answered questions—for instance, how does the relativistic electron inversion arise? At this time, it is not at all certain that negative absorption is occurring in quasars. The answer to this question must await further high-resolution observations. On the other hand, the mechanism has some very attractive features which offer the hope of resolving some of the difficulties associated with the construction of models for quasars.

Perhaps the most dramatic feature of the mechanism is that there can be secular variations in the radiation from the entire source on a time scale considerably shorter than the light travel time through the source. This is a consequence of the geometric increase of radiation across the source. If the emission along a small segment of the path length varies by a certain percentage due to a change in the physical conditions there, the radiation from the entire source varies by a similar percentage, even though conditions remain unchanged elsewhere. Therefore, the radio variations do not imply that the angular diameter of the source must be less than 0.055″. In fact, if the 41.7-Mcy/sec flux is evidence of negative absorption, one might expect it to have large secular variations.

In the sample calculation above, it was assumed that the object is optically thin to radiation at frequencies $\nu > 400$ Mcy/sec, in order to derive the density of relativistic electrons. This may not be the case. If the object were optically thick, owing to either synchrotron self-absorption or free-free absorption, the density of relativistic electrons might be much greater than the value of Eq. 18. Indeed, such a model has been proposed (*21, 30*). In that case the radiation at frequencies greater than 41.7 Mcy/sec might be partly due to negative absorption, and the observed secular variations might be explained by this mechanism.

The addition of negative absorption to the theory of synchrotron radiation opens some interesting possibilities for the construction of detailed models of 3C273B. One that immediately comes to mind is a core-halo structure, already indicated by observation (*14*). Perhaps the high-frequency radiation is due to negative absorption in the core, which is not radiating at lower frequencies owing to the Razin effect. The low-frequency radiation may be due to negative absorption in the halo, which is optically thin to the high-frequency radiation. Then one might see a very pronounced "limb brightening" at low frequencies. Furthermore, there is no reason to expect the physical conditions in quasars to be perfectly isotropic. A slight anisotropy in physical conditions will yield great anisotropy in the amplified radiation. If the radiation is a highly directional beam, the energy requirement of the source is greatly reduced (*31*). There is a possibility that the negative absorption may be marginal over a broad band of frequencies; for, if self-absorption, positive or negative, is very strong at a given frequency, there is a tendency for the electron spectrum to rearrange itself in order to level out the radiation spectrum. Finally, there is a hope of understanding the secular variations as arising from the high sensitivity of the absorption coefficient to the physical parameters, such as the magnetic field strength or the plasma density (*32*).

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Kodiak Seamount Not Flat-Topped

Abstract. *Earlier surveys in the Aleutian Trench southeast of Kodiak Island, Alaska, indicated that Kodiak Seamount had a flat top and was a tablemount or guyot. This seamount is of special significance because it has been supposed that its surface was eroded at the same time as those of a line of guyots to the southeast. If so, its present position in the axis of the Aleutian Trench indicates that the line of guyots was formed before the trench. A two-part survey in 1965 showed that Kodiak Seamount is not flat-topped, and should be eliminated from the category of guyots. Reflection profiling records indicate that the seamount was formed before the adjacent sediments were deposited, and that the small trough, or moat, on the south side is a depositional feature probably formed by a scouring effect or by the acceleration of turbidity currents around the base of the mount.*

Kodiak Seamount has been the subject of unusual interest and significance in studies of the geology of the Gulf of Alaska and the Aleutian Trench. Earlier surveys of Kodiak Seamount indicated that it had a flat top and could be designated a tablemount or guyot (*1*). Flat-topped seamounts are numerous in the Pacific Basin where they have been shown to be ancient islands; they have been truncated at the sea surface by wave erosion, and have now subsided to their present depths (*2*).

Kodiak Seamount is of special significance because it is in line with the Pratt-Welker chain of flat-topped seamounts to the southeast; it has been speculated that Kodiak and these seamounts were truncated at the same time. If this is the case, Kodiak Seamount, with its summit well below those of the line of guyots to the southeast, would indicate formation of the trench subsequent to the erosion of these flat summit surfaces.

