do have land features other than craters. Like we have land features of Kauhiʻīmakaokalani [Crouching Lion], which is right outside of Kahana Valley [Oʻahu] and the relationship of that valley to volcanism. What else do we have?

We have a [volcanic] relationship . . . with the Island of Molokaʻi. It does talk about eruptions on all of these different islands, but it's not as extensive as the eruption chants here.

Q. Also, there is another—I shouldn't say character, but the mo'o also plays an important role in this whole thing, too, yeah?

PUA. Yes. She's talking about mo'o. Mo'os are lizards and when you talk about mo'os in stories you're talking about huge mo'os and they are water characters. So when we begin to talk about water characters it tells you that the island is broken down so there is more water on that island exposed. So not so much volcanism exposed anymore.

So the mo'o islands, the mo'os begin to take over the island, or water forms begin to take over the island instead of fire. So the whole dynamic of the island changes.

And then you have chants being composed about the mo'os. Then you have chants being composed about the battles between the mo'os and the fire clan. The fire clan always wins, by the way.

Q. Pua, I have a two-part question about Kīlauea Iki. So yesterday we were at Wahinekapu; there are definitely places in the park where there are deep spiritual connections and deep meanings. I wondered if Kīlauea Iki has something like that.

The other part of the question is, because it was an eruption in modern time, where people living today experienced that eruption, if a chant or chants have been written about that?

PUA. There [are] not too many chants written about Kīlauea Iki. So it hasn't come to that point of becoming part of that spiritual step of chants or [indiscernible] that we deem are really, really important to pulling our information from.

So another reason for that is we haven't really gone to watch that [eruption], people who are composing the chant. That is like a question he asked [about why] we're not composing the chant? Yeah. So when that was going on a lot of people were not composing chants. That was humongous for a while, the eruption. Of course, it's a humongous puʻu.

What is your other part?

Q. That was just if there were any, I guess, chants or stories—also—

PUA. So it hasn't really been converted to be into the ideal of becoming part of that sacred realm of cones.

KEOLA AWONG. I think, too, during 1959, was that whole suppression, kind of, where the language was [forbidden].

PUA. Yes, it wasn't really pulled.

Q. It was a time when the [Hawaiian] culture was suppressed; we were becoming the United States and trying to assimilate to the United States. We weren't allowed to be Hawaiian. . . I think that may have played a part in nobody writing a chant.

PUA. Yeah, or [no one] wanted to be associated with that.

Q. Have you guys seen the resurgence of the younger generation getting interested?

PUA. Oh, yeah. That is a big light at the end of the tunnel. We like that a lot.

