An Acad Bras Cienc (2023) 95(3): e20221043 DOI 10.1590/0001-3765202320221043
Anais da Academia Brasileira de Ciências | *Annals of the Brazilian Academy of Sciences*
Printed ISSN 0001-3765 I Online ISSN 1678-2690
www.scielo.br/aabc | www.fb.com/aabcjournal

GEOSCIENCES

Reflections about the conceptual bases of Geotourism and its sub-segments Space Geotourism, Celestial Geotourism and Astrotourism to create a univocal definition

VITÓRIA SANTOS-SOUZA & BRUNO LEONARDO NASCIMENTO-DIAS

Abstract: The concept is part of the essence of a mentally represented element. The concept is part of the process of identification, categorization and description, which allows researchers to define and compare themes between two or more different categories. Following this idea, the main objective of this article is to establish a non-exhaustive reflection on the conceptual bases of Geotourism and its sub-segments Celestial Geotourism, Space Geotourism and Astrotourism. The main reason for carrying out this research is because there isn't a one definition yet for the terms. This is perhaps the reason for the conflicts that exist between the themes of this tourism practice and the three categories - Celestial Geotourism, Space Geotourism and Astrotourism. The methodology was developed through secondary sources and based on the results obtained, it was possible to identify and distinguish the most important concepts to establish a univocal operational definition for each term. Finally, it was possible to conclude that although there are conflicts, this happens due to the inadequate interpretative representation of the themes between the categories.

Key words: Geoheritage, tourism, space, celestial, universality, values.

INTRODUCTION

The concept is a mental representation of the meaning of a being or an entity, and this process is part of the identification, categorization and description activity. In other words, the concept is the essence of the object itself - concrete or abstract. In this way, in order to build and shape a well-consolidated definition, it is important that the conceptual bases are strong and consistent with the structure that is intended to be conceived. After all, the wise build their definitions on solid concepts like rocks, while the ingenuous build their definitions on sand. This is the motivation of this research, that is to say, to try to develop a definition based on solid concepts about Geotourism and its 3 sub-segments Celestial Geotourism, Space Geotourism and Astrotourism.

This research is justified, because although Geotourism is considered a consolidated field that enjoys autonomy, there is still no universal definition for this term (Dowling & Newsome 2006), as will be presented throughout this work. In reality, different authors - in different countries - keep trying to provide different definitions about Geotourism, but all these countless attempts have their conceptual bases built in sand, that is to say, they have their weaknesses and are inadequate.

Thus, our main objective is to develop a critical and reflective analysis of the conceptual bases of Geotourism, following the crucial

assumptions that surround this field, to establish an adequate generic definition based on operationalism for Geotourism and its 3 subsegments - Celestial Geotourism, Geotourism Space and Astrotourism. It is important to emphasize that the task here is to explore the Tower of Babel and not to deplore its existence. Thus, based on the experience of mistakes and gaps that exist in the various attempts to define Geotourism, we will seek to circumvent and build a solid generalist solution, which is capable of winning where all other alternatives have succumbed - the same process will follow for the terms Celestial Geotourism, Space Geotourism and Astrotourism.

The methodology to develop this investigation is based on the concatenation of historical aspects, which were involved with the progress of the practice of alternative tourism to the origin and propagation of Geotourism activities. Briefly, the methodological processes were developed based on secondary sources and carried out through a documentary survey of books and scientific articles, triage of material and content grouping of works with relevant information for this research.

Finally, it is expected that the results and analyzes developed in this scientific work can contribute to the progress of the field of Geotourism, providing a more adequate and, mainly, distinguishable definition between its sub-segments Celestial Geotourism, Space Geotourism and Astrotourism. After all, this is important, as tourism is one of the activities that most generate capital worldwide (Sadry 2009), and both Astrotourism and Space Geotourism are increasingly popular (Sadry 2020) not only by the media, but, nowadays, by the generation of tourists and scientists of this 21st century.

METHODS

This is an exploratory research that has a qualitative and theoretical approach, in which the conceptual bases that serve as the infrastructure for the term “Geotourism” and its 3 subsegments “Celestial Geotourism”, “Space Geotourism” and “Astrotourismobservations of atmospheric/celestial phenomena. So, Astrotourism reveals itself as a tourism”. The entire methodological process was developed from the collection of informational data through secondary sources, that is, from the works of other authors. The reason for this choice of methodology is due to the fact that we seek to understand the aspects that forge the field of Geotourism, and the different perspectives that exist in the literature among the authors. For the development of this methodological activity, the following steps were followed:

- Documentary survey of books and scientific articles,
- Triage of material and eligibility
- Grouping of selected materials
- Compilation of information from works relevant to the theme.

In the first stage, therefore, a search was made for scientific works - books and articles - in the field of Geology, Tourism, Sociology and the Heritage area (conservation and preservation). The entire documentary survey of scientific articles was carried out using search tools on the main platforms Scielo, Scopus, Elsevier and Thomson Reuters. On the other hand, the books that were part of the composition among the materials to be evaluated were obtained from the references at the end of some scientific articles, and the other part was acquired through a search on the Springer and Cambridge platforms, both book publishers scientific.

In the second stage, the screening process of all materials collected from the scientific

documentary survey was elaborated. The triage was developed based on inclusion and exclusion criteria. First, the potentially eligible contents were separated. For this, were chosen as inclusion criteria, all materials that had the keywords: Geotourism, Geoheritage, Space tourism, Celestial tourism, Astrotourism, Space Geotourism, Celestial Geotourism, Geoconservation, Preservation. Each term was added to search engines separately one-by-one. Based on this first screening, then, a new analysis based on exclusion criteria was developed. The reason for this procedure is due to the possibility of finding titles or repeated works, as well as contents that do not necessarily fit with the context of the research being developed. Thus, through this last analysis, the eligibility stage was carried out, that is, from the final result of the selection of books and scientific articles that were consistent with the interests of the research, in short, the materials were selected to be used for the construction of this scientific article.

In the third stage, the selected materials were grouped and separated by their respective thematic areas: (1) Tourism; (2) Geotourism; (3) Celestial Geotourism; (4) Space Geotourism and, finally (5) Astrotourism. This methodological process was intended to simplify the comparison between the different perspectives that exist for different authors on each term. Thus, it was possible to build a historical content to develop our comparative analyzes from these secondary sources. The main authors who contributed to forge the theoretical framework of this work were Thomas Hose, Bahram Nekouie Sadry, Ross Dowling, David Newsome, Murray Gray, Anze Chen and Carl Cater.

Finally, in the fourth and last stage, information on each of the 5 thematic areas was compiled, in which data from different authors was gathered. After this compilation, a record was made to facilitate the interaction between contents and even contribute to the development of a comprehensive discussion without generating misunderstandings and confusion - both factors were found in several literatures.

