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The Asymmetric Arrows of Space-Time in the Evolution of Planet and the Anthropocene

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Abstract- This article aims to verify the relationship of society with nature, and its thermodynamic energy flows, as an evolutionary element, generating totalization and being analyzed by the arrow(s) of space-time. This article will also verify how this process influences the formation of the Anthropocene. In this sense, the principles born after the advent of quantum mechanics will be applied to the spatial-temporal analysis of physis (which integrates society-nature). The article also verifies how each formcontent, in a unique way, contributes energetically to the development of its arrow of space-time. Thus, it will also be verified, as, the current production process, is associated, in general, with the disruption of the states of homeotase, in the energetic balance of the process of exchange between energy and matter, and as the old pattern of relative stability, which characterized the Holocene, has been replaced by disorder, which is at the basis of the emergence of the Anthropocene.

Keywords: thermodynamics, anthropocene, holocene, evolution, form-content.

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The Asymmetric Arrows of Space-Time in the Evolution of Planet and the Anthropocene

Luís Henrique Ramos de Camargo

Abstract- **This article aims to verify the relationship of society with nature, and its thermodynamic energy flows, as an evolutionary element, generating totalization and being analyzed by the arrow(s) of space-time. This article will also verify how this process influences the formation of the Anthropocene. In this sense, the principles born after the advent of quantum mechanics will be applied to the spatial-temporal analysis of physis (which integrates society-nature). The article also verifies how each formcontent, in a unique way, contributes energetically to the development of its arrow of space-time. Thus, it will also be verified, as, the current production process, is associated, in general, with the disruption of the states of homeotase, in the energetic balance of the process of exchange between energy and matter, and as the old pattern of relative stability, which characterized the Holocene, has been replaced by disorder, which is at the basis of the emergence of the Anthropocene.**

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I. Introduction

This article, constructed from bibliographic research, has as its central objective, to debate the planetary evolution, presenting as an explanation for the understanding of its spatio-temporal evolutionary mechanism, the systemic-quantum epistemological field. The choice of this paradigm is justified because it presents logics that are associated with how the Anthropocene emerges from its self-organization. This work aims to develop the hypothesis, which is associated with this constellation of ideas. In our assumption, we think of the planet as evolutionary, from achronic thermodynamic paths, which involve the society-nature relationship in constant exchanges, explained by the application of Bertalanffy's General Systems Theory (1968).

We believe, from research published in Camargo (2021), that each form-content, from its singularity, generates a certain energetic flow, in its contribution to the maintenance of the patterns of planetary balance. We call this the arrow of space-time. Therefore, we seek, in this article, the knowledge of why the current arrow (s) of space-time presents great asymmetry, and what is the relationship of this issue with the Anthropocene. Therefore, for this reason, the text has as its "backbone", to bring to the scientific debate, the dilemma: evolution by mutability and self-organization X mechanistic cyclic repetition, that is, the dilemma existing between the classical X quantum systemic paradigms.

From the systemic-quantum field, breaking with the idea of constant loss that guides the arrow of time, the concept of the arrow of space-time, going beyond the arrow of linear time, Cartesian-Newtonian, represents a demonstration, which seeks to explain, how we can understand the achronic evolutionary process planetary. The arrow of space-time is the dialectical development of time, from the different variables that any space presents, and, for this reason, singularizes it.

The concept of the space-time arrow may demonstrate how the Holocene, which was characterized by its relative, but almost constant stability, maintained a tenuous balance with each other; and how a new geological-ecological stage has been emerging, due to our productive logic, which for different reasons, fragments from nature, not realizing how thermodynamic equilibrium is the driving element of change, because it relates to the basic exchange mechanism, existing between all systems that make up the Earth. In this sense, the conceptual paradox between classical science and quantum systems thinking is manifested in the analysis that refers to reality itself, and how research and models are created.

