ELECTRICAL SELF-POTENTIAL IN ROCKS

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Studies of telluric electricity, as related to individual rocks, have revealed the existence of electrical self-potential. The true source of this energy is not now known, but the fact that the electrical output of rocks undergoes diurnal cycles, sidereal cycles and secular variations, appears to indicate that the energy has a cosmic origin. One might express it - "that the rocks of the Earth may actually be 'tapping' cosmic energy."

In recent years, scientists have speculated on the possibility, predicted by Einstein, that gravitational waves are generated by stellar explosions, rotation of binary stars and the gravitational collapse of stellar masses into so-called "black holes." This gravitational radiation, constituting a whole new spectrum equivalent to the electromagnetic spectrum, bathes the Earth from every direction. There is evidence that this extremely penetrating radiation may be coming with greatest intensity from the centers of gravities, including our own galaxy. It passes, in large measure, completely thru the Earth. The total energy may be enormous, even equaling the total radiation of light and heat. Why it is that massive or dense materials act to intercept this radiation from space and transform it into electricity is not now known. One may say it is a process analogous to the conversion of light into electricity, as in the photocell, but this is a new technology and very little is known about it.

ROCKS GENERATE ELECTRICITY

Certain laboratory-size rocks have developed as much as 700 millivolts, dc, quite independent of galvanic, magnetic or other known factors. While this is an extremely low output in useful standards, one must recognize that this is only the beginning. Future development, as in the case of nuclear fission, may increase the potential enormously. One need only recall that the first evidence of atomic fission (1934-1939) appeared on sensitive cathode ray oscilloscopes of Enrico Fermi, Lise Meitner and others. They had no idea at that time of the tremendous power of atomic bombs or of the use to which atomic power could be put in the years to come. Rock electricity may be in that position today, possibly offering a solution to our energy crises, completely free from environmental hazards or political considerations.

BACKGROUND

From 1931 to 1933, the author conducted research at the Naval Research Laboratory (Bellevue, Washington, D.C.) on the "Anomalous Behavior of Massive High-K Dielectrics." During this time, evidence was obtained which revealed that the electrical resistivity of certain high-density dielectrics undergoes solar and sidereal diurnal changes. The results were completely unexpected.

In subsequent work, at Navy-sponsored underground field stations at Zanesville, Ohio (1937) and at the University of Pennsylvania, Philadelphia (1939), these findings were confirmed and extended to include lunar effects. Largely because of the striking lunar corrections, it was believed informally that the action was actually gravitational in nature, but publication was withheld pending further confirmation.

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

The earlier (Eastern) results were not specifically confirmed in California, especially the lunar effects, caused possibly by time zone and geophysical differences, and this caused confusion. Although the automatic recordings continued for more than four years (1944-1949), the results never appeared to be directly compatible with the earlier results in the East. Hence, no interpretation as to the gravitational origin was pursued.

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 France. They involved the use of very high voltages (up to 300 KV) in high-vacuum test chambers under rigorously controlled test conditions. This was done to advance gravitational theory and to attempt to resolve the earlier conflicts. Again, 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. This was done to resolve the question as to the existence of gravitational waves from space, possibly indicating an undiscovered source of energy.

Special attention was paid to the design of non-resonant sensors utilizing resistance changes in massive dielectrics. This led to an investigation of resistance anomalies which generally occur 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 origin of gravitational radiation suspected to come from the center of the galaxy.

In 1974, automatic recording equipment was moved to the Mt. Haleakala Observatory (Maui) of the Hawaii Institute of Geophysics, for high-altitude observations (10,000 ft.) and in 1975 it was moved to an underground vault - University of Hawaii in Honolulu - where recording, using massive volcanic rocks, was 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 together with spontaneous generation of rf noise in massive high-k dielectric materials, including stone. As such, it could represent the first conclusive

evidence of a new source of energy. Whether this is of gravitational origin, arising from the influx of high-frequency gravitational radiation from space (or some similar energy source), remains to be determined.

Studies of the cyclic effects appear to indicate the existence of two related phenomena, namely; radio frequency noise (wide range of spectral bands) spontaneously and intrinsically generated in dielectric materials as a function of mass and dielectric constant; and, self-potential (dc) in massive rocks. These conclusions lead to the hypothesis that the energy represented in "rock" electricity, probably does originate in the ambient gravitational radiation from depths of space.

In the case of rock electricity, rectification from rf to dc, presumably, takes place within the rock (as a solid state function - like a transistor). The natural capacitance of the rock serves to store the rectified dc, so that more or less continuous output is observed. In a sense, the rock becomes a quasi-permanent electric dipole or electret but, actually, is a continuous converter of energy received from its environment.

ROCKS ARE NOT ALIKE

Many different rocks have been studied. Granite and dense lava rocks so far have shown the greatest voltage output. Other rocks, containing lead or other heavy metals seem to indicate that the electrical output is a function of mass (which is to be expected if the effect is gravitational).

Rocks also have a wide variety of cyclic patterns, the phasing of which differs from one rock or another. The interpretation of this phenomenon might be that the gravitational (wave) spectral band (rf) to which each individual rock is attuned is slightly different. Hence, each rock senses only that portion of the very broad spectrum of the ambient flux (from space) to which it is resonant. The effect is similar to radio receivers tuned to different frequencies.

AS AN EARTHQUAKE PRECURSOR

Another interesting facet of this research is its relation to geophysics - more particularly the electrical behavior of the Earth's crustal rocks subject to tectonic stress and prior to cleavage. There appears to be a distinct possibility that violent electrical changes ("glitches") occur which could preface dangerous earthquakes. These studies are being continued in California.

CONCLUSION

As a possible new source of energy for an energy-starved world, without the dangers inherent in nuclear power, "rock electricity" may prove the ultimate answer.

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

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