RESULTS AND DISCUSSION

A brief contextualization of the general aspects from Tourism to Geotourism

The voluntary and temporary displacement of an individual or group of people, through a trip, in which the visit to a place other than their residence is established - whether regional, national or international - for a few hours up to a period shorter than a year is characterized according to the World Tourism Organization (WTO 1993 p. 93), as an act of tourism. In other words, tourism is a human social activity, which presupposes temporary and limited visitation to an environment other than where the person lives.

Based on this perspective, the tourist would be considered a person who develops the practice of traveling by visiting places other than the one where he has established his residence. However, what would be the difference between a *traveler* and a *tourist*? According to Mário Baptista (1997), "*it is not easy to define a tourist, as it is an individual traveling whose decision was taken based on perceptions, interpretations, motivations, [...] related to psychological, educational, cultural, ethnic, economic, social and political.*"

Well, this perspective is not totally false, because the practice of traveling is really common for both a *traveler* and a *tourist*. However, evaluating more carefully, it is possible to say that every *tourist* is a traveler, but not every *traveler* is a tourist. In other words, a *tourist* necessarily needs to travel for his tourist

visit, so a *tourist* is also a traveler. On the other hand, a *traveler*, despite also carrying out the act of traveling, traveler displacement is not always "voluntary", in other words, the process of this activity can develop for work reasons or some kind of health emergency. Thus, a *traveler*, even making trips to places other than his residence, is not necessarily a tourist. After all, being in a hospital room in another state cannot be considered tourism. So not every *traveler* is a tourist.

In this way, tourism has as its essence the establishment of the act of traveling to visit an environment other than the person's residence for a limited time, with the aim of contemplating the local landscape, whether for leisure and fun or in search of *enculturation*. However, how does this process of *enculturation* develop from the practice of tourism? Can *enculturation* through tourist practices contribute to awareness and sensitization of people about the need to preserve and conserve these visited environments?

First of all, in order to adequately understand the *enculturation* process based on tourist practices, it is necessary to understand the concept of culture. Although culture is knowable, its definition is not, at least there is no universal definition that is capable of covering all perspectives of different aspects that exist involving this term. However, it is possible to conceive a generalist concept of culture, as a process of human social formation based on a combination between the personal interpretation of reality and the representation of global demands. The Austrian philosopher Ludwig Wittgenstein (2019) would probably agree and compliment by saying that "*the ends that the cultural subject intends to achieve are identical to the ends of the collective organization in which he is inserted*."

In other words, the experience and contemplation that an individual is subjected to by a set of social factors - including rules and normative standards - contribute as part of their personal training on their way of representing and interpreting the world. This socio-anthropological process, then, stimulates understanding about beliefs, customs, ways of acting and the principles of one or more social groups that exist spread across the six continents of the Earth. Thus, culture is a human social phenomenon.

Enculturation, then, is the process of merging part of the cultural aspects coming from a social group "A" with part of the cultural values coming from an individual or another social group "B". It is important to highlight that the adoption of part of external cultural values does not entail the loss of original personal values, as they are - all or part of them - kept preserved during the *enculturation* process. But, how could the process of *enculturation* be developed from the practice of tourism?

Assuming that the practice of tourism, in addition to promoting contemplation of the local landscape, also provides the tourist with an experience of local social factors - beliefs, customs and even the way of acting - providing the revival of local cultures. Therefore, it is possible to say that tourism is a human social activity that enables the human social phenomenon of *enculturation*. After all, the tourist is immersed in the local culture, being able to experience and "nourish" it.

In addition, it is important to enhance that modern tourism is no longer related only to urban visits - classic tourism - with the aim of getting to know cities like Paris, Copacabana, Tokyo, Athens and New York or coastal regions in search of leisure. According to Tadini & Melquiades (2010, p. 11), currently, tourism has become an activity that people also seek

to obtain cultural experiences, from visits to museums, historic centers, natural parks, among other activities. It is possible to say, then, that the practice of tourism can contribute to the process of *enculturation*. However, is this *enculturation* obtained through tourist practices capable of providing awareness and sensitization of people about the need to preserve and conserve these visited environments?

The French sociologist Marie-Françoise Lanfant would probably respond by saying that: "*today, tourism practices are gradually being developed based on respect for the differences in identity and authenticity of the host communities, just as they also seek to take greater care with the preservation of the visitation environment* (Lanfant, 1980)". Intrinsically, this is a perspective of tourist activity that develops based on aspects of ecological, economic and socio-cultural sustainability.

Well, the habit of preserving and conserving can be built by the practice of tourism, as an emerging aspect of enculturation, if during the visitation period there are activities that can give the tourist an affective attachment, a connection with the place of tourism. So, this process will be responsible for establishing the connection between the tourist's personal values and the global representation of the intrinsic values of the visitation environment. Thus, the individual starts to consider this place and everything in it, as a heritage that needs to be preserved.

Thus, sentimental attachment and affective memory are essential factors that need to be stimulated so that it is possible to sensitize tourists about the need to develop a conscious and sustainable visitation practice. Conscious tourism sustainability presupposes valuing the present without compromising the future, that is, visitation and the search for an experience of what is different today, need to establish the contemplation of local tourist values without putting at risk the possibility of future visits .

Thus, the process of enculturation is - and needs to be - involved with the sensitization and awareness of both tourists and local residents. After all, residents also need to be aware of the cultural aspects of the place where they live, because without emotional attachment on the part of these people, the acculturation process would be more likely to occur and it would be more difficult to preserve the entire visitation structure, such as the own local cultural aspects.

This modern tourism practice is considered as "alternative tourism" by Marie-Françoise Lanfant, in which the stimulus for tourist visits is provided together with initiatives of mutual accountability in favor of the quality of the product offered. In other words, it requires finning-tune on the part of the population that seeks it (Lanfant & Graburn 1992). Also according to the French sociologist, this transition was consecrated by the Manila Conference, in which the promotion of a new concept of tourism was valued.

It is also important to highlight that UNESCO started to recommend, as an ideal tourism practice, activities that provide a tourist experience that enable respect for local populations and visitation conditions that make it possible to safeguard cultural and environmental heritage (Unesco 1997). This is a very similar conditional perspective, after all, the tourist who seeks visitation in search of enculturation probably wants to find a living culture and preserved natural resources. But, how can abiotic factors be conceived by this "alternative tourism" as a tourism practice? How can the practice of tourism based on abiotic factors contribute to the establishment of environmental preservation and conservation?

As for the first question, Portuguese tourismologist Graça Joaquim (1997) would

answer by saying that: "*the new forms of tourism (NFT) agree that adequate and non-aggressive tourist activities establish visits that favor the contemplation of biotic and abiotic nature so that the relationship between the visitor and the environment visited does not pose risks to the place of visitation.*" The NFT, then, are the reflection of a growing concern with environmental changes.

In this way, these NFT practices establish that tourist resources, whether natural or cultural, are now considered as common heritage of humanity due to their various values - intrinsic, cultural, aesthetic, economic, functional, scientific and educational (Reynard & Brilha 2017, Gray 2004). In other words, responsible and alternative tourist activities must be carried out through visitation without wear and tear and without degradation of the visited environmental values.