To achieve our goal, the text will refer to the verification of how the human being, in his short path on the planet, became a driving element of states of imbalance, associated with the genesis of new geological and ecological patterns. In this sense, this research is developed in three specific moments and that are integrated. Initially, the article will follow the steps of our ancestors, in a brief analysis, verifying the dynamics humanity - environment, thus aiming to understand how the Holocene arises; in a second stage, seeking to understand that the Holocene was characterized by an almost regular stability, it was carried out, a comparison of paradigms, aiming to explain, how classical science, easily justifies a world without major changes, and how it is lost epistemologically with the reality of our days. In this sense, a brief analysis of classical science was made, however, we believe as fundamental, to be confused with the common sense of reality. In the final stage, after bringing the reader to systemic-quantum thinking, we present how the content-forms, from their different arrows of space time, collaborate with the

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thermodynamics of the planet and thus generate the evolution in disorder that is associated with the Anthropocene.

a) Man's First Steps on Earth

The first steps of our ancestors on Earth were taken by Australopithecus. Its fossils have been found in geological strata on the African continent, from the relative scale of time. These studies have dated the emergence of these bipeds to something around 4 million years, which brings us to the Pliocene (6 M.a. to 1.6 M.a.) (ASIMOV, 1990; WAR, 1969; SALGADO-LABOURIAU, 1994). Os Australopithecus teriam surgido, em conjunto com uma série de outras mudanças ambientais, ocasião que trouxe uma nova demanda ecológica (do padrão de organização), alterando o clima, a flora e a fauna. Surge, por exemplo, na África, uma savana arborizada, bem como também, diferentes espécies evoluíram, dentre elas carnívoros e onívoros, entre os quais, os ancestrais do Homo sapiens sapiens (SCHINEIDER, 1998; SALGADO-LABOURIAU, 1994).

The first hominids spread across the African and Eurasian continent, and among the most important species, two, which preceded Homo sapiens sapiens stand out, Homo erectus, which inhabited Asia, and Homo neanderthalensis, which inhabited Europe (ASIMOV, 1990). The Homos erectus, appears around 2 million years, and this species lasted for another 1.5 million years, and it was she who would dominate the fire 500,000 years ago (ASIMOV, 1990). During the European glaciation, around 200,000, Homo sapiens neanderthalensis (Neanderthals) would emerge (ASIMOV, 1990).

Neanderthals were stronger and more robust than other known hominids, thus being better able to live through the glaciation of the Pleistocene. They would be better suited to hunting, fishing and the cold they would face in times of glaciation. Neanderthals are believed to have gone extinct 28,000 years ago, and therefore coexisted on Earth with homo sapiens sapiens durante um certo período, até a sua extinção como espécie, ainda no Pleistoceno. Ambas espécies, possuíam um ancestral em comum, o Homo heidelbergensis, que viveu de 500 mil anos, até cerca de 250.000 anos atrás, portanto, também no Pleistoceno (TRINKAUS e SHIPMAN, 1993).

There are several dates that define the emergence of the first archaeological records of Homo sapiens sapiens, this variation is between 100,000 and 30,000 years. But what is certain, is that our species emerged in the Pleistocene, during the glaciation that would last until 12,000 years ago. And, we also know that, of all the hominid species that emerged on the planet, Homo sapiens sapiens, was the only one to survive glaciation, and reach a new stage of ecological organization in the Holocene (SCHNEIDER, 1998). During the glaciation, in the Pleistocene, the retreat of the waters (it is estimated that the sea level fell between 70 and 80 meters), widened the continental shelf. That means greater will be your weather extremes, colder winters and hotter summers. Due to climatic extremes, many animals and plants began to coexist with other species, reconfiguring the perspectives that emerged in new levels of ecological organization, both of plants and animals. It is estimated, for example, that the deciduous forest of Great Britain altered its structural ensemble in each of the four glaciations of the Quaternary (SALGADO-LABOURIAU, 1994).

Salgado-Labouriau (1994), alerts us to the understanding that the transition from the Pleistocene to the Holocene did not happen quickly. In general, the determination of the boundary between two geological-ecological periods is made from the study of paleogeography, and thus, the differentiation between species, perspective of geographical location, among other processes of analysis are used facilitating the delimitation. However, although the megafauna has become extinct, the Quaternary did not present large appreciable extinctions of plants and other elements of nature, such as microorganisms, which would make this differentiation difficult for stratigraphic analysis.

What we can characterize of the Quaternary, are its different glacial periods, the last one having ended approximately 12,000 years ago, beginning the Holocene. Salgado-Labouriau (1994), also tells us, that many geologists consider the Quaternary, due to its low extinction rates, as the same being a single epoch, so the Holocene would not exist as a geological stage.

