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Humanity Lives on the Cosmic Microwave

Vitaly A. Prisyazhniuk [a,b++*]

[a] Research and Design Institute for Basic Chemistry NIOCHIM, Mironositskaya St. 25, 61046 Kharkiv, Ukraine.
[b] Institute of Problem in Mechanical Engineering at the Ukrainian National Academy of Sciences, Dmitry Pozharsky Str., 2/10, 61046 Kharkiv, Ukraine.

Author's contribution

The sole author designed, analysed, interpreted and prepared the manuscript.

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Short Communication

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ABSTRACT

Seismologists and volcanologists have no answer to the question of what is the source of energy for volcanoes and earthquakes. A hypothesis is proposed and substantiated that the energy supplier is the Sun. Microwave and induction ovens are a public example of the transformation of high-frequency radiation energy into heat. The filtering of certain frequencies of radiation by a metal grid raised into the stratosphere can dampen the destructive effect of earthquakes and erupting volcanoes.

Keywords: Sun`s electromagnetic radiation; energy; earthquakes; erupting volcanoes; absorption-emission spectra; high frequency heating.

[++]Former Head of Laboratory;
**Corresponding author: E-mail: vitalpris@yahoo.com;*

1. INTRODUCTION

The First Law of Thermodynamics in the formulation of Heimholtz sounds like this: Energy is neither arises, nor destructed, but only gets transformed from one form to another [1]. When searching the Internet for an answer to the question: where does the energy of volcanoes and earthquakes come from, I found only the question: “Where does the huge energy that creates a boiling silicate melt come from? There is no definitive answer to this question yet.”

When looking for an answer to the question about the energy source of earthquakes and volcanic eruptions, I had to read publications in leading journals on volcanology and seismography: Bulletin of the Vulcanological Society Japan; Earthquake Spectra; Journal of Volcanology and Seismology; Journal of Volcanology and Geothermal Research. It turned out that each magazine has a certain specificity, preferences in the choice of topics.

The Bulletin of the Vulcanological Society Japan often publishes articles on the history of volcanic eruptions [2], the results of monitoring volcanic activity [3]. The Earthquake Spectra magazine focuses on the strength and repair of building structures [4], as well as the assessment of damage caused by earthquakes and tsunamis [5]. The Journal of Volcanology and Seismology pays much attention to earthquake prediction [6], [7]. In particular, according to thermal soil anomalies observed from satellites [8].

After getting acquainted with a fairly large number of scientific publications, it turned out that specialists, in principle, are not interested in the problem of the energy source of volcanoes, tsunamis, earthquakes, which annually cause billions of dollars of damage to the world economy and take hundreds of human lives. According to volcanologists and seismologists, perpetuum mobile of both the first and second kind exists. Let me remind you what we are talking about. A perpetual motion machine of the first kind [9] performs work without fuel or other energy resources. The perpetual motion machine of the second kind [9] converts the heat of the environment into work, being at the same time its integral part. That is, it turns itself into work, but does not disappear.

I propose a hypothesis for billions of years of not disappearing energy source of volcanoes and earthquakes. This source of energy is the Sun.

A hypothesis becomes a theory only after it has been experimentally confirmed. So let's start with an experiment.

2. MODELING A VOLCANO ERUPTION

Take a raw egg, put it in a glass or ceramic cup or bowl, and place it in a household microwave oven that you have in your kitchen. Turn on the furnace at maximum power to observe the model of an erupting volcano faster. In a minute you might even hear an "explosion". This will depend on the strength of the eggshell. In any case, you will clean the microwave oven longer than the experiment lasted. What happened?

According to the Boyle-Mariotte Law, Gay-Lussac, and Mendeleev's amendments:

$$P*V = n*R*T \quad (1)$$

where P, T, V, R, are respectively, Pressure, Temperature (degrees Kelvin), Volume, the Universal Gas Constant and n is the number of kilogram-molecules of the gas.

The chicken egg contained, among other things, water. As a result of heating the water to the boiling point (we will discuss how the microwave oven works below), it turned into water vapor. One kilogram-molecule of water in a liquid state occupies a volume of 18 liters. But one kilogram-molecule of water vapor at room temperature and atmospheric pressure occupies a volume of 22,400 liters. Thus, the volume of water in the gaseous state increases in comparison with the volume of water in the liquid state by 22400/18 = 1244 times.

