GEOLOGIC MAP GM-3

State of Washington
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DIVISION OF MINES AND GEOLOGY
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Geologic Map GM-3

GEOLOGY OF THE SIMCOE MOUNTAINS VOLCANIC AREA, WASHINGTON

By

RICHARD A. SHEPPARD

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For sale by Department of Conservation, Olympia, Washington.
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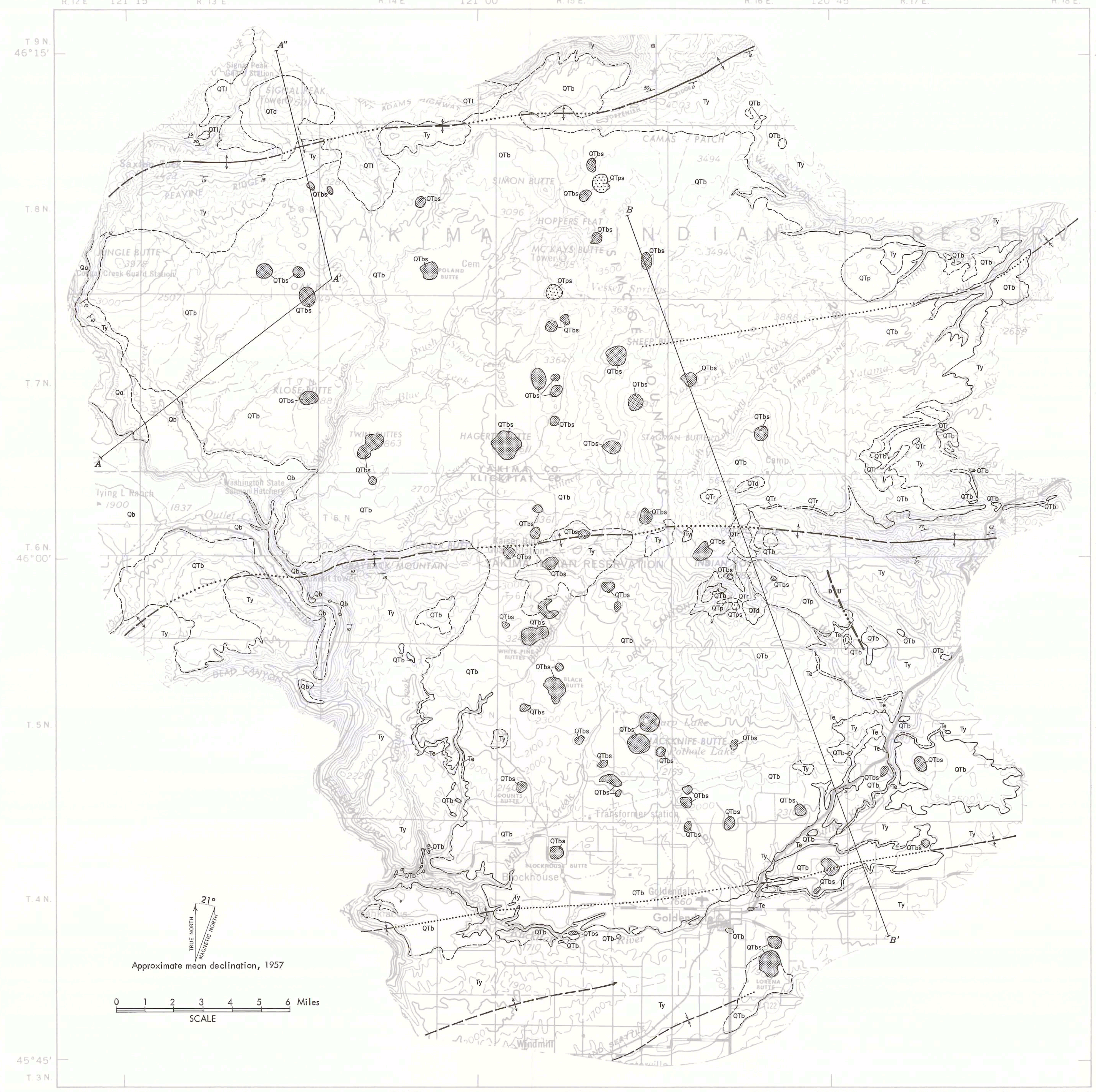
WASHINGTON DEPARTMENT OF CONSERVATION
DIVISION OF MINES AND GEOLOGY