Seeking to define the emergence of the Holocene, we can say that it can be represented by some factors such as: end of the most recent glaciation, beginning of marine transgression and, the epoch that presented a great alteration of the environment, initiating a period of relative amenities (climatic-environmental) (SALGADO LABOURIAU, 1994).

The Holocene, represented, thus, a change in the macrostructure of the combination of variables of nature, issues such as sea level rise, for example, were related to the restructuring of both flora and fauna, in the sense that species seek new areas as a result of transformations, and the possible weathering through which certain areas have passed in this transition. Therefore, there is a restructuring in the sense of ecological combinations. This mechanism alters ecosystems and old patterns are restructured (SALGADO-LABOURIAU, 1994). Thus, the Holocene, due to its variation in ecological and climatic organization, also presented major changes in the whole of its organization. Thus, new deserts were formed, in addition to temperate and tropical forests (SCHNEIDER, 1990).

In this way, there was the arrival of a period of greater stability, where plants and animals did not need

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to constantly migrate in search of refuge areas, among other things, providing a new adaptability or even mutation, by evolution, of plants and animals (SALGADO-LABOURIAU, 1994).

i. *Normality and the common sense of reality*

And, despite some climatic variations found throughout this period, if we were to look for the main feature of the Holocene, this definition would be its incredible, more relative, stability of environmental patterns (VEIGA, 2019).

About 12,000 years ago, this more stable state favored the domestication of animals and, later, 8,000 years ago, the same state of relative equilibrium provided the cultivation of plants, initiating agriculture (ASIMOV, 1990).

It happens that, among different other factors, agriculture, made its production much more vulnerable to theft and looting of other tribes, thus leading to the search for the formation of cities for protection, from places, where the farmer could take refuge and, if necessary, store water to war. This process, associated with other different factors, such as Mesopotamia being formed by two rivers, and by having volcanic soils, favored agricultural practice, and started civilization with the emergence of the city of your, around the Tigris and Euphrates rivers (ASIMOV, 1990).

Thus, the Holocene, and its relative stability, made possible an entirely different society from the nomads in their glaciation in the Pleistocene. Over different centuries, this stability was still confused with beliefs linked to the extra-physical universe. However, with the technical-scientific revolution of the sixteenth and seventeenth centuries, science began to create a new paradigm about reality, based on the machine-like universe. The hegemony, achieved by the mechanistic model, made it possible for his reading of the planet and its phisys, to integrate into the old state of climatic-ecological stability that was lived. Living on a planet, in which the guarantee of its predictability in a scientific way, would provide the control of nature (without needing divine help), represented the human control over nature.

The technical-scientific revolution of the sixteenth and seventeenth centuries, which emerged from the Copernican Revolution, would have in Newton (1643-1727), the consecration of a model of planet that lasted for centuries, guaranteeing in common sense the idea of a machine universe, with relative balance and easy understanding of what will occur in the future (CAMARGO, 2012).

This logic reproduces, in the common sense of reality of physis, the rules inherent in classical science. For, we think of nature as formed of different parts of a gear (BHOM, 1980). In this metaphor of reality, the planet would be formed of immovable pieces, being three-dimensional, similar to a machine, which has no external influence. Its gear, in structural behavior, consists of different integrated parts, and develops its movement in a synchronic and linear way. In this machine, as no external force acts, its movement, if its current position is known, makes its future easily known (NEWTON, 1987).

The classical method floods our sense of reality with processes that are no longer scientifically based. For example, by fragmenting and isolating an element for its analysis, one loses the essence of connectivity, which is governed and dialectically governs the rule itself. Society, by fragmenting space of time, loses the possibility of analytically understanding change, because it occurs in space and is found in the relativity of time of each place.

As the Baconian Cartesian-Newtonian universe fragments time from space, analyses based on its paradigm will follow its rules, limited to the repetitive and cyclical machine universe, where, for this very reason, talking about creative evolution is the same as inventing something impossible to happen. For, as time separates from space, it (space) does not evolve, does not undergo mutabilities with time (CAMARGO, 2005).

This dynamic, stable and that everyone still expects, is what common sense calls normality, that is, a time when environmental systems were in relative stability, ensuring that the great natural phenomena did not harm people's lives, as it has been harming.

