



New Trends in Geoproducts Development: Železné Hory National Geopark Case Study

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Abstract

Geotourism is still a relatively new direction of tourism and its development is bound mainly to the territory of geoparks. Many geoparks try to develop different types of geo-products with a focus on different target groups. However, the nature of these products is very different and their development is evident mainly in the time scale. In the past, simple forms of interpretation and application of geoproducts were popular, whereas currently, modern technologies such as animations or augmented reality are thriving. This is mainly due to the better availability of technological equipment. At the same time, a number of geoparks boast of above-average interpreters, who are able to render and simplify difficult geological topics. This also applies to their ability to create of new geoproducts, where the need to abbreviate and condense information is evident. The results of the study show a positive trend in the use of modern methods in geoscience interpretation and in the creation of new geoproducts. At the same time, it is clear that without a modern concept it is very difficult to reach the current visitors. Therefore, such a concept is necessary in order to develop geoscientific issues, especially in the area of geoparks.

Keywords

geopark, geotourism, innovative geo-product, Železné hory

JEL classification: L83, M31

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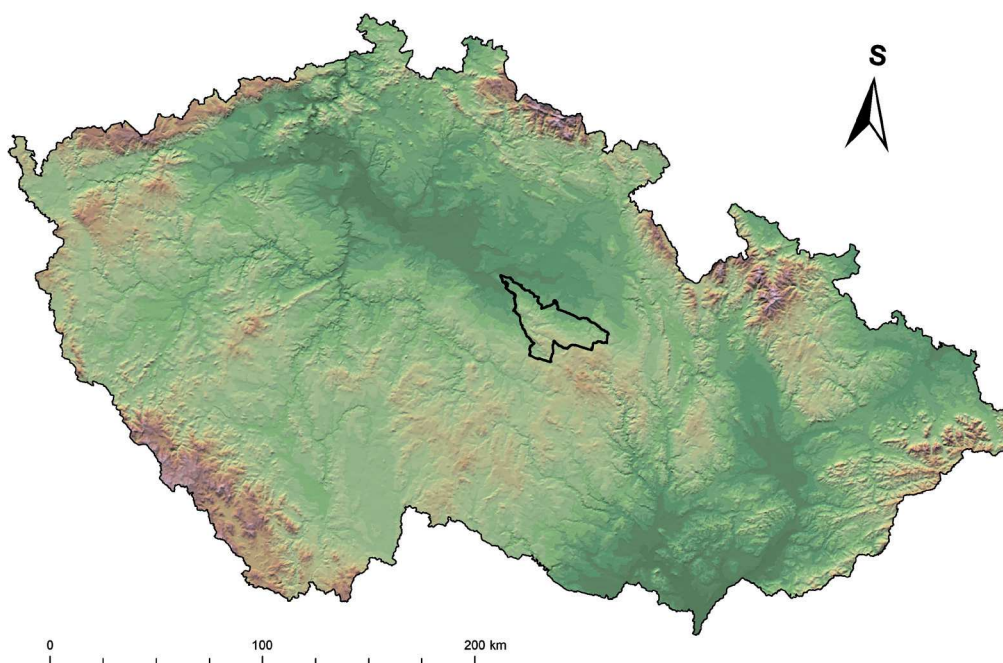


Introduction

Tourism activities have been divided into a number of different tourism segments in recent years. Segments as natural tourism, slow tourism and ecotourism are related to concepts such as environmentalism, sustainable development (Pásková & Zelenka, 2018a). Geotourism is another segment based on sustainable principles (Dowling, 2013; Pásková & Zelenka, 2018a) and linking the presentation and interpretation of inanimate nature, wildlife and local culture (ABC principle, Dowling, 2013; FACET, 2018). Geotourism has developed over the last fifteen years in a fully functional direction (Newsome, Dowling, & Leung, 2012) that has been growing mainly in rural areas (Farsani, Coelho, & Costa, 2011; 2013). However, the concept of geotourism in terms of the type of landscape involved has undergone a significant change. The original concept involving the natural landscape was soon supplemented with areas featuring surface and subsurface mining activities (Kubalíková, 2017), and archaeological sites (Moroni, Gnezdilova, & Ruban, 2015; Tomić et al., 2015). In recent years, geotourism has also been applied in the typical urban landscape and its potential in urban areas is documented by Chylińska and Kołodziejczyk (2018) for Poland and the Czech Republic. The importance of imaginative interpretation has been growing in geotourism (Newsome, Dowling, & Leung, 2012; Necheš, 2016) and the same applies to the use of various information and communication technologies in mapping and conserving the geological heritage (including the use of remote sensing – Wang, 2018), the creation of virtual natural trails, advanced visualization methods, and in the near future the use of artificial intelligence in the personalization of information and visitor management is expected (Zelenka et al., 2014; Zelenka, Pásková, & Husáková, 2015).

