

GEORGE PATRICK LEONARD
WALKER

2 mars 1926

— 17 janúar 2005

Walker

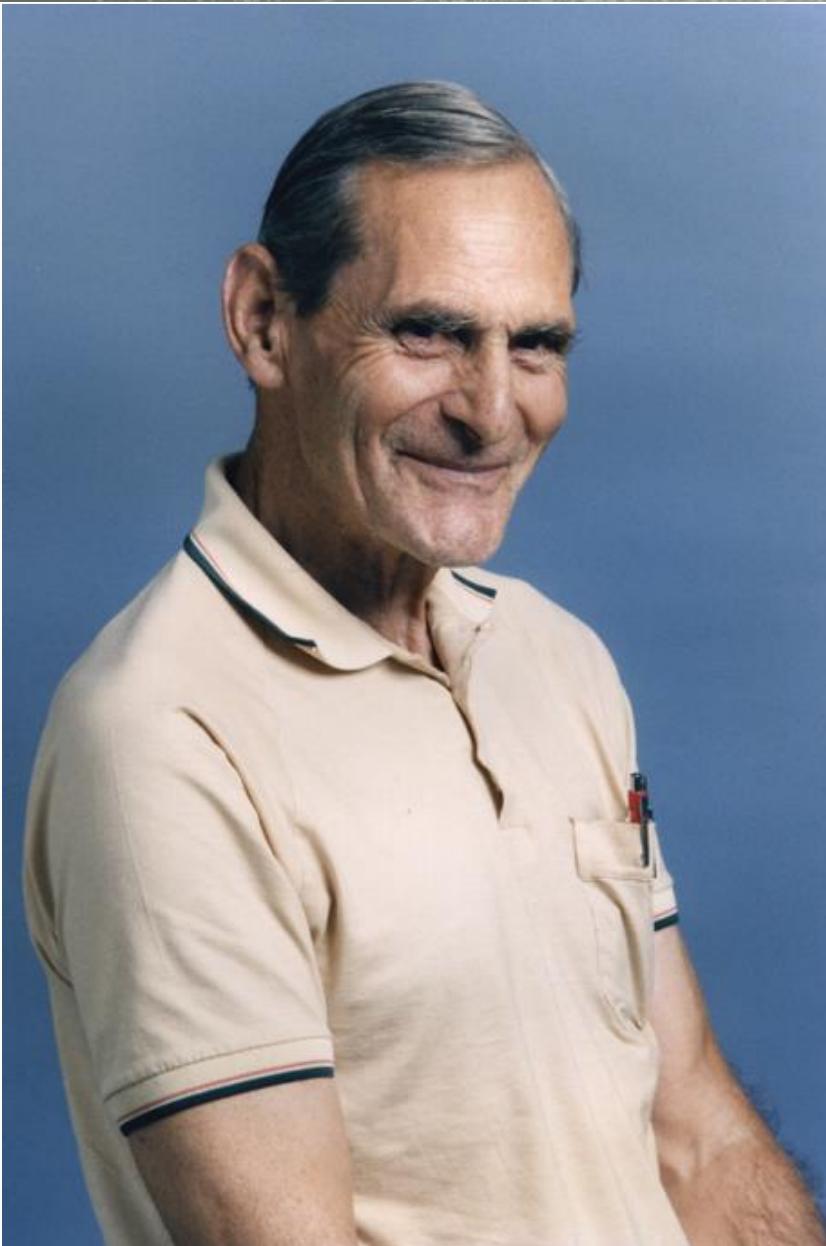
Faðir eldfjallafræðinnar og lagði grunnin að:

jarðfræðikortlagningu á Íslandi

magnbundnum rannsóknum á sprengigosum

kerfisbundnum athugunum á gjóskuflóðum

athugunum á myndunarferlum hrauna



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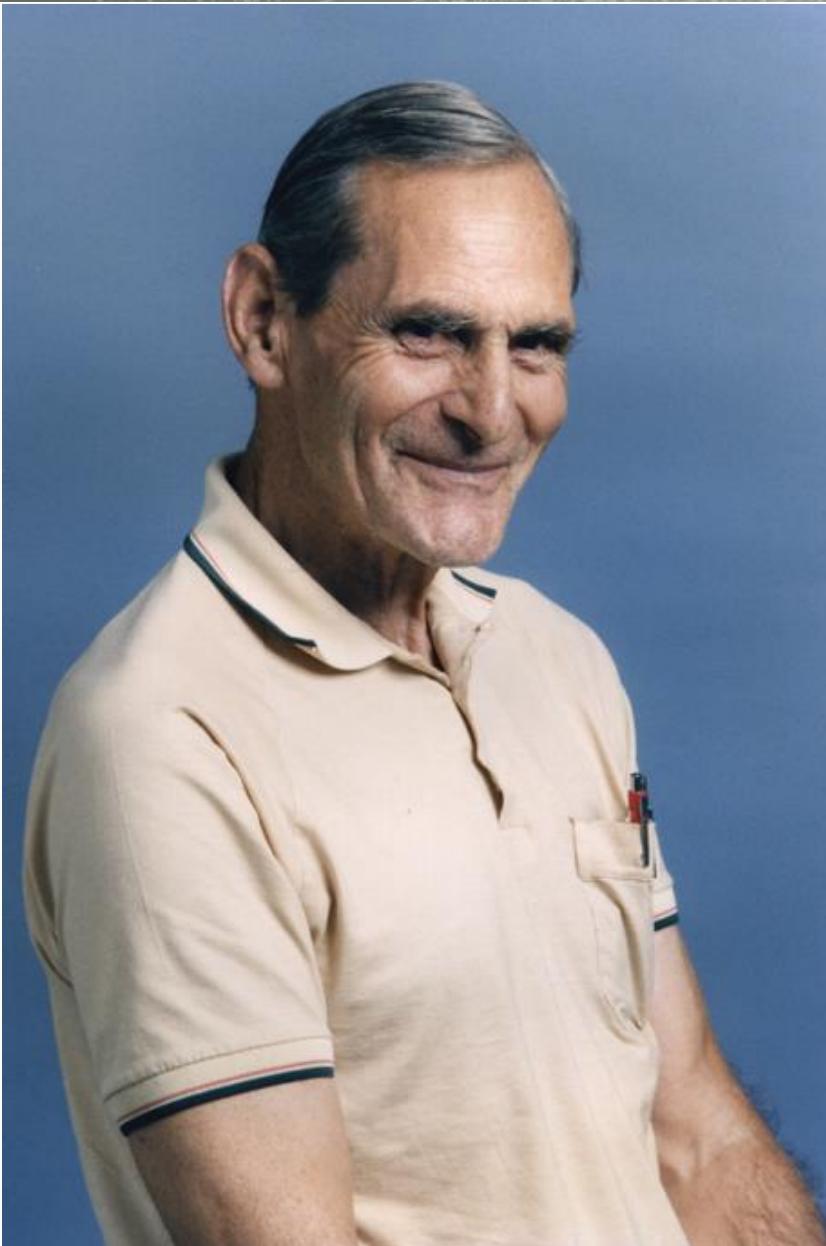
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Walker og Kyrrahafseyjar

Nýja Sjáland – sprengigos

Hawaii – hraungos og gangar



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Lengths of lava flows

By G. P. L. WALKER

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The principal factor influencing the length of a lava flow is the rate of effusion. With a high rate the lava flows rapidly from the source and tends to form an extensive and far-reaching flow which is simple in character (i.e. made of a single flow unit). With a low rate the lava tends to pile up layer upon layer to form a local accumulation of limited lateral extent near the source, and this accumulation is strongly compound in character (i.e. divisible into flow units). The initial viscosity affects the length indirectly by controlling the thickness of the extrusion, and this thickness control is capable of accounting for the fact that the median length of low-viscosity basaltic extrusions is 3.2 times that of high-viscosity andesite, trachyte and rhyolite ones. Other factors, such as the local topography, are thought to be relatively unimportant, an exception being when lava is ponded in a topographic depression.

Measurement of the rate of effusion may be critical in any attempt to predict the distance that a lava flow will travel, such as the one which threatened Fornazzo and other towns and villages on Etna in 1971.

