



Pacific  
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**THE 1943 ERUPTION OF NIUAFO'OU,  
KINGDOM OF TONGA:  
AN ERUPTION CHRONOLOGY AND THE  
EFFECTS OF VOLCANIC POLLUTION AS PROVIDED  
BY LOCAL INFORMANTS**

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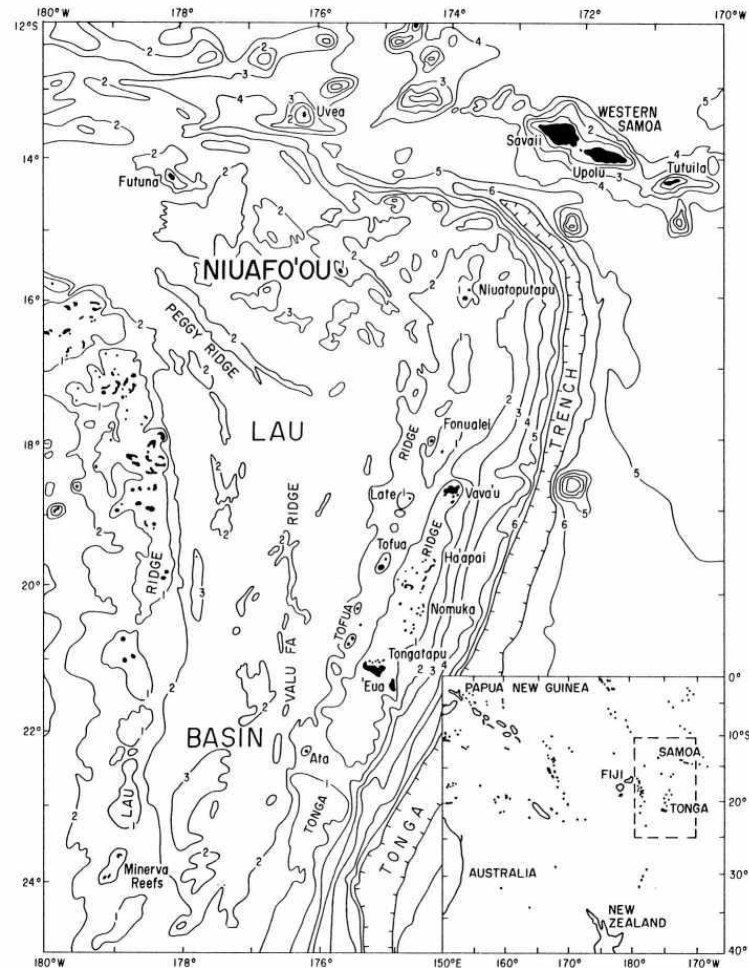
# What the presentation will cover

- **Background to Niuafo'ou**
- **Eruptive history**
- **Affects of past eruptions**
- **The 1943 eruption:**
  - **Newsreel of the eruption** (*US Navy*)
  - **Geological evidence**
  - **Effects of the activity from informants**
  - **A final chronology**
- **Concluding comments**

