
The Principia Nature 2.

By

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Abstract

The Principia Nature 2 is about the planet Earth research by using tools of system thinking, operational research, the requisitely holistic approach, global studies, case study, complex problem solving etc. Philosophical and modern sciences approach is offering new perspectives for understanding the present at the planet Earth. It is the second part of “The Principia Nature” and conclusions.

Key Words:

Basic Environments, Continuum, Global Studies, Land – Water – Air Environments, Nature, Requisitely Holistic Units, Sustainable Future of Mankind, System Thinking, The Climate Change System, The Planet Earth System, The Star Sun System

Discussion

The Nature of the Planet Earth

Everything what was born may look like many different or similar things, but it is individual characteristics that make difference. At present our humankind global community has 7000000000 + members and all of them are Homo sapiens, but each and one has his/her own characteristics. Therefore our civilization has 7000000000 + individuals. This is important because we have to accept the reality that within the basic environment of the universe system there are countless planets, but the planet Earth with the global humankind community is the only one, which we know and live on it.

The Nature of the planet Earth mirrors the nature of the rest of the Universe. Second to that, the planet Earth is a requisitely holistic unit or planet, a member of the planets of the star Sun system. It is orbiting the Sun within the distance which allows the environmental conditions needed for life. It is within the so called living belt of Solar system. Actually the biosphere environment has got conditions suitable for life. The first life on the Earth appeared around

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3.800.000.000 years ago. The anaerobic one cell protozoan were first creatures, which evolved because of suitable environment conditions,

The Planet Earth System

The Earth planetary system is very robust. The planetary body at present has got an inner core of 1.500 miles in diameter composed of iron and heavy metals, an outer core of 1.400 miles, a lower mantle of 1.400 miles, upper mantle of 400 miles and the crust of 2 – 45 miles in diameter.

On the top of the crust, there are permanent dynamic changes caused by the natural powers by which the Earth's surface has been and is shaped. The atmosphere covers, protects and completes the biosphere of the planet up to 650 miles or 1.000 kilometres, where the Exosphere is ending into the outer space. The main subsystems of the Earth are: its planetary body, its Moon, and its atmosphere. Its planetary body has 8.000 miles or 13.000 kilometres in diameter. The Earth is the fifth planet by diameter at the star Sun planetary system. The largest one is Jupiter with an eleven times longer diameter, and the smallest one is Pluto² with around one fifth of the Earth's diameter.

The surface of the Earth together with its atmosphere makes its biosphere, where we live and where the life has been a part of its system for more than 3.8 billion years. At that time in history the first appearance of the microbial life could be placed.

Among the life supporting components of the Earth, oxygen is the most important element. It forms:

- Two inorganic oxides - water and carbon dioxide, which are the life-supporting molecules,
- Atmosphere with oxygen molecules in the air we breathe, and
- The ozone layer as the protection against UV rays.

After the nature has put together such a support within the biosphere system the appearance of life on Earth was just a matter of time.

The external support from the star Sun to the Earth is the flow of light, warmth, particles and powers. It is an important support, because due to adequate distance of the planet Earth from the Sun, it actually supports life on Earth. The flow of light and warmth from the Sun has different effects on other planets.

The unique composition of the planet Earth and its distance from the Sun are two major qualities that evolved with evolution of the Solar system, and made the basic possibility for life to appear on the Earth.

² Data about the new 2 outer celestial bodies are not yet known to us; one missing planet might also have a questionable content within the present status of the Solar system. Pluto has been re-classified and is no longer recognized as a planet.



The Earth crust surface is at present made of a terrestrial part, which covers around 30 percent of the surface, and ocean/sea waters cover, which takes the remaining 70 percent of the surface. The ratio between oceans and lands was changing, and is changing, with dynamic changes of the planet Earth surface evolvments. The first appearance of the water on the Earth was the deciding factor for the formation of its surface and atmosphere. After cooling down the atmosphere was thick and much lower than now. The primordial atmosphere was oxygen-free. A big change came from the appearance of the first life forms. These were the anaerobic microbial organisms living without oxygen. They were gaining the necessary hydrogen for their synthesis of different organic carbon compounds from dissolved inorganic compounds of carbon. Change of the primordial Earth from its anaerobic to its aerobic stage took hundreds of millions of years. Bacterial life significant contribution was the sink of carbon dioxide, when their dead cells settled as sediment on the bottom of the oceans. There they were transformed into numerous carbon compounds that we see today as fossil fuels. It was the time of the first energy transformation; actually, anaerobic micro organisms transformed sugar molecules to gain two units of energy per molecule.