Geoparks have gradually been developing after 2000 in several different directions, and the National Networks (Pásková & Zelenka, 2018a) and Continental Networks have been created (2000 European Geoparks Network – EGN; 2004 Global Geoparks Network – GGN; 2007 Asian Pacific Geoparks Network – APGN; 2018 Latin American and Caribbean Geoparks Network). A major breakthrough was achieved in 2015 when the International Geoscience and Geoparks Program (IGGP) was created under the auspices of UNESCO. During the same period, a Global Geopark certification system has been developing (Pásková & Zelenka, 2018b).

In recent years (also thanks to the use of ICT and the involvement of new approaches to interpretation, including storytelling), the offer of geoparks for their visitors has been rapidly qualitatively and quantitatively developed. Important for this development is their cooperation and exchange of experience and examples of good practice in national and international networks and certification requirements (Pásková & Zelenka, 2018b). At the same time, geoparks fulfill their basic attribute - they are based on developing collaboration with many local actors and their service offerings are also targeted at the local community, including local children and students. This can be broadly demonstrated on a case study Železné hory National Geopark.

Figure 1 Location of Železné hory National Geopark

Source: own processing

Železné hory National Geopark

In the Czech Republic, the situation in geotourism certification copies the global trend. The Czech geoparks are coordinated by the National Geoparks Council, which is advisory body of the Minister of the Environment. In addition to the national and aspiring geoparks, there is also one global geopark, namely UNESCO Global Geopark Bohemian Paradise.

Železné hory (The Iron Mountains) National Geopark has been a part of the Czech network since 2012, when Vodní zdroje Chrudim, Ltd., the coordinator and founder of the geopark, was granted this certificate. This geopark covers an area of 777 km². It interferes with the territory of two counties: the Pardubice region and the Vysočina region. Furthermore, the territory is comprises one third of Železné hory Protected Landscape Area and at the same time, there are many other small-scale protected areas. Currently, there are active various subjects in tourism and regional development in the geopark area. There are 8 Local Action Groups, 10 micro-regions, and a part of the territory belongs to the Chrudimsko Hlinecko Tourist Region (Figure 1).

The management of Železné hory National Geopark is very unconventional not only in the Czech context but also in the global geoparks' institutional context. The geopark was founded by the private company Vodní zdroje Chrudim, Ltd., which is also the operator of its activities and owner of its trademark. One of the basic pillars of its endeavour is education and popularization in the field of geosciences. Thanks to the exceptional approach, providing combination of the private hydrogeological services and publicly beneficial educative activities, the geopark and its development are dominated by cooperation with dozens of different types of partners (government, municipalities, non-profit organisations, private companies, universities, research institutions, etc.). The co-operation principle is based on developing new products in the field of geotourism, where geopark's partners predominantly guarantee finance and project management, whereas the geopark management guarantees expertise.

