

Pu'u Wa'awa'a Geological Information Sheet

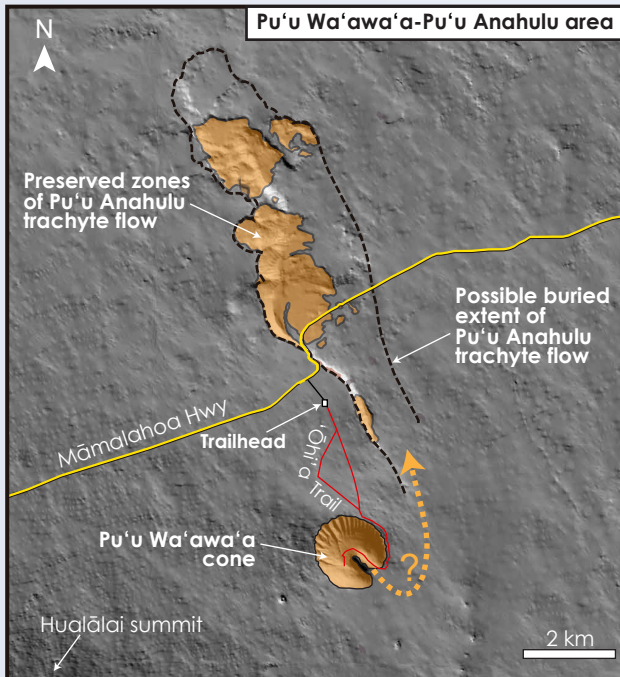


Hualālai is one of the Big Island's five main volcanoes. It has been so active in the past 13,000 years that lava flows from this period (yellow on this map) have almost completely resurfaced the volcano. Almost, but not entirely...

HL=Hualālai; KO=Kohala; MK=Mauna Kea; ML=Mauna Loa; KIL=Kīlauea

Pu'u Wa'awa'a and Pu'u Anahulu (orange in the map below) are two much older features (~110,000 years) that have resisted burial by the more recent lavas and provide a unique window into the ancient history of Hualālai.

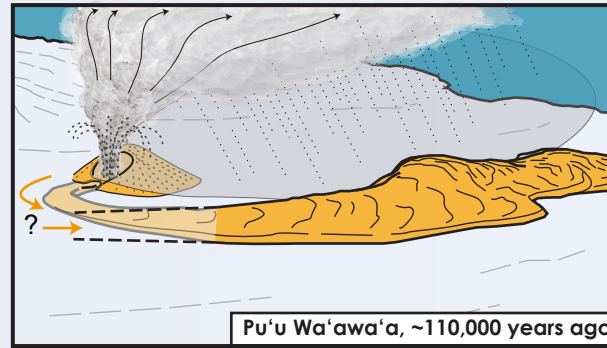
This ancient history is marked by eruptions that were very different from the typical gentle eruptions we often think of when envisioning Hawaii volcanoes...these eruptions involved non-traditional magmas called '**trachytes**', different from the typical **basalt** we are more familiar with.



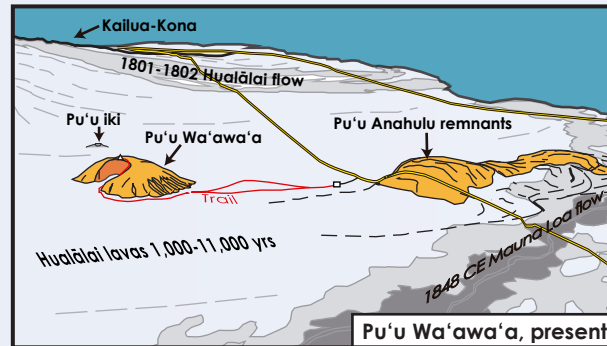
Sources: USGS 10-m Digital Elevation Model; USGS Geological Map of Hawaii

Pu'u Wa'awa'a: an explosive character

Both **Pu'u Wa'awa'a** and **Pu'u Anahulu** are trachytes and have a similar chemical 'make up'. Pu'u Wa'awa'a is known as a 'pyroclastic' cone and Pu'u Anahulu is made from very thick (>600 ft) viscous lavas. They were produced by very different types of eruptions.



The **Pu'u Wa'awa'a** cone was built during a series of explosive eruptions that emitted tephra (fragments of pumice, scoria and ash). The tephra was likely deposited over a large area towards the west of Wa'awa'a. Note the assymetric shape of the cone ('open mouth' or horse-shoe). This assymetry may tell us something about wind direction at the time of the eruption: more tephra was deposited to the west (the cone is higher on that side), meaning the wind was probably blowing west.