It is important to highlight that economic growth is neither minimized nor absent from the alternative NFT perspective. After all, it is argued that only with the development of economic activities is it possible to invest locally in conservation and preservation, both natural and environmental as well as socio-cultural. However, how can these tourism practices based on abiotic factors contribute to favoring environmental preservation and conservation?

Geologist Thomas Hose (2006), would respond by saying that: "*the abiotic environment has always attracted visitors, but it was only in recent years, with the advent of global environmental awareness [...] that geological attractions have become better known.*". The geologist further argues that: "*since the mid-1980s, heritage tourism has been a positive agent in the interpretive development of the UK, aiming to make its places meaningful to visitors.*"

In other words, visiting abiotic environments through heritage tourism is an activity that gives tourists meanings, which connect with the personal values of these individuals. This whole process causes these tourists to have an affective attachment and recognize the global representation of the abiotic values of the visitation environment. Based on this perspective, Geotourism was created, a term coined by Thomas Hose in 1995 promoting the highlight of this tourism practice, which covers aspects of geological heritage. But what is Geotourism and how can this practice contribute to favoring environmental preservation and conservation through its activities?

First, it is necessary to reflect on the term "Geotourism", because as stated by Dowling & Newsome (2006): "*There is no universally accepted definition of geotourism.*" Geotourism is mistakenly considered, in general, as a segment based on nature tourism that complements ecotourism. This conceptual basis is flawed, as "eco" encompasses both biotic and abiotic contents, but Geotourism is constituted "only" by abiotic factors as the main attraction. In other words, although fauna and flora are present in the tourist scenario, the representation of Geotourism includes geological structures as its protagonists.

This mistaken perspective is visible, for example, in the "definition" adopted by the Geological Society of Australia, on its website, which states that geotourism would be: " *[...] tourism that focuses on the geology of an area and landscape to provide to the visitor engagement, learning and pleasure (Joyce 2007).*" This perspective, although valid, is not entirely adequate, as it does not distinguish between biotic and abiotic landscape factors. This is a serious problem. After all, fauna and flora are factors that gain a lot of visibility, while the abiotic factors that sustain the entire

biodiversity go unnoticed in the eyes of less perceptive tourists.

On the other hand, Malaysia according to Komoo (1997 p. 2973), in its "definition" expresses that Geotourism would be an act of geological conservation at the same level of importance as the conservation of biology. This conceptual base construction, although not yet fully adequate, is more sensible. After all, the distinction between biotic and abiotic factors is noticeable, in addition to proposing the need to visualize the geoconservation conditions of the visitation environment.

In China, for example, Geotourism was defined in 1985 as "*Earth-science tourism that has the objective of finding, evaluating, planning and protecting natural and cultural landscapes, relics with tourist value, and discussing their causes of formation and historical evolution based on Earth scientific theories and methods [...] with the aim of promoting the development of tourism* (Chen & Li 1985)." The concepts that forge the basis of this conception about the activity of Geotourism, prove to be quite favorable, as it explains both the protection aspects and expresses that they have values. However, here it is not possible to distinguish, as in the Australian version, what natural landscapes are. In other words, the abiotic and biotic factors are again condensed and the abiotic aspects are made invisible by the fauna and flora.

So how to solve this problem? After all, what can be said about the universality of a definition for Geotourism? This problem would lead us, strictly speaking, to seek solutions through objective conceptual schemes, in which the solution factors must develop the expansion of the extension of the representations involved in a given situation or even for different situations. This is a thorny philosophical path that will be circumvented here, postulating a conceptual basis considered operationalist. For this procedure, the 3 key points that are part of most attempts to define Geotourism were collected:

1) Representation of abiotic nature as the main attraction;
2) Interpretations of the geological heritage, its values and meanings;
3) Conscious, responsible tourism that can favor the preservation and conservation of places to visit.

Thus, based on these 3 assumptions, it is possible to answer part of the second question, "What is Geotourism? We argue here that an adequate generalist definition of Geotourism must contain this conceptual basis. Our attempt here to express the practice of geological heritage tourism or Geotourism would be: *A conscious tourism about the representation of abiotic nature, which promotes the interpretation of the meanings and values of geological heritage, both for individuals who practice science and for non-practitioners of accessible way, stimulating sensitization and awareness of the need to preserve and conserve the geological spaces visited for future generations*.

In particular, our definition is intended to provide a suitable operational alternative to all other attempts that have succumbed in some way to trying to provide a "universal definition". We, on the other hand, only suggest a generalist definition based on operationalism, from which it is possible to extract all the others. After all, this proposed definition starts from the 3 assumptions that are congruent - in some way - with all the other incomplete alternatives.

Now, in possession of a generalist operationalist definition of Geotourism, is it possible to answer another part of the second question, about how Geotourism can contribute to favoring environmental preservation and conservation through its activities?

Well, it is possible to notice clearly that this practice favors the preservation and environmental conservation, as it promotes sensibilization and awareness through enculturation, providing the adequate interpretation of the meanings and values of the geological heritage to the tourists who carry out the visitation through the Geotourism activities.

Particularly, our definition not only answers this question, but is also adequate to other factors, for example, Thomas Hose would say that: "*the success of Geotourism depends on identifying and promoting its physical base, knowing and understanding its user base and, perhaps the most difficult , but most importantly, to develop and widely disseminate communicatively competent interpretive means.*" It is possible to perceive these factors of Hose, in the excerpt of our definition "[...] *promotes the interpretation of the meanings and values of geological heritage, both for individuals who practice science and for non-practitioners in an accessible way* [...]" . Indeed, this is a crucial point, as Hose (1997) states that: "*An interpretive strategy such as geotourism, in interface with formal (school and university) and informal (adult education and interpretive offer) educational environments, can potentially generate the political pressure necessary for the protection of Geoheritage*"

Finally, other important points about Geotourism contempled by our definition are also expressed by the social scientist Sam Ham (1992 p. 3), when he says that Geotourism is an activity that: "*translates the technical language of a natural science or a related field in terms and ideas that people who are not scientists can easily understand [...] in a way that is fun and interesting for them.*" Still according to Light (1995 p.132), these activities - of Geotourism - stimulate and awaken both imagination and curiosity, contributing to the satisfaction of visitors, as well as expanding the meaning for the tourist about the visited heritage.

As Geotourism is an activity that promotes the representation of the abiotic nature of geological aspects as a main attraction, what would be "Space Geotourism", "Celestial Geotourism" and "Astrotourism"? currently developing?

Celestial Geotourism

The sky, the sea and the land are components of abiotic nature that cause admiration in most people - perhaps in all. After all, who has never stopped to contemplate the moon and the starry sky on a cloudless night or the beautiful blue hue of the sky on a sunny day, enjoy the smell of the sea or delight in the sound of waves on a beach while resting. All these are activities that can be developed during tourism practices. But, what about the land? Where are the activities involving contemplation of the earth? How are the activities involving the land?