In the next generation, microbes were able to split water molecules by using the light from the Sun, and used the released hydrogen to reduce the carbon dioxide molecules. By this photosynthesis, a rich biomass was produced. The product of this reaction was the molecular oxygen, but its appearance was poisonous for the existing living creatures. It changed the life critically: the new generation of microbes was able to use oxygen in its oxidation of biomass by respiration. It was the second energy transition on the Earth, because with such a transformation of the sugar molecule they gained 36 energy units or eighteen times more than the anaerobic microbes.

The carbon dioxide was a part of water due to its solubility, while oxygen that was not solvable in water, became an integral part of the atmosphere. The concentration of the oxygen in the atmosphere was and is increasing and changing and is settled at 21 %, with 78 % of nitrogen, and the remaining 1 % was made of carbon dioxide, methane, and some other gaseous elements.

With appearance of oxygen in the atmosphere, with influence from the Sun radiation the oxygen molecules were split down to the elementary oxygen, which in the upper layers of atmosphere made the three-valence oxygen molecule ozone. With time, the ozone formed an UV-impermeable screen or ozone protection-layer against those rays from the Sun, which was responsible for decomposition of the dioxide molecules – the UV rays. The biosphere on the Earth responded with evolution of life, its intensification, and transition from water to the Earth's terrestrial parts.

The bacterial life moved to the terrestrial part of the surface, forming on it crust top a carbon-rich layer, which eventually became what we today call soil. The Earth system evolved to the stage when complex life forms were able to appear. It was some 700 millions years ago. Land mammals appeared some 350 million years ago. The human predecessors are dated some 8 millions years ago, and Homo sapiens, our predecessor, evolved some 200000 years ago.

So here we are – after the big-bang and evolvment of one requisitely holistic part of the Universe, we have the Universe, the Milky Way, the Solar system, the planet Earth system, and the life on the surface of its terrestrial, aquatic, and lower atmosphere parts. With the existing input/output effects from superior systems, especially the Solar system, with evolved



parts of the Earth system, etc., the climate change system became the provider, maker, holder, and guardian of living conditions within the biosphere.

The climate change system is the internal planet Earth system within the surface of the planet Earth and atmosphere.

The Nature system and the planet Earth system.

Movement is the major characteristic of the Universe or the Nature. It is easy to observe when researching the Universe, Galaxies, star systems and planets, and world of atoms and particles. Many different forms or systems of matter, energy, and information could be observed. The Universe is a grand scene very fascinating and less understandable than we would wish. Humankind top understanding for long time or millennia was to observe the positions of the stars and to work out a horoscope with the purpose of predicting the future or something else. The humankind of course, did not accept the truth - the future is unpredictable.

Actually, we think the continuum of movement is there, from the smallest particle to the largest galaxy and beyond. Circular movement, the movement like top, large parts of the universe moving together or apart, particles inter-universe movement and the inter-universe particles movements within requisite holistic units, looking at the world of atoms the movement is there, within the atoms, and in the inter-atoms space as well.

Looking at the Homo sapiens community there is more or less movement, except when we are asleep. Our body system has many different possibilities for a movement looking from the exterior viewpoint. However, majority of humankind do not make a perception of the internal movement, which commences when a successful movement of spermatozoa makes him reach ovum inside the mother's body. From this point of successful movement and conception, a new life has its own internal movement. After the birth, the internal movement is the main characteristic of living and when it stops, it is the end of a life. The whole of humankind life is a very complex internal and external movement.

Moving means living!

It is not only in a living nature but also to the nature as a whole and any requisite holistic parts.

The nature of the planet Earth has its internal movement within the planet environments and external movement as a part of the star Sun system both internal and external movements, and the universe movements (Milky Way Galaxy, etc).

So here we are with the planet Earth system.

The planet Earth system is a requisitely holistic unit/part of the star Sun system, Milky Way Galaxy system, and the Universe system. The planet Earth system is a very small part of the Universe. However, as a planet with the environment suitable for the living nature, it is a home of humankind and of countless forms of creatures of living nature. From one-cell creatures: viruses, micro organisms, protozoan, zoo and phytoplankton, and others to plants and animals, and on the top of living creatures kingdom Homo sapiens is placed.



The planet Earth system – planetary body, atmosphere, and moon - appeared around 4.5 billion years ago (4500000000). At that time the planet was something like a ball of energy and gases with temperature around 7000 degrees Celsius. Within millions of years, the planet was cooling down, and the firm matter was formed within two hundred million years. The oldest rocks on the Earth have been dated at 4.3 billions years ago (4300000000).