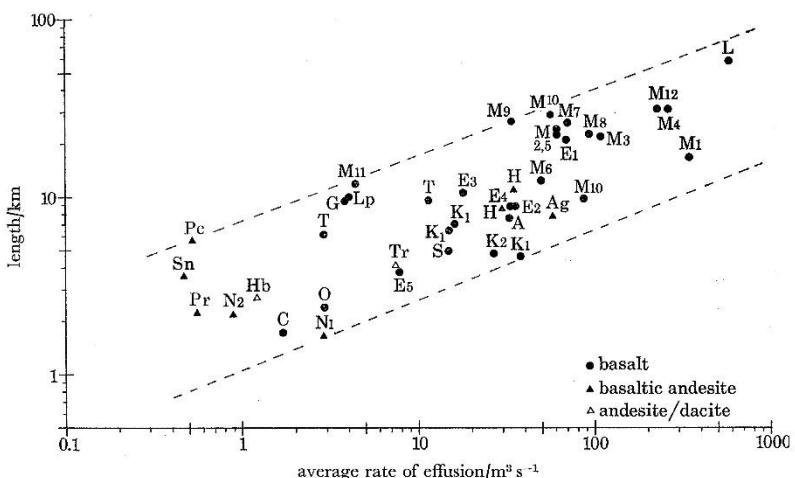
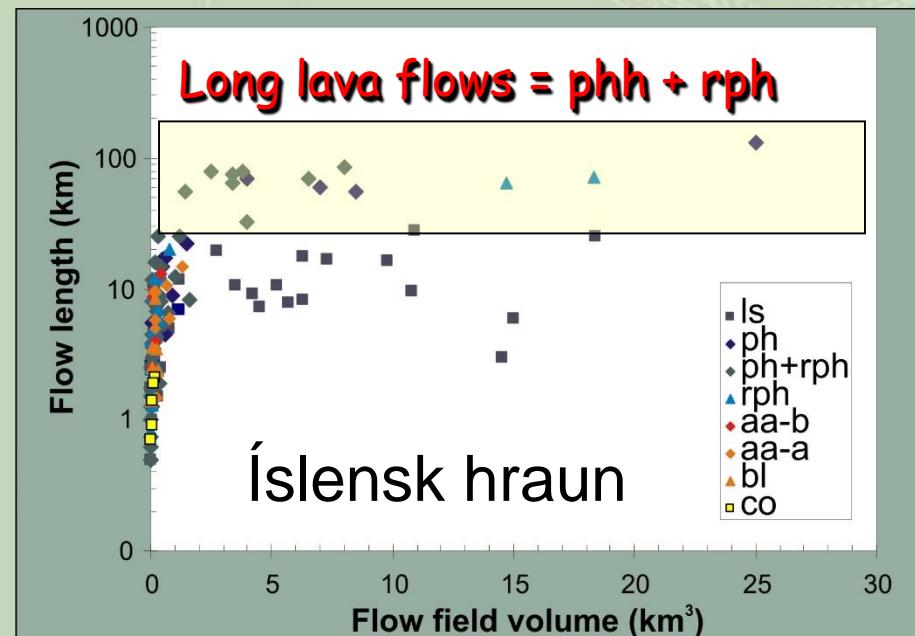
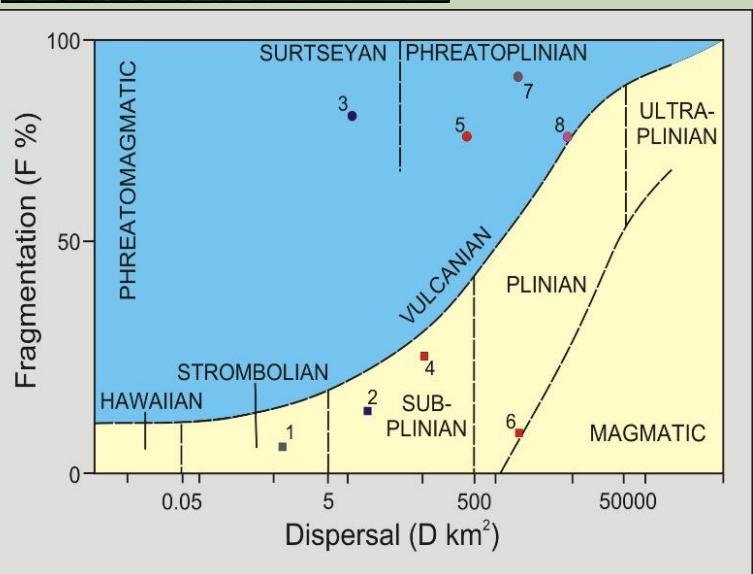
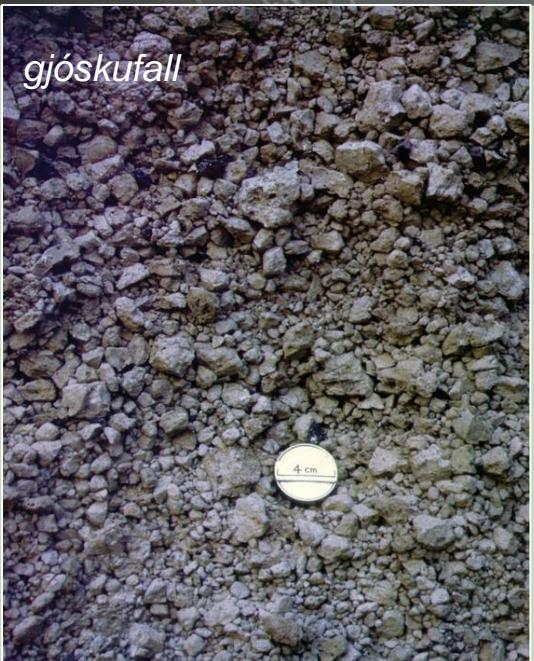
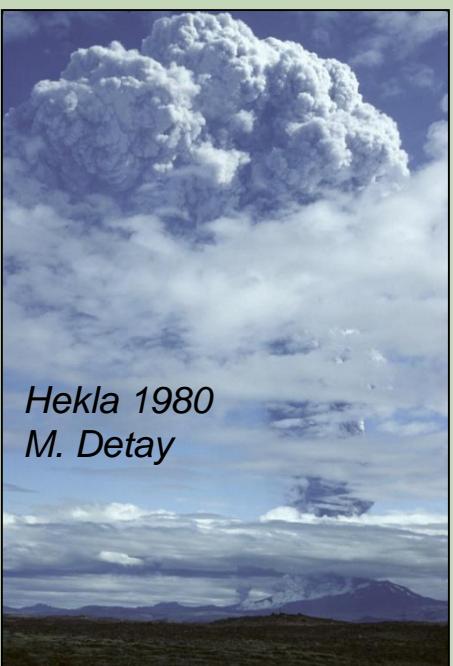