# Niuafo'ou Volcano

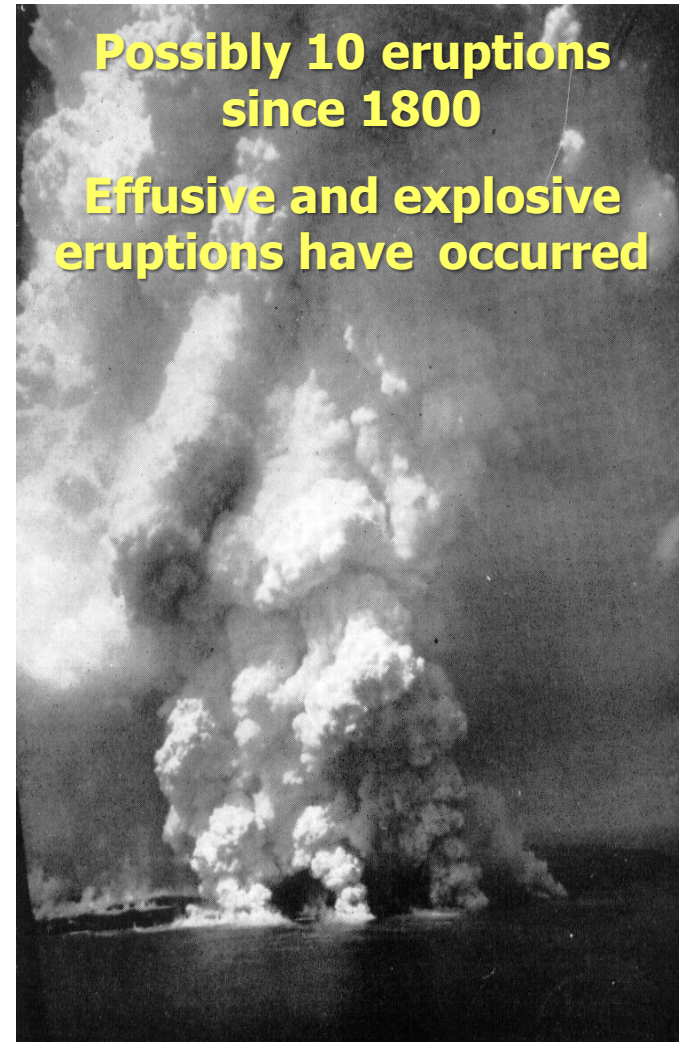


- Niuafo'ou is an active volcanic island, 8 km in diameter, with a history of recent eruptions
- It has a population of about 800, living in 8 villages on the N & E flanks
- It is the most remote island of Tonga, situated 450 km NNW of the capital Nuku'alofa and 130 km from its nearest neighbour Niuatoputapu
- Geologically, it is quite distinct from surrounding areas.



Eruption	Character	Location
1814	Explosive	Within the caldera, location unknown.
1840	?	Location and character unknown.
1853	Effusive	SW flank; 'Ahau village destroyed.
1867	Effusive	SSW flank.
1886	Explosive	Within the caldera, NE side behind the village of Mata'aho.
1912	Effusive	W flank, south of Futu village.
1929	Effusive	W flank; Futu village and arable land destroyed.
1935-36	Effusive	S flank; Petani village threatened, relocated as a result of eruption.
<b>1943</b>	<b>Effusive</b>	<b>SW flank; most crops destroyed.</b>
1946	Effusive	N flank; Angaha village destroyed, island completely evacuated December 1946; not resettled until 1958.
Intermittent	Fumarolic	Hot springs and H <sub>2</sub> S issuing at Vai Kona; springs not active 1958, active December 1982-January 1983, active August 1984.
1985	?	Earthquake swarm 21-22 March, 250 metre crack/ fissure near Fata'ulua village, small pumice/scoria raft present on caldera lake.

## Recent Volcanic History





# Effects of the Activity

- Deaths of villagers - 1853 and 1886? eruptions
- Destruction of and damage to villages - 1853, 1886, 1929 and 1946 eruptions
- Destruction of valuable lands/crops - most eruptions
- Relocation of village - *Petani* after 1935/36 eruptions
- 1946 - *Angaha* village partially destroyed. Island evacuated Dec 1946. Population resettled in other parts of Tonga. Island resettled (with government reluctance) 1958.