Products of Železné hory National Geopark

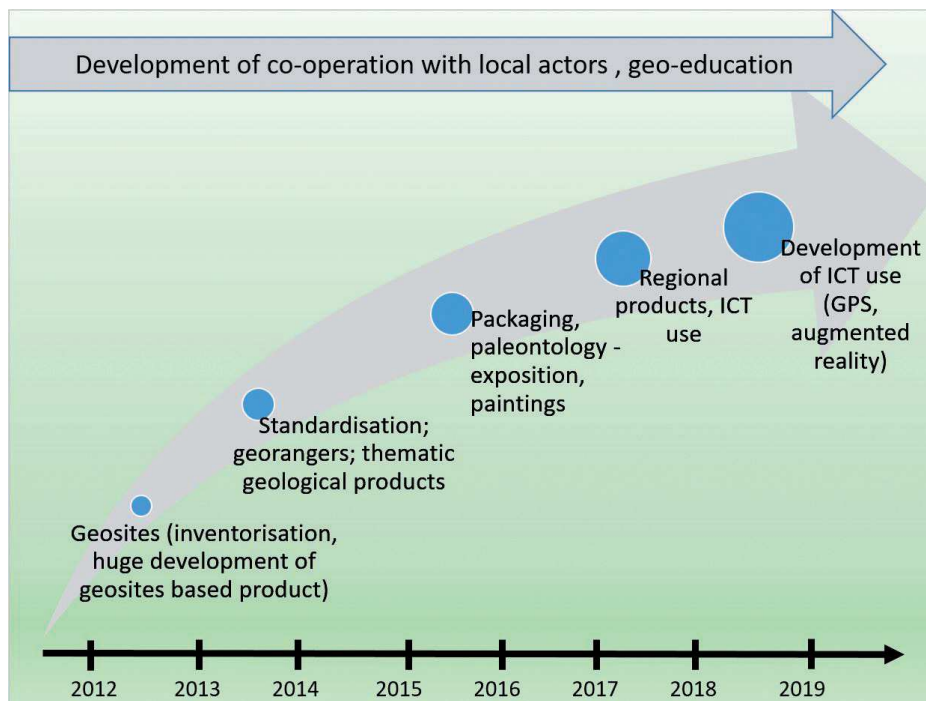
Historical overview and concept

During its relatively short existence, the Železné hory National Geopark participated in the creation of a relatively large number of products in the field of tourism. The product is perceived in this sense as any tourist offer, which has the potential to make the area of geopark more attractive to its residents as well as external visitors.

However, since 2012, when the geopark became a part of the national network, access to interpretation has changed significantly. The conservative approach to the built infrastructure is at least on the territory of the geopark on the decline. Modern trends in interpretation abandon conventional educational panels and try to make the interpretative elements more attractive. At the same time, it appears that an excessive use of digital elements is not the right way. Expositions should also take into account the sustainability and economy of service. Another major chapter in interpretation is the graphic processing of materials and the ratio of image and text material. Many studies unambiguously demonstrate the lack of interest of visitors in reading the written text. Therefore, the above facts must be reflected in the creation of a new geotourism offer (Figure 2). What follows is an overview of selected products that have been made during the existence of Železné hory National Geopark. Each product is accompanied by a summary commentary.

Right after the founding of the geopark, a basic concept of development of the territory was drawn up. Of course, since then it has been updated several times (predominantly for revalidation purposes). However, this concept is very general and only sets the baseline without further listing of specific interpretation methods or tools. The very concept of geoproduct development is a 'living organism' that is a subject to current possibilities, offers, development and acquired experience. This approach ensures that you can react to new options without updating concepts or other strategic documents.

Figure 2 Historical development of products in Železné hory National Geopark



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Source: own processing

Detailed description of selected Železné hory National Geopark geotourism products

2012 – Outdoor exposition of polished rock slabs

Large-format rock plates placed in nine racks, each in three pieces, are installed directly at the company's headquarters (Figure 3). Each plate is labelled with a name, trade name and the country of origin. Worksheets and more detailed comments are available on request. At the same time, there is also available an information leaflet describing the company's overall exhibition offer. The aim of the exhibition is to show the beauty of stones and their practical use. This exposition demonstrates the innovative geopark approach to interpretation.

2013 – Update of the MAGMA Geological Cycle Trail

MAGMA Geological Cycle Trail was established in 2003 in cooperation with Železné hory Protected Landscape Area and Vodní zdroje Chrudim, Ltd. It is a cycle trail leading across the geopark with a total of eight stops in the form of simple information

