

# Development of equipment for assessing the influence of the sun and the moon on life on earth

## News

A comprehensive analysis of the influence of astrophysical factors of the Sun, Moon and planets of the solar system on life processes on Earth was carried out to develop monitoring equipment and comparison with the biological activity of living organisms.

**Keywords:** equipment for astrophysical and biological monitoring, sun, moon, planets of the solar, solar radiation, earth diameters

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## Introduction

### The relationship of the sun, moon and earth

The Sun - has the strongest influence on life on Earth. Daily cycles, seasons, solar radiation - all this has a direct impact on life on Earth. However, there are more complex interactions of the Sun and the Earth, such as internal stresses in the shell of the earth, the effect on the magnetosphere and the ionosphere, whose influence on life on Earth is difficult to assess without regular monitoring. The Moon is the closest natural space satellite of the Earth. This is the second brightest celestial object in the earth's sky after the sun. The average distance between the centers of the Earth and the Moon is 384 467 km (0.002 57 a. e., ~30 Earth diameters). Even in ancient times, people noted the influence of the moon on life on Earth. The interrelation of a lunar cycle and tides in oceans is noticed. The influence of the Moon on the weather, the development of plants, and the well-being of people was also noted. Today, science knows a lot about the effects of the Sun, Moon and planets on life on Earth.<sup>1-3</sup> Tides in the seas and oceans occur twice a day. Moreover, the ebb and flow exist not only in the seas and oceans. All water sources are influenced by the moon. But far from the seas, it is almost imperceptible, the water rises a little and falls a little.

However, few people know that the same tides, or rather deformations, occur in the earth's envelope. Simply, they are almost invisible to people. At the same time, great stresses arise in the bowels of the earth, which are the trigger mechanism of earthquakes. Changes occur in the atmosphere of the Earth. The ebb and flow of the atmosphere occurs, reflected in changes in atmospheric pressure, which are the initiators of ocean storms and cyclones. Also changes the magnetic and electric field of the Earth. All this affects terrestrial biological organisms and humans. The facts of the influence of the Sun, Moon and planets of the solar system on biological organisms of the Earth have been known for a long time,<sup>1,2</sup> but the deep patterns of these phenomena were revealed at the molecular level as a result of regular instrumental monitoring of electro physical processes in aquatic electrochemical environments conducted at the Institute of

Medical and Biological Problems of the Russian Academy of Sciences Professor of Physics VV Tsetlin.<sup>5-8</sup> The purpose of this article is a comprehensive analysis of the influence of the geophysics fields of the solar system on life processes on Earth to develop monitoring equipment and comparison with the biological activity of living organisms.

### Influence of the sun and the moon on tides

The greatest ebb and flow are on the shores of the oceans. In Russia, this occurs on the shores of the Pacific and Arctic Oceans. Small ebbs and flows are characteristic of inland seas, and they are even weaker in lakes, rivers and groundwater levels. Only accurate instrumental measurements can establish tidal deformations of the Earth's surface. You may notice that on the shores of the oceans at one time of the year the tides are more powerful, while at another time they are weaker. This is related to the position of the Moon in relation to the Sun, and also to the fact that the Moon moves in an elliptical orbit, and the distance of the Moon from the Earth changes. The closer the moon is to the surface of our planet, the stronger the ebb and flow will be, the farther - the weaker. The gravitational field of the moon is vector-shaped with the field of the sun. At the same time, ebbs and flows become very strong when the Sun and the Moon are on the same axis with respect to the Earth (this happens at the new moon). In this case, there are two powerful tides per day. If the Moon and the Sun are from different sides of the Earth (at the full moon), two strong tides per day are also observed - the Moon and the Sun. Other tidal phenomena and their duration are easily explained by the vector addition of the gravitational fields of the Moon and the Sun. Tidal phenomena are used by people to generate electrical energy. On the shores of the seas and oceans built tidal hydroelectric power stations, which produce electricity due to the rotation of the Earth and the influence of the Sun and the Moon. Tidal power plants are considered to be environmentally friendly sources of inexhaustible energy.

Less influence is exerted by the gravitational fields of the planets of the solar system. However, they also have a significant effect on tidal phenomena in the seas, oceans and the atmosphere of the Earth,

especially when there is such an astronomical phenomenon as the "Parade of the Planets", when several planets line up in one line. Based on the above, it can be concluded that the vectorial addition of the gravitational fields of the Moon, the Sun and the planets leads to a complex effect on the Earth, taking into account its daily rotation. Only the instrumental measurement of the gravitational field can show its effect on biological objects on Earth, under the influence of the astronomical bodies of the solar system.