# Newsreel of the 1943 Eruption

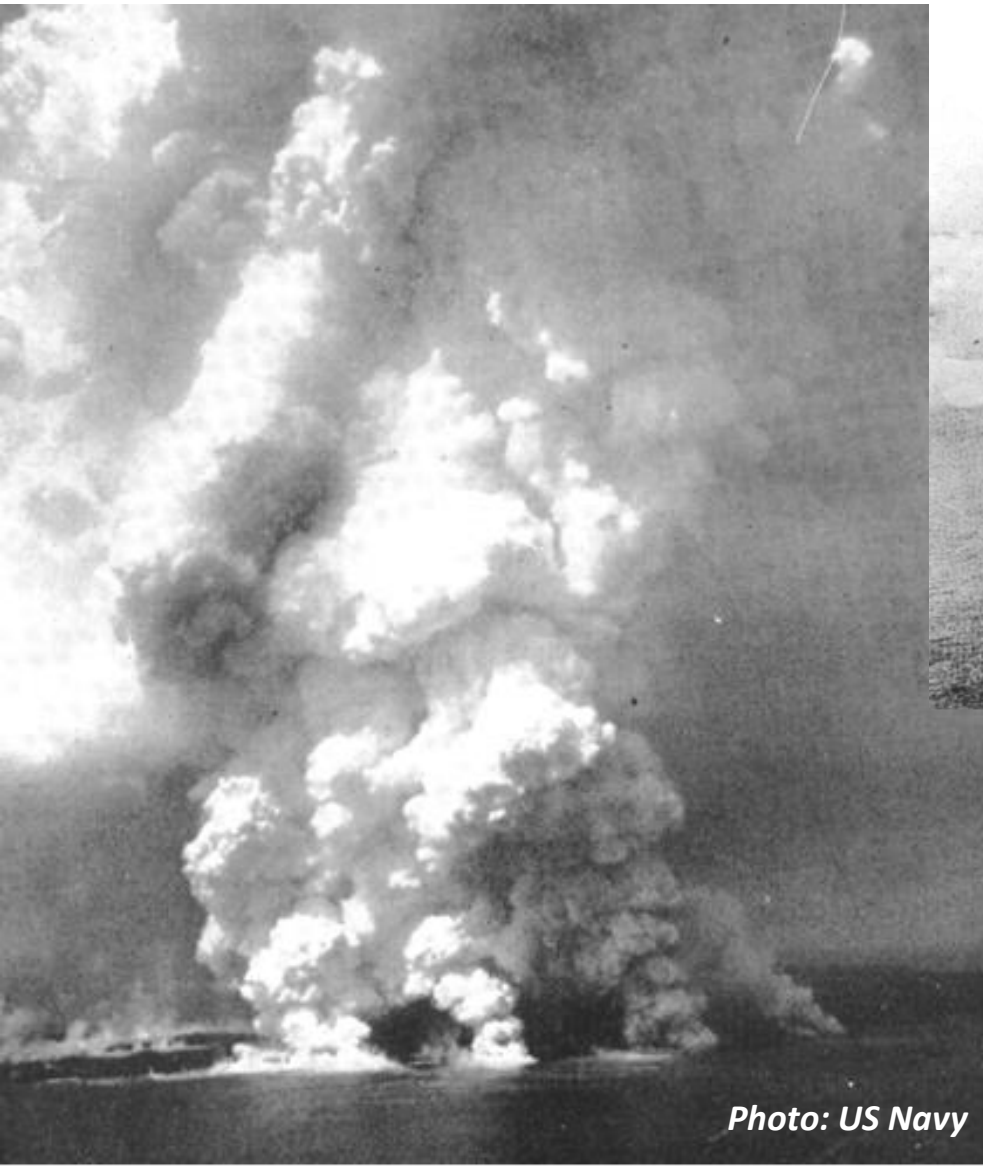
★ ★ ★ ★ ★ ★ ★ ★

REMOTE PACIFIC  
ISLAND SCENE OF  
VOLCANIC ERUPTION

★ ★ ★ ★ ★ ★ ★ ★