GEOLOGIC MAP
GM-3



Base from Army Map Service Topographic Quadrangles, Yakima and The Dalles, 1:250,000

EXPLANATION

Index map of Washington showing area mapped

Pleistocene to Recent

Qa

Andesite of Mount Adams

Intracanyon flow, light- to dark-gray; upper vesicular part grades downward through platy zone to columnar jointed lower part; hyalopilitic and porphyritic; contains oscillatory zoned plagioclase (An_{50-28}), clinopyroxene (+2V=51°-49°), and hypersthene (-2V=64°-60°), and rare olivine phenocrysts in groundmass of plagioclase (An_{32-28}), clinopyroxene (+2V=13°-4°), opaque minerals, and pink to pale-brown glass. Probably extruded from the southeast flank of Mount Adams

Qb

Olivine basalt of King Mountain

Intracanyon flows, gray, generally 10 to 15 feet thick; holocrystalline, diktytaxitic, and porphyritic; contain plagioclase (An_{58-50}) and olivine (Fo_{78-60}) phenocrysts in groundmass of plagioclase (An_{50-46}), ophitic to subophitic clinopyroxene (+2V=54°-52°), olivine (Fo_{55}), and opaque minerals; glomeroporphyritic olivine common. Extruded from King Mountain, a shield volcano southeast of Mount Adams in T. 7 N., R. 11 E.

Pliocene (?)

QTb QTbs

Olivine basalt of the Simcoe Mountains

QTb, flows, gray, 3 to 40 feet thick; intergranular to diktytaxitic, generally nonporphyritic but contain as much as 15 percent plagioclase (An_{56-43}) and olivine (Fo_{81-60}) phenocrysts in nearly holocrystalline groundmass of plagioclase (An_{49-40}), clinopyroxene (+2V=56°-45°), olivine (Fo_{65-40}), opaque minerals, and apatite; glass content generally less than 2 percent; olivine phenocrysts commonly resorbed and partly altered to iddingsite; rare quartz xenocrysts surrounded by clinopyroxene reaction rim; vesicles locally lined with calcite and (or) hyalite. Extruded from northwest-trending zone of shield volcanoes and local vents

QTbs, scoria cones; generally 150 to 300 feet high; mainly red to dark-gray, poorly sorted, generally unconsolidated, stratified scoria; some spindle-shaped bombs. Many in southern part of area aligned along northwest-trending lines, suggesting fault control. May be as young as Recent

QTl

Olivine basalt of Lincoln Plateau

Flows, gray, generally 10 to 20 feet thick; holocrystalline, intergranular to diktytaxitic, and porphyritic; contain olivine (Fo_{80-65}) phenocrysts in groundmass of plagioclase (An_{48-40}), clinopyroxene (+2V=54°-50°), olivine (Fo_{60}), opaque minerals, and apatite; glomeroporphyritic clots of olivine phenocrysts common; olivine phenocrysts commonly resorbed and partly altered to iddingsite. Erupted from a shield volcano on Lincoln Plateau, north of area

QTp QTps

Pyroxene-olivine basalt

QTp, flows, gray, 20 to 30 feet thick, holocrystalline, intergranular to pilotaxitic, and porphyritic; contain plagioclase (An_{58-38}), olivine (Fo_{81-60}), clinopyroxene (+2V=56°-49°), and rare hypersthene phenocrysts in groundmass of plagioclase (An_{46-36}), clinopyroxene (+2V=54°-49°), ferriferous olivine, and opaque minerals; hypersthene resorbed and surrounded by granular clinopyroxene. Erupted from local vents