We call normality, that which is associated with the planet we want, not that we have... And what we seek as a planet is nothing different from what is usually learned in school with Newtonian physics.

The mechanical model of the universe, which is associated with the idea of Laplacian Newtonian certainty, gave mechanistic predictability something that is undone from Heisenberg (1901 —1976) and Schroedinger (1887 —1961). Uncertainty, verified under scientific judgment, came to be seen as a real element, and thus, new interpretive and empirically explained possibilities emerged.

Thus, the reading of a new planet is opened, which can rebuild and evolve, because it no longer has the totality, as a simple sum of all its internal parts. Uncertainty, when referred to totality, in turn, can only be seen, as the whole, always being superior to the internal sum of its parts (where in truth there are no parts at all, only links of interconnectivity). Therefore, by being creative, in the emergence of unpredictability and uncertainty, the whole reinvents itself and evolves. Thus, the path to understand the analysis of the reality of space-time and its applicability is broadened, in the sense of understanding the events of nature in relation to society (CAMARGO, 2005).

Being evolutionary, by self-organization of its variables, the planet, demonstrates its creativity, which becomes reality, totally making impossible the analysis

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made by the classical paradigm. This article, dedicated to the understanding of this evolutionary mechanism, involves how the spatio-temporal syntropy of the society-nature relationship relates to the development of the Anthropocene.

Our current search for the meaning of the "normal" is nothing more than the metaphorical representation of reality, presented by the Scientific Revolution, which occurred in the sixteenth and seventeenth centuries, under the "baton" of thinkers such as Copernicus, Bacon, Descartes, Galilei Galileo, Kepler, Titus Brache and Newton.

Living in a world in relative balance, following a daily logic appropriate to a controlled planet, would be wonderful, this would be what is expected, of what people call normal, however, stability does not seem to be the characteristic presented by the planet in our days.

b) Planet Earth and the integrated society-nature dynamics

In the nineteenth century, the philosophy of nature in Schelling (1775-1854), and the work of Humboldt (1769-1859), already demonstrated the perspective of the perception of the most energetic look at the man-nature relationship, where Descartes' conception of machine nature ends up not being dominant (CAPEL, 1981).

Schelling (2015), in his first project of a system of philosophy of nature, which sought to understand the relationship between man and his environment, demonstrated a clear departure from the existing reductionism. Schelling (2015) thought of nature, where there was evolution of matter, he conceived the chemical and biological connection, seeking, for example, the existing interconnectivity between biochemical phenomena and neurological functioning that influences the way of feeling and thinking. Schelling (2015) enabled the non-linear vision of the future, by understanding that there is a meeting of the natural spheres, and that this brought the very idea of evolution, in a world dominated by the machine universe. And just as William Blake (1757-1827) demonstrated the dehumanization existing in the work of Newton (1643-1727), Romanticism also positioned itself, showed that there was something that went beyond the mechanistic universe.

His theory for nature was a (re)encounter that dialectically involved magnetism, electricity, sound, light, heat, and chemical processes. Pure syntropy. Humboldt, influenced by Schelling, also suggested a logic of understanding wholeness that involved elements of nature, and of human society.

Just as Morin (1977), who fosters a critique of the General Systems Theory, verifying that it needs to be inserted in a broader context of "organization with emergent properties", Dutra-Gomes and Vitte (2017) provide this creative perspective to it, thus dimensioning the movement of integration into the natural spheres, generating the emergence of new patterns. This, was what was missing to complete what was in the genesis of this integration sought by Romanticism.

This integration guides what the planet is. The Earth, is a macro system consisting of different subsystems governed by their interactions (SILVA, 2008). This dynamic characteristic is linked to the interdependence of the parts, which form the whole of the planet, and which have a direct or tenuous connection, being impossible to understand any isolated aspect without reference to its function as part of a larger set (CAPRA and STAND-RAST, 1991).

In this dynamic, each subsystem, in a unique way, has different scales of space-time, and act by exchanging energy and matter with each other. In this mechanism, involving the entire planet at different scales, the natural spheres (hydrosphere, lithosphere, cryosphere, atmosphere and biosphere), act in interaction with the technosphere, which suggests a dynamic that is in the genesis of the movement, breaking with the three-dimensional Cartesian-Newtonian idea. Thus, the processes are referred to as a fourth dimension of space-time and that is linked to the possibility of change, which can be understood by the General Systems Theory (CAMARGO, 2012 and 2021).

