UNITED STATES

DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

TECHNICAL LETTER NASA-27

GEOLOGIC EVALUATION OF RADAR IMAGERY OF FLIGHTS 100-B and 100-C ACROSS THE CENTRAL SIERRA NEVADA, CALIFORNIA*

by

Paul C. Batemann**

May 1966

These data are preliminary and should not be quoted without permission

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**U.S. Geological Survey, Menlo Park, California

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The radar imagery here evaluated includes two strips that cross the central Sierra Nevada, which are designated Flights 100-B and 100-C. Flight 100-B was flown close to the 37th parallel of latitude, and the imagery is north of the flight line. Flight 100-C was flown farther north, approximately along lat 37°30'., and the imagery is south of the flight line. To make the evaluation, the entire length of both strips was carefully examined, and three areas from the like imagery were selected to illustrate the kinds of geologic features that can be identified from the imagery. The depolarized component is weaker than the like image and shows no geological features not more readily visible on the like image; consequently, it was given little attention.

AREA 1

Location. --West end of Flight 100-C; approximately between lat 37°15' and 37°30' N. and long 119°40' and 119°50'W.; Bass Lake and Mariposa 15-minute quadrangles.

Geologic reference.--Unpublished and incomplete map of the Mariposa 30-minute quadrangle made in 1916 by J. Fred Hunter. This map is No. 5241-D, Field Records file, U.S. Geological Survey, Geologic Division, Denver, Colorado. It was used in the preparation of plate 1 of U.S. Geological Survey Prof. Paper 414-D, The Sierra Nevada batholith--a synthesis of recent work across the central part, by Bateman and others, 1963.

Interpretation.--A roof remnant of schistose rocks that extends northwestward across this area is shown in the radar imagery by a coarser texture in the drainage pattern than is present in the enclosing granitic rocks. The boundary of the pendant as delineated on the imagery agrees well with the boundary mapped by J. Fred Hunter. Lineaments within the pendant and parallel to its long axis probably reflect internal structure. Pervasive short east-west lineaments in the enclosing granitic rock, which are most conspicuous northwest of the pendant, are probably joints.

Area 2

Location.--East end of Flight 100-C; approximately between lat 37°15' and 37°25' N. and long 118°30' and 118°45' W., Mount Tom 15-minute quadrangle.

Geologic reference.--Bateman, P.C., 1965, Geology and tungsten mineralization of the Bishop district, California: U.S. Geol. Survey Prof. Paper 470, pl. 2.

Interpretation.--This area includes part of the eastern escarpment of the Sierra Nevada near Bishop. Bedrock, moraines, alluvial fans, valley alluvium, and physiographically expressed faults and joints can be delineated. The topographically lower, finer grained alluvial deposits have a darker shade than the alluvial deposits in fans and raised terrances, presumably because of a higher near-surface water content. Metamorphic rocks and granitic rocks of different colors, which can be readily distinguished from one another on conventional photographs cannot be distinguished on the radar imagery.

Area 3

Location.--East end of Flight 100-B; approximately between lat 37°00' and 37°10' N. and long 118°23' and 118°30' W.; Waucoba Mountain and Big Pine 15-minute quadrangles.

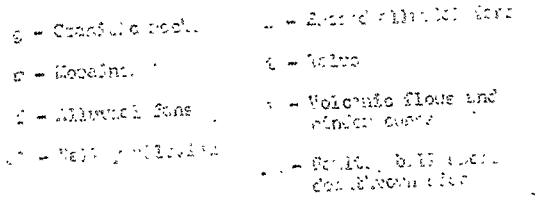
Geologic references.--Bateman, P. C., 1965, Geology and tungsten mineralization of the Bishop district, California: U.S. Geol. Survey Prof. Paper 470, pl. 4; Nelson, C. A., 196_, Geologic map of the Waucoba Mountain quadrangle: U.S. Geol. Survey Geologic Map GQ-528 (In press).

Interpretation.--Bedrock, alluvial fans with constructional surfaces, uplifted and dissected alluvial fans and lake beds, moraines, talus, and volcanic rocks can be delineated. Cinder cones show clearly, but lava flows can be distinguished from alluvial fans only with difficulty by closely examining the texture of the surface. Topographically expressed faults are apparent.

Evaluation.--Geologic features than can be distinguished on the radar imagery are those that have distinctive topographic expression. The topographic expression may result from volcanism or faulting or from lithologic control of erosion. In alluvial areas, deposits with relatively high near-surface water content appear darker than deposits with lower water content. Radar imagery would be more useful in the western Sierra Nevada than in the eastern part of the range because the radar sees beneath the vegetation that covers much of the western Sierra Nevada. In the eastern Sierra Nevada and in the Owens Valley and the desert ranges east of Owens Valley, where bare-rock outcrops prevail, the radar imagery is less useful than conventional photography because conventional photography shows color differences, and radar imagery does not.

AREA 1 - Flight 100 B

AREA 2 - Flight 100 B



AREA 3 – Flight 100 C