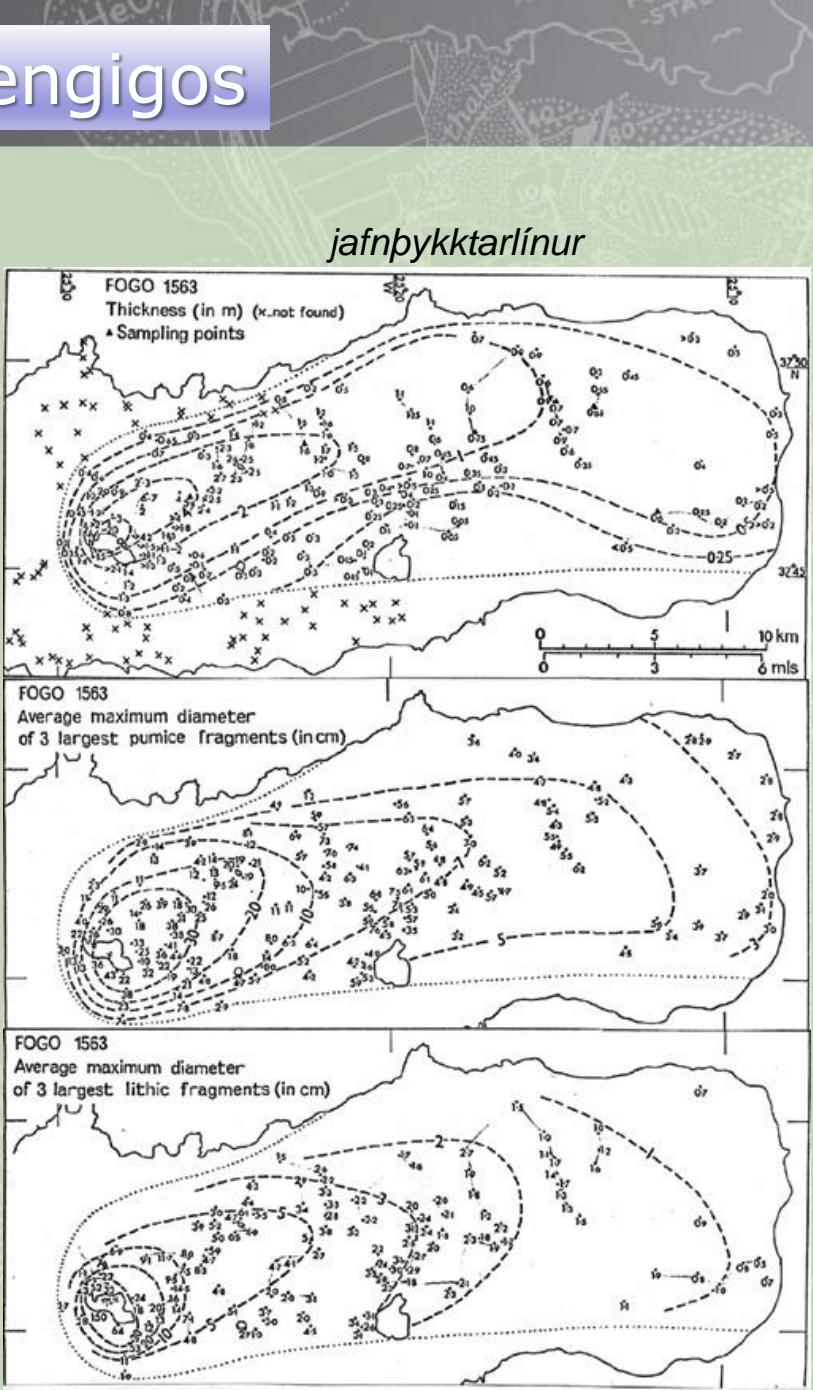
FIGURE 4. Plot of lava length against average effusion rate for lava eruptions (mostly basaltic) on various volcanoes. Basaltic lavas, ●: A, Askja 1961 (Iceland); C, Cerro Negra 1968; E, Etna (1, 1669; 2, 1911; 3, 1923; 4, 1928; 5, 1971); G, Gituro 1948 (Congo); K, Kilauea (1, 1955; 2, 1965); L, Laki, 1783 (Iceland); Lp, La Palma 1585; M, Mauna Loa (1, 1852; 2, 1858; 3, 1868; 4, 1887; 5, 1907; 6, 1916; 7, 1919; 8, 1926; 9, 1935; 10, 1942; 11, 1949; 12, 1950); O, Oosima 1951; T, Tenerife 1705; S, Sakurajima 1946. Basaltic andesite lavas, ▲: Ag, Mt Agung 1963 (Bali); H, Hekla (1, 1845/6; 2, 1947); N, Ngauruhoe (1, 1949; 2, 1954); P, Pacaya 1961 (Guatemala); Pr, Paricutin (first 8 months 1945); Sn, Santiaguita (Guatemala). Andesite/dacite lavas, △: Hb, Hibok-Hibok 1948; Tr, Trident 1953.

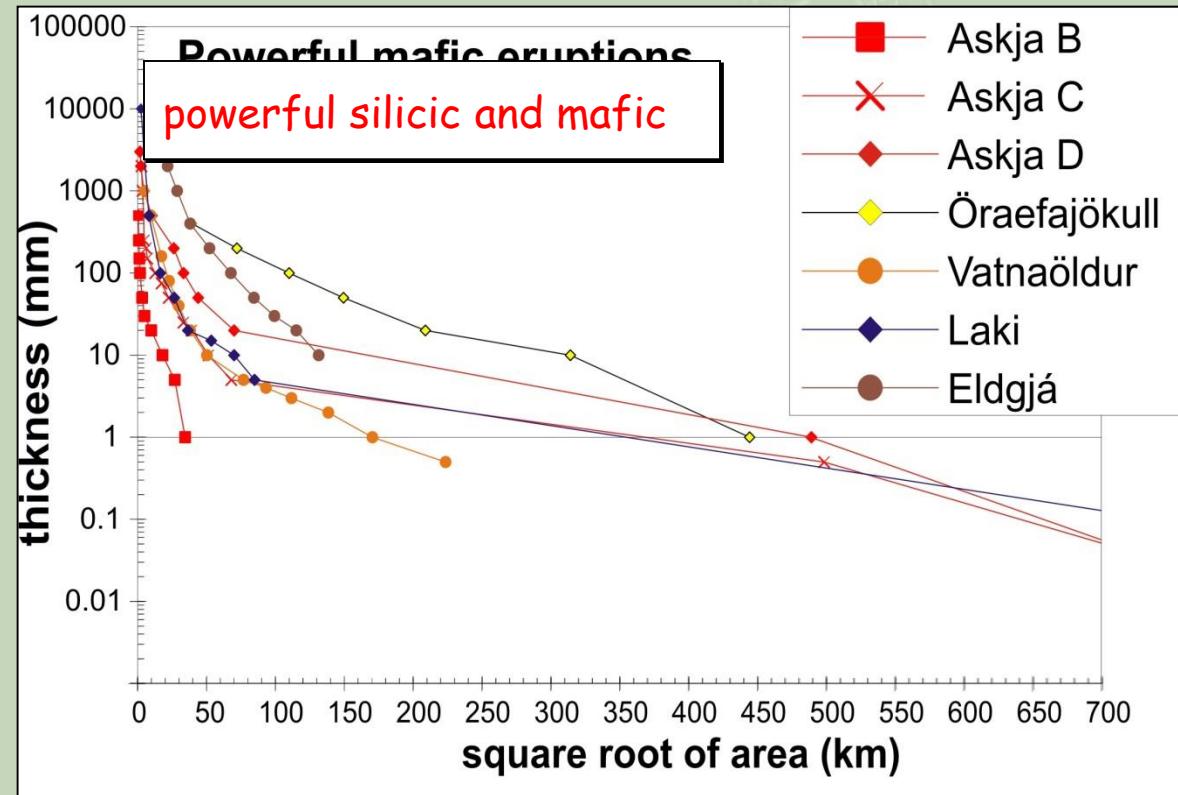


Sprengigos



flokkun
sprengigosa





≥ 60 súr sprengigos á nútíma
Rúmmál upp að 10 km³

Thordarson and Hoskuldsson, 2008
Larsen and Eiriksson, 2008

GG 400 Volcanology				Grain-size analyses of pyroclastics				
phi	M	W	wt %	cum %	W	W(split)	wt %	cum %
-4	16	-	-	-	11.94	-	3.5	3.5
-3	8	-	-	-	26.51	-	7.7	11.2
-2	4	-	-	-	37.16	-	10.8	22.0
-1	2	6.71	2.5	2.5	33.85	-	9.9	31.9
0	1	47.33	17.4	19.9	34.82	-	10.1	42.0
1	½	92.12	33.8	53.7		18.16	10.8	52.8
2	¼	81.58	30.1	83.8		16.63	9.9	62.7
3	⅛	36.79	13.5	97.3		16.99	10.1	72.8
4	⅛	6.27	2.3	99.6		22.80	13.5	86.3
>4	<⅛	1.14	0.4	100.0		23.13	13.7	100.0
		271.94			343.36	97.71		
SAMPLE A airfall ash collected from deck of ship off Surtsey 1963				SAMPLE B non-welded ignimbrite Taupo, New Zealand				

M...sieve aperture size

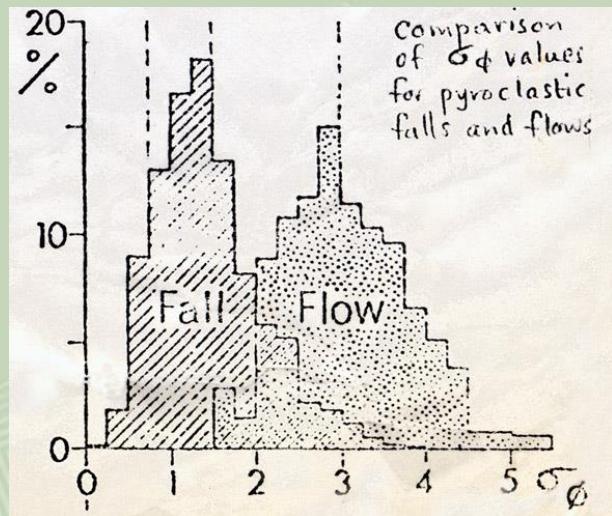
W...weight (g) retained by
sieve of stated
aperture size

wt%... weight percent
cum%... cumulative weight
percent coarser than
the stated sieve
aperture size