For many people the earth is just a small grain of silicate, in which its unity is barely visible, without grandeur and practically insignificant. However, the set of these tiny grains forge the entire coastal part of tourist environments such as sand dunes and beaches in coastal regions. In particular, in Rio de Janeiro it is possible to contemplate all the geotouristic beauty of rocky structures such as the Morro do Pão de Açúcar. These are some examples of activities that involve the contemplation of the land as a tourist practice. But, could the contemplation of geological factors be more enriching when concatenated with celestial aspects?

Geotourism can be enhanced when astronomical factors are linked to its scenario. In other words, the appreciation of geological factors can be more enriching when contemplated together with celestial aspects. Thus, the possibility of watching the sunrise or

sunset, while feeling the warm soft sand and the beach breeze, or when we watch the occurrence of a lunar eclipse - commonly known as the bloody moon - while contemplating the beauty of Corcovado and the Pão de Açúcar (Figure 1), are all practices that increase its aesthetic value and geological heritage. All these activities are linked to Celestial Geotourism. But what would Celestial Geotourism be?

According to the geographer, Bahram Nekouie Sadry (2020), Celestial Geotourism would be a practice composed of activities that provide contemplation of celestial aspects, such as the observation of meteor showers, observation of bolid, lunar and solar eclipses that occurred within geoparks, celestial geosites, national parks, or in an urban environment free of light pollution. In other words, the observation of planets, "falling stars" or even clouds, in environments where there is an interpretation focused on the geological heritage are activities that are part of Celestial Geotourism.

Furthermore, according to Sadry (2020), "astronomical objects are geo-objects (space/planetary geological objects) and are abiotic objects based on the nature of the universe". This perspective, in which astronomical objects are geo-objects, was suggested by Sadry (2009), when he proposed that celestial phenomena and planetary/spatial geological histories are geotourism resources. This statement is pertinent because, in fact, it is a reality that several components of the Earth's atmosphere are determinant for the formation of different climates and the observation of abiotic phenomena. Furthermore, it is certain that the geographic location favors the observation of certain constellations and celestial phenomena. In this sense, according to Chen et al. (2015), atmospheric, meteorological and climatological resources can also be considered geotourism resources, further expanding the number of activities that can be generated from Celestial Geotourism. So, based on the examples and information cited, what would be the definition for space geotourism?

Again, for this procedure, 3 key points will be used that are part of what could be considered a conceptual basis that can support the formation of a definition considered operationalist. So, we have to:

Figure 1. Lunar eclipse on Botafogo beach, image captured from Kiko Fairbain. Legend: Lunar eclipse in the spotlight (label a) and Mars together with lunar eclipse (label b).

4) Joint representation of geological factors as the main attraction and which are complemented by celestial aspects;
5) Interpretations of their values and meanings of geoheritage factors;
6) Conscious, responsible tourism that can favor the environmental geoconservation of the place visited.

Based on these 3 assumptions, it is possible to arrive at a logical syllogistic solution on an operationalist definition adequate to Celestial Geotourism, which would be expressed as: *A conscious tourism activity that seeks to promote the main attraction is the landscape representation of the set of geological factors potentiated by the association with celestial phenomena, in order to warn about the impacts caused by anthropic action on Earth, through the interpretation of the values and meanings of geoheritage factors in a way that is accessible to all*.

Therefore, based on this definition of Celestial Geotourism based on operationalism, is it possible to say that Celestial Geotourism would be able to raise awareness about the impacts of man on the conservation of the atmosphere and its relationships with life?

Well, this practice has as a conceptual basis in one of its assumptions the attempt to warn about atmospheric pollution and its consequences for human beings and ecosystems, with the aim of making visitors aware of the growth of air pollution and the impact of their actions, favorable or unfavorable, to the conservation of life on Earth. Thus, it is expected that through interpretive activities, Celestial Geotourism supporters reflect on their role in the permanence of life

According to Tilden (1957), one of the principles of interpretation, whether of an object or a place, is to generate feelings such as interest and curiosity in the visitor. According to Pacheco (2012), "there are difficulties in sensitizing the public" from themes such as celestial geotourism. In other words, geodiversity would not provoke emotional attachment or affective memory in visitors, as occurs with other tourist activities. Therefore, Geotourism would not be able to make tourists reflect on their role in environmental preservation and conservation.

However, Chen et al. (2015), would probably contest this perspective by saying that interest in observing and understanding the immensity of the heavens is not exclusive to the 21st century, it is a very ancient heritage that began at least 5000 years ago. Thus, celestial geotourism, which following the definition *provided is the contemplation of the set of geological factors potentiated with the association of celestial phenomena*, based on Chen's objection, seems to invalidate Pacheco's arguments. Incidentally, Chen's answer seems beyond plausible to also be able to explain the great interest that human beings show in observations of atmospheric/ celestial phenomena. Even Fayos-Sola & Marin (2014) would complement by saying that Celestial Geotourism "*... is probably one of the most effective ways to bring tourism and tourists closer to nature for an understanding of the systems of the physical and dynamic world*".

Thus, it can be said that Celestial Geotourism, by concatenating geological factors to celestial phenomena, is able to contribute to affirm that Celestial Geotourism would be able to raise awareness about the impacts of man on the conservation of the atmosphere and its relationships with life.

Space Geotourism

Space, this may be the final frontier for humanity. Looking up, it is possible to observe the infinite and silent Universe. Throughout our history, philosophers, scientists and artists seek to express all our admiration and curiosities about

space. In 1957, when the space age began, each individual in this pale blue dot began to reflect a little more on their place in the midst of this vast cosmic ocean. After the first humans were sent - successfully - to the Moon, our perspectives and concerns were expanded beyond Earth's orbit.. We began to question ourselves, for example, about the probability of other civilizations existing on other worlds - perhaps the same or perhaps completely different from ours. At last, we began to make our journeys in the stars - traveling the vast galaxy where no man has gone before - in thoughts during the day or in dreams during the night.

However, these journeys outside Earth that were considered only science fiction, perhaps, will actually be possible very soon. In the middle of the 21st century, we will have the possibility of starting to explore the frontiers beyond Earth's orbit through space tourism. But, what would be the practice of space tourism? According to Carter & Garrod (2015), this is a practice that is divided into flights within the Earth that simulate microgravity environments at altitudes between 20 km and 100 km, as well as flight activities outside the Earth's orbit through visitation. to space stations.

It is worth reflecting that this practice of space tourism gained more notoriety in 2001, when multimillionaire and former NASA engineer Dennis Anthony Tito, aged 60, became the first space tourist to spend eight days on board. of the International Space Station (ISS). It is important to mention that these space tourism practices are not related - momentarily - to visiting other planets in the Solar System itself, for example, Mars. In other words, space tourism visits are limited to short spaceflight trips. Among the main companies that are training and improving their structures to provide this type of space tourism activity, it is possible to list SpaceX, Blue Origin and Virgin Galactic. But what would space geotourism be then? Furthermore, would this practice of spatial geotourism have any favorable or unfavorable relationship with issues related to environmental preservation and conservation?