A kilogram molecule of tin iodide SnJ_2 weighs 372.5 kg. Specific gravity (mass per unit volume) 5.28 kg/m^3. The boiling point is 720^{0}C. At room temperature, a kilogram-molecule of tin iodide occupies a volume of 70.5 m^3. However, in the vapor state, that is, at 720^{0}C, a kilogram-molecule of tin iodide occupies a volume of 22,400 m^3. That is, during the transition from a solid to a gaseous state, its volume increases by 318 times.

As a chemist, I use the database of physicochemical properties of chemicals available to me [10]. Geochemists, geologists and geophysicists will be able to perform similar calculations based on reference books available to them.

Let us remind that Avogadro showed back in the 19th century that one kilogram-molecule of ANY SUBSTANCE IN A GASEOUS STATE occupies a volume of 22,400 liters.

Let us transform equation (1) to the form:

$$P = (n*R/V)*T \quad (2)$$

Since the volume of the egg is limited by the shell, the pressure of water vapor inside increases not only 1244 times, but also in proportion to the temperature. This is why the egg shell is torn by pressure and the contents are thrown onto the ceiling and walls of the microwave oven.

It seems to me that the same thing happens in nature. As a rule, any substance, any rock in the liquid state occupies a larger volume than in the solid state. If the volume of rock formed during heating (including the melt and gaseous products of chemical reactions) finds an outlet to the Earth's surface and due to this, excess pressure is released, a volcanic eruption will be observed. If the melt and reaction products can only push the walls of the "chamber" in which the heating takes place, and thus reduce the pressure, then an earthquake will be observed.

3. HOW THE MICROWAVE OVEN WORKS

Structurally, a microwave oven is a chamber with a high-frequency emitter fixed on the side wall and a disk rotating in the center of the chamber, on which the heating object is placed. The instructions for the microwave oven say that the maximum efficiency of converting radiation energy into temperature is created at the center of the rotating disk.

The emitter of a microwave oven emits an electromagnetic wave, usually at a frequency of $2.45 *10^6$ Hz. This frequency is resonant to the frequency of natural vibrations of water molecules. Reheated food always contains some water. Absorbing radiation energy, the water molecule goes to a higher energy level $\Delta E = h\nu$, where h is Planck's constant and ν is the resonant frequency.

The water molecule is unable to store energy. Therefore, it uses as much energy as it needs to ensure its movement, and emits the rest, returning to the old energy level. But a water molecule emits in the infrared (thermal) range $3*10^{11}$ - $4*10^{14}$ Hz. Thus, each water molecule becomes a heater and heats up its surroundings. The temperature to which the heated object is heated is determined by the emitter power set by the user (W/s) and the heating duration.

There is another mechanism for heating a substance due to radiation: induction heating is a method of non-contact heating with high-frequency currents (RFH - radio-frequency heating, heating by radio-frequency waves) of electrically conductive materials. Known induction non-contact heating of metal stock materials due to induction eddy currents generated by a high-frequency electromagnetic field. Moreover, such heating is applicable to any metals and conductive materials.

This technique is used for: Ultra-clean non-contact melting, soldering and welding of metal.

Obtaining test samples of alloys.

Bending and heat treatment of machine parts.

Jewelry business.

Machining small parts that can be damaged by flame or arc heating.

Surface hardened.

Hardening and heat treatment of parts of complex shape.

Disinfection of medical instruments.

Heating is carried out through the walls of a protective chamber made of glass, cement, plastics, wood - these materials absorb electromagnetic radiation very weakly and remain cold during operation of the camera. Only electrically conductive material is heated - metal (including molten), carbon, conductive ceramics, electrolytes, liquid metals, etc.

Due to the emerging MHD (magnetohydro-dynamic) forces, the liquid metal is intensively mixed, up to keeping it suspended in air or a protective gas - this is how ultrapure alloys are obtained in small quantities (levitation melting, melting in an electromagnetic crucible).

4. HOW ENERGETICALLY INTERACTS THE SUN AND THE EARTH

Let us draw an analogy: the Sun, which emits an electromagnetic field in an extremely wide range

of frequencies, is "fixed" as an emitter in a fixed place in the Solar System. The Planet Earth revolves around it in its individual orbit, exposing its entire surface to the Sun during the day. Just like in a microwave oven, the maximum efficiency of converting high-frequency electromagnetic radiation into heat is at the center of the Earth.

A molecule of any chemical substance has two individual characteristics: an absorption spectrum and an emission spectrum. Let me remind you of a classic example: helium was first discovered in terms of its emission spectrum on the Sun. And only later, after obtaining helium in its pure form on Earth, it was possible to study its absorption spectrum.