QTps, scoria cones; mainly red to dark-gray, poorly sorted generally unconsolidated, stratified scoria; contains plagioclase, olivine, and clinopyroxene phenocrysts. May be as young as Recent

QTa

Andesite of Signal Peak

Flows, dark-gray, 10 to 30 feet thick; intersertal and porphyritic; contain oscillatory zoned plagioclase (An_{50-32}), olivine (Fo_{70-50}), hypersthene (-2V=55°-50°), and clinopyroxene (+2V=50°) phenocrysts in groundmass of plagioclase (An_{36-28}), clinopyroxene (pigeonite and augite), opaque minerals, apatite, and pale-brown glass; glass content generally 10 to 20 percent; reaction rims of clinopyroxene surround olivine and hypersthene phenocrysts; glomeroporphyritic plagioclase common. Extruded from Signal Peak, a steep-sided volcano in sec. 36, T. 9 N., R. 13 E.

QTd

Dacite

Domes, light- to dark-gray, poorly exposed; flow banded, hyalopilitic, and porphyritic; contain oscillatory zoned plagioclase (An_{44-27}), olivine (Fo_{46}), clinopyroxene (+2V=51°-48°), hypersthene (-2V=72°-53°), oxyhornblende, biotite, and rare sanidine phenocrysts in groundmass of plagioclase (An_{30-26}), clinopyroxene (pigeonite(?)), opaque minerals, and pale-brown glass; olivine and hypersthene rimmed by granular clinopyroxene; oxyhornblende and biotite rimmed or entirely replaced by opaque minerals; glass content generally 30 to 50 percent

QTr

Rhyolite

Flows and dome (?); white to dark-gray, poorly exposed; flow banded and spherulitic; generally contain less than 3 percent plagioclase (An_{22-18}), sanidine, quartz, and clinopyroxene (+2V=55°-53°) phenocrysts in glassy matrix containing abundant flow-aligned crystallites; refractive index of glass ranges from 1.501 to 1.492. Erupted from local vents in central and east-central parts of area

UNCONFORMITY

Pliocene

Te

Ellensburg Formation

Mainly gravel and sand of fluvial origin, light-yellow to yellowish-brown, poorly sorted, poorly consolidated; sand, fine- to coarse-grained, micaceous, locally crossbedded; gravel consists mostly of rounded pebbles and cobbles of quartzite in micaceous sand matrix; gravels in upper part of formation between Bowman and Canyon Creeks locally consist mostly of greenish-gray and light-purple porphyritic dacite. Top of formation eroded, maximum exposed thickness 250 feet

Miocene and Pliocene

Ty

Yakima Basalt

Flows, black but weather brown to brownish gray, generally 70 to 150 feet thick; local interlayers of diatomite and tuffaceous sandstone; two-tier jointing; upper part vesicular grading upward to scoriaceous top; intersertal and generally nonporphyritic; contain plagioclase (An_{50}), clinopyroxene (+2V=44°-38°), opaque minerals, and little or no olivine (Fo_{80}); glass content 10 to 30 percent, locally charged with clinopyroxene, opaque minerals, and apatite; chlorophaeite or its alteration products generally fill interstices. Base of formation not exposed, total thickness unknown

Contact
Dashed where approximate

U / D
Fault
Dashed where approximate; dotted where concealed; U, upthrown side; D, downthrown side

20
Strike and dip of beds and flows

Horizontal flows

Anticline
Showing trace of axial plane. Dashed where approximate; dotted where concealed.

Syncline
Showing trace of axial plane and plunge of axis. Dashed where approximate; dotted where concealed

SUMMARY

The oldest formation exposed in the area is the Yakima Basalt of Miocene and Pliocene age. This vast series of plateau basalts covers a large portion of eastern Washington, northeastern Oregon, and northwestern Idaho. Following the extrusion of the Yakima Basalt, quartzite-bearing gravels of the Ellensburg Formation were deposited by southwestward flowing streams. North of the mapped area, the quartzite-bearing gravels were succeeded by a thick accumulation of rhyodacitic or andesitic debris that was stream-transported from volcanic centers in the Cascade Mountains (Waters, 1961, p. 53-55).