As for the first, according to Sadry (2020), spatial geotourism would be a practice composed of activities that provide the contemplation of geolandscapes from terrestrial space, giving the tourist the feeling of visiting an "extraterrestrial environment", in other words, that have environmental configurations analogous to other planets or regions of the Solar System - the Valley of the Moon in the Atacama Desert in Chile (Figure 2) would be an example of an analogue of Mars.

It is important, therefore, to highlight that these environments are also used with scientific space activities and also, due to this, increases the value of "space tourism" or more properly, space geotourism. Toivonen et al. (2017), enlarge so much more the number of activities that would be part of space geotourism, saying that visits and tours in planetariums, attractions such as space launches at Cape Canaveral, in the region of Brevard, in the state of Florida would also be part of this tourism practice. So, based on these examples and information, what would be the definition for Space Geotourism?

As will be followed in all analyses, the procedure here will also be developed starting from 3 critical points that could be considered as the conceptual bases for the formation of an adequate operationalist definition. Thus, we have to:

7) Joint representation of geological factors or geographic spaces that are associated with spatial aspects as a main attraction;
8) Interpretations of their values and meanings of abiotic environmental factors, associated with space mission factors or astronomical aspects;

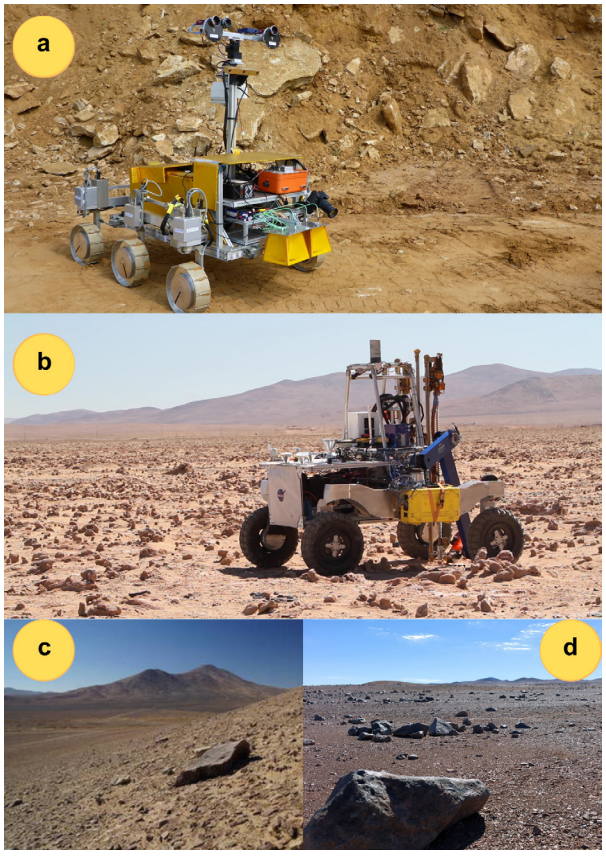

Figure 2. Valley of the Moon used as an analogue environment of Mars. Legend: label (a) SAFER field test rover from ESA. label (b) The ARADS rover from NASA's Ames Research Center image from Victor Robles. label (c) and (d) are the different perspectives from Valley of the moon from NASA and ESA.

9) Responsible tourist activity, which seeks to establish itself without causing wear or degradation of its tourist resources.

Based on these 3 assumptions is possible to arrive at a logical syllogistic solution on an operationalist definition suitable for spatial geotourism, which would be expressed as: *A responsible tourism activity that is promoted trying not to cause degradation of its tourism resources, in which the main attractions are representations of geological factors or geographic spaces associated with aspects of space missions, astronomical factors of terrestrial environments, and which are interpreted as analogous to extraterrestrial environments, with invaluable heritage values and meanings.*

Based on this definition of spatial Geotourism based on operationalism, is it possible to say that spatial Geotourism would have any favorable or unfavorable relationship on issues related to environmental preservation and conservation?

This practice is conceptually based on not producing wear or degradation of its tourist resources. So, assuming that the contemplation of the Earth itself is an observation activity carried out from outside our own planet, through space travel to space stations, it is possible to consider this process as part of Space Geotourism. Therefore, this practice should and would need to provide awareness about the need for preservation and conservation of the Earth.

After all, observing the blue of the oceans, the green of the vegetation and its entire planetary structure would be part of the main attraction. Therefore, both biotic and abiotic environments present on Earth could not or should not be devastated or human beings would lose much more than just a tourist attraction.

Independently of there being billions of stars that have billions of other planets - called exoplanets - revolving around those stars, and it being possible to carry out these space travels. Our technology still does not allow us - with total security - to develop long-term trips, our most distant destination so far has been the Moon. So our planet remains the only place where human beings are capable of residing without spacesuits or relying on artificial structures to ensure their survival. Thus, it is expected that within the normative standards of spatial Geotourism, awareness factors can be established that favor the expansion of responsibility that everyone has for their actions to preserve and conserve this pale blue dot.

Astrotourism

Even as a child, after our maturity as an adult, darkness is a disturbing factor that causes us great discomfort. The reason for this is simple, the unknown bothers us. Ironically, it is our destiny to live looking at the night sky and be confronted with a dark Universe, despite the fact that there is a background full of dots of billions of distant stars. We are bothered by the darkness and the immense silence that spreads throughout the Universe, reaching us every night, making us reflect on whether we could be the protagonists of a cosmic drama. After all, in the midst of the unknown, what would be more frightening, being alone in the Universe or there being countless other civilizations out there that are more advanced than us and that could dominate us in the future?

All these yearnings come from the accumulation of our astronomical observations carried out over the centuries, after man and the Earth have been removed from the center of the Universe based on the observational data of Galileo Galilei (1564-1642). Subsequently, the Sun itself, in the 19th century, ceased to be considered the center of the Universe, and came to be seen as just another solitary star among many others that exist in our galaxy and which is located on the periphery of one of the arms of the Milky Way galaxy.

The astronomical observations that made it possible for Galileo Galilei to reveal that other celestial bodies had as much right to be "worlds" as the Earth, with mountains, craters, atmospheres, polar ice caps and clouds, became the basis for both the beginning and continuity of scientific observational practices as for the development of amateur observational practices - looking at the sky as an act of contemplation of astronomical aesthetics. Anyway, knowledge is preferable to ignorance. From this principle and from the concatenation of all the mentioned factors, Astrotourism emerged as a tourism practice that promotes both the contemplation of the sky and favors the development of educational and scientific activities.

According to Fayos-Sola & Marin (2014) "*Astrotourism has become tourism that uses the natural resource of the night skies*" and this finding is complemented by Bahram Nekouie Sadry (2020), saying that Astrotourism develops at from use: "*appropriate scientific knowledge of Astronomy, culture or environmental activities for the development of its activities.*"

So, as is noticeable and also as pointed out by practice that is based on activities related to the contemplation of the sky, but that uses resources from the scientific knowledge of Astronomy to provide adequate conditions for this tourism practice, in which the landscape is the sky itself . In other words, it is necessary to know "where", "what to look at", "what is being observed", besides obviously "how to observe", and for all these factors a minimum knowledge of Astronomy is required.

