NEPHELINITIC LAVAS DREDGED FROM THE WESTERN HAWAIIAN RIDGE

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Rocks dredged from a seamount on the western Hawaiian Ridge (29°50'N, 179°37'E) include ankaramite and analcime tephrite from the nephelinitic suite in addition to diabasic alkalic basalt and amphibole-rich trachybasalt. The analcime tephrites have titanaugite with lesser labradorite, very dark glass,titaniferous iron oxides,analcime,and an Fe-Ti rich reddish-brown amphibole. The ankaramites have about 50% augite phenocrysts plus iddingsite pseudomorphing olivine both set in a groundmass of titanaugite,titaniferous iron oxides and dark glass with subordinate analcime,calcite and labradorite. The samples are unusual for the Hawaiian Chain,although other silica deficient lavas such as basanites, basanitoids,nepheline basalts and nepheline-melilite basalts occur on the Hawaiian Islands, particularly Oahu. The Hawaiian silica deficient lavas are post-erosional and normally erupted several million years after the tholeiitic shield building stage. By analogy it is inferred that the seamount evolved through a similar sequence of eruptive events, although the tholeiitic shield was not sampled,possibly due to subsequent mantling by alkalic and nephelinitic eruptions. The mechanisms which cause volcanism to occur in two widely separated periods in the Hawaiian Islands appear to have been operative at least since the formation of the western Hawaiian Ridge. Eruption of the nephelinitic suite may be caused by pressure release associated with lithospheric flexure during an observed change from subsidence to uplift (Moore,1970) as the islands pass over the Hawaiian Arch. This interpretation would imply that a proto-Hawaiian Arch has existed during the formation of virtually the entire Hawaiian Ridge.

HOLOCENE BEHAVIOR OF THE GARLOCK FAULT

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A linear gravel bar deposited during the late Pleistocene highstand of Lake Koehn has been offset about 80 m by left-lateral movement on the Garlock fault. Displacement occurred across a zone about 30 m wide, with no obvious horizontal bending or drag beyond the zone. The segment north of the fault has also been relatively downdropped several meters. Incremental Holocene displacement is shown by similar, but smaller (~½m) vertical displacement of the adjacent and much younger playa surface. A thin layer of tufa deposited near the crest of the bar before it was significantly offset yields a C^{14} age of 11360±160 years BP. The offset and the date produce an average horizontal displacement rate of 7 mm/yr at Koehn Lake during Holocene time.

Comparison of the Garlock fault with the San Jacinto fault suggests possible patterns of Holocene behavior for the Garlock fault. The two faults are grossly similar in length and abundance of well-preserved evidence of recent faulting. Although the average Holocene displacement rate for the Garlock fault is roughly double the 2.5-3 mm/yr rate estimated for the San Jacinto fault, the Garlock has had no historic earthquakes of M6.0 or greater, whereas the San Jacinto fault has had seven earthquakes of M6.0-6.8 since 1899. This comparison suggests that one of the three following behavioral patterns probably applies to the Garlock fault: 1) it is not now accumulating tectonic strain, perhaps like some Middle Eastern faults whose behavior is irregular; 2) accumulating strain is being relieved by aseismic creep; or 3) the Garlock fault typically relieves strain with infrequent (ca. 200-1000 yrs.?) earthquakes of roughly M7.0 or greater. Available evidence favors the third possibility.

GEOTHERMAL ACTIVITY AND CRUSTAL DEFORMATION IN SURPRISE VALLEY - ARE THEY RELATED?

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Both geothermal activity and crustal deformation are observed in tectonically active regions. The Great Basin contains areas of geothermal activity and recently active faults. If it could be shown that ancient shorelines have been defomed by faulting or crustal warping in a geothermal area, then exploration for deformed shorelines might become a useful tool in geothermal exploration. Surprise Valley, in the northwestern corner of th Great Basin, contains a broad geothermal zone and a suite of shorelines as old as Pleistocene extending up to 550 feet above the present bottom of the valley.

An attempt was made to find whether these shorelines have been deformed by warping or movement on the Surprise Valley Fault to the west or a series of smaller en echelon faults separating the Surprise Valley graben from the uplifted Hayes Canyon Range to the east. An altimeter survey, accurate to approximately ± 5', was run on selected shoreline segments the length of the valley. No deformation was found in shorelines either on the graben or on the uplifted block. Thus major tectonic movements seem to have been completed before the present shorelines formed. The geothermal activity may have begun during deformation, but the shorelines are yet more recent.

EARLY TRIASSIC HISTORY OF NORTHEAST NEVADA AND WEST-CENTRAL UTAH

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Zonation of Lower Triassic strata in the eastern Great Basin based on conodonts and ammonites permits reconstruction of the Early Triassic history of the region. The Lower Triassic sequence comprises two major cycles of marine transgression and regression. In the northern Confusion Range, Utah, megapolygonal structures near the base of the sequence are interpreted to mean that a broad marginal marine area under supratidal to high intertidal conditions developed with the initial transgression of west-central Utah. As the transgression encountered increasing relief toward the west in eastern Nevada, chert-pebble conglomerate accumulated in channels and low areas on the unconformity along a north-south trending belt. In southeastern Elko County, Nevada, a maximum paleoslope of 4 to 7 m/km is estimated. The initial transgressive cycle peaked with development of the Meekoceras limestone over much of the eastern Great Basin. Gradual filling of the basin then occurred as fine-grained clastics prograded from the east, resulting in red beds at the northern Confusion Range. Chert-pebble conglomerate developed along the western strandline in the vicinity of the Medicine Range, Nevada. During the Spathian a second transgressive cycle was