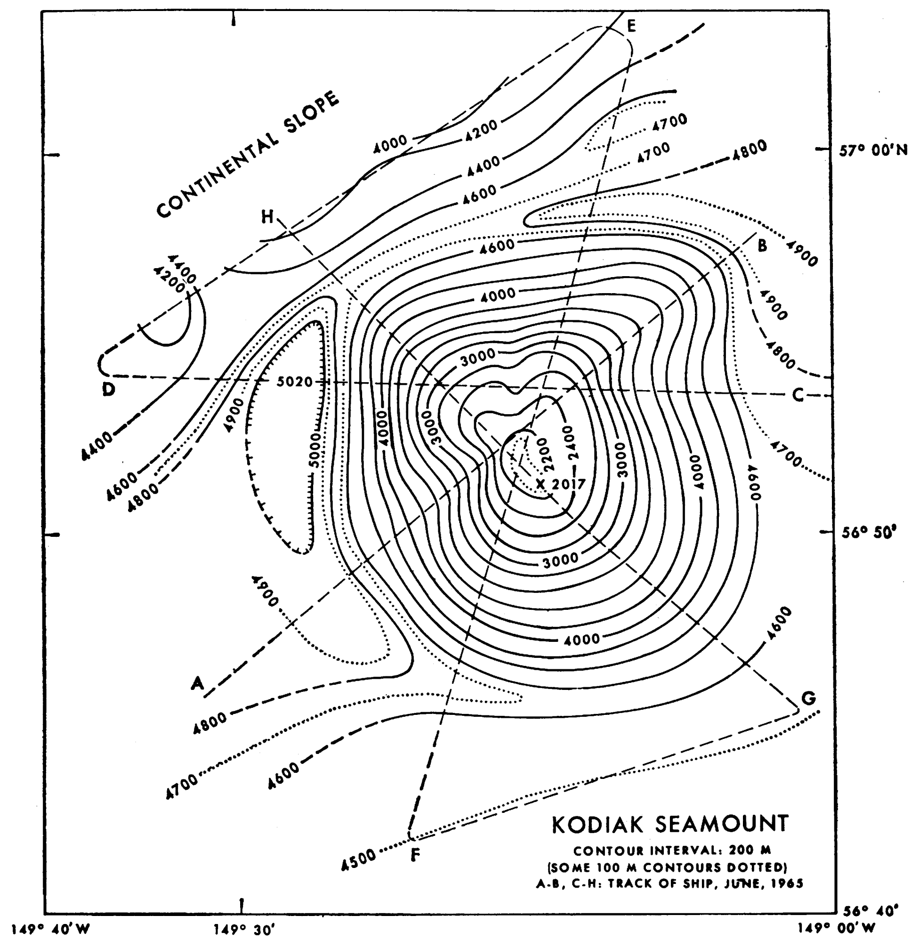

Fig. 1. Contour chart of Kodiak Seamount.

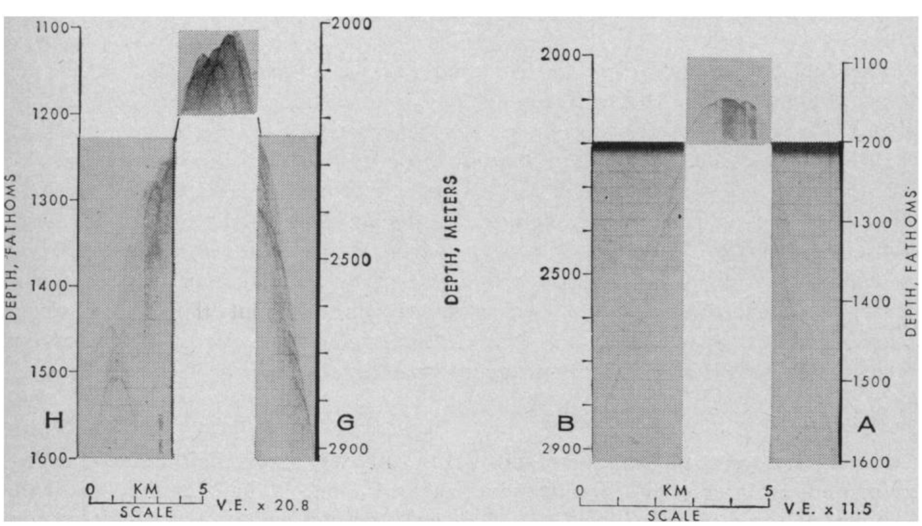

Fig. 2. Fathograms across Kodiak Seamount.