And this is because interconceivability is general, and scales achronic flows, which reproduce the Copenhagen Interpretation. The mental design of this structure is the four-dimensional drawing of the totality in totalization, from its processes, actions and the movement of flow. With each increase in complexity, emergent relationships occur, from one or more syntropic processes, that lead the whole to evolve.

In this sense, the research believes that, has intensified the changes in the flows of energy and matter in excess on the planet. We know that nowadays, human activities have reached a level that, according to Veiga (2019), can damage the systems that keep the Earth in the desirable holocene state. In Safe Operating Space for humanity, the 29 authors added that since 2009 there was already a lot of evidence that some of the Earth's "subsystems" were moving out of their stable Holocene patterns, and thus verified, that the Earth System could not be operating in stable conditions like those of the Holocene (VEIGA, 2019).

To better understand this evolutionary dynamics, driven by the constant exchanges of energy and matter, which is energized throughout the planet Earth, it is necessary to understand the basic principles of Thermodynamics, expressed in the arrow of space-time. The essence of the society-nature relationship can thus be demonstrated, bearing in mind that the exchange relationship between human beings on the surrounding environment, in general, transmits a high degree of external energy input into natural systems,

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thus causing a local imbalance and discontinuous and often unpredictable feedbacks.

The asymmetric arrows of space-time as a tool of analysis Verifying the discontinuity of planetary systems, different scientists seek a stewardship of the Earth System, compatible with the desired habitable stability. However, perhaps, because they still "drink" too much of the classical influence, the models have difficulty understanding the society-nature coevolution, issues such as uncertainty, so common in our days, for example, do not have mechanisms for their scope (VEIGA, 2019).

Seeking a reading of the planetary evolutionary process, from a systemic-quantum epistemological view, Camargo (2021), effectuates the term arrow of space time to redefine the meaning, linear and fragmented, that was associated with the arrow of time.

Essentially, the arrow of time did not verify the discontinuity and achronic disharmony that surrounds all systems on the planet. For her, past, present and future are sequences, but tomorrow is the fruit of the complexity of today, so it cannot be repetitive and monotonous. However, when we list space as a fundamental element for the understanding of time, we find that the flow of time cannot be linear and predictable, considering the variables that differentiate and singularize space.

In seeking to prove the existence of the arrow of space-time, Camargo (2021) verifying that agriculture, being the art of disturbing the balance of nature in a safer way for human benefit (Wigglesworth) (DREW, 2002), presents how the human being directly interferes in the planetary balance, deliberately causing thermodynamic imbalances.

Thus, it proposes a comparison between an agricultural area, which uses a high degree of the use of pesticides, tractors, artificial irrigation, among other elements, in contrast to ecological agriculture. Camargo (2021), demonstrates that due to the high degree of external energy input in the areas of non-ecological agriculture, it ends up generating systemic imbalance in the spheres that surround it, and in some cases, these mechanisms provoke unpredictable responses, which arise at random, and may create new irreversible patterns.

That is, soils that have non-ecological management, in contrast to ecological soils, due to their technical and spatial organizational apparatus, measure greater energy exchanges with natural spheres, thus bringing greater instabilities, and often causing irreversible processes to the systemic set. In turn, ecological agricultural systems size structures closer to natural systems, causing little change in the dynamics that involve natural spheres in their processes.

According to Drew (2002, p. 146):

> The effects of agriculture on the environment relate directly to the scale at which it is undertaken. There are two aspects to consider: the intensity and degree of alteration caused in the soil and in the pre-existing vegetation; and the area where the change took place.

Therefore, it is a spatio-temporal question of easy understanding. The natural cycles of energy and mass function to some extent as closed systems, as nutrients are retained within the soil-vegetation system. Here the equilibrium is maintained unchanged, however, as agriculture deliberately transforms this dynamic, with the intention of manipulating certain aspects to obtain the maximum yield and foodstuffs, a large external energy input is then generated in the system, creating a lot of entropy in the agricultural processes. Therefore, Drew (2002) states that one of the traits of modern and intensive agriculture is the very high deformation of natural energy currents and the application of external energy to the earth.

