

ASTROTOURISM - MODERN FORM OF TOURISM

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Abstract. *Astrotourism is a niche form of classical tourism that consists in contemplating special places characterized by special effects, using as resources for this type of tourism: educational astronomical centers, astrotourism centers, astronomical institutes and laboratories, astronomical museums, space museums, astronomical observatories, planetariums, archeo-astronomical sites.*

Key words: *resources, astronomical tourism, forms*

INTRODUCTION

Astrotourism also called astronomical tourism [4,10] is a niche tourism that consists in visiting special places from which tourists can watch:

- southern aurora (Figure 1a);
- northern aurora (Figure 1b) (natural electrical phenomena characterized by the appearance of streaks of reddish or greenish light in the sky, especially near the southern or northern magnetic pole: the effect is caused by the interaction of charged particles with atoms in the upper atmosphere);
- stars (Figure 1c);
- shooting stars (small meteorites that move rapidly burning at the entrance to the earth's atmosphere) (Figure 1d).



Figure 1. Southern aurora, northern aurora, stars, shooting stars

Source: [4,10]

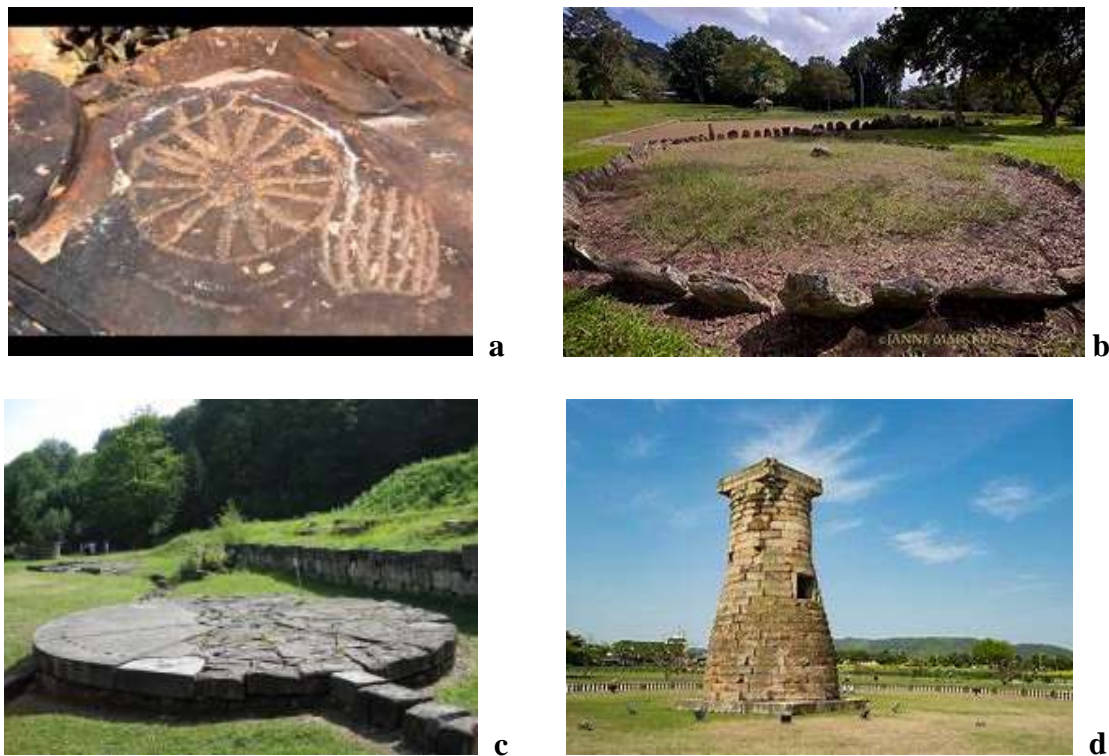


Figure 2. Archaeo-astronomical vestiges

Source: [1,15]

The astronomical and archaic-astronomic heritage of the world was grouped by specialists [1,15] in:

- early prehistory - decorated plate from Geißenklösterle (Germany), Ishango bone (R.D. Congo), Thais bone (France) and astronomical stone panels from Lascaux Cave (France);
- Late prehistoric Europe - stone circles in Odry (Poland), megalithic tombs in Portugal and Spain, Stonehenge (England);
- Pre-Columbian America - metallurgical center in Viña del Cerro (Chile), solar observatory in Chankillo (Peru), petroglyphs in Boca de Potrerillos (Mexico), petroglyphs in Caguana (Puerto Rico);
- Indigenous uses of astronomy - the Wurdi Youang (Australia) stone arrangement, the solstice observation deck in Atituiti Ruga (French Polynesia), the Navajo star ceilings (USA);
- Ancient and medieval Far East - astronomical observatory in Cheomseongdae (South Korea), astronomical observatory in Denfeng (China), astronomical observatory in Taosi (China), the old astronomical observatory in Beijing (China);
- India - the collection of 19 astronomical instruments Jantar Mantar;
- Mesopotamia and the Middle East - the Babylonian Astronomical Journal, the Dead Sea Scrolls, the cuneiform tablets from Assyria and Babylon;
- North Africa - the tomb of Senenmut near Thebes (Egypt), the city of Napata (Sudan), the pyramids of Giza and adjacent buildings (Egypt), the pyramids of Nuri (Sudan), the temples of Jebel Barkal (Sudan), the temple of Amun at Karnak (Egypt), the temple of Hathor at Dandara (Egypt);
- Classical Europe - the Acropolis of Alatri (Italy), the Pnyx Hill in Athens (Greece), the Pantheon in Rome (Italy);

- Islamic astronomy - Maragheh Observatory (Iran), Ulugh Beg's Observatory (Uzbekistan); Medieval Europe - Baptistery of Parma (Italy), Cathedral of Strasbourg (France), development of astronomy at Monkwearmouth-Jarrow (England);

- Renaissance, Modern and Contemporary World - Mount Wilson Observatory (USA), Meudon Observatory (France), Royal Observatory in Cape of Good Hope (South Africa), Royal Observatory in Greenwich (England), Einstein Tower in Potsdam (Germany);

- radio-astronomy - Stockert radio-telescope (Germany); applied astronomy in the modern world - Struve geodetic arc (Belarus, Estonia, Finland, Latvia, Lithuania, Moldova, Norway, Russian Federation, Sweden, Ukraine); astronomical observatory sites in Austria, Chile, New Zealand, Spain, USA

The most well-known astronomical vestiges are:

- petroglyph from Boca de Potrerillos, Mexico (Figure 2a);
- ceremonial park in Caguana, Puerto Rico (Figure 2b);
- solar disk from Sarmizegetusa Regia, Romania (Figure 2c);
- Observatory in Cheomseongdae, South Korea (Figure 2d).

MATERIAL AND METHOD

Astrotourism is a form of tourism in development that involves the practice of astrotourism activities which contribute to the conservation of resources, bringing them closer to nature. For these reasons, in this scientific approach, based on studies undertaken and published in the literature, we analyzed the main resources for practicing astrotourism, the main activities of astrotourists depending on the astrotourism destination identifying the benefits of practicing this form of tourism, the importance of resources the areas where it is practiced as well as its effects in activating other tourist niches in order to propose relevant solutions to improve this activity.

RESULTS AND DISCUSSIONS

The astrotourism destination offers astrotourists the following activities: astrophotography, astronomical/celestial events - sunsets, planetary conjunctions, rainbows, equinoxes, lunar eclipses, solar eclipses, cyclical phases of the Moon, occultations, planetary oppositions, meteor showers, sunrises, midnight sun, solstices, transitions but also formal lectures, telescopes for rent or sale, etc. [7,10]

The main resources for practicing astrotourism are those presented in the figure below.

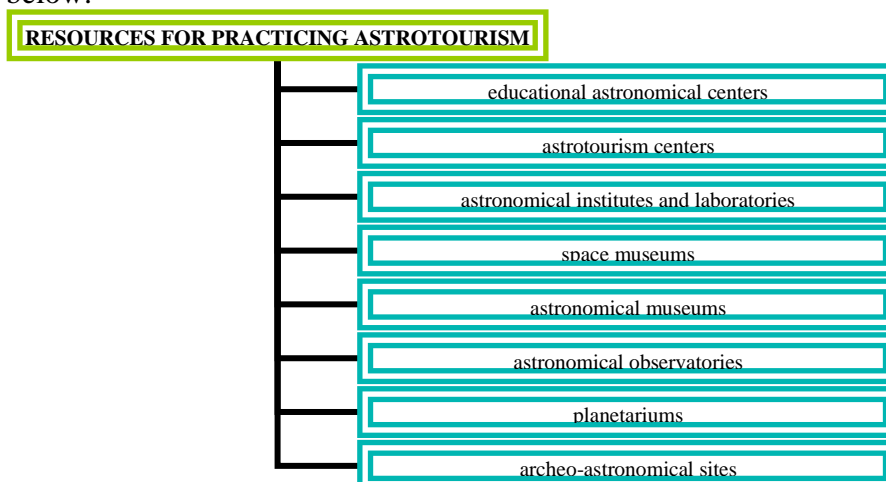


Figure 3. Resources for practicing astrotourism

Astrotourism differs from space tourism [2] by distinguishing between:

- astrotourism practiced beyond Earth orbit and in Earth orbit;
- atmospheric space tourism practiced in the Earth's atmosphere;
- terrestrial space tourism practiced in:
 - a. tourist sites - tour of spatial arrangements;
 - b. specific spaces - simulations;
 - c. in some spaces - trips related to space tourism: meteorite picking, trips to observe eclipses, tours to see the stars;
 - d. popular culture: travel related to space movies; edu-fun: in space centers;
 - e. cyber space travel experiences: virtual space travel, video games).

Terrestrial astrotourism is considered a sub-niche form of astrotourism (Figure 4).[8]

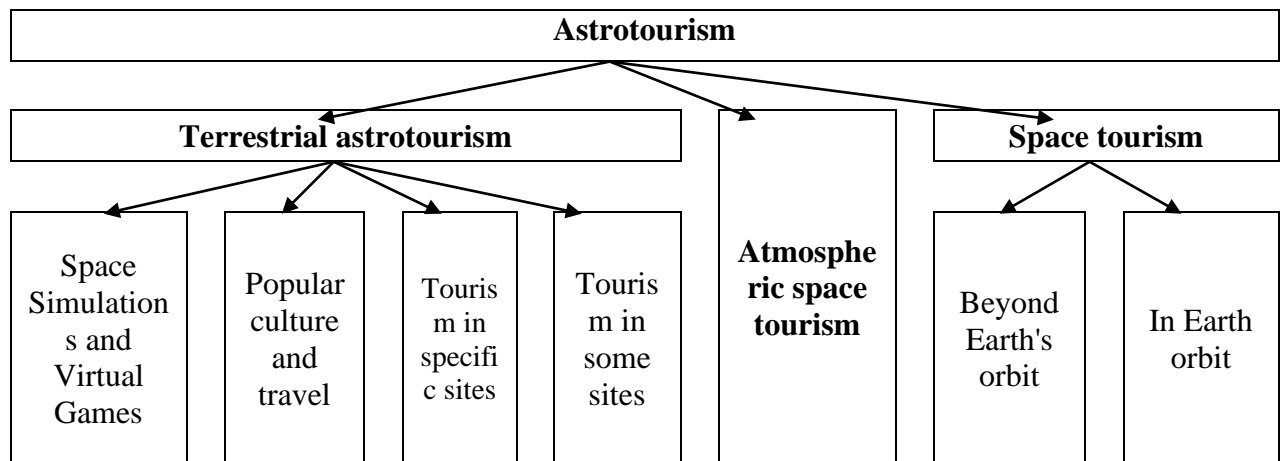


Figure 4. Types and sub-types of astrotourism

Source: [2,8]

Astrotourism partially overlaps with educational tourism [1] being a form of historical cultural tourism, but it can be included in other categories such as adventure tourism or sustainable tourism. [2, 10, 13]

Astrotourism is important for several reasons:

- contributes to the conservation of essential resources (unpolluted landscapes);
- the dissemination of scientific values;
- when forming capital;
- to protect and promote the heritage represented by the arrangements of prehistoric stones or petroglyphs;
- brings tourists closer to nature and helps them understand the physical world and its dynamics:
- reduces natural light pollution,
- raises awareness of the protection of day and night wildlife in all its forms (water, land, air);
- emphasizes the importance of the history and traditions of the place and the impact on the culture and identity of the respective people and emphasizes the importance of the natural landscape and its needs [3, 4, 8, 14, 15].

The promoters of astrotourism for watching stars are especially interested in the brightness of the sky. In order to find the best destinations for this type of astrotourism activity, the specialists carry out real sky brightness measurement campaigns with the help of models that allow them to map the sky brightness and prospect the opportunities for

astrotourism development in the area provided the dark sky is full of stars and reducing light pollution.