The Moon system has been formed as result of catastrophic happenings after collision of the planet Earth with another cosmic body of the size of the planet Mars. As result, the large mass of matter was put into the orbit of the planet Earth, which after certain time shaped the Moon.

The planet Earth system is an inferior system to the Solar System, the Milky Way, and the Universe.

The Star Sun System

Our Solar system contains nine (eight by new classification) major planets (one planet missing) and along with the tenth and eleventh as newcomers to the family (now asteroids together with Pluto, which used to be a planet), and thousands of comets and minor planets called asteroids. It also contains the Sun, the star around which the planets revolve.

The composition of the Earth, as a planet inside of the Solar System, is “unique” because of the information, matter, and energy at its birth.

All forms existing at the moment of appearance are included within our Earth system, and so are many more other forms of the Universe such as light, particles, rays and matter that over the time from the appearance until now have collided with the planet Earth system.

Major influences on the Earth dynamics come from the permanent energy flux from the Sun, and from collisions with asteroids, which arrive from the outer space. .

The Climate Change System

The climate change system is internal system of the nature of the planet Earth. It is responsible for biosphere environmental qualities and conditions for the life to continue.

Interdependences, interactions, and co-operations within the planet Earth system of the life, climate change system, and biosphere are dynamic factors for the evolution of the life forms, and the resulting environmental conditions.

The primordial Earth, some 4.5 billions years ago, was lifeless and unrecognizable by our civilization standards. The air was oxygen-free and many subsystems of the climate change system known today did not exist. The climate change system itself was evolving according to the components and relations of the system as it does even today.

The living nature is a moderator of living conditions and is interdependent, interacting, and co-operating with the climate change system. The rise of the life on the Earth reacted to conditions of the primordial surface water environment, and its physical and other contents. It took the



nature of the planet Earth some 0.7 billion years to evolve the life. The first evidence of the life is dated 3.8 billions years ago. From microbial life of primordial time to final evolving of the complex biosphere around 1.2 billion years ago there was the time within which the biosphere evolved. First complex living creatures on the terrestrial environment could be placed at 700 millions years ago.

The first and second biosphere energy transition from the anaerobic to the aerobic energy production by microbial life was responsible for the change of the atmosphere from the oxygen-free to the oxygen-reach one. The oxygen-content was around 40 % and with time it has been diminishing to 21 % as it was at the end of the 19th century.

The oxygen-content in the air was the major improvement of life conditions, which made the difference from the primordial time to the time of biosphere, from 1.2 billions years ago until the present time.

The concentration of the oxygen in the air for living creatures to breathe should not fall below 8 % that is somehow a minimum needed for survival. At present in some heavily populated areas of big cities, the concentration of the oxygen could fall as just above 10 %. We are recommending monitoring of oxygen concentration as a precondition for survival of humans in the fragile and heavy polluted environments (big/mega/poly cities).

Our civilization's first settlements were built some 14000 years ago, because of social life evolvement of pre-antiquity humans.

First settlements on European area were built on swampy areas, for security reason, and population was up to 10.000 people. It was a result of the changed conditions within the biosphere that happened after the last ice period, which ended some 60000 – 16000 years ago. Since then the climate change system conditions on the Earth were almost at the quality of the present time. Of course, changes have existed but not as extreme ones, as the ones coming up now.

The difference between today and 200 years ago is due to the extreme input of our civilization's output into biosphere such as: all sort of waste, and side-effects of nuclear etc. technologies, synthetic chemicals, human population explosion and its consequences; destruction of biosphere resulted from covering the current needs of humans. In short, and we shall work out the above-mentioned later on, those are reasons/impacts, which cause the triggering effects and other changes of our civilization on the climate change system, as consequences.

The climate change system is a natural complex entity/system. It consists of several subsystems and is a subsystem, too, of systems such as the planet Earth system, the Solar system, the Milky Way and the Universe. It is very old and has been changing, and is changing all the time, offering rather stable conditions to the life forms. At present much more extreme changes have been taking place, over the centuries of industrialization and post-industrialization than ever before since the end of last ice age. We humans are not the only cause of these dangerous processes, although an essential one, especially if our decisions and actions are based on a lack of systemic/holistic thinking/behaviour.

The climate change system as an integral part of the planet Earth biosphere system is somehow between its inferior and superior systems; all of them together with the climate



change system itself have a number of mutual interdependences, interactions, and co-operations.

As we have mentioned before, the Universe contains all matter and energy, particles, rays, information, dimensions, powers, forces and yet unknown contents. The Universe may have a dramatic influence on the Earth's climate change system, in the case of catastrophic changes affecting the Solar system, and in the case of the Earth's collisions with space body/bodies influencing the Earth's existence.