The essence of this mechanism is in, when they import and export energy, linked to the process of agricultural production, energy development is achieved and, often, change in its cyclical characteristic that caused the energy that was sent to a subsystem, to return without high entropy rates (LORENTZ, 1996).

Therefore, when we compare both agricultural models, we will find different arrows of space-time, and in the form-content, linked to the agricultural areas of high yield, the arrow ends up presenting constant asymmetries.

According to Prigogine (2008), close to equilibrium, linear dynamics is possible, is the case of ecological agriculture, in which the cycles occur closer to that of semi-closed systems, with low loss rates, or low entropy, therefore, remaining relatively permanent. However, when the system receives a high degree of external energy, a non-linearity occurs, where new patterns emerge, new behaviors that would be impossible near equilibrium. Nonlinearity can thus describe new irreversible realities, generating within the system a differentiation from its outer universe. Far from equilibrium, matter acquires new properties, that is, from different probabilities of responses, caused by an energetic stress, the system can acquire a new irreversible pattern (PRIGOGINE, 2008).

The rule is: If an isolated system in equilibrium is disturbed, in the negative feedback, it returns successively to equilibrium and can control future operations in the system; however, in dynamical systems perturbations, linked to positive feedback, lead to the emergence of new possibilities, and, new levels of organization can be created, which give rise to new irreversible structures. An example, on a given scale, is the development of a ravine (PRIGOGINE and STENGERLS, 1984; Christofoletti, 1999).

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Thus, due to its spatial productive process, an open system can actively tend towards a state of higher organization. A feedback mechanism can reactively reach a state of higher organization, due to learning (positive feedback), that is, the information introduced into the system, coming from another subsystem, leading it to modify and evolve together with the new pattern that has been formed.

The arrow of space-time is thus associated with how the content forms develop, because depending on it, its asymmetry will be something common, and often exponential, collaborating to the constant imbalances that mark the Anthropocene.

c) Anthropocene: an evolutionary nonlinear response

In this section, we seek to demonstrate that the Anthropocene is linked to the emergence of chance by self-organization and increased complexity. Thus, we verified the proximity of our hypotheses with the studies developed linked to Earth Systems Science (ESS).

Defining the Anthropocene is still something very controversial, some consider it from the second world war, others from the Industrial Revolution, others from when man began to cultivate, and therefore ceased to be sedentary.

Thus, in this phase of our research, we will try to demonstrate that the Anthropocene is the result of the movement of exchanges of energy and matter with its means, this being a process and not an end, bearing in mind that the same has been forming over time, where new space-time dimensions, relative to the technical-technological environment of humanity, has been constantly intensifying planetary thermodynamic exchanges.

Therefore, and still seeking to understand the Anthropocene, we verified that this movement, if seen from the process of totalization of each form-content, due to its uniqueness, also demonstrates that it has its flows of exchanges between energy and matter relative to the very specificity of each place and, Therefore, each form-content will have its own thermodynamic characteristic, thus contributing, in a unique way, to the generation of the evolutionary totalization of society-planetary nature.

This means that there is a spatio-temporal evolutionary contribution proper to each form-content. There is the contribution of the areas of agribusiness, in a high degree of energy stress, and also of the areas of low spatio-temporal content of exchanges, where natural systems suffer little or almost no external energy input, such as ecological agriculture. Each one thus possesses a totalization relative to its space (its space-time).

This totalization, whether of the place or the planetary, can be understood from the application of the General Theory of Systems (BERTALANFFY, 1968), and can be visualized, for example, in a similar way to that explained by the Copenhagen experience, because each place collaborates in a unique spatio-temporal way with the totality in its totalization process.