Film: United States Navy

# 1943 Eruption: Character of Activity



*Photo: US Navy*

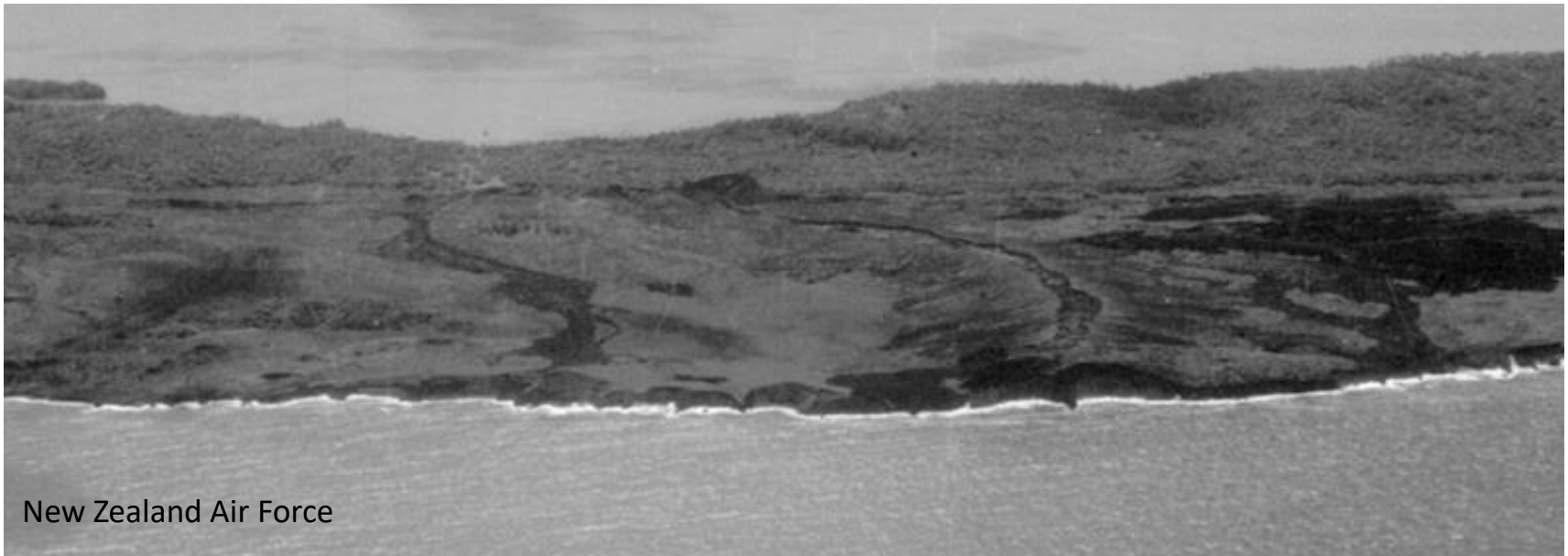
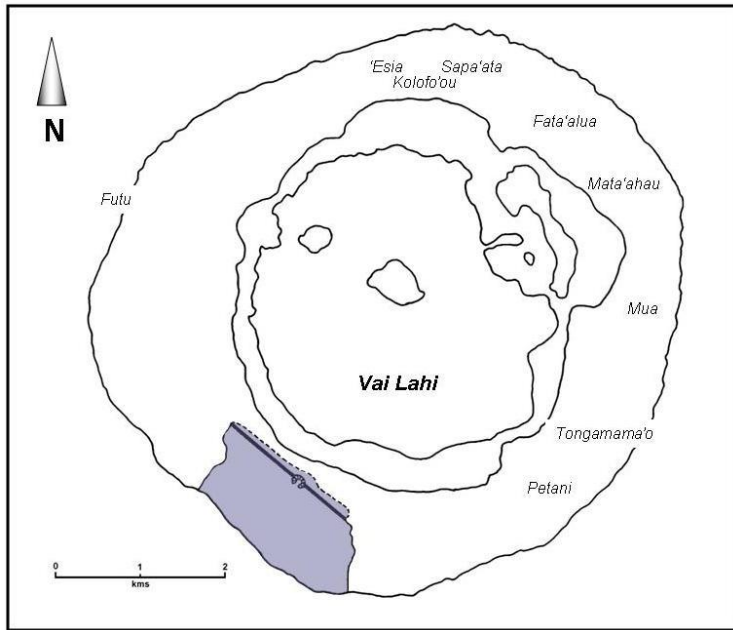