### **Influence of the moon and the sun on the earth's atmosphere**

The Sun and the Moon are two heavenly bodies that are directly related to life on our planet. Objects greatly affect people, but they themselves have very little in common. Dimensions: the sun is 400 times larger than the moon. In addition, it is a source of intense thermal radiation and many types of radiation.

#### **Change in atmospheric pressure**

With the sun's rays, the atmosphere and the surface of the Earth warms up, and the volume of the atmosphere increases, the pressure increases. In addition, tidal phenomena and wave and cyclonic movements of the atmosphere play an important role. In a calm atmosphere, in the anticyclone mode, with the rising of the Sun, the atmosphere begins to warm, the temperature increases, and the pressure gradually increases, and the east wind arises. Accounting for the influence of the Sun on the Earth's surface is complicated by processes in the atmosphere and the presence of clouds. Only continuous instrumental monitoring of pressure and temperature can show the influence of the Sun on biological objects on Earth.

### **Changes in the electric and magnetic fields on the Earth's surface**

Various natural electric fields of constant and variable types are recorded in the bowels of the Earth and its atmosphere.

- I. In particular, as a rule, in the mountain-folded areas, constant natural electric fields with an amplitude of up to 0.2–1.3 V are observed above the outcrops of electrical conductors of sulphide ores and carbonaceous and graphitic schists on the day surface. These fields are widely distributed and are the object of research in exploration
- II. Before the start of earthquakes in the earth's crust tectonic stresses and ruptures arise with the release of mechanical and electrical energy. Various mechano-electric phenomena also arise (the piezoelectric effect, electrification during friction, destruction or rupture of double electric layers, etc.). The resulting electric fields  $E=10^8-10^9$  V/m are sufficient to make a breakdown in rocks and in liquids
- III. There is a magneto-telluric field in the Earth due to short-period oscillations (SPO). It includes a natural alternating electromagnetic field arising under the influence of charged particles that are emitted by the Sun and enter space around the Earth
- IV. In the plasma surrounding the Earth, a stream of charged solar particles excites magnetohydrodynamic waves. These waves reach the ionosphere and change it.

According to the current classification, SPOs are divided into two main groups:

- I. Stable oscillations, denoted by the symbol Pc. These fluctuations occur in the form of a long series and, as a rule, have a quasi-sinusoidal form
- II. Irregular fluctuations, denoted by the symbol Pi. These fluctuations are found in the form of short series, separated by long breaks.

As a result of observations, and on the basis of calculations for long-period oscillations of the electric field, the distribution of the earth's conductivity to a depth of 1000 km was determined.

### **Atmospheric electricity**

The reasons for the emergence and long-term existence of the electric field and charges in the Earth's atmosphere have long been of great interest. Some local, regional and global sources of charges on the Earth's surface are known-precipitation, cloudiness, snow and sandstorms, blizzards, thunderstorms and lightning, convective currents and currents from sharp leaves of plants, etc.<sup>3</sup> Change of ground atmospheric electricity happens before earthquakes.<sup>4</sup> As a source of global variable atmospheric electric field and charge Earth is considered to be the world's thunderstorms and magnetic field.

### **Earth's magnetic field**

Magnetic fields are widespread in the universe. They exist in stars, in outer space; there is a magnetic field at the Sun and at the planets Jupiter and Saturn. There is some evidence of the presence of a magnetic field of the planets Uranus and Neptune. At the same time, the spacecraft could not detect the magnetic field of our three closest space neighbors - Mars and Venus. Earth's magnetic field can be divided into constant and variable. It changes under the influence of the Sun, solar storms and sun's spots. It is possible to track the change of the magnetic field near the surface of the Earth only with the help of continuous instrumental monitoring. The great influence of the earth's magnetic field on humans and biological objects is undoubted, but it can only be linked to biological activity by continuous instrumental observation.