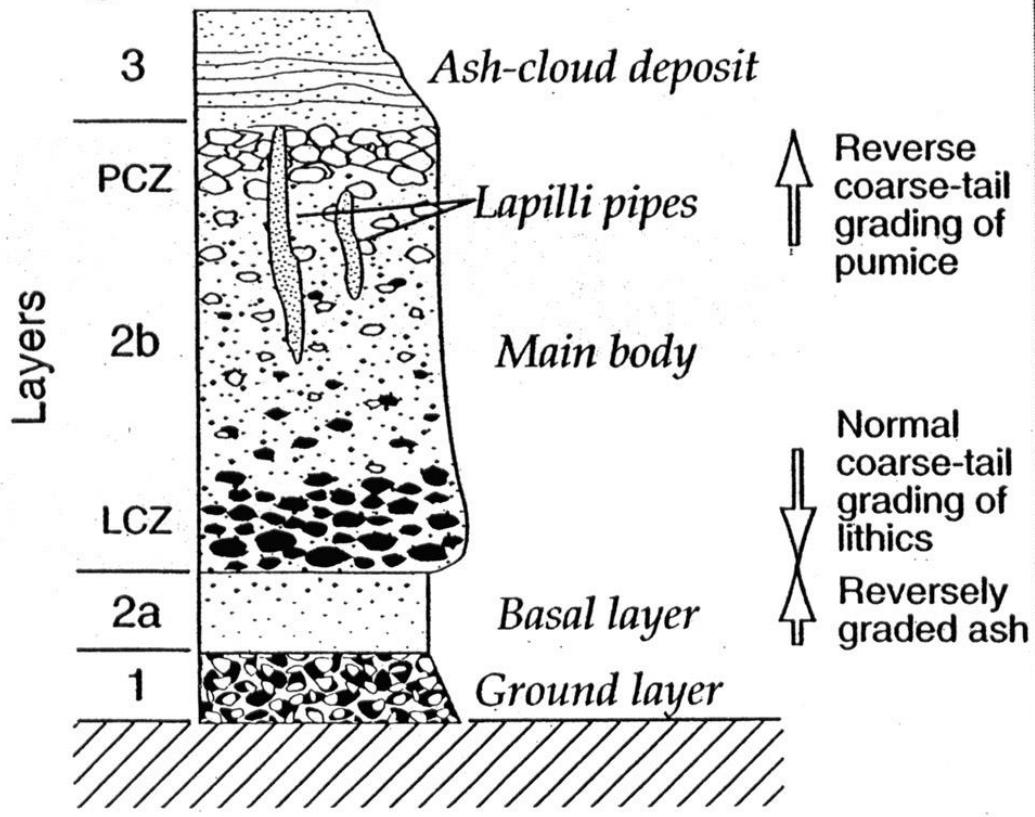
Note: for sample B a split of
the fraction finer than 1 mm
was sieved to reduce the time
taken for sieving



Grain size distributions

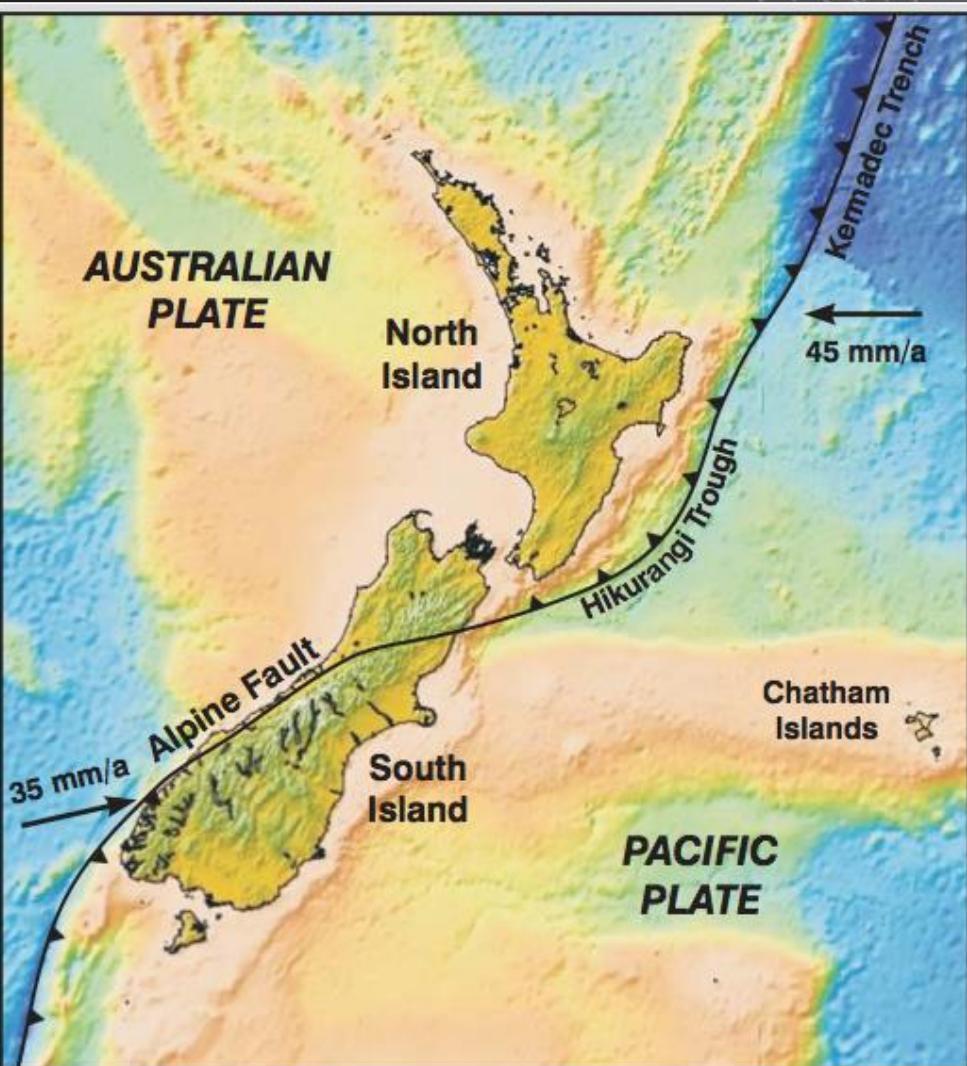


Ignimbrite flow unit

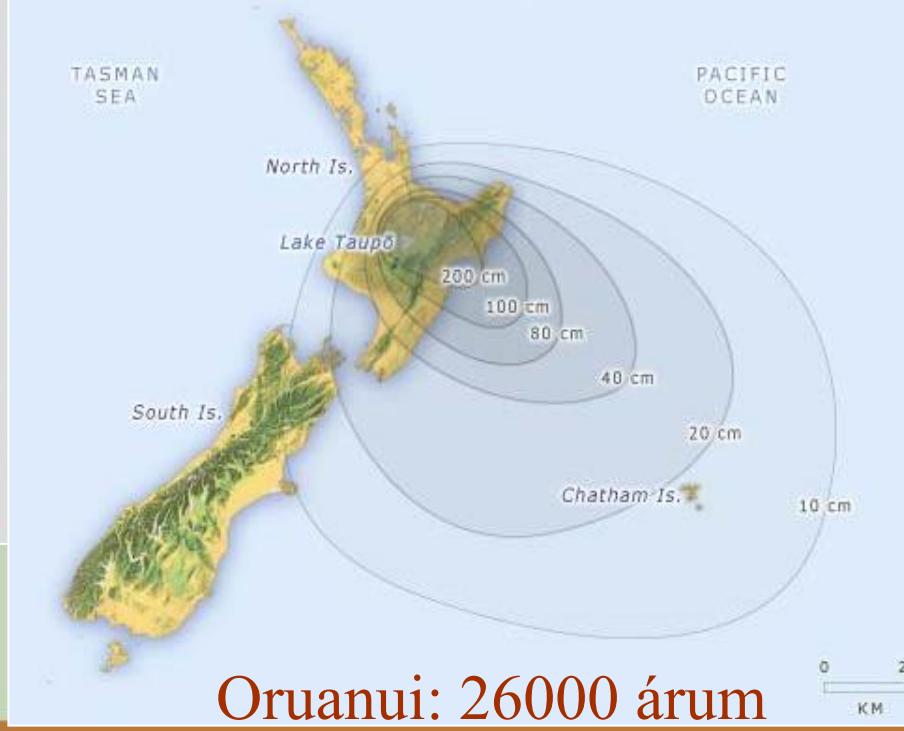
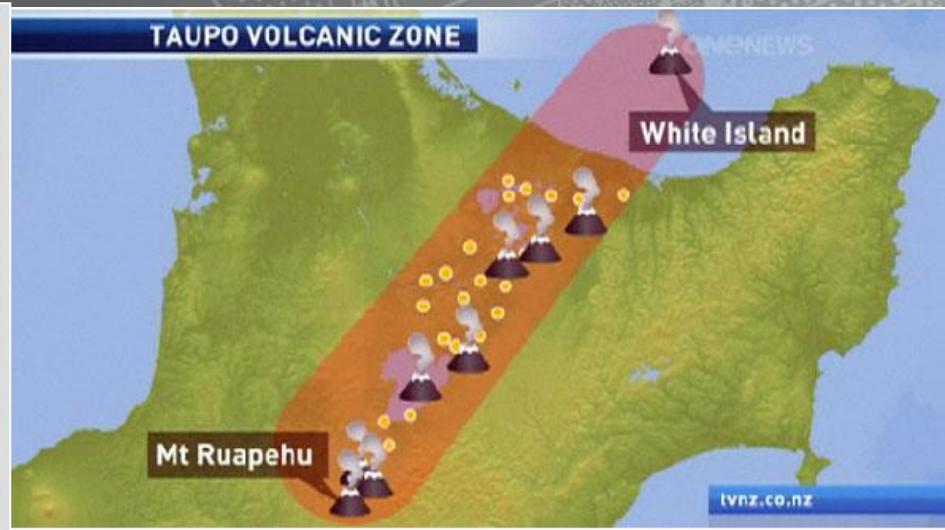