In terms of spending free time for your own pleasure, astrotourism can mean:

- "relaxed" leisure time
- "serious" leisure time [1, 5, 11, 16].

The motivation of astrotourists is one of the most complex:

- acquiring physical skills, avoiding stimuli;
- skills training;
- intellectual - the desire to learn about the things around them;
- the desire to discover new things;
- desire to explore new ideas;
- social.

Regarding the satisfaction of astrotourists, this can be:

- relaxation;
- educational [1];
- aesthetics;
- physiological;
- psychological;
- social. [8]

Astrotourism brings important benefits to areas where the development of astrotourism is practiced with effects for activating other tourist niches (agrotourism, anti-tourism, ecotourism, geotourism, paleotourism, alternative tourism, botanical tourism, cultural tourism, adventure tourism, wellness tourism, research tourism, bird watching tourism in their natural habitat, heritage tourism, educational tourism, railway tourism, festival tourism, genealogical tourism, wild tourism, literary tourism, natural tourism, responsible tourism, rural tourism, road tourism. Some researchers propose [1, 4, 7, 10] to create educational and training opportunities; development of technological infrastructure, education and education facilities; extending the benefits of astronomy and space science; improving science education and awareness; and the general progress of the economy and technology.

The most visited star viewing destinations are: Atacama Desert (Chile) (Figure 5a), for high altitude, unpolluted sky and driest non-polar air on Earth, Tenerife Island (Spain) (Figure 5b), for high altitude, close to the equator and away from tropical storms, enjoys one of the lightest and darkest skies. Tenerife, Nova Scotia (Canada) (Figure 5c), home to the world's first Starlight Hotel-certified hotel: Trout Point Lodge. The area was once the cradle of the Mi'kmaq indigenous nation, whose stories about the constellations explained the changing seasons and other phenomena of the universe. Today, a resident astronomer organizes guided walks in the light of the stars, as well as star-gazing sessions on the platform of the Trout Point Lodge building. Jasper National Park (Canada) (Figure 5d), full of spruce and pine forests, is home to the Jasper Annual Dark Sky Festival, with daytime solar sightings, rocket launches for children and telescope workshops. October is the ideal month for tourists, but also in the rest of the year more adventurous tourists can set up their tents in the over 100 places specially arranged in the reservation, which are open all year round. Cherry Springs State Park (USA) (Figure 5e), located in the state of Pennsylvania, where, in 2014, northern lights - phenomena that usually occur only in high-latitude regions - were spotted four times. Aspiring astronomers can attend the annual Black Forest Star Party (September 22-24), which brings together hundreds of amateur observers for a weekend of watching the stars together. Aoraki Mackenzie International Reserve (New Zealand) (Figure 5f), the largest dark sky reservation in the world, located in the Mackenzie Basin surrounded entirely by mountains on the rugged southern island of the

country. During the Earth & Sky night tour at the Mt. John, used by astronomers in Japan, Germany and the United States, visitors can see the Magellanic Clouds - the satellite galaxies of the Milky Way visible only from the southern hemisphere.

NamibRand Nature Reserve (Namibia) (Figure 5g), located in the Namibian Desert, 60 km away from the nearest village, where tourists can set up their tents and tour the dunes accompanied by a guide. The Wolwedans complex has mountain-view apartments with summer star-studded beds on the veranda. Mauna Kea Volcano (Hawaii, USA) (Figure 5h), 4,205 m high, home to the world's largest optical telescope, has a high risk of altitude sickness, but serious sky-lovers face the elements (and low levels of oxygen) for some spectacular sunrises and sunsets. The peak is no longer accessible to tourists at nightfall, but the visitor center (at an easier-to-manage altitude of only 2,804 m) remains open until 10 p.m. There, guests are offered free lectures, question and answer sessions and 28, 36 and 40 cm telescopes.