Initially, during the formation of the solar system in the center of the Earth, the temperature increased due to those molecules whose emission spectrum was in the infrared (thermal) region. But as metal ores were included in the heated volume (heating chamber) and their melting took place, the mechanism of induction heating of the smelted metal by eddy currents began to prevail. Thus, the metallic molten Core of the Earth began to form, the efficiency of which is much more efficient in converting the electromagnetic radiation of the Sun into thermal energy. It can be assumed that the Earth's Core continues to increase its size as the deposits of metal ores are consumed. And the electromagnetic radiation of the Sun continues to supply thermal energy to the melt by the mechanism of induction heating.

As the creators of chemical kinetics, van't Hoff and Arrhenius, showed at the end of the 19th century, the rate of chemical reactions increases significantly with increasing temperature. Taking into account the temperatures and pressures existing in the bowels of the Earth, we can assume the formation of new chemicals with their own individual absorption and emission spectra. Including emitting infrared radiation.

5. HOW TO USE THE PROPOSED HYPOTHESIS

To begin with, I would like to share media information that confirms the hypothesis put forward. In the second decade of November 2022, the media announced a high-intensity magnetic storm that was to be observed on Earth on November 20. Perhaps as a result of a coincidence, two volcanoes erupted in Kamchatka exactly on November 20, 2022. On November 21, it became known about the volcanic eruption in Indonesia, which led to the need to evacuate 2,000 residents from the volcanic eruption zone. November 22 reported a volcanic eruption in South America.

The development of extra-atmospheric observation methods made it possible to study the spectrum of the Sun in the entire range of electromagnetic waves: from the γ range (X-ray radiation) to kilometer radio waves.

It is necessary to collect data for many years on the energy intensity of various frequency ranges of the electromagnetic radiation of the Sun and their change over time. And also about the localization and date of earthquakes and volcanic eruptions. Then compare these data with each other. In other words, find a correlation between earthquakes, volcanic eruptions and the energy intensity of individual frequency ranges of the Sun's electromagnetic radiation. If such a correlation is found, then the revealed patterns will be a database for predicting earthquakes and volcanic eruptions [11-12].

It will be possible to prevent or at least reduce the intensity of earthquakes and eruptions by raising into the stratosphere in the area of the alleged eruption or earthquake a mobile screen made of metal mesh, which will transform high-frequency electromagnetic radiation into heat. The cell size of the metal mesh is determined by the frequency of the electromagnetic radiation that needs to be filtered out. At an altitude of 11 - 25 km (the lower layer of the stratosphere), the temperature is about - 500C. Therefore, one can count on the cooling of the grid, the energy of electromagnetic radiation absorbed by which will be converted into heat.

6. CONCLUSIONS

1. Seismologists, volcanologists do not even try to find an answer to the question: where does the energy of volcanic eruptions and earthquakes, tsunamis and geothermal waters come from. Geophysicists only in recent decades have realized that the Planet Earth is an open thermodynamic system, calling these ideas New Geophysics. In principle, these ideas are more than 100 years old, and they form the basis of statistical physics and nonequilibrium thermodynamics.

2. As a rule, in a series of phase transitions of the first order [13] (solid-liquid-gaseous state), the volume of the phase increases, which means that pressure increases in a closed space. For example, when water passes from a liquid to a vapor state, its volume increases by 1244 times. Naturally, in accordance with the Boyle-Mariotte Low, Gay-Lussac, with Mendeleev's refinement, in a closed space a further increase in pressure is determined by temperature.
3. The microwave oven in the kitchen is a great model for raising the temperature by converting shortwave radiation energy into heat. The second example of converting electromagnetic radiation into thermal energy is induction furnaces, which have already found their place not only in industry, but also in the kitchen.
4. The source of electromagnetic radiation of a wide range is the Sun, which provides geothermal sources, tsunamis, volcanoes and earthquakes with energy round-the-clock for billions of years.
5. A geomagnetic storm is a disturbance of the Earth's geomagnetic field lasting from several hours to several days. Evidence for the role of the Sun in earthquakes and volcanic eruptions is the correlation between geomagnetic storms and volcano and earthquake activity.
6. Since high-frequency radiation in the radio range has long been (30s of the twentieth century) learned to generate and capture (radar, radar installations), this principle can be used to filter certain frequencies of solar radiation and, at least, attenuation, or maybe prevent earthquakes and eruptions volcanoes.

COMPETING INTERESTS

Author has declared that no competing interests exist.

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