Q. During the early Hawaiian cultural expansion into the islands, was there a lot of inter-island transportation? Did people migrate, move around?
PUA. There wasn't a lot of migration. There wasn't a lot, there was some. Then you hear about it in stories. All the chiefs, the chiefs did a lot of moving and they did a lot of circulating with other chiefs, that kind of thing. Regular people, no, they just stayed where they were supposed to stay.
Q. In kind of exploring more of that inter-island activity, do you have several chants from different places? Obviously, when Mauna Loa erupts you can see it from Maui. I stand up there and I see Maui pretty frequently [while] doing field work. Are there different chants from different places that kind of describe the same thing happening but just a different experience from the person sitting on this island looking at it, as opposed to a person on Maui looking at the mountain fire far away?
Q. Yeah, that one chant on Oʻahu. Yeah, coming back and she can see her forest burning from Waiʻanae.
PUA. Yeah, there are chants of people sitting on another island watching the eruption on another island and then describing that eruption. So they're talking about a chant where somebody is sitting up on the heights of Waiʻanae Mountains, what is that, Waiʻanae Mountains?
Q. Kaʻala.
PUA. Lehua? Anyway, on the Waiʻanae Mountains and they're looking towards [the Island of] Hawaiʻi and they can actually see the eruption that is happening here.
Q. Pālehua.
Q. Where is Pālehua?
Q. Right above Kapolei uka.
PUA. Yes.
Q. The timberline ….
PUA. Okay. Are we pau? [laughter]
Q. Do you recall any chants about a great tsunami, like the great flood in the Bible …?
PUA. Yes, besides the one I talked about yesterday.
Q. Because there are marine deposits up north that are pretty high and I was wondering if anyone [had interpreted those to be from] tsunamis?
PUA. Yes, we do have a few [chants]. It doesn't have to do with volcanoes, though, it just has to do with the big flood. It is still Kaikahinaliʻi flood. . .
Q. Kai a Pele, the word Kai a pele, too.
PUA. Kai a Pele, yes.
Q. The chant.
PUA. Yes, we do have a few. The one that is sort of related to the chant that I just told you, another part of that tells you that the … islands were just full of water, you could only see the tops of the mountains. So I don't know, you know, how valid that is. It just came in a small portion of it, so I couldn't judge it or make any kind of—get any kind of information from it, other than just those few lines. So I didn't really pay attention to that.
Q. This was touched on earlier, over here, were there Hawaiian words for Pele's tears and Pele's hair, were there Hawaiian words to describe the smaller scale features or different types of pāhoehoe, like spatter cones and things like that? Were there Hawaiian words describing those kinds of features? Not names, but just a descriptive word?
PUA. Yeah. In the birth chants of Pele, Haumea, and Moemoeaʻaliʻi—great chants because they have different brothers being born and all of those different brothers represent different land

features. So there is a brother called Leho and what Leho represents are … where you have one puʻu and another puʻu and another puʻu. That is what Leho represents. That is what these things are.

Then there is Kāneikōkala, and Kāneikōkala are like, they said that he was born from the fingers of the mother, but what that represents is really the veins of dike zones that runs through the island so they become like the skeleton of the islands.

So when you go to the Island of Nihoa, where the whole west side and the north side is fallen and you can see all these dike zones, all the veins, then you have a better idea of what Kōkala is, [what] Kaneikōkala is, that they were describing.

So if you look at say Mokumanamana, for instance, and you look at this, this is what this is describing, that is kind of a Leho.

Q. Leho?

PUA. Leho. You know, like the leho [cowry] shells, yeah, so just a bunch of them continuing. So when you look down at a side of a mountain, for instance, the south flank of Haleakalā, you have those pools that run right after the other, that is Leho.

Q. So Bobby was talking about official names, you know, the geographic names, and then we sort of mentioned that we have working names for different flows and creative names like PKK, TEB, Mother's Day flow, and all this. Is that okay or is that offensive in any way? Should we be doing something differently on our working (inaudible)?

PUA. You know, when the Army and the Navy and Marines and whoever else was on Kahoʻolawe they gave all of these names to the different landing ships, LZs they called them. LZ Dove, LZ Seal, LZ Mina, that's for Mina bird or something like that. So they had all of these LZs.

They were fine . . . as long as they were using it but once they're off the island they're not fine. So you need to rename all of those things if it needs to be renamed.

Then the other thing about that, when you look at the lava tubes, one of the brothers that was born was Kūhaʻimoana. The start of Kūhaʻimoana is that he lived on the Island of Kaʻula. On the Island of Kaʻula is a huge lava tube that you can take your—if you had a sailing boat you could sail it in, it's huge.

The big shark lived there and in the chant he is born from the ears of the mother. This is a lava tube. So this is a Kūhaʻimoana. Kūhaʻimoana tells you that it is breaking to the ocean. So it gives the magma that space to move. So that is another description.

It really is a great chant because it describes all of these little features in the land that allows magma to move.

The other brother is the one that comes up?

Q. Kānemilohaʻi.

PUA. Kānemilohaʻi is like the—it's when an eruption comes straight up from in a—it's like Puʻu ʻŌʻō, when the lava comes straight up instead of going over like this and going in and then moving up. It moves straight up, comes up vertically. That's a milohaʻi, yes.