It happened and may/can happen again. There is e.g. the hypothesis that a collision of the Earth with a cosmic meteorite some 65 millions years ago caused Dinosaurs to get extinct.

The largest and most superior system of the Nature is the Universe. The probability of a destructive interaction of the Earth with the Universe system is very small. Because there is a countless number of star systems and other forms within the Universe, the Earth has a little chance to experience a major destruction caused by the Universe system activities. The Earth system is namely just a very small part of it.

The Solar system is a very large system, from our civilization's point of view, but a very small one from the galactic point of view, and even much smaller from the Universe point of view. The Sun and its eight planets make one small sub-system of the Milky Way Galaxy. Actually, the Milky Way Galaxy has almost countless star systems, and our Solar system is just one of them.

The Sun is the central star of the Solar System, and has 99.8 percent of the Solar system mass. It is the centre of its system, and source of all energy, matter, power, and information within it. Of course, it is an inferior system to the Milky Way Galaxy, which is over 100000 billion times bigger in mass than the Solar system.

The Solar system revolves around the centre of the Milky Way Galaxy at a speed of around 250 kilometres per second.

For our Earth planetary system the Sun is the source of everything from the birth of the planet onward, and we exist because the Sun provides us energy, warmth, light, and all other important inputs – physical and other components and interdependent, interacting, and co-operating matter, energy, and information. Our planet system is completely dependent on the Sun. Our present time experience is mirroring physical, geographical, and biological etc. statuses at which the planet Earth system is at this very moment.

Of course, the influence from the Solar system is not caused only by the Sun, but also by a number of interdependent, interacting, and co-operating relations with neighbouring planets, planet-like bodies of different size, Moon and other forms of energy, matter, information, and natural powers. The planet Venus is the closest to Sun, and the outer planet is Mars. Together with Mercury, they present terrestrial planets of the Solar system.

The other four planets Jupiter, Saturn, Uranus, and Neptune are gaseous gigantic planets on the outer part of our Solar system. The last planet (not any more a planet but an asteroid) is Pluto, but it is not always the last one, because of its oval-shaped orbit, which places it sometimes before Neptune, but most of the time it is the most distant one from the Sun.



Recently two new celestial bodies have been discovered in line from the Sun and after Neptune/Pluto.

The Solar system is stable, and changes in its system qualities are reflect/influence its entire system. The most important parts of the Solar system are the energy flow from the Sun to the planets, and the quality of each planetary system. Not only each planet's composition, but also its distance from the Sun is a deciding factor for the quality of the Solar system. The life stream of light and warmth from the Sun enables life on Earth.

Both the quality of the star Sun system and unique Earth's composition/distance from Sun make interdependent, interacting, and co-operating parts of the life-support system on the Earth.

Understanding of many powers and forces of nature is important. They include gravitational, magnetic, energy, matter, and information transformations, rays, and particles etc., dynamics/movements (like the top, orbital, galactic, and of the Universe), the Solar system, the Sun and planets including our planet the Earth. Synergistically, they make characteristics, interdependences, interactions, and co-operations of the whole system.

The Sun has a diameter that is 109 times bigger than the one of the Earth, and 400 times larger than the one of our Moon. All eight planets and all other forms within the Solar system are orbiting around the Sun. The Sun and all planets move like a top and all together orbit within the Milky Way Galaxy. All this movement should be more researched to allow us to understand the basic powers resulting from interdependences, interactions, and co-operation among parts of the Solar system. The Solar system as well as all other systems is functioning according to their given systems³/entities of parameters. Our civilization has its chance to explore, research, and understand the Nature and our existence.

The open question is whether the global humankind community interfere with operations of the climate change system and the nature or not. The answer is **yes**.

As conclusion;

We are closing our initial research results, which may open new horizons for researching the Nature.

We think the global humankind community with its history and evolvement has been at commencement of the 3rd millennium not in her best. Due to societal, money/finance system, political and urban crisis the chances for the sustainable future are within all the peoples of the world.

Good work of humans during the second half of 20th century on “sustainable development” are foundations for the next step towards the “sustainable future of humankind” and transition towards a better tomorrow for all of us and our descendents.

³ We say »system« rather than »set«, because in the systems theory a system consists of two sets, mathematically: the set of its elements and the set of relations between them (and with its environment) resulting in synergetic attributes that the entire system has, but its elements alone do not. Hence, speaking of a set would mean the traditional oversight of relations and their crucial importance.



Our wish is going for the sustainable future of each and one member of our global humankind community.

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