During the 1965 Gulf of Alaska Expedition, a single fathogram across Kodiak Seamount (Fig. 1, *A–B*, and Fig. 2) indicated that the relatively pointed peak was shallower than any previously reported depth, and that the feature was probably not a guyot. On the next leg of the expedition a good survey was made with a precision depth recorder and a seismic-reflection profiling system (*3*) (Fig. 1, *C–H*, and Figs. 2–4). The morphology of the feature was confirmed as that of a relatively sharp-pointed volcanic seamount; its shallowest summit depth, so far determined, is 1103 fathoms (2017 m). This feature should, accordingly, be eliminated from the category of tablemounts or guyots. Its morphology is thus no longer relevant to the age of the Aleutian Trench and the line of guyots to the southeast.

The 1965 survey had the advantage of Loran-A electronic position control (particularly good in this area) which was not available during earlier surveys. Without such control it is very difficult to reconcile a ship's tracks across such a small area as the top of a seamount; traverses relatively parallel to near-summit contours may misleadingly indicate a flat top.

Seismic-reflection profiles were made (Fig. 1, *C–D* and *E–F*) which include the discontinuous trough around the base of Kodiak Seamount (Figs. 1 and 3). At the base of the continental slope (Fig. 4, *D*), overlapping hyperbolic reflections from the surface of volcanic flows, or from blocky slumps, obscure the structure below the sea floor. The hyperbolic reflectors end abruptly at a possible fault along the base of the continental slope, forming one side of a narrow trough. Beneath the trough's floor are nearly horizontal reflectors that butt against the seamount.

Sediment filling the Aleutian Trench apparently comes from sources at its northeastern end (*4*). The area designated *C* (Figs. 1 and 4) is on the east side of the seamount (near the axis of the trench) where the sediment moving down the trench to the southwest first comes into contact with the volcanic rock. At this point there is no trough; there is a thick layer of horizontally bedded, unde-

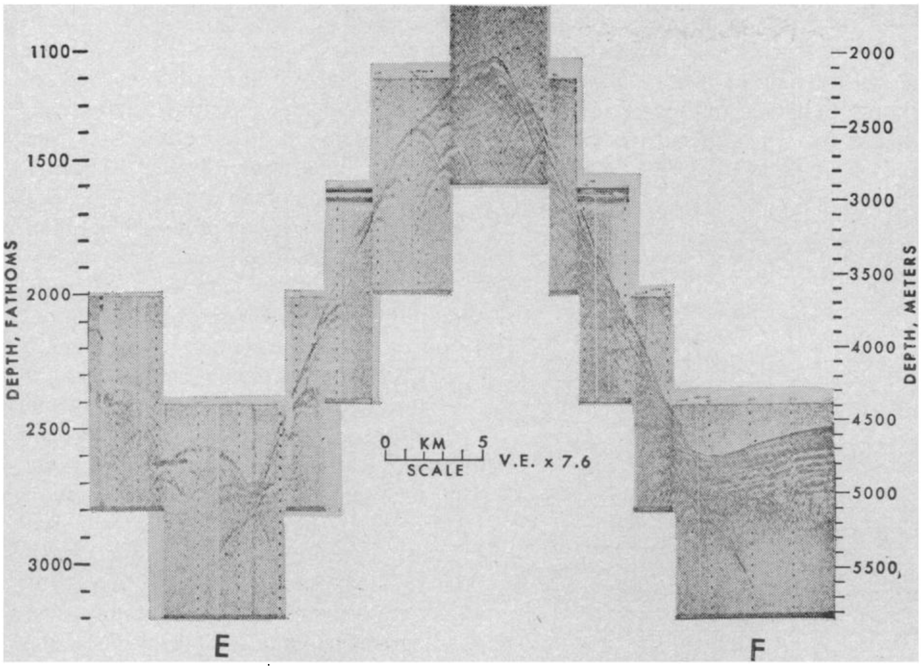

Fig. 3. A continuous seismic-reflection profile across Kodiak Seamount.