Milohaʻi means that it's twisting but it's moving upward and then it will come straight up. It's breaking to the earth.

Q. The craters on Hualālai, you can see that, just that shaft like that.

PUA. Yes.

FRANK. I guess I have a tough one and that is in relationship to [when] we as scientists go out and we're in these areas that are considered sacred and we're doing our jobs; so one of the

things I was [wondering is] what is your perception of . . . that . . .? Are there some protocols that we should be following?

Finally, can you comment about the resurgence of geothermal [energy development] and how that interplays with [the sacred sites]?

As a part-Hawaiian working on the volcano, [I] got to be sensitive to that, and I know that there were people in geothermal [discipline] that were on the other side before, and now it has changed doors.

PUA. Yeah.

FRANK. So I'm just kind of wondering if there is a change in philosophy. That is two different questions.

PUA. Yes, they are.

FRANK. Yeah.

PUA. Actually there are three questions. Let's go back to your job first, you going on the land.

FRANK. Yeah.

PUA: One of the things, as far as protocol is concerned, is that you always ask permission to be there. If you have to do a job, you have to do a job, but you also have to ask permission to be there.

I guess it was [Peter] Mills yesterday, when . . . he went up to the quarry on Mauna Kea, they asked permission to be there.

The thing about asking permission to be there is, we don't mind teaching you about how to ask permission, but we don't want to be the ones to go up there and ask permission for you because it's not us that is there. We don't mind teaching you how to ask permission.

Q. Is that with a chant?

PUA. That is with a chant, yes. So we can do that.

You know, you are going to do the job so you have to go wherever. It's not like you're going to build a house there or live there forever. You're just there temporarily, you're off. On and off checking it out. So it's good. It's not like where Jaggar Museum is, which is really a sacred place, but it's there. It still feels like kids are running all over the place. It's that same kind of feeling for us. We're humble and we're [indiscernible].

COMMENT. Can I say something along those lines, because sometimes the interpretation [is] that if I ask, I can just go, but what it is, you need to take a moment to really check yourself to say whether or not you're asking because you really want to—for permission. When the thing happens, it will guide you to where you are going or not.

I feel like with answering your question but I've seen people ask that question, go to these places and just say, "okay, I asked, so I got permission to go," versus really asking to be there and really waiting for the response; to open up yourself to that.

There is a difference between saying, yeah, you're going to go where you're going to go because that is allowing it to happen. So it's an open question—I mean a response, because, like I said, I've seen it used the other way, too.

When we come in there, then it's like oh, well, I got permission, I [asked] permission and it's like, okay, but okay.

PUA. Do you remember Kaeo talking about them finding places to put this structure in there? That's kind of an "ask permission" to be there and so you just go and you wait. Then they wait and then they got some kind of hōʻailona [recognition]. Okay, so this is the place, great. It's that kind of thing.

The thing about asking permission and doing a chant for it is that you are committing to it, you're making a commitment. Then the commitment back is that, yes, you can go, but you go in with the idea that you're going [in] service [to] that place, you're going to do a good job and then you're going to leave.

Q. Yesterday there was a point at one of the stops we made where Kalei was talking and right after she finished talking there is this huge crash, a lot of people looked. So you have to—sometimes you take that and go was that affirmative or was it something else?

Q. Was that a negative to go home?

Q. Yes, or a stop talking.

PUA. Geothermal. Geothermal, we were so against geothermal and we still [are] really so against geothermal, but both of us on both sides [have] sort of softened to it so that we can work together.

The working together only means that—because initially we were just bumping heads like this, saying, "oh, you can't go there, this is sacred, blah, blah, blah," but we weren't telling them why. They weren't telling us what they were doing exactly, what the process was.