Los Chocoyos ignimbrite

Nýja Sjáland



Kort af Nýja Sjálandi



Oruanui: 26000 árum

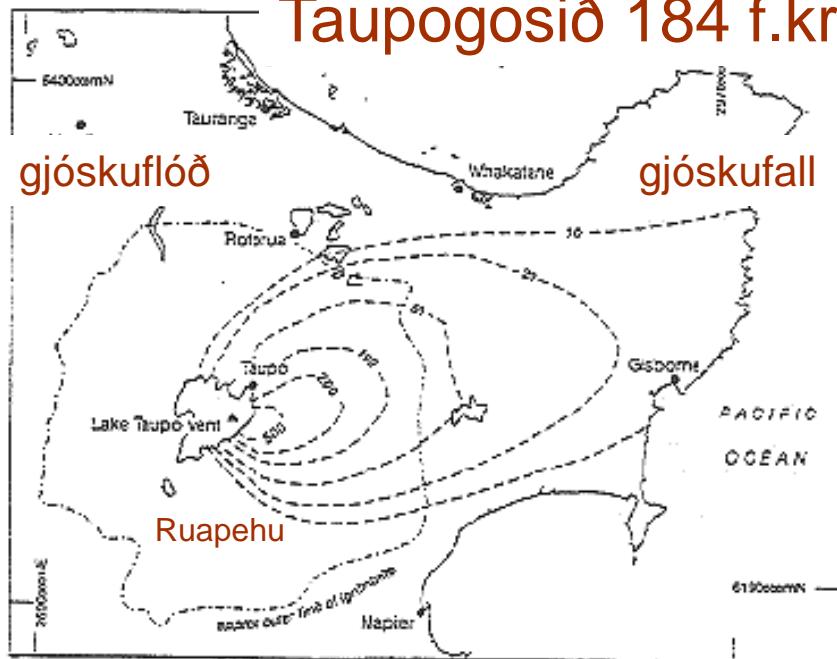


Maori hefðbundnar móttökur

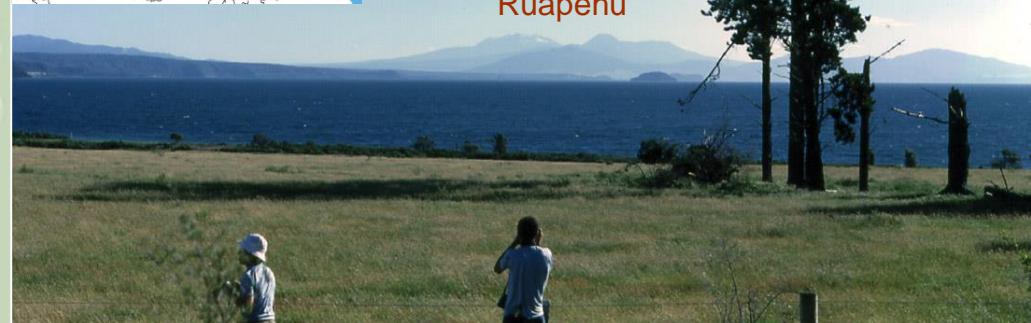
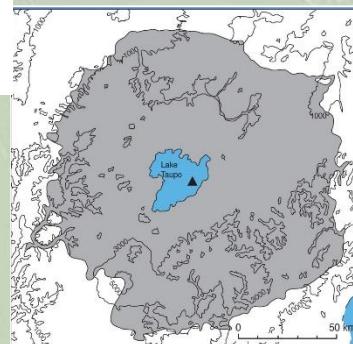
<https://www.youtube.com/watch?v=BI851yJUQQw>



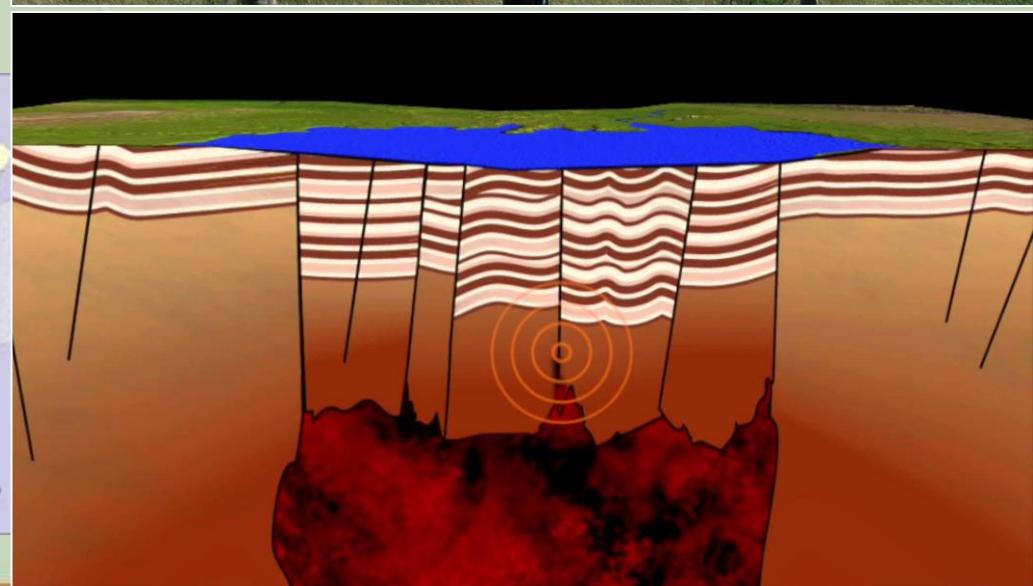
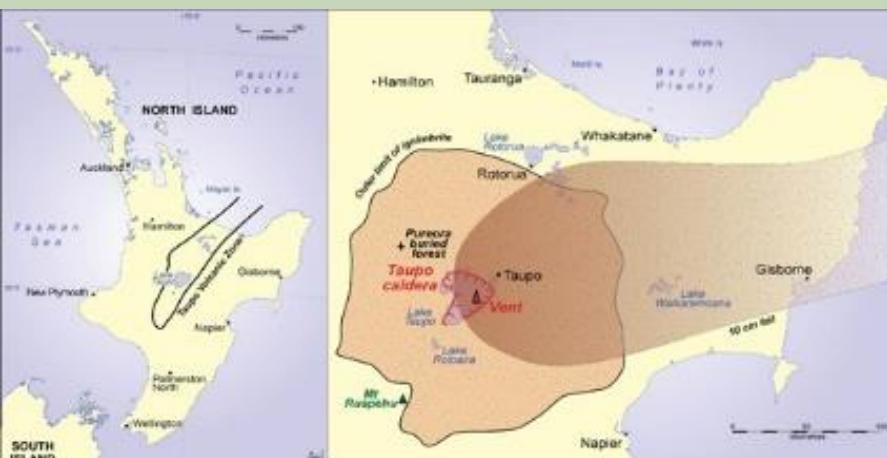
Taupogosið 184 f.kr.

