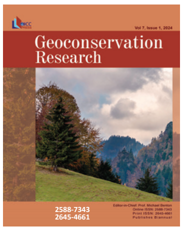

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The Partisan Glade Geosite (Western Greater Caucasus) as an Important Resource and Rising Tourist Attraction

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Abstract

Geoheritage is an important resource for contemporary society, and the inventory of geosites remains an urgent task, especially in geologically rich, but poorly known regions. The present study offers a systematic description of the Partisan Glade geosite, which is a large, elongated locality in the western Greater Caucasus. There, tourist activities have accelerated significantly in the past decade. This geosite represents Lower–Middle Jurassic deep-marine siliciclastics, and it shows Upper Jurassic carbonates, unusual landforms, landslides, and tectonic structures. The geosite is heterogeneous, and it consists of five parts with different properties. The Partisan Glade geosite is important for geological research and education. It can also be employed in geotourism development. The multiple scenic views and fascinating landscape contribute to the importance of this geosite as a rising tourist attraction. Some practical implications concerning conservation and planning issues are specified.

Keywords: Geoheritage Management; Jurassic; Mountainous Adygeya; Scenery; Tourism

Introduction

Despite significant progress in studies of the world's geoheritage (Cleal *et al*. 1999; Brilha *et al*. 2018; Benado *et al*. 2019; Antić *et al*. 2022a; Coronato & Schwarz 2022; Herrera-Franco *et al*. 2022; Kubalíková *et al*. 2022; Neto & Henriques 2022; Bétard *et al*. 2023; Bressan & Lopes 2023; Coratza *et al*. 2023; Köroğlu & Mülayim 2023; Pescatore *et al*. 2023; Ruban 2023; Yazdi *et al*. 2024), the inventory of geosites remains on the agenda of contemporary research. Geosites constitute an important resource for the tourism and recreation industries, not merely for pure geotourism (Ehsan *et al*. 2013; Hobléa *et al*. 2017; Santangelo & Valente 2020; Ruban *et al*. 2022a; Zoboli 2023), and, therefore, researchers should pay attention to large, globally and nationally ranked geosites found in promising tourist destinations. Better awareness and understanding can facilitate the overall growth of touristic activities in these destinations and increase their attractiveness. Moreover, geosites face serious anthropogenic stress when they are located in tourist destinations (Ovreiu *et al*. 2019; Aydın & Yüceer 2020; Sumanapala &Wolf 2020; Zavadskaya *et al*. 2021; Santos & Brilha 2023), which implies that in-depth examination is necessary for their better conservation.

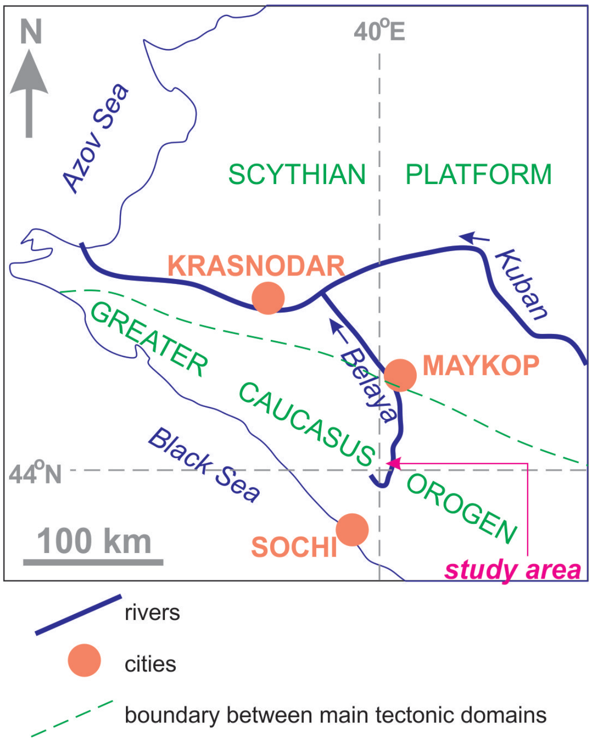

Figure 1. Geographical location of the study area.

Mountainous Adygeya, which constitutes the core of the western Greater Caucasus (Fig. 1), is one of the most important tourist destinations of the Russian South, the natural heritage of which annually attracts hundreds of thousands of visitors (Bedanokov *et al*. 2020; Mahmudov *et al*. 2020). This territory also boasts outstanding geological richness and world-class geoheritage with numerous opportunities for geotourism development (Ruban *et al*. 2022a). This geoheritage is represented at many geosites, among which the Partisan Glade geosite deserves special attention. On the one hand, it illustrates some interesting phenomena such as oxygen depletion in the Early–Middle Jurassic semi-enclosed Caucasian Sea and tectonic deformation of thick complexes dominated by fine siliciclastics. On the other hand, it could be an all-season tourist attraction in the future, whose visitors would appreciate the diversification of activities. Previously, this geosite was characterized only briefly (Ruban *et al*. 2022a), because of its large size and complexity and poor accessibility of some parts. Several field campaigns were required to register all principal features of this geosite, which was facilitated by the rapid development of the local tourist infrastructure in the past decade.