The east-west anticlinal ridges such as Peavine-Toppenish Ridge and the Horse Heaven Hills resulted from a regional deformation contemporaneous with deposition of the upper part of the Ellensburg Formation (Waters, 1955, p. 674-675). Erosion subsequently removed most of the Ellensburg Formation from the anticlines prior to the eruption of olivine basalt of the Simcoe Mountains.

There appears to be little regularity in the sequence of eruption of the various rock types in the Simcoe Mountains volcanic area. Olivine basalt was erupted throughout the volcanic history. Much of the olivine basalt was erupted from a northwest-trending line of shield volcanoes between the westward extension of the Horse Heaven Hills and Toppenish Ridge and became localized in the synclinal valley between the two ridges. Olivine basalt also was erupted contemporaneously from a low shield volcano on the Lincoln Plateau north of the mapped area.

Pyroxene-olivine basalt and rhyolite are contemporaneous with the olivine basalt, but andesite of Signal Peak and dacite probably postdate all of the basalt except that of the parasitic scoria cones. The building of numerous basaltic scoria cones marked the closing phase of volcanism. Many of the cones, particularly those in the southern part of the area, show a linear arrangement, suggesting fault control.

Intracanyon flows of olivine basalt from King Mountain, a shield volcano southeast of Mount Adams, flowed down the Klickitat Canyon but were later eroded out by the Klickitat River. A single intracanyon andesite flow from Mount Adams then partially filled the new canyon.

There is no direct evidence to indicate that glaciers ever occupied any part of the Simcoe Mountains; however, both Satus Creek and Devils Canyon head in amphitheaters. Possibly, small alpine glaciers once occupied these amphitheaters.

REFERENCES

Waters, A. C., 1955, Geomorphology of south-central Washington, illustrated by the Yakima East quadrangle: Geol. Soc. America Bull., v. 66, p. 663-684.

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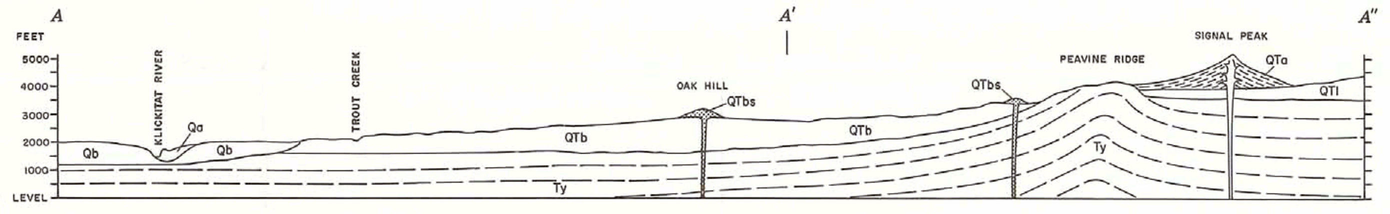
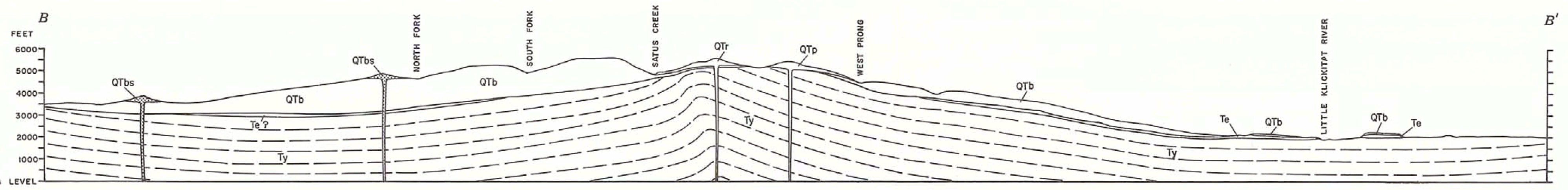


GEOLOGIC SECTION ALONG LINE A-A'-A"



GEOLOGIC SECTION ALONG LINE B-B'

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