### **Influence of the sun and the moon on man**

The Sun and Moon the affect the activity and sleep of a person. In the daytime, people are active and successfully working, and at night they need rest. Noted that in full moon people sleep poorly, fatigue accumulates, nervous tension and diseases appear. Women suffer a full moon worse than men. VI Vernadsky et al.,<sup>1,2</sup> in their scientific works stated that all life on Earth develops under the influence of space. The life of the Universe has its own cycles, periods, and rhythms, and changing them affects the cycles, periods, and rhythms associated with the rotation of the Earth. Thus, all terrestrial phenomena depend on cosmic forces and changes in their rhythms. It has been established that on a full moon, people tend to commit rash acts, accidents often occur, crimes are committed. On the full moon, people look tired, turn into pessimists. During this period, it is not recommended to solve difficult problems, make decisions, settle conflicts, and begin serious work. In a full moon, blood pressure often rises, illness worsens, and people experience headaches and joint pain. Full moon blood does not coagulate well, operations are worse. Doctors recommend at this time to reduce the load, drink plenty of fluids, dairy products, vegetables, fruits, and rest more.

In the new moon, people are weakened, depleted morally. Men can be aggressive, nervous for no reason. When the moon begins to grow, then energy will increase and increase. In the new moon most

often there are heart attacks, strokes. The growing moon is a favorable period for the growth of plants, the development of people's abilities, for various undertakings. People at this time are full of strength, energy, able to withstand high loads. Usually the state of health during this period is stable and good. Improves metabolism, there is a special vigor and vitality. Doctors recommend at this time to take care of themselves, to undergo a course of medical procedures, drink vitamins, do more sports.

### Experimental studies

Studies conducted in recent years show that there are daily oscillations of electric current in pure water that fills an electrochemical cell.<sup>5,6</sup> As shown by the authors, these fluctuations are due to direct effects of the Sun and the Moon, as well as aftereffects and predecessors associated with the activity of high-frequency oscillations in the ionosphere in the frequency range 11.5-12.5 MHz.<sup>6,7</sup> Since water is present in living organisms, these vibrations are transmitted to all functional systems of biological creatures. These articles show the presence of periodic fluctuations during the day from 1 minute to 12 hours, as well as daily fluctuations and items with a period of 28 days during the year. It is also shown that the structure of the spectra is associated with the biological activity of bacteria. Their activity is influenced by rhythmic and non-rhythmic variations of environmental factors in the form, solar and geomagnetic activity, or meteorological factors. Statistical processing showed a correlation in the dynamics of the electrical conductivity of water with the influence of these factors. The combined use of various methods of temporal spectral analysis makes it possible to more reliably identify the rhythmic composition of a given series and localize the points in time of their structural adjustment. Detailed studies show that identified rhythmic (with periods of 4 and 8 hours, 12 hours, 1 day, ~5 days, ~7 days and 2 weeks, 28 days) and non-rhythmic changes can be caused by natural electromagnetic radiation from the ionosphere and be defined as solar radiation, so as the lunar-solar tidal gravitational energy. The synchronous effect of fluctuations in the conductivity of water with astronomical impact factors was confirmed experimentally.

### Development of equipment for monitoring physical processes and biological effects

Based on the experience of preliminary studies, the task was to develop a basic set of equipment for continuous observation of objective astronomical, terrestrial and biological parameters in order to establish their relationship and determine the impact on biological objects. As a result of the discussions, we stopped at the following indicators:

#### Astronomical

- I. Gravitational, electric and magnetic fields
- II. Solar radiation
- III. The radiation of the ionosphere at a frequency of 12 MHz.

Meteorological (in the surface layer of the atmosphere)

- I. Air temperature
- II. Humidity
- III. Pressure
- IV. Wind speed and direction.

### Biological

- I. Conductivity of weakly ionized water
- II. Conductivity of a leaf of a plant (aloe)
- III. The conductivity of the gel with saline
- IV. Conductivity of gel with bacteria.

The following set of equipment was selected for monitoring

- I. Personal computer LENOVO
- II. ATMEGA-328 microcontroller based on ARDUINO
- III. Temperature sensor - thermocouple chromel-alumel
- IV. Motorola Moisture Sensor
- V. The pressure sensor Motorola MPH 2200 AR
- VI. BPW 34 light sensor
- VII. Infrared Sensor SOLEMS
- VIII. 12 MHz radiation sensor
- IX. Weight strain 1kG gauge with an accuracy of 0.1 g
- X. Electrical conductivity water sensors - authoring with Pt electrodes.

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### Conflicts of interest

The author declares there is no conflict of interest.

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