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80-796

EXPLANATION

SYMBOLS FOR ROCK UNITS--The Puna Formation comprises most of the map area. It is subdivided in three ways--by age, by morphology/lithology, and by morphologic assemblage--each type of subdivision being indicated by a separate code. Age groups are designated by Arabic numerals, assemblage types by capital letters, and morphologic/lithologic types by lower-case letters, as indicated below. Any of the designations may be omitted for a given unit. The year (A.D.) of eruption may be given for a historic unit.

Examples: 1@aa 1960 — aa flow erupted in A.D. 1960 from a localized pyroclastic vent, accompanied by surface-fed pahoehoe flows

4?ps — surface-fed pahoehoe possibly erupted during the Seventeenth Century A.D.

9pt? — lava flow older than 1500 years before present that may consist of tube-fed pahoehoe

The Ka'u Formation is subdivided by age and morphology only; assemblage designations are omitted. The Pahala and Hilina Formations have limited exposure and are not subdivided

Age groups

1	Twentieth Century A.D.
2	Nineteenth Century A.D.
3	Eighteenth Century A.D.
4	Seventeenth Century A.D.
5	350-500 years B.P.
6	500-750 years B.P. (younger rocks)
6'	500-750 years B.P. (older rocks)
7	750-1000 years B.P.
8	1000-1500 years B.P.
9	Older than 1500 years B.P.

Morphologic assemblages

A	Open fissure and/or spatter rampart with surface-fed pahoehoe and/or aa
B	Localised pyroclastic vent. Surface-fed pahoehoe with or without aa and/or spatter ramparts
C	Small lava shield with surface-fed pahoehoe, tube-fed pahoehoe, and aa, with or without pyroclastic deposits
D	Large lava shield with predominance of tube-fed pahoehoe and minor proportions of surface-fed pahoehoe and aa
E	Extensive ash deposits, commonly associated with a crater or caldera

Morphologic/lithologic types

ps	Surface-fed pahoehoe
pt	Tube-fed pahoehoe
aa	Aa
p	Pyroclastics, undifferentiated
sr	Spatter rampart
sc	Spatter cone
cc	Cinder cone
pl	Pumice layer
tc	Tuff cone
a	Ash deposit
lc	Littoral cone
b	Beach
sd	Sand dunes
al	Alluvium
tfs	Talus, fanglomerate, and sheetwash

Miscellaneous symbols

KF	Ka'u Formation
PF	Pahala Formation
HF	Hilina Formation
( )	Buried unit
	Non-contiguous outcrops of the same unit

SYMBOLS FOR MORPHOLOGIC FEATURES

- Contact--Dashed where gradational or approximate, dotted where buried. Relative age indicated by Y (young) and O (old)
- Fissure--Cross-hatched where lava was emitted, dashed where uncertain or inferred
- Dip-slip fault--Ball on downthrown side, dashed where uncertain
- Buried dip-slip fault--Ball on downthrown side, dashed were uncertain
- Buried strike-slip fault--Arrows show sense of displacement, dashing indicates uncertainty
- Buried rim of crater or caldera, dashed where uncertain or inferred
- Lava channel, showing flow direction
- Lava tube, showing flow direction
- Lava-subsidence terrace of enclosed lava pond
- Lava levee of perched lava pond

SYMBOLS FOR CHRONOLOGY COLLECTION SITES

- ● W-3800 — ^{14}C date only, with no paleomagnetic samples--Code is the laboratory identification number
- ■ 88847, W-3811 — Paleomagnetic site of this study at a ^{14}C collection site or on a flow of otherwise known age--Codes are sample identification numbers
- □ — Paleomagnetic site from previous study on historic lava flow
- ▲ 88313 — Paleomagnetic site on flow of otherwise unknown age

MAJOR STRATIGRAPHIC UNITS

Geologic age	Mauna Loa	Kilauea
Holocene	Ka'u Formation	Puna Formation
Pleistocene	Pahala Formation	Pahala Formation
	Kahuku Formation	Hilina Formation