Thus, the totality is here constituted of the society-nature integration, from the syntropy of the natural spheres (hydrosphere, lithosphere, atmosphere, biosphere and cryosphere) with the technological sphere (technosphere), which generates its totalization process. This process, interpreted by the principles of Prigoginian thermodynamics, believes that, depending on the degree of energetic stress that is involved in events that become dynamic, old patterns of natural organization (in any of the spheres) can be broken, generating the appearance of a new level of complexity at random, unexpectedly, reproducing the experience of Schroedinger's cat, explaining, too, the great state of disorder that "populates" the Anthropocene.

d) The Anthropocene

The beginning of the debate about the emergence of the Anthropocene occurred in the year 2000, when the Nobel Prize in chemistry Paul Crutzen, popularized the term Anthropocene that had been believed by Eugene Stoemer in 1980. For Crutzen, this new era had emerged from the analysis of air trapped in polar ice, which had a large concentration of CO2 and NH4. These analyses portray the accumulation of these gases, which coincided with the emergence of the steam engine created by James Watt in 1784, and which started the industrial revolution (MENDES, 2020). Therefore, many authors such as Pellogia (2015), relate this time to the beginning of this new geological-ecological era.

In defense of the emergence of the Anthropocene, from the industrial revolution, for Crutzen the pre-industrial societies did not alter in great magnitude the ecosystems nor did their economic and social productive forces alter nature so much (PAULA and MELLO, 2019).

In relation to the Industrial Revolution, we can warn that in the following three centuries the global population increased tenfold reaching six billion. The cattle population has risen to 1.4 million, producing methane gas and about 30 to 50 percent of the planet's surface today is exploited. As well as also, energy use has grown 10 times in the last century, causing 160 million tons of CO2 emission (MENDES, 2020).

To what was put in the previous paragraph, different issues could be raised, therefore, taking into account the constant network exchanges that exist on the planet, when we apply to these data the syntropic logic of the society-nature relationship, we will verify that new and greater energetic exchanges have arisen throughout the planet.

If we empirically verify climate change, and part of the processes that have been resizing old environmental realities, we will observe patterns that are

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part of a new set of properties, which represent the Anthropocene.

For this reason, and escaping from Cartesian fragmentation, the Anthropocene is energized in a non-structuralist way, but in an evolutionary way involving all spheres of the Earth, including, as Capra and Standl-Rast (1991, p. 11) teach, because there are no parts at all, only "patterns in an inseparable web of relations".

Another characteristic of the new geological-ecological era, and that goes beyond greenhouse gas emissions, is associated with some authors who, to define the Anthropocene, bring the idea of technofossils, resulting from the unprecedented combination of plastics, fibers, metals, concrete and pesticides, among other elements that are presented in the stratigraphy of the planet. For these authors, this characteristic is a direct result of the rapid growth of humanity in number and exploitation of natural resources and that has over the last three centuries grown exponentially (NASCIMENTO, 2020).

As an example, Cerreata et.al. (2019) state that the Anthropocene differs from other epochs because it is a chronostratigraphic unit, and that it is contained completely within human history. The elements generated by humanity have the potential to persist in the long term in the stratigraphic layers, resulting in a robust range of evidence from this geological-ecological period, delimited from the eighteenth century.

In its less structuralist reading, and corroborating our hypotheses, according to Vianna (2019), the new geomorphological landscapes would also be a characteristic of the Anthropocene, because human interference has expanded the surface processes of the relief, greatly increasing the rates of sediment transport, also unbalancing the flow of matter and energy between the continents and altering the surface water resources.

For Vianna (2019, p. 358), different anthropogenic evidences about the relief and stratigraphic layer are also related to various human activities. "Parameters include lake sediments, greenhouse gas concentrations, artificial isotopes produced by nuclear weapon detonations," among others.

For this author (2019, p.356), who relates the expansion of greenhouse gases on the planet with the new geological-ecological epoch, the main characteristics of the Anthropocene would be: "1) appearance and increase of anthropogenic deposits; 2) change in biota volume; 3) geochemical change in sediments; 4) climate change; and 5) catastrophic events."

Human influence on the environment has caused dramatic transformations due to the acceleration of our actions. This generated a series of spatio-temporal discontinuities, which led to the suggestion of the arrival of a new geological-ecological era. In this sense, corroborating our hypothesis, humanity would represent a driving force responsible for the exit of the Holocene and its arrival at the Anthropocene (FIGUEIREDO, et.al., 2020).

It is true that exponential economic growth, which links the development of modern science to Baconian logic and humus economicus, has increasingly made nature a hostage object of its valuation and exploitation. The dynamics of systemic exchanges, which involve the entire planet, ends up raising increasingly intense and achronic reformulations in space-time. They are always linked to much broader biogeophysicochemical processes than the dominant economic system can explain. Syntropy, born of the society-nature relationship, generated a new "natural" evolutionary systemic dynamic, filled with the artificial that became naturalized and that is the question.