*Photo: US Navy*

**Late phase of the eruption**

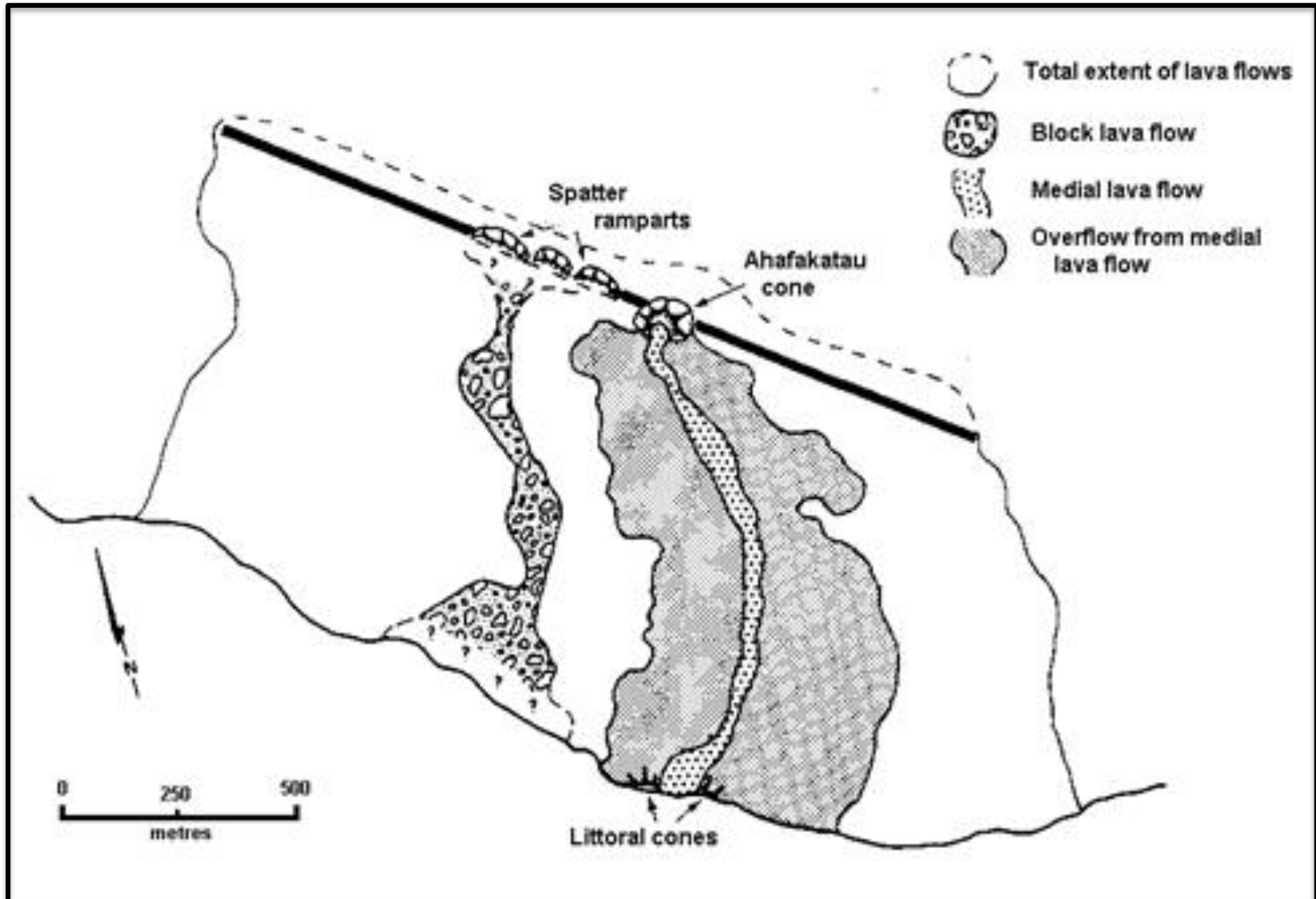
**Early phase of  
the eruption**

# 1943 Eruption: Geological Evidence





# 1943 Eruption: Geological Evidence



# 1943 Eruption: Geological Evidence



***Ahafakatau Crater***



# 1943 Eruption: Eruptive Activity from Local Informants

*".....Suddenly, **the earth beneath us heaved**, the church shook, for a while those sitting on chairs rocked and tremors were felt for a few minutes.....*

*.....a strange **noise like thunder** was heard about the same time as **the pounding thrust**....."*

*".....The **spray of molten rock** congealed rapidly, but was soft enough to gather on shrubs and trees and hung like rough black fruit to the branches... ..It [the smoke from the burning vegetation] curled from the green branches of shrubs around where blobs of congealing lava had fallen and clung. ....**All plantations were destroyed and thousands of coconut trees were burned**....."*

*".....a **down-pour of sulphur and lava** followed, **big pieces of black molten lead were pattering on the roof** of our veranda, blown in our direction, at 6 miles distant from the crater.....All the time we could hear the pieces of stone rolling down the roof as if little children had been playing marbles there."*

(Sister Mary Julia)