The objective of the present paper is to offer a systematic description of the Partisan Glade geosite based on field observations, laboratory work, and related interpretations. The outcomes fill the above-mentioned knowledge gap, demonstrate the principle of lateral analysis of elongated geosites, and contribute to better awareness of Caucasian geology internationally. The general geological context and specific geoheritage properties are addressed in this study because both are essential for the correct understanding of all geosites.

Study Area

The study area is situated in the south of the Republic of Adygeya, which is an administrative

Figure 2. Landscapes of the Partisan Glade geosite: A) forested mountain slopes, B) artificial lake.

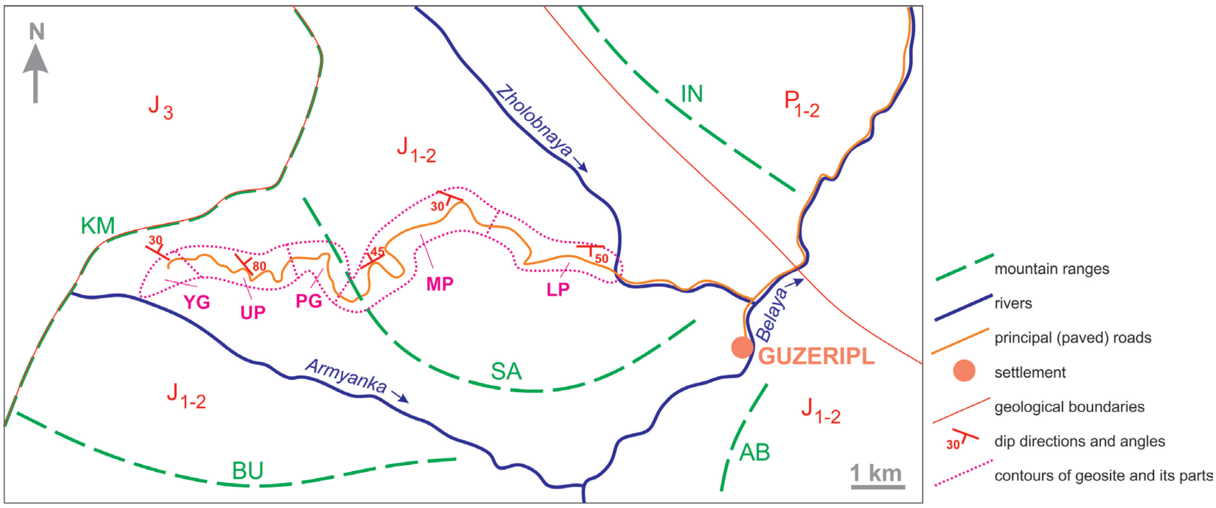

Figure 3. Configuration of the Partisan Glade geosite and its geological context. Abbreviations: AB – Abago, BU – Buyny, IN – Inzhenerny, KM – Kamennoe more, SA – Skazhenny mountain ranges; P1-2 – Cisuralian–Guadalupian (Lower-Middle Permian), J1-2 – Lower-Middle Jurassic, J3 – Upper Jurassic sedimentary complexes; LP – lower, MP – middle, PG – Partisan Glade (sensu strict), UP – upper, YG – Yavorova Glade parts of the geosite.

division of the Russian Federation. This is also the southwestern edge of the tourist destination of Mountainous Adygeya. The area is dominated by mountain ranges with elevations up to 2000 m (these ranges belong to the Greater Caucasus mountain belt), rather steep slopes (up to 450 and higher), and dense vegetation cover (mixed, coniferous–deciduous forests) (Fig. 2A). The rivers belong to the basin of the Belaya River, which is a large left tributary of the Kuban River flowing to the Azov Sea (Fig. 1). They have deep valleys, which either stretch along mountain ranges or cross them almost perpendicularly. Although the area boasts significant wilderness and natural diversity (Bedanokov *et al*. 2020), it experiences anthropogenic pressure from the growth of tourism infrastructure. This includes not only the construction and regular maintenance of paved roads (Fig. 2A), but also deeper modification of the local landscapes and, particularly, the creation of artificial lakes (Fig. 2B).