The transition from the Holocene to the Anthropocene represents a radical discontinuity in natural flows, and demonstrates the planet's departure from expected behavior. Cearreta et.al. (2019), also believe that, from the Anthropocene, human action generated irreversible changes on the planet, changing the dynamics of the environment, where its consequences will be perceived for many centuries ahead (MENDES, 2020a).

The new era has, as well as a characteristic, the mark left by humanity on the earth's surface, making it humanized. Therefore, the transformations generated in natural systems, by creating non-existent patterns, also bring new species, structures, processes and natural forms that are installed and evolve, establishing new dynamics of varying proportions and scales (PONTE & SZLAFSZTEIN, 2019).

Affirming this perspective of innovation, generated from human action, Nascimento (2020), referring to the Anthropocene, presents the Covid-19 pandemic as a didactic element, which demonstrates the interdependence of humanity with nature; Drew (2002), states that deforestation is responsible for the emergence of new viruses; Letcher (2021), in turn, links the rise in global temperature to the emergence of Covid-19.

Therefore, our research approaches the planetary systemic view or Earth Systems Science (ESS). This vision involves the natural spheres, associated with the dynamics of the so-called technosphere (MENDES, 2020a).

We thus corroborate the concepts linked to the SSE. The ESS is based on the concept that the planet is a large system interconnected between physical, chemical and biological processes, maintaining complicated relationships that involve feedbacks, with transfer and transformations of matter and energy. Therefore, the transition from the Holocene to the Anthropocene represents a radical discontinuity in natural flows, going beyond linear causality. The

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technosphere today, for the SSE is hybrid, that is, it has syntropy dialectically integrating society and nature (MENDES, 2020a).

II. Final Considerations

We live in an environmental panopticon, fed by classical science so intensely that it is already part of a dangerous common sense of reality. Dangerous, because it is necessary to develop research escaping, both from the static sense of space, and in planning from the reading of a linear time. To think of nature as a repetitive and easily controlled element in the twenty-first century is fearful in the face of the necessary dialectical analysis of reality.

Our research found that the Holocene presented a relative stability, linked to little productive energy demand, however, from the last century, probably as a result of the interconnectivity of humanity with nature, increasingly the natural environment presented unpredictable and achronic phenomena, where chance is made, every day, more present in our lives.

The Anthropocene is itself this new reality, which has its genesis, a web of interconnectedness, which goes far beyond global warming and climate change. Being part of the totality, the atmosphere participates dialectically in all mechanisms of exchange, where the energetic demands happen, involving all spheres.

Ayoade (1986) defines climate as the usual succession of weather types and, therefore, the type of weather, is directly associated with different geographical factors, either in macro scale (Latitude, altitude, continentality, maritimity) or in the local scale. Therefore, the climate, being a component of the atmosphere, participates dialectically, along with the other spheres, in the mechanisms brought by the local influence of the technosphere. Where each place, through its arrow of space-time, effectively participates in the general processes of the planet.

Global changes are the result of a dynamic of complex human actions, involving all natural spheres, where the technosphere is a driving and dissipating element, thus generating flows of energy and matter, which have become naturalized, and which are part of our spatio-temporal evolutionary mechanism. Therefore, change is not only climatic, it is dialectically of totality.

In this sense, it is not only necessary to review the production process, adopting sustainable energies and technologies, but, however, to embrace a new scientific and conceptual perspective, which understands the planet as it really is, that is, a continuous spatio-temporal evolutionary mechanism, which self-organizes, determining its future often in an unpredictable way.

Recently, different patterns have been broken, not only climate changes, but ecosystems and water behaviors, have also undergone changes. These changes, even if hierarchical and fragmented, by the common sense of reality, demonstrate the joint evolution, and that has no end, where with each imbalance, a new order of (re)balance manifests itself spontaneously, evolving as a spiral of space-time, developing increasingly asymmetrical arrows.

This new planetary epoch, where disorder, and the generation of new patterns, is more present than in the Holocene, and which already presents empirical data of its existence, we call the Anthropocene.

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