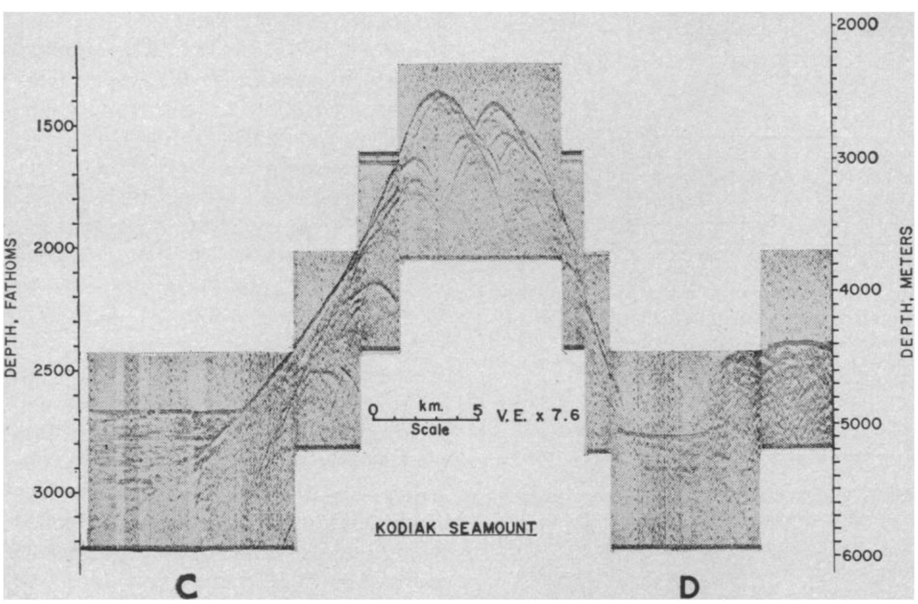

Fig. 4. Seismic-reflection profile across Kodiak Seamount. Faint reflections at *C* have been made darker by tracing over them with a pencil.

formed sediment that laps against the buried surface of the seamount. This indicates that the sediment was deposited after formation of the seamount.

Sediment moving past Kodiak Seamount to the southwest is apparently not deposited as quickly near the base of the seamount as it is deposited a relatively short distance away. Consequently, there is a small trough, or moat, formed on the south and southwest sides (Figs. 1 and 3, *F*). This trough is clearly shown in these figures to be a depositional feature, probably due to a scouring effect, or a slower rate of deposition because of accelerated turbidity currents around the seamount. The same effect is seen elsewhere on the abyssal plains to the south.

The parallel sub-bottom layers tilted toward and abutting the rock of the seamount are shown with no depositional moating effect. Overlying these layers are sediments forming the present curved surface of the sea floor, and the depositional moat or trough. Probably these lower beds were originally horizontal, and were tilted by regional warping or downbowing of the trench. Thus, the present depositional trough overlies an older tectonic trough. Large-scale tilting and subsequent sedimentation has been seen in continuous seismic-reflection profiles across the Aleutian Trench, both northwest and southeast of Kodiak Seamount.

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Air-Sea Waves from the Explosion of Krakatoa

Abstract. *The distant sea disturbances which followed the explosion of Krakatoa are correlated with recently discovered atmospheric acoustic and gravity modes having the same phase velocity as long waves on the ocean. The atmospheric waves jumped over the land barriers and reexcited the sea waves with amplitudes exceeding the hydrostatic values. An explosion of 100 to 150 megatons would be required to duplicate the Krakatoa atmospheric-pressure pulse.*

The explosion of the volcano Krakatoa in 1883 is remarkable in many respects. In magnitude it was probably the greatest explosion ever recorded. The atmospheric disturbance was detected by barographs at many stations throughout the world on at least three passages around the earth. Sea-level disturbances were observed on tide gages as far away as ports of the English Channel. The various phenomena and original data associated with the explosion have been documented in a report of a committee of the Royal Society (*1*).