It is necessary to know at least the concepts of Astronomy, so that a higher quality contemplation is provided during the practice of Astrotourism. Therefore, this is an activity that can also be considered as a practice that provides educational activities. After all, Mathematics content such as basic geometry, Geography content such as the cardinal points, Physics content such as types of lenses for cameras and telescopes, among many other factors, are just some of the examples found immersed in this tourist activity, and which could be used by schools and even even by Universities as extension activities.

In these cases of teaching, education and scientific popularization, both teachers and tour guides need to have skills that allow them to develop appropriate and "meaningful" Astrotourism practices. Tourismologist

John Veverka (1998) would argue that: "*the effectiveness of the interpretation depends on the monitor being able to maintain the interest of the visitor, and establish a connection of its message to the daily life of the public in a creative and memorable way*". So, in activities where there is a tourist mediation professional, this person needs to be able to provide content that establishes connections with the representative reality of tourists or students. Otherwise, part of the information may be lost due to lack of understanding and proper interpretation by the recipients - tourists or students. But, how could Astrotourism be a sub-segment of a tourism practice, such as Geotourism that promotes the representation of the abiotic nature of geological aspects as a main attraction?

Regarding this, Chen et al. (2015), states that astronomical resources are Geotourism resources, or in their words, would be an "Earth science tourism". Now, this perspective seems to be plausible, after all, several astronomical processes such as rainbows, observation of meteor showers and observation of bolides are observational activities provided due to the Earth's atmospheric processes. Other examples would be lunar and solar eclipses, but, in particular, the solar eclipse can be seen as a phenomenon of Astrotourism that is related to aspects of Geotourism, since observation is dependent on geographic factors. So, all these and many other Astrotourism observational practices depend on geological infrastructures, or geographic positions to be contemplated.

In addition, based on the syllogistic principle proposed by Chen and assuming that it is possible to use tourism configurations by analogical representations, activities such as trails in the Death Valley desert in Arizona, or trips to the Valley of the Moon in Chile (Figure 3), The Namibian Desert, the Outback Desert in Australia and the arid northeastern hinterland in Brazil are all environments that have some particularities that can be associated with

Figure 3. The sculpture in the shape of a hand, 11 meters high, which was builded by Chilean artist Mario Irarrázabal, encrusted in the Atacama Desert (Chile), image captured from Kiko Fairbain.

similar terrestrial environments in relation to other planetary environments, such as Mars or the Moon, for example.

In addition, there is the famous Yellowstone park that also provides both Geotouristic and Astrotouristic activities. After all, this park is a place known for having hydrothermal vents full of organisms considered extremophiles, and they are important for the field of Astrobiology, as they are often compared as candidates that could survive and exist on other planets.

So, as is noticeable and also as pointed out by Fayos-Sola & Marin (2014), Astrotourism has no connection with the idea of being, in their words: "*an activity related to people paying in search of becoming travelers to go to space in search of recreation*". Indeed, this is a tourism practice that is now being promoted by Space Geotourism. So, what would be the definition of Astrotourism that distinguishes it from other practices such as Celestial Geotourism and Space Geotourism?

Once again, for this procedure, 3 key points will be used that are part of what could be considered a conceptual basis that can support the formation of a definition considered operationalist. Thus, we have to:

10) Joint representation of astronomical aspects that can be complemented with geological factors as the main attraction;
11) Interpretations of their values and meanings of astronomical phenomena that may be related to geoheritage environments;
12) Sustainable tourist practice that respects cultural and environmental heritage.

Based on these 3 assumptions, it is possible to arrive at a plausible logical answer about an adequate operationalist definition of Astrotourism that would be expressed as: *A sustainable tourist practice based on the values and meanings of astronomical phenomena that may be related to geoheritage environments, in which the representation and interpretation of astronomical aspects must be promoted in an accessible way for any individual, with the aim of favoring the establishment of respect for local cultural and environmental heritage.*

It is important to point out that this definition is only intended to provide a more adequate operational alternative than those that exist in the practice of Astrotourism. In other words, it is not the objective here, such as no expect this definition to be considered an absolute truth, on the contrary. The intention here is to offer a definition that can serve as a solid initial building block, which does not lead to misunderstandings with other nearby and very similar areas such as Celestial Geotourism and Space Geotourism.

Now, in possession of a generalist definition of Astrotourism based on operationalism, is it possible to say that this tourism practice can contribute to favoring environmental preservation and conservation?

Well, although it is not as clear as in the other terms - Spatial Geotourism and Celestial Geotourism. However, this practice is conceptually based on one of its assumptions, respect for cultural and environmental heritage, in which the objective is to develop sustainable practices that do not cause wear or degradation of the visitation site. Thus, it is expected that within the normative sustainability standards, abiotic factors will also be respected by Astrotourism adherents.

Astrophysicist Carl Sagan would argue in favor of activities coming from Astronomy, probably highlighting their power to develop experiences that create humility and awareness in each of us, as he describes in his work *Pale Blue Dot: A Vision of the Future of humanity in space* (2019):

> "Earth is the only known world to date that harbors life. There is nowhere else – at least in the near future – to which our species could migrate. Visit? yes. Settle? not yet. Like it or not, for the moment, the Earth is where we make our stand. It has been said that astronomy is a humbling and character-building experience. There is perhaps no better demonstration of the folly of human conceits than this distant image of our tiny world. To me, it underscores our responsibility to deal more kindly with one another and to preserve, and cherish, the pale blue dot; the only home we've ever known."

It is possible to perceive from this passage that the search of human beings to try to understand the infinity of the Universe, would be part of the search to try to understand their own finitude, fragility, but also promotes and stimulates the act of reflection on the importance that we have in preserve what is, so far, the only place capable of providing conditions for human life to settle and reside. Therefore, Astrotourism practices, if well conducted, can favor and contribute to awareness of environmental preservation and conservation.

Conflicts and confusions between the categories and its themes

A category is a collection of elements that have resemblance but that do not need to be identical or have great similarities, it is only necessary to gather factors that allow them to be classified in the same "set". Categorization is an important aspect that researchers have to carry out the identification, distinction and description between the characteristics of a category. This process, in turn, allows the category itself to be defined, compared and contrasted with other categories.

In contrast, themes are used in the later phase to "tie everything together", eliciting the concept, expressing the very essence present in the collection that is part of the category. Particularly, here the "errors" and categorical confusions coming from the Geotourism sub-segments will be addressed, which is a very recent activity (Hose 2006), which until now does not have a univocal definition for the term (Dowling & Newsome 2006) and which also does not have many academic materials on its topics (Sadry 2020). For all these reasons and many others that have already been explored, throughout the text, several categorical problems are found in several scientific works that place several themes in 2 different categories, or in other words, the same tourist activities are allocated in 2 sub- distinct segments of Geotourism.

