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Viewpoint geosites — values, conservation and management issues

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This paper is dedicated to the memory of Irena Pijet who sadly passed away while the paper was written.

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ABSTRACT

Viewpoint geosites are a specific category of geosites, defined as locations which allow for unobstructed observation of the surrounding landscape and comprehension of Earth history recorded in rocks, structures and landforms visible from this locality. They have been poorly addressed in literature so far and this paper, primarily based on field observations and literature review, aims to discuss their significance and associated management and geoeducation issues. Viewpoint geosites do not necessarily have an intrinsic value related to geology or geomorphology but offer a view towards features and areas which do have such values. The role of a viewpoint geosite may be played by both natural features such as tors, crags, mountain tops, cliff edges, as well as by man-made structures erected intentionally to provide panoramic views and converted to play such a role. Paradoxically, although viewpoint geosites are the most suitable places to develop landscape interpretation, any interpretation facilities may severely interfere with the natural scenery, spoiling the aesthetic qualities of the landscape. Publications and mobile applications are alternative means to develop interpretation programmes. As other types of geosites, viewpoint geosites require management strategies that should focus on sustaining the view by periodic removal of vegetation if necessary, getting right balance between on-site facilities and scenic values, preventing soil erosion, and ensuring visitor safety.

1. Introduction

Geosites, i.e. sites of special geological and geomorphological significance, are the key localities for Earth sciences. Reynard (2004, p. 440) defined them as 'portions of the geosphere that present a particular importance for the comprehension of Earth history'. Ruban (2010, p. 326) considers geosites as 'geological objects or fragments of the geological environment exposed on the land surface' and adds that they should be accessible for visits and studies. Both these explicit definitions as well as implicit understanding of the meaning of geosites (e.g. Prosser et al., 2006; Gray, 2013) highlight the importance of geosites not only for research, but also – perhaps even mainly – in the context of outreach activities (Hose, 2005; Thomas, 2016). Brilha (2016) appears to present a narrower view of a geosite and argues that this term should be reserved for sites of international or at least national significance which have scientific value. Other locations, including those more important for education and geotourism rather than science, are termed 'geodiversity sites'. Nevertheless, in practice such a restrictive view is not necessarily adopted and in fact, to make a clear-cut division between these two categories would be difficult. A clear manifestation of a broader approach is the strong focus on geosite designation, management and access within geoparks (both UNESCO Global Geoparks and national ones, if these exist). In each properly functioning geopark a network of geosites is maintained and they are the main places to visit and carry out educational activities, whether on guided tours or at the individual level, with the aid of interpretation panels, leaflets, guidebooks or mobile applications.

Geosites are usually classified through identification of the sub-discipline of geosciences that is most evidently represented at a given location. Hence, mineralogical, palaeontological, geomorphological, hydrological and other 'types' of geosites are mentioned in literature. In this vein, Ruban (2010) and Ruban and Kuo (2010) distinguished as many as 21 types of geosites based on the subject matter. However, for practical reasons of facilitating access and management other classifications may be more useful which emphasize the setting of a site (e.g. quarry, road cut, cliff etc.—see Prosser et al., 2006) or the spatial dimension and context of the feature to observe. Thus, some geosites may be essentially points (e.g. small natural rock outcrop amidst otherwise vegetated terrain), others can be linear (e.g. sections of river channels), and yet others may encompass fairly large areas of natural features

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(e.g. fields of collapsed pingos or roche moutonnées) or anthropogenic objects (e.g. large quarries). Within 'sites' of the latter type specific places may be designated to erect interpretation facilities, but nevertheless features of interest will remain dispersed over a broader tract of terrain. In this paper we intend to focus on localities escaping traditional classification schemes as those above, but which are very important for geoeducation, especially in the fields of general geology, geomorphology and land use patterns, often crucially underpinned by rock and landform diversity. These are provisionally termed 'viewpoint geosites' and are understood as localities which offer a wider look at the surrounding landscape and hence, better understanding of its history, spatial relationships between rock types and landform categories (i.e. geodiversity), and ongoing environmental change. Comprehending Earth history, especially the evolution of landforms, requires examination of many facets simultaneously and this can be done most effectively in the field, from an appropriate observation point. Such points are of considerable value, yet remain neglected and underrated in most works dealing with geosites and geoheritage. Filling this gap is the main aim of this paper in which we will discuss various aspects related to such locations, from terminology and typology, through interpretation issues, to management challenges.

2. Recognition and terminology

2.1. Viewpoint—a neglected subject in geosite studies

The importance of sites which allow the visitor to see the panorama of the surroundings is probably most evident in geomorphology (Fig. 1), but in areas with scarce vegetation or prominent rock outcrops such localities can be also very important for structural geology and reconstructing the history of rock deformation (Fig. 2). This is because of scale issue—geomorphological heritage can be appreciated at the level of individual landforms, fitting the traditional meaning of a geosite, but also at the much wider landscape scale where elements of various origin and age can be seen in their spatial context and integrate with one another. The complexity of geomorphological heritage was recognized by Grandgirard (1997) (cited after Reynard, 2009a) and then addressed by Reynard (2005, 2009a), who used the term "geomorphological landscape" as adequate to large geomorphosites, of the order of several square kilometres. At the same time, such "sites" of considerable areal extent are complex in terms of origin, representing polygenetic geomorphological systems rather than monogenetic groups of individual landforms. In attempt to define "geomorphological landscapes" Reynard (2009a) emphasized that they need to be *viewed* (our italics), thus implicitly a good observation point must exist to allow for this. In addition, smaller-scale and singular features may also be better appreciated from a distance, i.e. from a designated viewing point. A good example are waterfalls whose grandeur, but also relationship to relief and structure, are difficult to recognize if one stands at the bottom of the fall (Fig. 3).

However, the role of viewing points as potential geosites remained poorly addressed explicitly and it is not always clear whether they are considered as geosites at all. Such an uncertainty emerges for instance from a recent study of geodiversity in the Bucegi Mountains in Romania (Necheş, 2016). She analyzed four geosites, clearly fitting the notion of "geomorphological landscape" according to Reynard (2009a) due to their spatial scale, and emphasized ridge and hilltop viewing points as locations from

Fig. 1. Multitude of geomorphological themes such as general rock—landform relationships, glacial landforms, rock weathering and contemporary slope processes (note numerous debris flow tracks on the right) can be explored from the viewing point on the top of Goat Fell, Isle of Arran, Scotland.

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