Figure 3 Polished rock slabs

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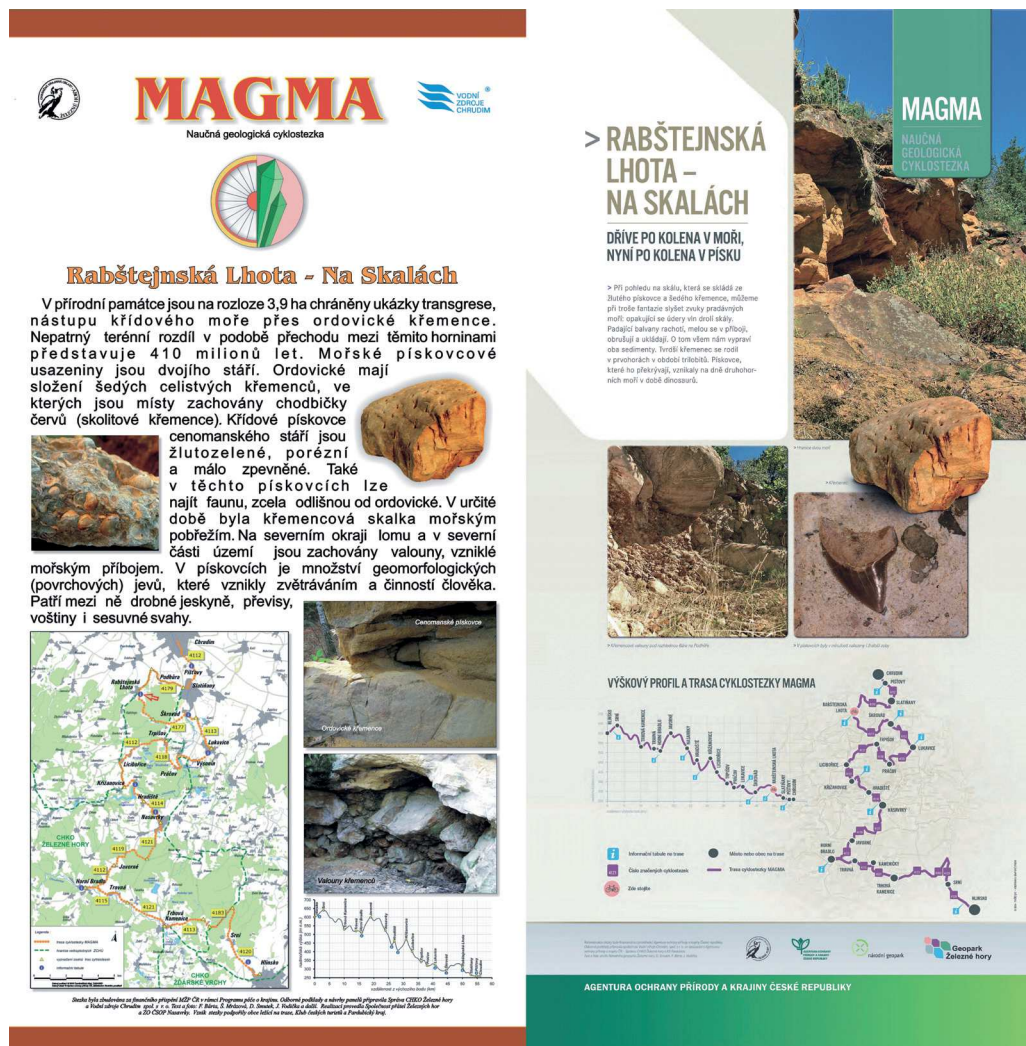
Source: archive of Železné hory National Geopark

signs. A complete reconstruction of the MAGMA Geological Cycle Trail was completed at the end of 2013. It included replacing old racks with new ones, changing the layout of boards, updating their content, and creating a printed guide. This example (Figure 4) shows new trends in creating educational boards. Both with regards to their content (text retreats at the expense of graphics and is subdivided into paragraphs) and new graphics (modern attractive design).

2014 – Calcium crystals at Berl’s limekiln

On the occasion of the International Year of Crystallography (an event promoted by the United Nations in 2014), a statue of Crystal Calcite was officially unveiled at Berl’s limekiln in Závratec, which is a part of Třemošnice. Calcite crystals (Figure 5) point to the history and present of limestone mining and processing, as evidenced by the local exposition of the Limestone Museum. This site has become one of the main attractions of the geopark - small elements designed to awaken the visitor’s imagination and his or her interest in getting more detailed information.

Figure 4 Comparison of an old board (left) and a new one (right)



Source: archive of Železné hory National Geopark

2015 – Outdoor exhibition of NATURA PARK

On September 25, 2015, the new Natura Park Environmental Education Centre in Pardubice was opened. Železné hory National Geopark was a subcontractor of geological game elements to a part of the exhibition - mineral and rock cassettes including methodical sheets, rock blocks with carved holes and a geopark panel. It is mainly an outdoor exposition that aims to transform the rock blocks into interactive elements. These elements, in conjunction with mold sets, mineral models, and minerals themselves, are mainly used in lecture programs.

Figure 5 Calcium crystal made of concrete



Source: archive of Železné hory National Geopark

2016 – The Gate to Prehistory in Pasíčka near Proseč

In 2015, the construction of an interactive Visitor Centre ‘Gate to Prehistory’ in Pasíčka near the Rescue Station Pasíčka was carried out. The main idea, content and form of exhibits were proposed by the workers of Železné hory National Geopark, which was one of the suppliers of game and geological elements for the exhibition and its professional supervisor. The exposition includes a geological map of the eastern part of the geopark consisting of local rocks, an exposition of a rock city, fossil sculptures, volcanoes and dinosaur climbing frame, a skeleton of the dinosaur that can be excavated from the sand, granite exposition of rocks and much more. The Visiting and Educational Centre focuses on child visitors and serves as the ‘Eastern Gateway to the Geopark’. The exhibition comprises several educational programs. The concept of the exposition has embarked on a new, modern way without the use of digital technology. It focuses on child visitors, who seek getting new experience through playing (Figure 6). Adult visitors prefer primarily visual appearance and also welcome an opportunity to touch various elements. The exhibition is also partly features information in Braille writing system. All in all, this is a modern approach focusing on minority groups.