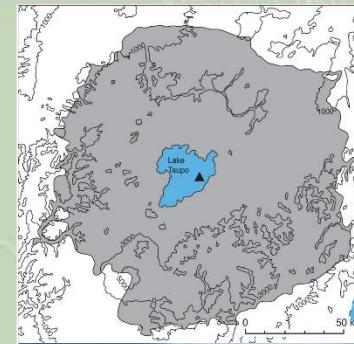


Taupo eldfjallið



Ruapehu



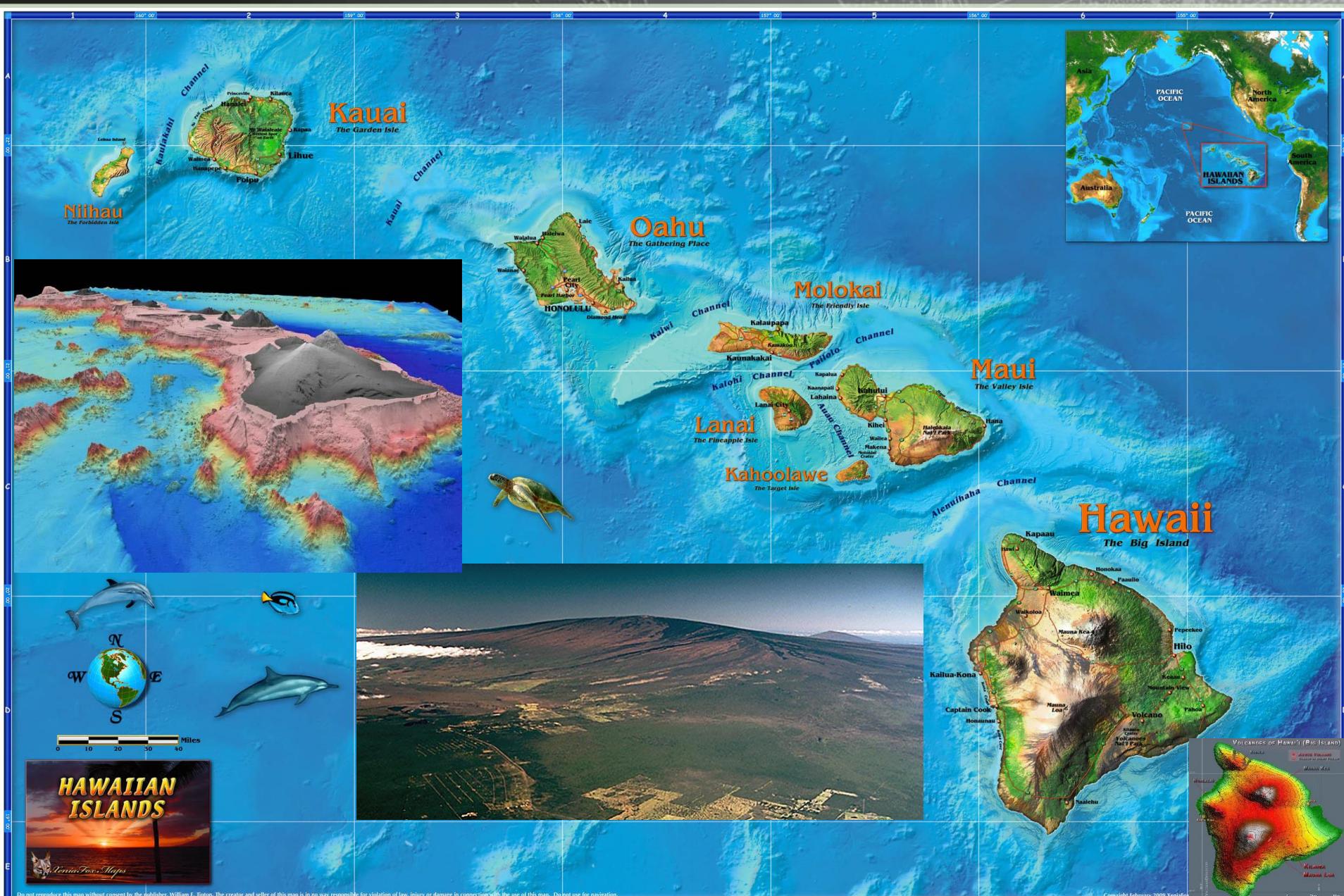


Taupo eldfjallið



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Hawaii



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WALKER



Gordon MacDonald Chair of Volcanology
University of Hawaii (1980-1996)

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Hawaii



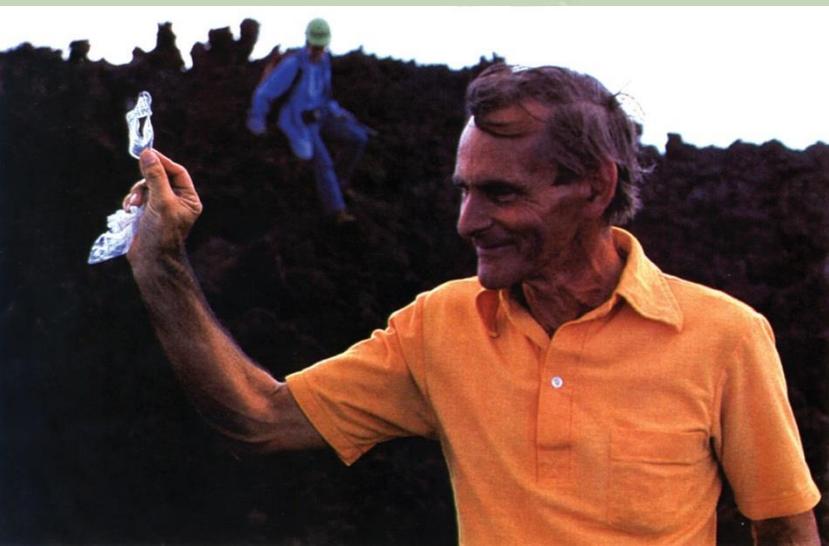
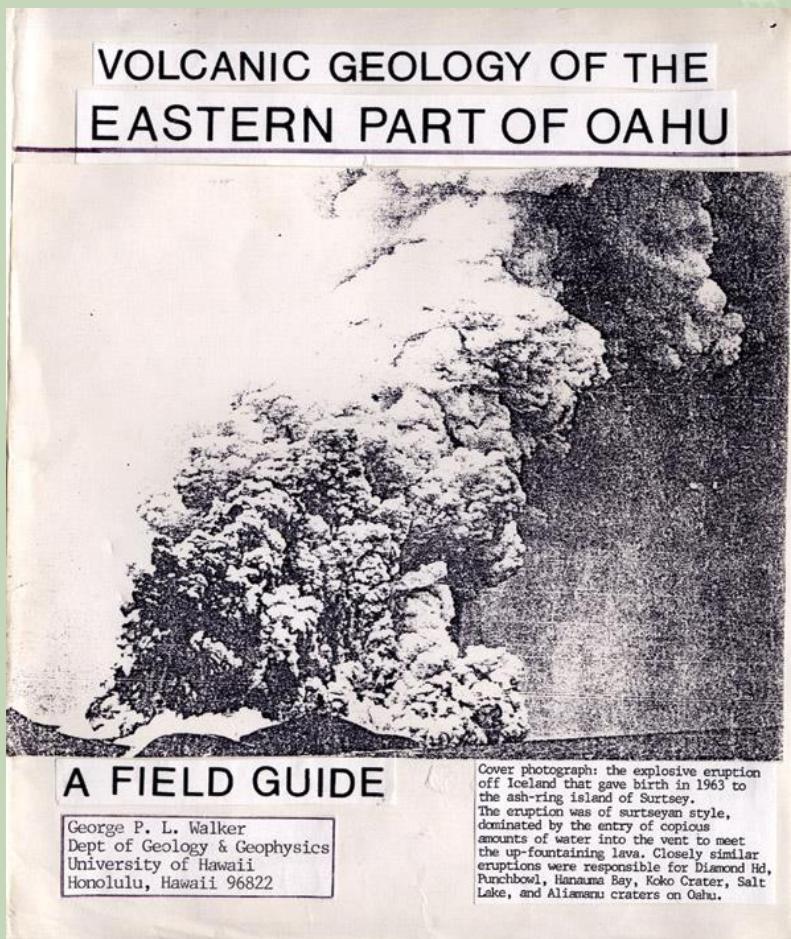
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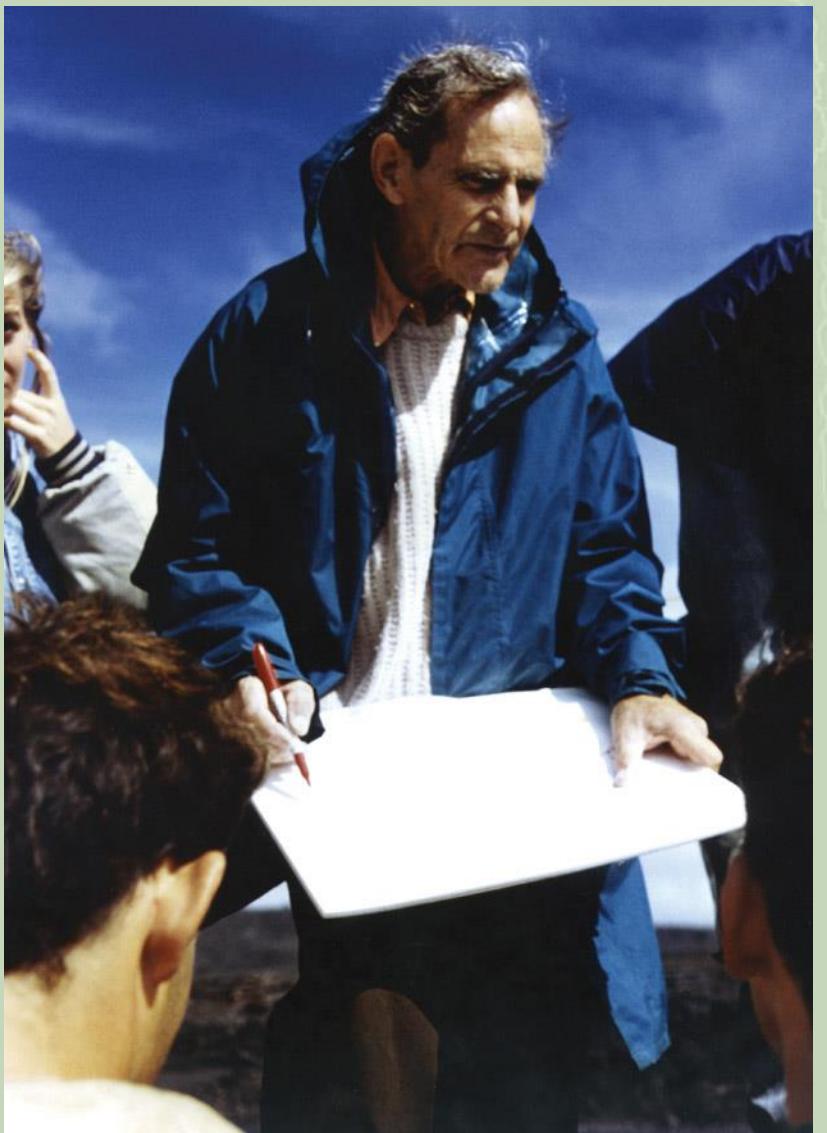
GEORGE PATRICK LEONARD WALKER