The geological setting of the study area is generally typical of the western Greater Caucasus. This is a late Cenozoic orogen (Van Hinsbergen *et al*. 2020), which developed at the southwestern margin of the Eurasian lithospheric plate (Fig. 1). The area is dominated by Lower–Middle Jurassic sedimentary rocks (Fig. 3). Earlier, these rocks were attributed to many formations (Rostovtsev *et al*. 1992) grouped later in the Psebay Formation/Group (Vuks 2013). Its age is established by micro- and macrofossils including ammonites as Pliensbachian–Aalenian, and this formation consists chiefly of fine siliciclastics (dark-colored shales and siltstones) with subordinate amounts of sandstones; the total thickness exceeds 2000 m. These deposits are intensively folded and faulted as a result of the late Cenozoic orogeny and earlier episodes of tectonic activity. In the western part of the area, Oxfordian–Kimmeridgian carbonates, limestones and dolostones with a total thickness of ~200–250 m, attributed to the Gerpegem Formation (Rostovtsev *et al*. 1992) crop out extensively (Fig. 3). These deposits are deformed only slightly, and they form a kind of northwest-dipping, low-angle monocline. Jurassic rocks accumulated in the southern part of the semi-enclosed Caucasian Sea, which covered the back-arc basin (Yasamanov 1978; Kuznetsov 1993; Ruban 2006). Additionally, Lower–Middle Permian red molassic beds are exposed in the northeastern part of the study area, but they are neither represented in the considered geosite, nor visible from there. The new fieldwork has revealed more information about the study area, and these lines of evidence are provided below, together with the geosite description.

Local tourist flows are directed along the paved road (~17 km long), which links the town of Guzeripl with the toes of the Kamennoe More range (Fig. 3). The main points of interest are the Partisan Glade with its outstanding natural scenery and the Yavorova Glade where hiking routes start, and skiing facilities are available. Although statistics about the number of visitors to this attraction are absent, it is seen to be visited by many thousands of tourists annually, and it is overcrowded by tourists on holidays and weekends. However, the potential of this attraction is far from being fully exploited, and the ongoing development of the touristic infrastructure enlarges this potential. The expected increase in tourist flows makes this a rising attraction.

Materials and Methods

Information about the Partisan Glade geosite has been collected in the course of fieldwork undertaken almost every summer since 2010. Special, geoheritage-focused investigations were conducted in the summer of 2023. All parts of this geosite have been visited to record the main geological peculiarities and the geoheritage properties. This information is systematized and reported in this paper. The sedimentology of the Lower–Middle Jurassic deposits of the western Greater Caucasus was characterized comprehensively by Teodorovich & Pokhvisneva (1964) and Rostovtsev *et al*. (1992). In our fieldwork, we sampled the siltstones and sandstones, as well as the shaly concretions that are common here. We measured dip directions and angles at several key outcrops to document better the tectonic deformation of the sedimentary rocks. The national rank of this geosite was argued by Ruban *et al*. (2022a). However, the geoheritage properties differ laterally along the geosite, and the new field observations establish some tentative criteria for tracing these differences (see below).

To enhance knowledge of the siltstones, sandstones, and shaly concretions, thin sections were made from the samples and analyzed under the polarizing microscope. X-ray powder diffraction (XRD) analysis was also undertaken for the siltstones. These analyses were made in the laboratory of the Kazan Federal University (Russia). The dip parameters were mapped to interpret the possible tectonic structures.

There are different approaches for the assessment of geoheritage properties (Tomić & Božić 2014; Brilha 2016; Antić *et al*. 2022a,b; Ruban *et al*. 2022a; Štrba *et al*. 2023; Zafeiropoulos & Drinia 2023; Moradipour *et al*. 2024). However, these quantitative tools are applied to entire geosites, and they miss some important properties that cannot be quantified, or which are applicable in only particular cases. Anyway, the quantitative assessment of the Partisan Glade geosite was already done by Ruban *et al*. (2022a). The present study has a different focus, applying the set of tentatively established criteria to judge lateral differences along the geosite. These criteria include length and remoteness from the start of the road in Guzeripl, relative number and size of outcrops, configuration of space, elevations, relative number of visual cues of the geological environment, aesthetics of the geological features and the entire geological landscape, availability of panoramic views and related observation points, opportunity for off-road hiking, dominance and diversity of vegetation, visible anthropogenic pressure, and touristic infrastructure. Our field observations allowed us to characterize each part of the geosite by these criteria.

Results

Geosite and its Geological Characteristics

The Partisan Glade geosite stretches for ~15 km along the road connecting the town of Guzeripl and Yavorova Glade (Fig. 3). It includes some adjacent plots, but the width of this geosite does not exceed 0.5 km due to steep slopes and dense vegetation cover, which make the adjacent areas almost inaccessible. This geosite shares features of linear and areal geosites, and it is distinctive in its curvature determined by the complex road trajectory (Fig. 3). The study area is rich geologically, although natural rock exposures are almost absent. The construction and subsequent maintenance of the noted road required many cuttings, and the lengthy chain of these artificial outcrops of strongly deformed Lower–Middle Jurassic siliciclastics constitutes the axis of this geosite (Fig. 4). Spectacular panoramas of geological landscapes are available from this road, and, particularly, Upper Jurassic carbonates that outcrop in the cliff of the Kamennoe More cuesta is well seen. Although this cuesta belongs to the other geosite, the cliff is not visible and the typical cuesta morphology cannot be realized from that geosite. Ruban *et al.* (2022a) stated the national rank of the Partisan Glade geosite and noted its perfect accessibility, absent vulnerability, high scientific importance, and exceptional aesthetic properties.