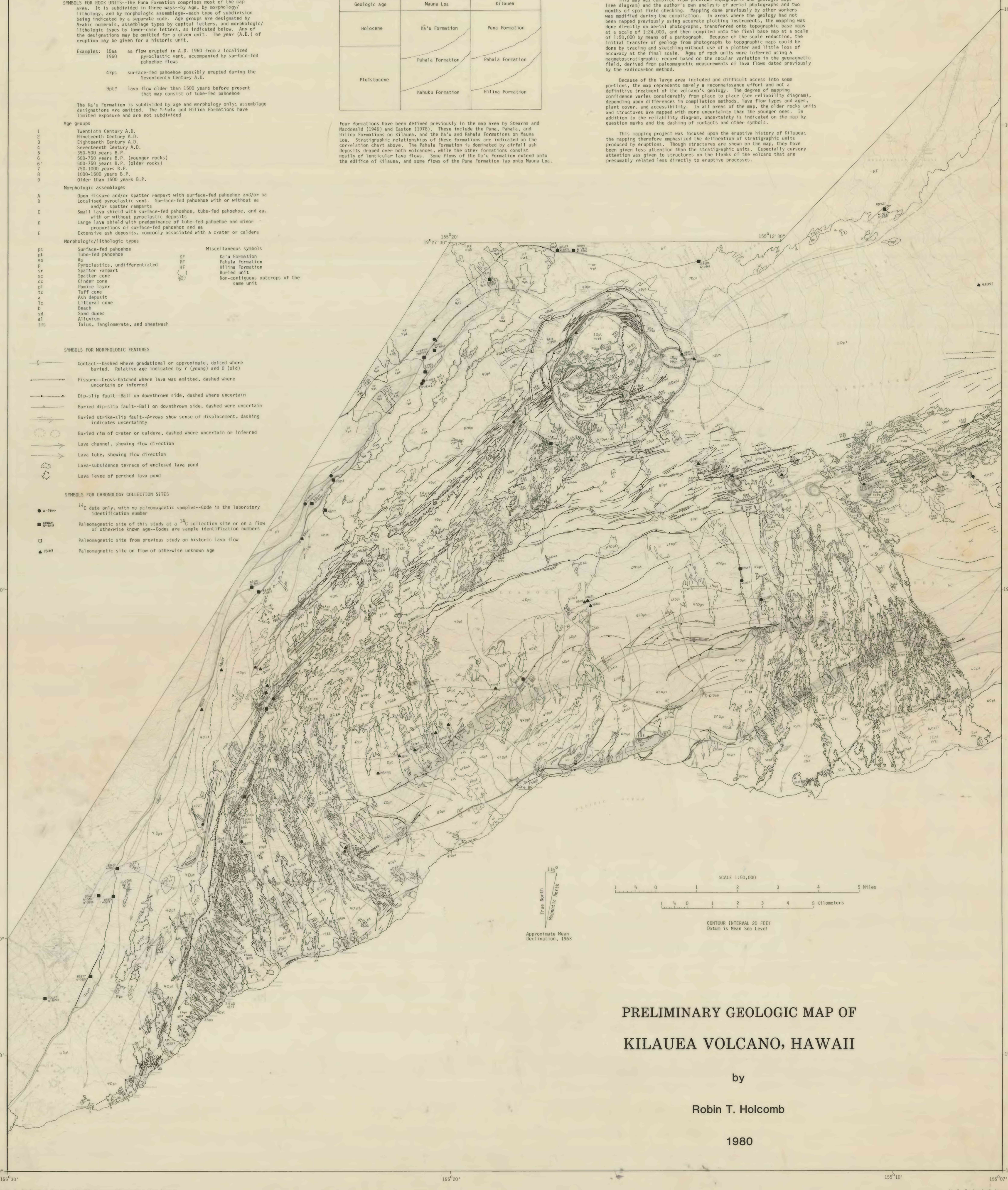
Four formations have been defined previously in the map area by Stearns and Macdonald (1946) and Easton (1978). These include the Puna, Pahala, and Hilina Formations on Kilauea, and the Ka'u and Pahala Formations on Mauna Loa. Stratigraphic relationships of these formations are indicated on the correlation chart above. The Pahala Formation is dominated by airfall ash deposits draped over both volcanoes, while the other formations consist mostly of lenticular lava flows. Some flows of the Ka'u Formation extend onto the edifice of Kilauea, and some flows of the Puna Formation lap onto Mauna Loa.

MAPPING METHODS

This map was compiled from previous topographic and geologic maps (see diagram) and the author's own analysis of aerial photographs and two months of spot field checking. Mapping done previously by other workers was modified during the compilation. In areas where the geology had not been mapped previously using accurate plotting instruments, the mapping was done directly on aerial photographs, transferred onto topographic base maps at a scale of 1:24,000, and then compiled onto the final base map at a scale of 1:50,000 by means of a pantograph. Because of the scale reduction, the initial transfer of geology from photographs to topographic maps could be done by tracing and sketching without use of a plotter and little loss of accuracy at the final scale. Ages of rock units were inferred using a magnetostratigraphic record based on the secular variation in the geomagnetic field, derived from paleomagnetic measurements of lava flows dated previously by the radiocarbon method.

Because of the large area included and difficult access into some portions, the map represents merely a reconnaissance effort and not a definitive treatment of the volcano's geology. The degree of mapping confidence varies considerably from place to place (see reliability diagram), depending upon differences in compilation methods, lava flow types and ages, plant cover, and accessibility. In all areas of the map, the older rocks units and structures are mapped with more uncertainty than the younger ones. In addition to the reliability diagram, uncertainty is indicated on the map by question marks and the dashing of contacts and other symbols.

This mapping project was focused upon the eruptive history of Kilauea; the mapping therefore emphasized the delineation of stratigraphic units produced by eruptions. Though structures are shown on the map, they have been given less attention than the stratigraphic units. Especially cursory attention was given to structures on the flanks of the volcano that are presumably related less directly to eruptive processes.



PRELIMINARY GEOLOGIC MAP OF KILAUEA VOLCANO, HAWAII

by

Robin T. Holcomb

1980

Base from U. S. Geological Survey 1:24,000 topographic series: Kau Desert, 1963; Kilauea Crater, 1963; Makaopuhi Crater, 1963; Naliikakani Point, 1963; Pahala, 1967; Puu Makaala, 1963; Volcano, 1963; and Wood Valley, 1967

Geology mapped from aerial photographs and field checked, 1977; revised, 1980

U. S. Geological Survey
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This report is preliminary and has not been edited or reviewed for conformity with Geological Survey Standards and nomenclature