Hawaii

• George as an educator



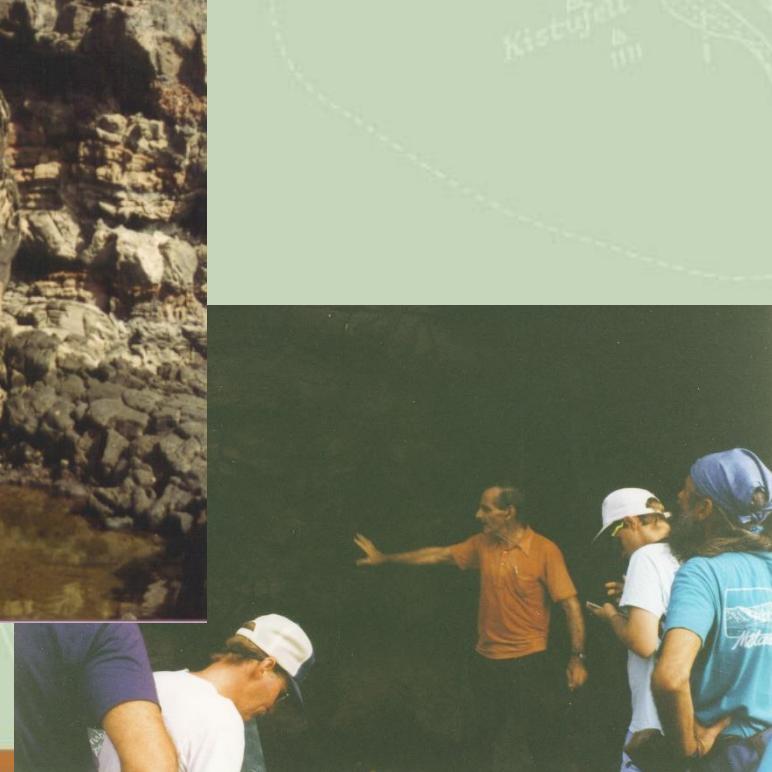
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WALKER



Hawaii

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Hawaii



REPRESENTATION OF LAVA FLOWS

(a) different ages : 16 age periods can be distinguished, as below

1. levee walls / lava channels

2. lava tunnels and flow-unit pyramids where lava has leaked out from tunnels

3. aa flows

Suggest :

- a. use Rapidograph 0.4 throughout
- b. have same spacing of ornament for all "historic" lava flows, and a more open spacing for "prehistoric" flows

4. pahoehoe flows

Suggest :

- a. use Rapidograph 0.4 throughout
- b. have same spacing of ornament for all "historic" lava flows, and a more open spacing for "prehistoric" flows

(b) height of flow front : 3 grades suggested — 1 mm, 2 mm and 3 mm hatching

e.g. 1... < 5 m high
2... 5-10 m high
3... > 10 m high

REPRESENTATION OF PYROCLASTIC FEATURES

(a) Scoria cones :

1. by Rapidograph 0.4

(b) pyroclastic fall deposits : can be conveniently denoted by dot stipple

Suggest distinguish different thicknesses thus :

1. particularly thick and coarse (Rapidograph 0.8)
2. > 1 m
3. < 1 m but more or less continuous cover
4. < 1 m, scattered patches only

These stiples can be overprinted successfully on lava flows, etc

Probably unnecessary to stipple scoria cones.

(c) spatter rings :

suggested representation
Rapidograph 0.4

(d) craters :

Suggest wedge-shaped hatching to distinguish from lava flow fronts

Rapidograph 0.4

(e) regional changes of slope (e.g. at edge of caldera)

Rapidograph 0.4
lines thinning towards down-slope side

built up area }
road }
railway }
river or river course }
Rapidograph 0.2
Rapidograph 0.4
#6 analyzed sample Letraset 258
Important town Letraset 266
24 pt
date of lava Blk BOE 6
24 pt
petrology of lava Letraset 257
letters 18 pt
Letraset 258
numbers 12 pt

pyroclastic cover
1 km grid lines Rapidograph 0.2

These proposed methods for the representation of volcanic features on black and white maps of Etna are intended as a basis for discussion. G.P.L.Walker, 1975

GEORGE PATRICK LEONARD WALKER

Hawaii



Fig. 29. George contributed considerably to the understanding of lava flow inflation, both localized at tumuli, and generalized within entire flow fields. Here, George examines one of his favourite tumuli on the floor of Kilauea caldera. He particularly liked this tumulus because the pahoehoe ropes (to the right of his hand) indicate that the lava surface had to have been emplaced before inflation occurred. Otherwise the ropes would indicate that lava had flowed uphill. Photo by M. Yoshioka.