# 1943 Eruption: Effects of the Activity from Local Informants

*".....the atmosphere was heavy with the odour of sulphur etc. **Our eyes were smarting and our lungs burning from the poisonous fumes..... The air was thick with that choking odour of sulphur....."***

*(Sister Mary Julia)*

*".....The seawater **causes sometimes itching**, but it's not serious....." (S. Kata)*

*"..... There was a **sea water rain** because the **crater exploded from the ocean.....** In the afternoon there was a heavy rain of rocks (kanekita) and sea water and sulfur. The eruption came from the hill Ahafakatau. The **rain caused a famine** in the western area the following day..... They found out the **plants were dead** the following morning....." (Oto)*

*"In 43 the wind blew from the south, the **rain of sulfur spread over the western side**: there was a **famine during the breadfruit season**. It lasted a few hours on Sunday, **all the breadfruits were falling, and the coconuts...."** (Fala)*

*".....liquids coming from the sky, but **you can smell sulfurite**, that's what he call in tongan Uha Sulifa. You know sulfur, it's different from the saltwater rain, and **you can tell the difference....."** (S. Leua)*

*".....stone rain with water, **everything was dead**, nothing lived. In the morning it rained for a long time..... The **yam became soft, and died**, in the yam field of my father. The other **plants burned, they died, the coconuts died....."** (P. Tuamei'api )*