Pu'u Anahulu: A voluminous eruption

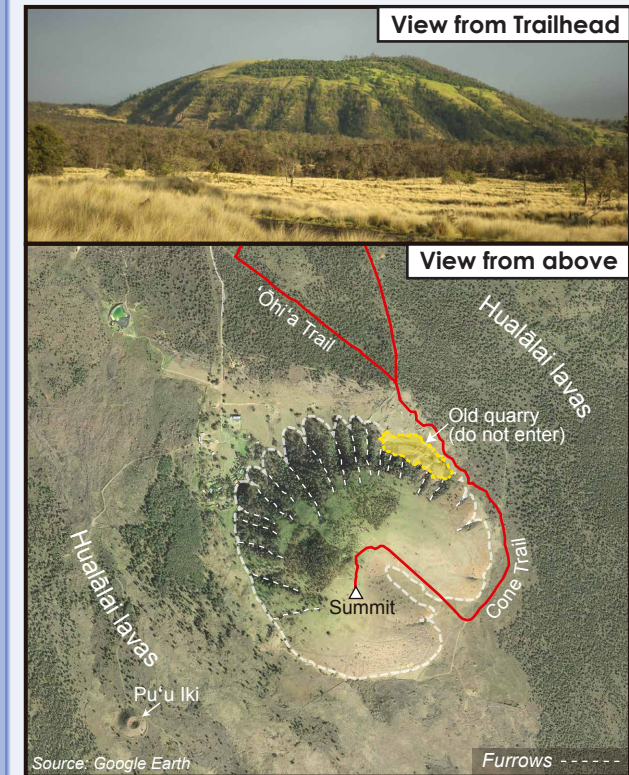
The **Pu'u Anahulu** flows were erupted AFTER Pu'u Wa'awa'a formed. These flows were probably slow-moving and took weeks-to-months to solidify. The total volume of magma emitted during this single eruption is similar to the total volume that has been emitted by Kīlauea over the **past 35 years!**

Since Wa'awa'a and Anahulu formed ~110,000 years ago, Hualālai lavas have covered most of the products from this eruption. Only the thickest parts of the flows and the cone remain.

Note: Hiking to the top of Pu'u Wa'awa'a allows for a great panoramic view of the different localities mentioned here!

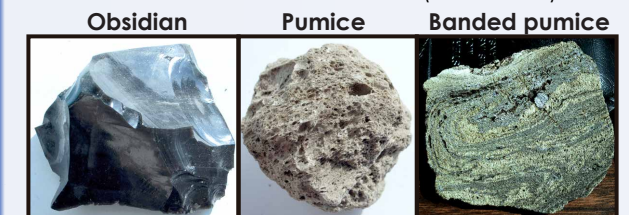
Features of the cone

Pu'u Wa'awa'a is distinct from many other younger cones around Big Island by its larger size and its numerous furrows (Pu'u Wa'awa'a translates to "the many-furrowed hill"). These furrows likely formed by gullying and erosion from rainfall water over the past 110,000 years.



Unique Hawaiian rocks

The cone is made up of layers of tephra, composed dominantly of light **pumice** and darker **scoria** (bubbly rock fragments). Black **obsidian** fragments (mostly volcanic glass) are also frequently found within the tephra. This is the only location where true pumice or obsidian has been found so far in the Hawaiian islands. Obsidian from Pu'u Wa'awa'a was a valuable resource and was heavily traded by Hawaiians to make various stone artefacts since at least 1400 CE (Current Era).



Note: Please, do not collect rocks, mahalo for your kōkua

Pu'u Wa'awa'a Questions & Answers

Q. What is so special about Pu'u Wa'awa'a?

A. It is an unusual volcanic cone with unusual eruption materials (pumice, obsidian) that produced, along with the Pu'u Anahulu flows, one of the largest single eruptions known in Hawai'i (~3.5 km³). It is also the only surface remnant of the ancient history of Hualālai volcano (prior to 13,000 years ago). The Wa'awa'a area also offers a unique opportunity to observe a native Hawaiian dryland forest (www.puu-waawaa.org/files/Halapepe.pdf and www.puu-waawaa.org/files/Ohiacone.pdf for more information).

Q. How dangerous were eruptions like Pu'u Wa'awa'a?

A. Very dangerous. The tephra falling from the eruption plume and accumulating on the ground may have been several meters thick for several kilometers around the Pu'u Wa'awa'a cone. There is also evidence that "pyroclastic density currents" (rapidly-moving, ground-hugging mixtures of hot gas and tephra) were produced during these eruptions.

Q. Can similar explosive eruptions occur around Hualālai in the near future?

A. Very unlikely. Several similar eruptions have occurred at Hualālai (now covered by younger lavas) from ~90,000-120,000 yr BP (Before Present), but none since. Other smaller explosive eruptions (those that generate the smaller basaltic cones scattered around Hualālai) are more likely to occur.

Help preserve Pu'u Wa'awa'a by not disturbing plants or animals, or picking up rocks. Do not enter the quarry (very frequent rockfalls).

Questions? comments?

tshea@hawaii.edu

More information on
Pu'u Wa'awa'a (history, trails)
available at:

<http://www.puuwaawaa.org/>

<https://www.facebook.com/PuuWaawaa>

http://www.hef.us/page/puu_waa_waa/

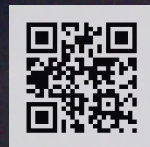
<http://dlnr.hawaii.gov/forestry/frs/reserves/hawaii-island/puuwaawaa/>

Use barcodes below for quick website access



Acknowledgements

- Project supported by the National Science Foundation (NSF-EAR grant 1250366)
- Field collaboration from Division of Forestry and Wildlife's Elliott Parsons and the Hawaiian Experimental Tropical Forest (HETF)



PWW main site



PWW Facebook



DNLN Page

Pu'u Wa'awa'a



A window into Hualālai's Explosive Past

A geological pamphlet
by **Thomas Shea**

Dept. of Geology & Geophysics
University of Hawai'i at Mānoa



UNIVERSITY
of HAWAII®
MĀNOA



SCHOOL OF OCEAN AND EARTH
SCIENCE AND TECHNOLOGY
UNIVERSITY OF HAWAII AT MĀNOA