2017 – Granite trail Horky

Geopark was the main contractor of the work in the second phase of the project ‘Granite trail Horky’, which was realized by the town of Skuteč (Figure 7). Within the project, landscaping was done in order to improve the trail’s viability, educational boards were innovated, interactive elements such as augmented reality for the use of smartphones were added, the original tools and technologies used for extracting and processing granite were deployed. The Granite trail Horky is a model example of suitable adjustment of natural spaces for the creation of a nature trail. Nowadays, the trail represents an ideal blend of terrain, printed information, digital technologies, game elements, and 3D objects.

New product

Description of the new product

Based on modern approaches to interpretation and previous experience with the interest of visitors, the geopark management has decided to create a new geo-product targeted primarily at families with children. This product should reflect current trends, i.e., interactivity, creativity and movement in nature. It should be based on local geology and the human need to search and discover. At the same time, it takes over the principles of geocaching.

There are miniaturized representations of minerals or fossils (from special plastic, concrete or iron) in ten locations within the geopark (Figure 8). These objects are always closely associated with the location where they are situated as the minerals or fossils they

Figure 6 Examples of educational equipment in Gate to Prehistory

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Source: archive of Železné hory National Geopark

Figure 7 Interactive elements on the trail

Source: archive of Železné hory National Geopark

represent were either found in these very places or they can be found in the same type of rocks in the vicinity of the particular location. These objects are not installed in readily visible places, they are hidden under a small overhang or crack. Each object is accompanied by a simple 10 x 10 cm table, carrying a QR code, an obligatory advertisement, a simple caption and, in some selected locations, a virtual reality application.

The QR code serves as an access to the geopark website, where can be found a separate section devoted to this product. All objects have their own place in this section where additional information about them is available. This information includes, for example, the reason why the object is situated at its particular location as well as photographs of the original or similar findings. A virtual reality feature is based on 3D object modeling. Specifically, it is trilobite and ammonite modeling. 3D animation is one of the most popular ways of presenting geological heritage. However, this is a fairly new and costly method. For this reason, it is not widely used, yet. The whole process of modeling is based on the existence of a real object, usually a fossil, scanned as a 3D scanner or modeled in Maya, Photoshop. Subsequently, it is necessary to communicate the external appearance of the object, texture and structure. In the case of ammonite, this is a moving object that needs to be 'revived' in Unity 3D. The results are then exported to a special format that a 3D engine, such as Unity 3D, can import and manipulate. The whole process is finally transferred to a supporting platform. In our case to Android (Figure 9).

In addition to the virtual environment, the entire product is also supported by printed materials in the form of a DL flyer at A3 pack. The material contains basic product information, a location map and GPS coordinates. At the same time, there is more information about the 'Top' geopark products with reference to the site.

Figure 8 Examples of miniaturized minerals and fossils

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Source: archive of Železné hory National Geopark

Figure 9 3D animation as part of the geoproduct



Source: archive of Železné hory National Geopark

Usage of product

Each finalised product is designed to connect modern trends in interpretation. The main target group is family with children who want to enjoy, for example, a free morning in nature. Locations are largely inaccessible by car. It is therefore necessary to go to the terrain and look for the site using GPS coordinates. In this respect, the new product principle of Geocaching is used. Localization by GPS coordinates is accurate to approximately ten metres. Searching is therefore a prerequisite for successful finding.

During the development of the product, it was considered whether it could be done in the form of a game, where the visitor would find clues in a particular place, which would lead him or her to another place. But this idea was abandoned, especially because of the openness of the whole system. If necessary, it is possible to supplement the whole system of ten sites with another site and make an update of the website or small adjustments and a reprint of the printed material. The main attraction of the whole product should be the search for new objects, photographing these objects and sharing them on social networks, for example.