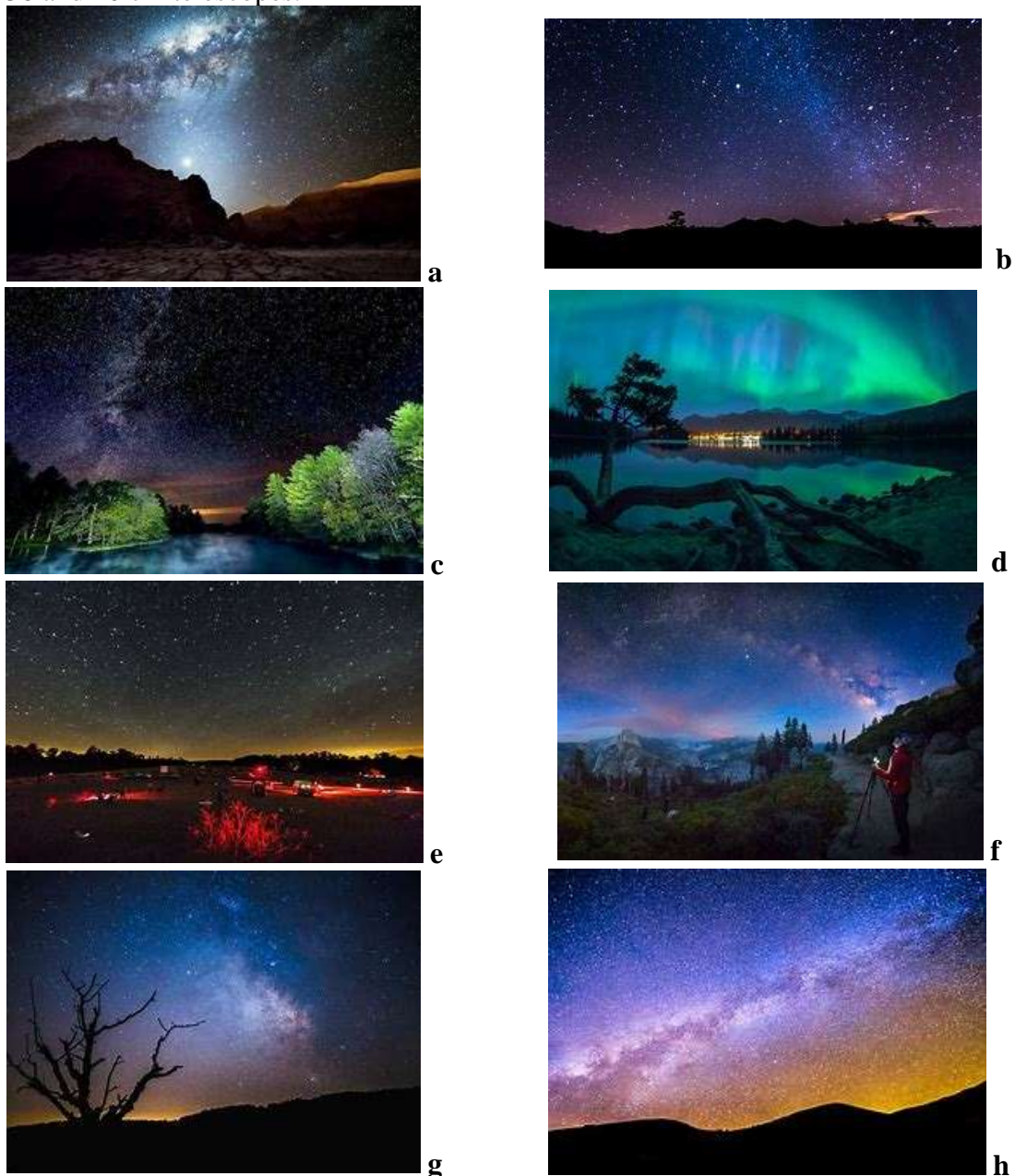


Figure 5. Destinations for looking at the stars

Source: [1,4,7,10]

CONCLUSIONS

Astrotourism has special benefits on the areas where it is practiced, bringing tourists closer to nature, highlights the importance of local tradition, has an impact on the culture and identity of the people by activating other tourist niches. By practicing astrotourism, astrotourists train their skills in this field, being primarily motivated by the desire to discover, explore and learn new things. The activities that astrotourists can practice are some of the most special depending on the astrotourism destination they visit. Among them we mention: astronomical events, astrophotography and formal lectures, producing both educational effects on astrotourists and social, physiological and relaxation effects. The most visited star viewing destinations are: Atacama Desert (Chile), Tenerife Island (Spain), Nova Scotia (Canada) Jasper National Park (Canada), Cherry Springs State Park (USA), Aoraki Mackenzie International Reserve (New Zealand), NamibRand Nature Reserve (Namibia), Mauna Kea Volcano (Hawaii, USA). Taking in consideration these aspects, we consider it is necessary to promote and expand this type of niche tourism by increasing the level of knowledge and by creating educational and training opportunities in this field.

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