To make everything tangible, it is possible to list some cases in which confusion occurs between the sub-segments of Space Geotourism and Astrotourism, for example. Although we have shown that definitions between these two sub-segments can be constructed by identifying and providing a definition that distinguishes both categories. The elements of each sub-segment are categorized in a way that creates confusion, for example, visiting places such as Valley of the Moon appears as an element in both space Geotourism (Chen et al. 2015) and Astrotourism (Sadry 2020) .

Well, the tourist activity mentioned, apparently, is closer to Space Geotourism than Astrotourism. After all, a tourist practice to the Valley of the Moon in the Atacama Desert of Chile, has tourist values due to the meanings expressed from its geological factors that can be associated with an environment similar to that of Mars.

However, this does not mischaracterize the practices developed in that place as processes involving Astrotourism. After all,

taking Astrophotography in this environment, or filming for memories of this scenario with a starry background would be themes associated with Astrotourism.

But anyway, this would be an activity related to which tourist practice? Visiting the Valley of the Moon would be a Geotourism practice, but it can also be considered Astrotourism. The question is in the representation and interpretation of the elements to be considered for analysis. If the visitor goes to the Atacama Desert to take pictures of the sky and contextualize it with the geological environment, then this is an Astrotourism activity, as the tourist is primarily focused on the meanings of astronomical phenomena - the starry sky - which are amplified their values because it is related to geoheritage environments such as Valley of the Moon. On the other hand, if the visitor carries out his tourist practice to photograph "only" the geological features of the Valley of the Moon, or to take a trail through an environment that has configurations similar to those of Mars, then this would be a Space Geotourism activity. After all, the tourist is privileging the representation of geological aspects that have meanings that can have interpretative meanings with astronomical aspects. For these reasons, despite the conflict generated, the confusion is in the interpretation given to the tourist practice and not exactly in the activity itself.

Another example is the confusion that is generated between Astrotourism activities and celestial Geotourism practices. Specifically, in this case several themes are found in both categories, such as contemplating rainbows, observing meteor showers and observing bolides, in addition to lunar and solar eclipses.

Again, in these cases, similarly to the case mentioned above, although there is a conflict being generated, the confusion is in the interpretation provided by the guide or mediator to the developed tourist practice. In other words, if the mediator is a geologist - naturally - he will establish interpretations related to the geological aspects of the observation of bolides, meteor showers, or he will talk about the need for a geographical position to contemplate lunar and solar eclipses - something similar for the rainbow . However, if the mediator of the activity is an astronomer - very likely - he will promote interpretations linked to the astronomical aspects of the observation of bolides and meteor showers that only occur due to the trajectory that the Earth performs in space, or will address astronomical schematic questions of the relative position between Sun, Earth and Moon to carry out observations of lunar and solar eclipses, as well as the rarity that each one has due to astronomical factors. Therefore, all these activities are at the intersection between Astrotourism practices and celestial Geotourism, and it is up to the interpretive representation of the guide to establish his relationship with the "world" he wishes to express.

Thus, based on all these considerations, it is possible to build a representative scheme that involves all these scenarios that generate conflicts and confusions between the themes and their categories. For this, an Euler-Venn diagram (Figure 4) was developed, in which it consists of three sets so that each one represents one of the sub-segments Celestial Geotourism (GC), Space Geotourism (GE) and Astrotourism (AT).

The AT set is formed by all astronomical phenomena that are possible to be observed, photographed, filmed and used in tourism practices that follow the definition provided here in this article. The GE set is formed by all aspects of abiotic factors in geology that can be related to analogous spatial environments, which provide tourism practices that follow the definition provided here in this article. And the

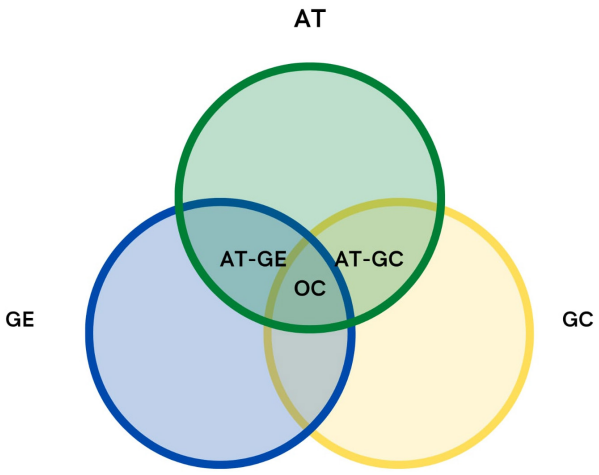

Figure 4. Representative set of Geotourism sub-segments.

GC set is formed by all the geological factors that are observed, photographed, filmed and that are associated with celestial aspects, being used in tourism practices that follow the definition provided here in this article.

The set (AT-GE) is formed by the intersection between the sets (AT) and (GE). In other words, the set is formed by elements such as terrestrial environments considered as analogues of Mars, Moon and other extraterrestrial environments. The set (AT-GC) is constituted by the intersection between the sets (AT) and (GC). Thus, the set has as constituent elements some astronomical aspects, such as the observation of bolides, meteor showers and observations of lunar and solar eclipses. Finally, as a central aspect of all tourist attractions of all sub-segments of Geotourism, there is the responsible and sustainable observation and contemplation (OC) of abiotic factors of Geology associated with the phenomenological aspects of Astronomy. In other words, all tourists, regardless of the activity, seek in these practices the possibility of contemplating the landscape and observing the best there is, extracting only the observation of beauty, without wearing out and not degrading the place of visitation so that future generations can have the same empirical experience.

CONCLUSION

Here, in this article, we sought to develop less superficial analyzes, among those that exist in the literature on the elements that compose and define Geotourism and its sub-segments Celestial Geotourism, Space Geotourism and Astrotourism. Based on the informational components collected through secondary sources, it was possible to notice that there are "conflicts" between the themes that are part of the sub-segments of Geotourism - both Astrotourism with space Geotourism and Astrotourism with celestial Geotourism. As a method to solve these obstacles, "unique definitions" were developed for Geotourism and each sub-segment, through assumptions that forged the conceptual bases of each one of them, thus giving rise to the operational definitions of each term.

In this way, it was possible to conclude that the conflicts generated between the three categories, in reality, occur due to inadequate processes established in the representation of the themes of each tourist practice. In other words, the interpretations that are carried out by the mediators of tourist activities promote these thematic confusions. In addition, it was found that these confusions are favored and disseminated in various scientific contents that approach in an unclear way and practically not establish distinction between the themes and their categories, without providing any syllogistic reasons to conceive their conclusions.

However, this research does not have the character of reaching a closed and definitive conclusion. In reality, the list of tasks to reach this point is immense and we are here only contributing with an appetizer, an invitation to

academics - linguistics and science practitioners - to get involved in coordinated actions to improve this field and its actions.