# Volcanic Pollution and its Effects during the 1943 Eruption

At the coast



At the vent

USGS

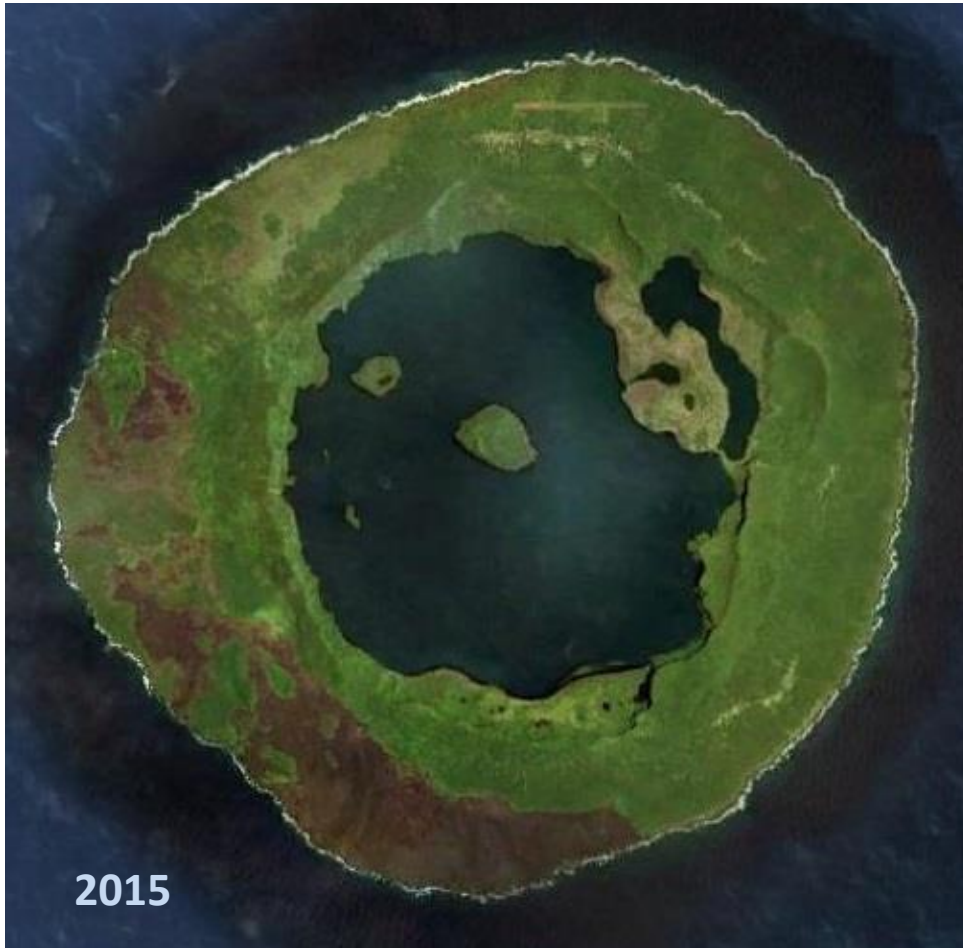
## Sources of Volcanic Pollution in Hawaii

- Similar eruptive phenomena occurred during the 1943 eruption
- Vegetation wilted and died following deposition of acid rain
- Health problems were experienced by many residents

# 1943 Eruption: Chronology

Date	Time	Eruptive Activity and Effects
26 Sept	prior to 08:00	One or more earthquakes occur.
	08:00	Large detonation (explosion); eruption column observed from <i>Angaha</i> ; explosions and lightning occurring.
	late-morning	Effusive activity on SW flanks of the island; lava fountaining; voluminous outpouring of lava; ash deposited on <i>Angaha</i> and other villages; <b>strong sulphur smell over entire island; breathing issues experienced.</b>
	late-afternoon	Effusive activity continues; lava entering the sea causes voluminous steam/ash columns; littoral cones formed along the coast; <b>“seawater rain” blown eastward by prevailing winds; breathing issues experienced.</b>
	evening	Effusive activity continues.
27 Sept	early-morning	Effusive activity continues; <b>majority of vegetation on island destroyed by acid rain; all water contaminated.</b>
	late-morning	Effusive activity continues; lava fountaining; lava flows entering sea at many locations; further development of littoral cones.
Late-Sept to early-Oct		Activity continues for unknown period; effusive activity confined to medial vents; large spatter cone ( <i>Ahafakatau</i> ) develops.
04 Nov		Effusive activity may have ceased; solid crust formed on lava flows; “sparks of fire” observed in cracks and crevices in lava crusts.
early-Nov		Fumarolic activity at vents may have continued for some time.

# Concluding Comments



- Geological evidence gives an indication of the features produced by the eruption
- Experiences of local informants provides further detail on the effects of the activity



- A comprehensive event chronology of the entire period of activity

*Thank You*