Product evaluation

Evaluating the success of a product is not as simple as in case of paid services, where simple results can be obtained by simply counting visitors and comparing these figures with the surrounding attractions. In this case, it is necessary to rely on data from website traffic, or data on the number of applications with extended reality. However, the data are not entirely relevant with regard to the possibility of entry and access from locations other than the ten locations. The success can be measured, albeit not precisely, only in selected locations, when footprint tracking rate is applied before the product implementation and then in selected intervals after it has been put into operation.

Discussion

As it can be seen, individual products and interpretation can take many forms. A clear global trend in geoproducts and geointerpretation is to make the topic as simple as possible. For example, in creating educational panels it is therefore advisable to minimize the text component and rather focus on the graphic concept of the subject.

The second major trend is an increasing effort to get a visitor into action by changing them from passive readers of information panels to active players who touch and actively reflect on the subject. The use of these methods always depends on aiming at a particular target rather than an age group.

A properly targeted product is influenced in practice by several factors, which the investigator, developer or interpreter has to deal with. A big challenge is the theme of geology, which is still perceived by the general public as marginal and not very useful in everyday life. Another factor is the influence that the contracting authority or the owner have on the final form of the geo-product. Concepts and the very nature of a geo-product always depends on specific assignment, and it can not always go hand in hand with the performer's or interpreter's idea. One of the major factors currently affecting the nature of a geoproduct are the subsidies and conditions of a particular grant competition. A large part of new geoproducts are not so-called free, that is 100% for the purpose of the geosite. In contrast, they are created with respect to the terms of the grant application. On the other hand, without external public funds, a lot of great ideas would probably never have come into being, and at the same time, a simultaneous blending of modern digital trends into geointerpretation would be impossible. In this case, the limit is mainly the relatively high costs of creating digital or virtual outputs.

All the above mentioned issues can be well documented even on selected products of Železné hory National Geopark. There are some so-called free products, which are not influenced by negative external factors. Then, there are products subjected to the terms of the contracting entity (e.g., graphical visuals not attributed to the geopark but to the contracting authority) or to the conditions of a corresponding project call. Last but not least, it is necessary to mention the fact that, in Železné hory National Geopark and elsewhere, there exists a number of so-called 'drawer projects', written and compiled for the needs of a specific grant program or a challenge, and with the negative response

to the submitted application they were put aside, although these projects might be very interesting and innovative. Unfortunately, their specific focus hinders their successful realization, also due to the lack of funds.

Defining the concept of further development of geoproducts in Železné hory National Geopark is very difficult. Current global trends focus on merging real and virtual worlds. Especially in the field of geosciences, this is very welcome due to the dimension and abstraction of individual geological processes and phenomena. Based on the above list of selected geotourism products, it is obvious that Železné hory National Geopark already actively uses these methods. Železné hory National Geopark also strives for its own innovation, and development of new geoproducts. An exemplary demonstration can be the development and creation of thematic playgrounds (Figure 10), still unparalleled in Europe. These are gaming elements for children tailored to the location in question and focused on a specific geoscientific theme. The child's game element suddenly becomes a simple educational tool that can be used primarily for the needs of locally-based learning.

Conclusion

The aim of this article was to highlight the development of tourism products using the geological potential of a territory, especially in connection with the theme of geotourism and geoparks. This development was described in general and then in more detail on the example of a specific geopark – Železné hory National Geopark.

Železné hory National Geopark has been in existence for more than 6 years during which several dozens of geo-products of different nature have been realized. Six years is a very long time in terms of technology development and access to innovation of geo-products. So it is clear that the shape of individual geo-products must be adapted to this time horizon.

Another aspect in the creation of geo-products is the constantly accelerating time and the lesser will of listeners and visitors to perceive a great deal of information. The geopark management tries to adapt these new and not always positive trends. Newly created geo-products are aimed at a modern visitor who does not want education but entertainment although education takes place unconsciously while the visitor is having fun.

New products include, for example, theme-based playgrounds tailored to a particular location, additional animation and augmented reality used outdoors, and the use of non-traditional materials, methods and procedures for presenting selected locations. Visitors' responses show that this approach stimulates their interest in geo-products and thus helps spread the ideas of geopark and sustainable geotourism.

This research also revealed a number of other issues to be discussed in other articles. One of the big questions is closely related to the use of modern but also very expensive technologies. It is a question of the effectiveness of using technology compared with its actual utilization by ordinary visitors. Another big question is the general shape of geo-product parameter setting in geopark conditions. That is, what-already-is and what-is-not-yet a geoproduct within the geopark context.

Figure 10 Kids playground in the geopark



Source: archive of Železné hory National Geopark

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