So we were able to sit down and listen to them, what is your process, why are you doing this? So we've come up with all of these—a lot of these things that I'm talking about now we're sitting down and talking to the PGV [Puna Geothermal Venture], writing up documents for them, this is why it's sacred to us, dah, dah-dah, dah-dah. This is the other thing why it's sacred to us, dah-dah, dah-dah, dah-dah, all these documents, here it is. Now we're telling you why it's sacred to us.

So now you have some sense of knowledge before you did it, so now you become more responsible for it . . . But we're not going to help you do it. We're not going to help you go into public and say, okay, now they know everything about the Hawaiian culture in its relationship to Pelehonuamea so it's fine for them to do it. We're not going to ever let you do that. We're always telling them, oh, no, we're against, we're against geothermal.

Geothermal is energy, but it's an energy to us that has an attachment to it, and for us that attachment belongs to us. So we cannot easily give up on that. That is a kuleana for us to maintain. As long as I have that kind of knowledge I'm going to maintain it.

The knowledge is still free and it's public. People just don't understand it the way we understand it. So we make it understandable for people to accept or not to accept, it's really up to them.

Geothermal goes down and what they're doing is they're pulling up steam. They take down their own water and what is most sacred about the Pelehonuamea is magma, lava, and everything that comes off of it, so the mahu at that initial steam that comes off of that magma or lava, those two things are the most sacred.

So that is what we tell then. You cannot touch the lava at all. So their whole idea is that they go down and they pull up their own steam. Then it goes into a cycle and eventually they put it back in the ground. I don't know what they're putting in the ground. I don't know that much about it.

They've explained the process and we've explained our process and I'm using their electricity, but I don't need to agree with them. Anyway, that's it.

Then the rest of the EKF guys, those guys are working with Kamehameha Schools, because they are looking at geothermal, too, on their properties.

So what do you think of geothermal?

FRANK. As a government guy or as my personal self?

PUA. As you.
FRANK. It's sort of a quandary, as a Hawaiian. I guess I'm kind of thinking that if it's done in an appropriate manner and in mind with what is consistent with what they told you, then I guess I'm for it. Not for them plugging in a giant extension cord and then energizing any other island.
PUA. Yeah.
FRANK. I also think that we should be able to, if they actually develop it here, then we should have some concession, cheaper electric rates or something to that effect. That is my own personal level.
PUA. Okay. Thank you. I don't really care what the rest of you think. [laughter]
Q. You have another hour, right?
. . .
JIM. That's a good place to stop.
PUA. Thank you very much.
JIM. Thank you.
FRANK. Can I ask—there two [locations named] Pohaku Hanalei?
PUA. Oh, that's really a good one. You should have asked that question.
FRANK. I got to end on a positive note.
PUA. We're having a hana hou. I'm going to answer his one question. He said on Mauna Loa there [are] two [locations with the name] Pohaku Hanalei. One Pohaku Hanalei [location] is on the north side of the crater, northeast side of the crater, that is an alignment with [the] east-west corridor of the island. If you are measuring the sun on the equinox, the sun will rise over Kumukahi and go over that Pohaku Hanalei.

So it is in alignment with the sun at the equinox; [the sun] will rise over Kumukahi and go over that Pohaku Hanalei. So it is alignment with the sun at the equinox.

The other Pohaku Hanalei [location] is on the west-south side of … the crater and it's really measuring the north-south corridor of the island. So it will measure straight to Waipi'o [Valley].
FRANK. Where is that second one?
PUA. It's kind of on the northwest side of the crater – no, southwest side, yes.
… [indiscernible]
PUA. The Pohaku Hanalei. But it measures the north-south corridor of the island.
Q. So we're up there at equinox this here the sun is going to be straight up?
PUA. Yeah, if you are on the northeast Pohaku Hanalei, it should [be] right up.
Q. Let's go on a field trip.
PUA. Anyway, that was a good question. Okay.

(End of session.)