"Phenomenal Variations in the Self-Potential of Rocks"

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Catalina Island Monitoring Station
Avalon, Catalina

The following report describes a simplified version of a class of experiments which have been conducted over a period of years. The findings are of interest for the reason that there is, as yet, no adequate explanation.

Discussion:

It has been found that certain basaltic and granitic rocks exhibit a self-potential which undergoes large cyclic variation not related to temperature, pressure, humidity or other local variables. Long-time monitoring has revealed periods of the year when the self-potential correlates consistently with sidereal time, reaching maximum and minimum values vectoring on the galactic center (17^h43^mRA). At other times, solar cycles predominate and sidereal component disappears. Even so, a circadian pattern nearly always exists which cannot be correlated with ambient laboratory conditions.

Hence, it is of interest not so much that a self-potential exists but that it varies with a cosmic pattern. It has been found further, that complete reversals of electrical polarity occasionally take place (See figure 5, Encl. B) and this suggests that magnetic reversals as with the tetanohematite lavas may also be present.

The Experiment:

An oval-shaped basaltic rock, approximately 3" x 5" x 8", from the rim of the ancient Koolau volcano on Oahu, Hawaii, is thoroughly oven-dried and copper electrodes are painted on opposite sides. The rock is then covered with an insulating plastic sheath and enclosed in several layers of aluminum foil, which is grounded. A 5-megohm wire-wound precision resistor (Shallcross) is attached to provide an electrical load. The load causes the freely-floating self-potential of the rock to drop from approximately 300 mV. The rock and resistor are encased in an electrically shielded, constant temperature box controlled to .1°C.

BNC shielded cable connects the rock to a double-throw one-hour timing switch, thence to a strip-chart recorder as shown in the diagram. When the switch is in position 1 for one minute, the recorder is directly connected to the rock. When in position #2, for the remaining fifty-nine minutes, the recorder is connected to a fixed 50 mV constant (battery-fed) source.

Experience has shown that most recorders have a feed-back potential which causes them to drift when free. "Clamping" the recorder to a fixed 50 mV battery during the rest position prevents such drift. The same result could be achieved by simply shorting the recorder (to zero) during the rest period, but with ordinary strip-chart recorders the margins are so tight that problems occur with the ranging scales when the pen is required each time to return to zero. Hence, the indicated arrangement is preferred. When the switch is in position 1, which occurs only for one minute each hour, the dwell time is insufficient for drift to occur, and the recorder accurately indicates the voltage of the rock.

Results:

1.) The chart shows a succession of vertical lines one hour apart, the tops of which indicate the rock voltage at that hour.

2.) It is interesting to note the surprising activity and the change of voltage with time.

3.) It is the cyclic behavior, with its' cosmological implication, which is significant and requires explanation.