VELOCITY ANISOTROPY OF UPPER MANTLE[1]

During the summer of 1966 a joint marine refraction survey was conducted across the Hawaiian arch by the Scripps Institution of Oceanography, the University of Hawaii, Oregon State University, and the University of Wisconsin. Conventional and unique types of refraction profiles were shot to study the directional dependence of velocity or velocity anisotropy of the mantle and the depth configuration of the Mohorovičić discontinuity. A two-dimensional delay time function method was used to study (1) the anisotropy and (2) the delay-time surface. The upper mantle was found to display compressional velocity anisotropy amounting to about 0.6 km/sec difference between the maximum and minimum velocities with the direction of maximum velocity being east-west. The delay time surface suggests that, as expected from earlier work, the mantle is generally shallow along the crest of the arch. The shallowest region occurs near the southeast end of the arch, where it intersects the Molokai fracture zone. The mantle deepens southwest of the crest of the arch as the Hawaiian deep is approached.

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OIL FIELDS, GRAVITY ANOMALIES, AND SURFACE CHEMICAL MANIFESTATIONS—CORRELATIONS, CAUSES, AND EXPLORATION SIGNIFICANCE

(No abstract submitted)

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GRAVITY OF NORTHERN CHANNEL ISLANDS

The northern Channel Islands form a regional gravity high which forms a break in the dominant northwest-southeast gravity pattern south of the islands and the east-west gravity and structural pattern found on the north in the Transverse Ranges province of California. Both northwest-southeast and east-west components are apparent in the gravity and structure on the islands. Thus, the northern Channel Islands lie on the border between Transverse Ranges structure and the northwest-trending structures characteristic of the rest of California.

The complete Bouguer anomaly values across the northern Channel Islands range from 20 to 80 mgal. North of the Santa Cruz Island fault there is little variation in the complete Bouguer anomaly except toward the east across the Anacapa Passage, where the complete Bouguer anomaly decreases sharply. This decrease reflects the deepening of the basement rock under the Santa Barbara Channel.

South of the Santa Cruz Island fault, a continuous gravity pattern extends from the schist exposures on Santa Cruz Island to Point Bennett on San Miguel Island. This continuity in gravity suggests that the basement rock and the Santa Rosa basin also are continuous from the southwestern part of Santa Cruz Island to the western tip of San Miguel Island. The lowest gravity values are found in the Santa Cruz Passage, a fact that indicates that the center of the Santa Rosa basin is between Santa Cruz and Santa Rosa Islands. This gravity low is an extension of the gravity low in the Santa Cruz basin on the south and suggests that the Santa Rosa basin is a northern continuation of the Santa Cruz basin. A gravity high south of San Miguel Island and a high north of Santa Rosa Island give evidence for two possible preexisting source areas, which supplied sediments to the area of San Miguel and Santa Rosa Islands.

Sparker profiles in the Santa Cruz Passage show the presence of a northwest-trending fault along Santa Cruz Canyon, but the continuity of the gravity data across this region shows that this fault is unimportant. A second fault, the Santa Rosa Island fault, cannot be seen on the sparker profiles, nor is it reflected in the complete Bouguer anomaly values over Santa Rosa Island. Therefore, this fault also is insignificant in regional structure. The Santa Cruz Island fault, in contrast, is reflected markedly in the gravity pattern over the island, and may have produced a large amount of lateral offset.

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BOUGUER REDUCTION TECHNIQUE FOR SURFACE SHIP GRAVITY METER DATA

(No abstract submitted)

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APPLICATIONS OF CONTINUOUS REFLECTION PARAMETER DETERMINATION

This processing technique automatically extracts reflection information continuously in space and time from the CDP input data. The reflection parameters are obtained by a systematic search in time and moveout which yield an estimate of arrival time $T_i(X)$, amplitude $A_i(X)$, and moveout $\Delta T_i(X)$ for each depth point. The combination of all the reflector segments for the line forms a reflector segment file consisting of *all* coherent events reflected from the subsurface including primaries, multiples, diffractions, and "false alarms."

Variations in band width and the picking aperture of both time and moveout are investigated in this paper. Land and marine field data are used to illustrate the results.

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SEISMIC RECORD SECTION IN DEPTH

Automatic velocity-determination methods developed in recent years make it possible for the geophysicist to convert seismic information from time coordinates to depth coordinates. In making this conversion it is feasible to account for almost any horizontal velocity gradient and, under favorable conditions, to migrate the data and still have the results in the form of a record section. Although these procedures offer possibilities for saving labor and for improving interpretational insight, they should be used with the understanding that interpretation is involved and the results should be reviewed as new data are added.

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SEARCHING FOR STRATIGRAPHIC TRAPS

The main difference between a great anticlinal or fault trap and a great *other* kind is that the former is

[1] Contribution of the Scripps Institution of Oceanography, new series.