It is not possible to say just based on the research that was carried out here, but one of our hypotheses - apparently obvious - is that part of the conflicts would also be related to the way that each agent establishes himself before the field, seeking to give greater visibility to the term that he uses. "satisfies". Geologists, for example, adopt as part of Space Geotourism and Celestial Geotourism all elements of intersection with Astrotourism without much refinement, zeal and care with the definitions, since both terms have the prefix "Geo" which "appropriate" and gets closer to your field of research. In contrast, astronomers develop the same attitude, but giving greater visibility to Astrotourism for the same elements that are observed in celestial Geotourism and Space Geotourism. In fact, this convention continues with the same problems of lack of arguments, zeal, detail and theoretical support that support this decision-making. In other words, the "social" groups – astronomers and geologists – in academia do not talk to each other, there is a "barrier" between agents who seem to work – and want to work – separately and in isolation from each other.

The success of Geotourism and its sub-segments depends on the identification, distinction and understanding of its conceptual bases, on the adequate definition and on knowing the base of its users. The apparent dispute, as the French sociologist Pierre Bourdieu would say, between the agents in search of capital and domain of the field, only disadvantages the main purpose, which is the progress of the practice of "alternative tourism", responsible and sustainable based on abiotic activities originating from Geotourism and its sub-segments. The most important and most difficult thing needs to start being promoted, which is the popularization of scientific knowledge, widely disseminating interpretive means that are communicatively accessible to the public that does not practice science. After all, sustainable tourism is a cultural and socio-scientific asset of great value that needs to be improved and better developed among rural agents.

Acknowledgments

The author would like to thank the support and funding provided by the Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq) for the development of this research. Furthermore, we would like to thank the support from the Pró-Reitoria de Inclusão e Pertencimento da Universidade de São Paulo (PRIP - USP).

REFERENCES

BAPTISTA M. 1997. Turismo: competitividade sustentável.

CARTER C & GARROD B. 2015. Low T, Eds. The Encyclopedia of Sustainable Tourism; CAB International.

CHEN A & LI W. 1985. Status Quo and Prospects of Tourism Earth-science. Earth 4-16.

CHEN A, LU Y & NG YCY. 2015. The principles of geotourism. Berlin: Springer Berlin Heidelberg.

DOWLING RK & NEWSOME D (Eds). 2006. Geotourism. routledge. New York: Cambridge University Press, p. 221-242.

FAYOS-SOLÁ E & MARIN C. 2014. Astrotourism: No requiem for meaningful travel.

GRAY M. 2004. Geodiversity: valuing and conserving abiotic nature. J Wiley and Sons, Chichester, England, p. 434.

HAM S. 1992. Environmental Interpretation: A Practical Guide for People with Big Ideas and Small Budgets. North American Press, p. 3.

HOSE T. 1997. Geotourism – selling the earth to Europe. In: Marinos PG, Koukis GC, Tsiambaos GC & Stournas GC (Eds), Engineering Geology and the Environment. Balkema, p. 2955-2960.

HOSE T. 2006. Geoturism and Interpretation. In: DOWLING RK & NEWSOME D (Eds), Geotourism. routledge. New York: Cambridge University Press, p. 221-242.

JOAQUIM G. 1997. Da Identidade à Sustentabilidade ou a Emergência do «Turismo Responsável» in Sociologia Problemas e Práticas, no 23.

JOYCE B. 2007. Geotourism, Geosites and Geoparks: Working Together in Australia. Special Report, The Australian Geologist 144: 26-29.

KOMOO I. 1997. Conservation Geology: A Case for the Ecotourism Industry of Malaysia. In: Engineering Geology and the Environment; Marinos PG, Koukis GC, Tsiambaos GC & Stournas GC (Eds), Balkema: Rotterdam, p. 2969-2973.

LANFANT MF. 1980. Introduction: Tourism in the process of internationalization. Int Soc Sci J 32(1): 14-43.

LANFANT MF & GRABURN NHH. 1992. International tourism reconsidered: The principle of the alternative. Tourism alternatives: Potentials and problems in the development of tourism, p. 88-112.

LIGHT D. 1995. Visitor's use of interpretative media at heritage sites. Leisure Studies 14: 132-149.

PACHECO J. 2012. Interpretação de património geológico: uma aplicação ao Geoparque Arouca. Master thesis em Património Geológico e Geoconservação, Universidade do Minho, Braga. (Unpublished).

REYNARD E & BRILHA J (Eds). 2017. Geoheritage: assessment, protection, and management. Elsevier.

SADRY BN. 2009. Fundamentals of Geotourism: With Special Emphasis on Iran, SAMT publishers, Tehran.

SADRY BN. 2020. The Geotourism Industry in the 21st Century: The Origin, Principles, and Futuristic Approach. Apple Academic Press.

SAGAN C. 2019. Pale Blue Dot: A Vision of Humanity 's Future in Space. Companhia das Letras, p. 13.

TADINI RF & MELQUIADES T. 2010. Fundamentals of tourism. Rio de Janeiro: Fundação CECIERJ.

TILDEN F. 1957. Interpreting Our Heritage. The University of North Carolina Press.

TOIVONEN A. 2017. Sustainable Planning for Space Tourism. MATKAILUTUTKIMUS 13: 1-2. from https://journal.fi/matkailututkimus/article/download/67850/28443/.

UNESCO. 1997. Culture, Tourisme, Développement: Les Enjeux du XXIème Siècle, Table Ronde d'experts organisée à Paris. UNESCO/AIEST, Ann Tour Res.

VEVERKA JA. 1998. Planning truly" Interpretive" Panels. Interpretation 3: 5-7.

WITTGENSTEIN L. 2019. Culture and the value. Leya.

WTO - WORLD TOURISM ORGANIZATION. 1993. Sustainable tourism development. Guide for local planners by WTO.

How to cite

SANTOS-SOUZA V & NASCIMENTO-DIAS B. 2023. Reflections about the conceptual bases of Geotourism and its sub-segments Space Geotourism, Celestial Geotourism and Astrotourism to create a univocal definition. An Acad Bras Cienc 95: e20221043. DOI 10.1590/0001-3765202320221043.

Manuscript received on January 5, 2023;
accepted for publication on February 2, 2023

VITÓRIA SANTOS-SOUZA[1]
https://orcid.org/0000-0009-0001-4068-21791

BRUNO LEONARDO NASCIMENTO-DIAS[2]
https://orcid.og/0000-0000-0002-3632-90732

[1]Universidade Federal do Rio de Janeiro, Departamento de Belas Artes e Preservação, Av. Pedro Calmon, 550, Cidade Universitária, 21941-901 Rio de Janeiro, RJ, Brazil

[2]Universidade de São Paulo/USP, Instituto de Química, Departamento de Química Fundamental, Av. Prof. Lineu Prestes, 748, Butantã, 05508-900 São Paulo, SP, Brazil

Correspondence to: **Vitória Santos-Souza**
E-mail: vssouza.arte@gmail.com

Author contributions

Nascimento-Dias, B. L. Conceptualization; Project administration; Resources; Supervision; Final Writing and edition; Santos-Souza, V. Investigation; Methodology; Validation; preliminary writing.