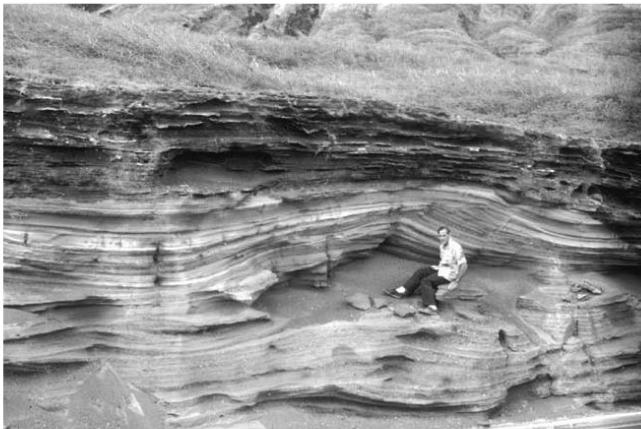
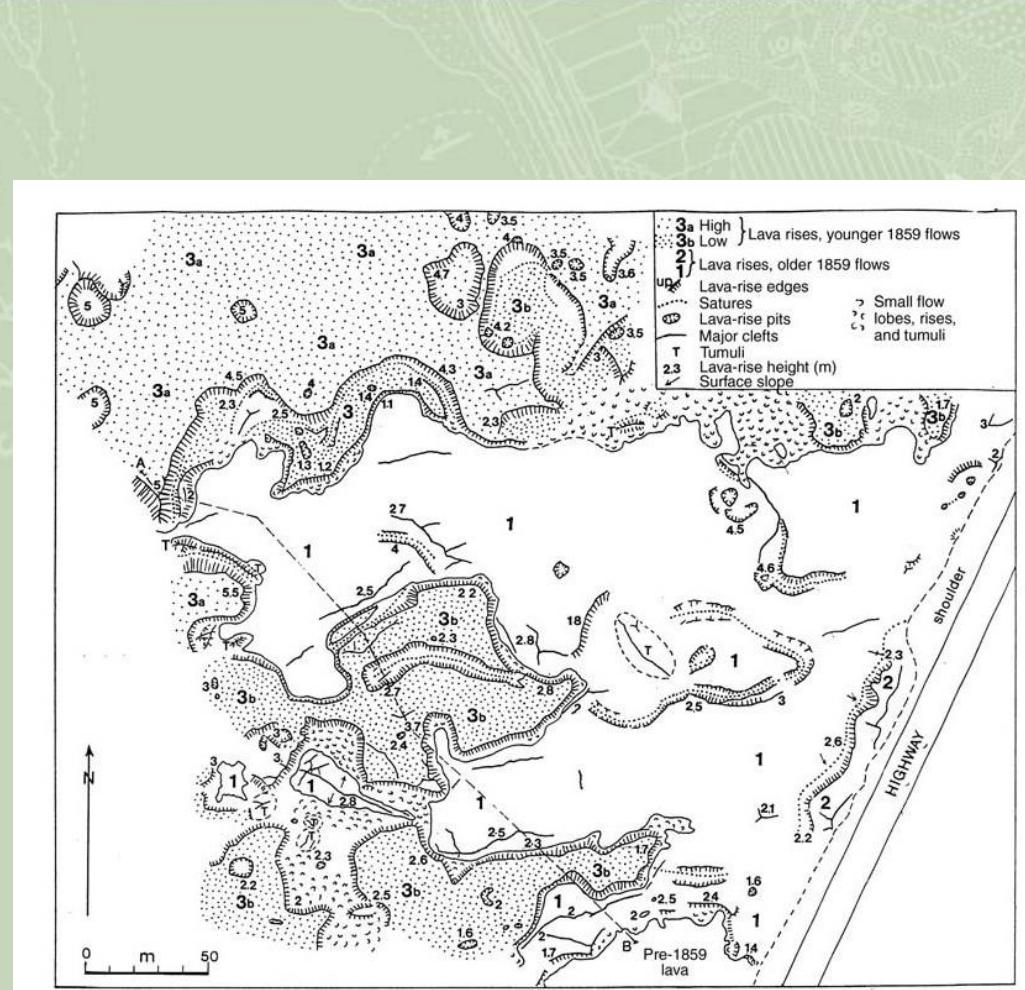
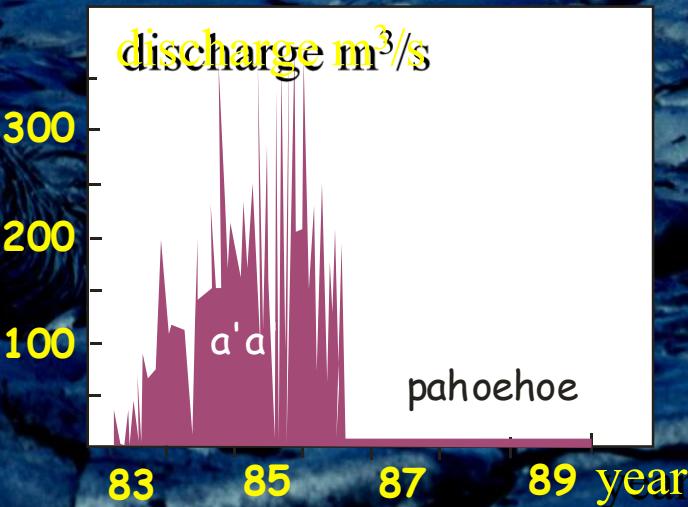


Fig. 30. Not all Hawaiian volcanology is effusive. While at the University of Hawaii, George continued his study of explosive volcanism, both within the state and elsewhere. This work included detailed mapping of the Keanaakoi ash deposit (Kilauea) with visiting scholar Jocelyn McPhie, as well as studies of violent Strombolian deposits in Mexico, littoral deposits in Hawaii and large silicic fall deposits in New Zealand, all with Zinzuni Jurado-Chichay, his last official graduate student. Here, George is perched on a crumbly outcrop of dune-bedded surge deposits above a busy highway along the Koko rift, Oahu. Notably, he is wearing an aloha shirt rather than his typical orange, tan or yellow polo shirt. Photo by J. McPhie.

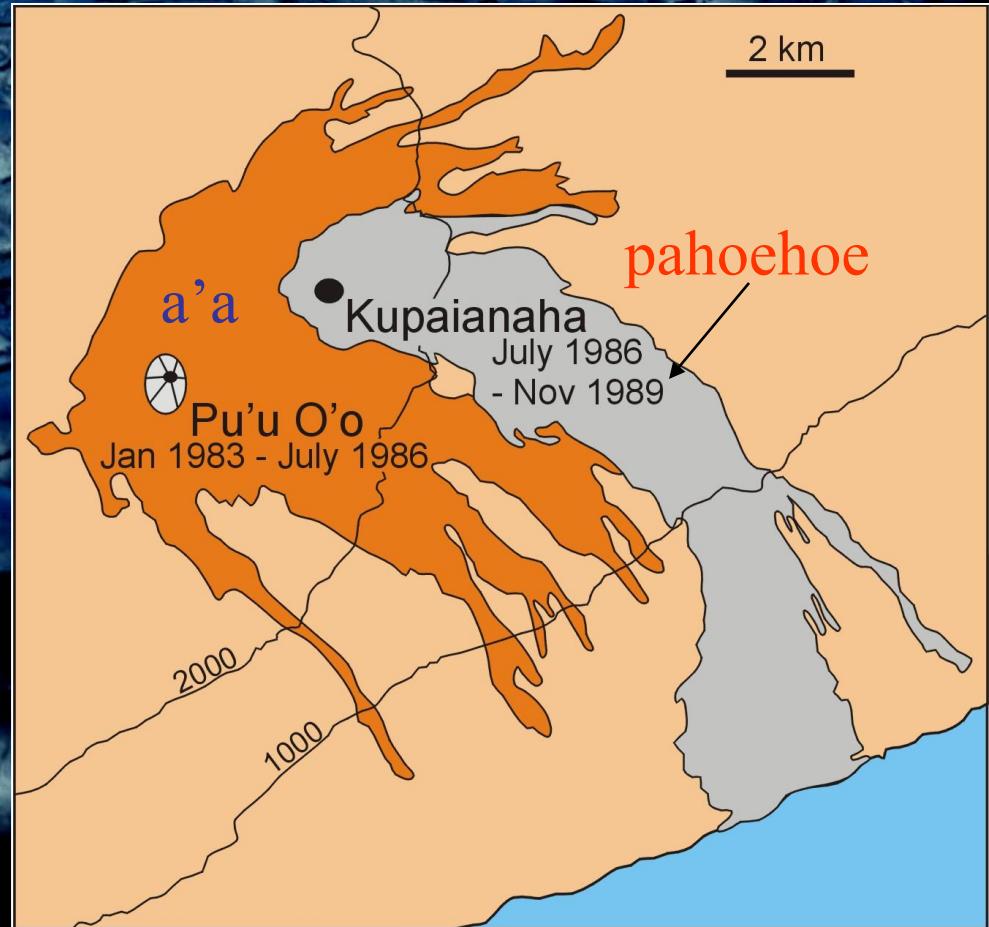


Insulated vs. Rapid Flow Emplacement



A'a flows

high discharge,
thermally inefficient
short flow lengths



Pahoehoe flows

low discharge, insulated emplacement
efficient mode for forming long lava flows

GEORGE PATRICK LEONARD WALKER

• Awards and Fellowships



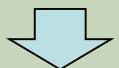
GEORGE PATRICK LEONARD WALKER

• Walker ví sindafjölskyldan

Stór og inniheldur marga öfluga ví sindamenn og nokkra sem eru fremstir meðal jafningja.

Hér er einn fjölskyldu armurinn

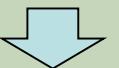
George GP Walker



Stephen Self



Þorvaldur Þórðarson



Robert Askew



- Walker Prize (IAVCEI)

Verðlaun fyrir tvö unga vísindamenn
(innan 3 ára frá doktorsgráðu)

Síðasti verðlaunahafi:
Anja Schmidt –
unnið að rannsóknum á veðurfars og
umhverfis áhrifum Skaftárelsta og
Nornaelda

