

## **"Anomalous Diurnal and Secular Variations in the Self-Potential of Certain Rocks"**

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### Abstract:

Studies of telluric electricity, as related to individual rocks, have revealed the existence of diurnal cycles and secular variations in self-potential.

Automatic recording and measurement of potential over a period of several years appears to indicate that certain granitic and basaltic rocks act as electric dipoles and spontaneously generate an emf ranging to about 700 mV. These anomalous variations range to at least 50% in some instances.

No adequate explanation appears to exist.

### Background:

In earlier studies, in which the author was engaged at the Naval Research Laboratory in 1931 to 1933, entitled "Anomalous Behavior of Massive High-K Dielectrics" (classified), evidence was obtained that the electrical resistivity of certain high-density dielectrics undergoes solar and sidereal diurnal changes.

In subsequent work, at Navy-sponsored underground field stations in Ohio (1937) and in Pennsylvania (1939), these findings were confirmed and extended to include lunar effects. Largely because of the striking lunar correlations, it was believed informally that the action was gravitational in nature. Publication was withheld.

The investigation was interrupted by World War II but was resumed in 1944 in California by the Townsend Brown Foundation (an Ohio non-profit corporation) and was carried forward in two locations in especially-constructed shielded rooms at constant temperature.

The earlier (Eastern) results were not specifically confirmed in California, especially the lunar effects, and this caused confusion. Although the automatic recordings were continued for more than 4 years (1944 to 1949), the results never appeared to be directly compatible with the earlier results in the East. No interpretation as to the gravitational origin seemed appropriate.

During the 20-year period from 1950 to 1970, research in this field was continued by the Foundation but was directed more toward the electrokinetic effects of massive dielectrics (movement of barium titanate blocks, etc.). These studies were performed in the United States

and in France. They involved the use of very high voltages (up to 300KV) and high vacuum test chambers under rigorously controlled test conditions. This was done to advance gravitational theory and to attempt to resolve the earlier conflicts. Publication was withheld until a clearer understanding could be obtained.

In 1970, using improved computer-type equipment, automatic recordings were resumed in a relatively isolated location on Catalina Island, 28 miles off the coast of Southern California. The effort was directed toward the detection and measurement of gravitational radiation.

Special attention was paid to the design of non-resonant sensors utilizing resistance changes in massive dielectrics. This led to an investigation of resistance changes generally in various materials, heavy metals and semi-conductors. Observations were conducted at various altitudes in an effort to detect changes correlated with sidereal time and hence pinpoint the possible origin of gravitational radiation believed (Joseph Weber) to come from the center of the galaxy.

In 1974, automatic recording equipment was moved to the Haleakala Observatory of the Hawaii Institute of Geophysics, for high-altitude observations, and in 1975 it was moved to Honolulu where recording is being continued day and night.

To date, these observations seem to indicate that the cause of the phenomenal variations can be found in the changes in resistivity and the spontaneous generation of rf noise in massive high-K dielectric materials, including stone. Whether this is of gravitational origin, arising from the influx of gravitational radiation from space (or some similar energy source) remains to be determined.

### Conclusion:

Studies to date of the cyclic effects appear to indicate the existence of two related phenomena:

- 1) Radio frequency noise (wide range of spectral bands) spontaneously and intrinsically generated in dielectric materials as a function of mass and dielectric constant.
- 2) Self-potential (dc) in certain rocks.

This leads to a tentative hypothesis that the energy represented in the so-called "rock" electricity, as exhibited by certain rocks, originates in a specific spectral band of radio frequency currents set up by a penetrating external flux.

It is noted that rocks have a wide variety of cyclic patterns, the phasing of which differs from one rock to another. The interpretation of this phenomenon might be, therefore, that the spectral band (rf) to which each individual rock is attuned is different. Hence, each rock senses only that portion of the very broad spectrum of the ambient flux to which it is resonant.

In the case of rock electricity, rectification from rf to dc, presumably, could take place internally. The natural capacitance of the rock could serve to store the rectified dc, so that a more or less continuous output is observed. In a sense, the rock becomes a quasi-permanent electric dipole or electret and, actually, is a continuous converter of energy.

The same may be said of the alternate system, the so-called "synthetic rock," made up of a resistor, diode and capacitor, as shown in Figure 2.

To insure significant results, all systems should be operated within electrostatic and magnetic shields. Shielding against very low and very high electromagnetic radiation is difficult to accomplish, so theoretical consideration must be given to the possibility of effects entering from this quarter. The same applies to other penetrating radiations such as from radioactivity or cosmic rays.

A great amount of theoretical and empirical work must be completed before any positive conclusion can be reached. It is a challenge and, perhaps, a worthy one.