Geologically, this geosite is the reference section of the Psebay Formation. Lower–Middle Jurassic deposits exposed there are represented by siliciclastic rocks. The most common of these are laminated shales, consisting of hydromica (illite) with subordinate amounts of quartz and other detrital grains; pyrite grains are abundant (Teodorovich Teodorivich & Pokhvisneva 1964). These rocks

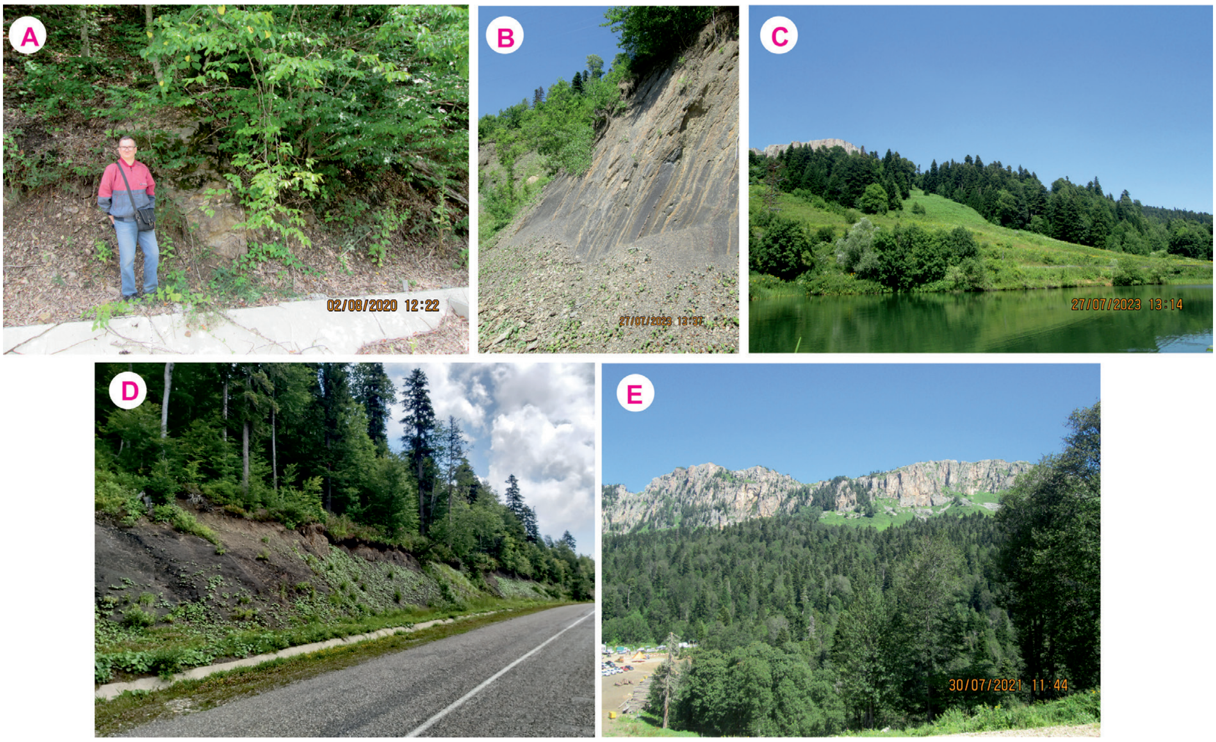

Figure 4. Views of the different parts of the Partisan Glade geosite: A) outcrop (road cutting) of Lower–Middle Jurassic sandstones and siltstones in the lower part (the author stays for scale), B) outcrop (road cutting) of Lower–Middle Jurassic dark-grey, laminated shales and siltstones in the middle part, C) slope of the Skazhenny Range with the visible cliff of the Kamennoe more cuesta made of Upper Jurassic carbonates in the Partisan Glade (sensu stricto), D) outcrop (road cutting) of Lower–Middle Jurassic dark-grey, laminated shales and siltstones in the upper part, E – high cliff of the Kamennoe More cuesta made of Upper Jurassic carbonates in the Yavorova Glade (the glade itself is on the bottom).

are chiefly dark gray and locally black due to the high content of organic carbon, which reaches 1% (Teodorovich Teodorivich & Pokhvisneva 1964).

Siltstones were thought initially less common, but analyses of the samples from some "shale" layers revealed that these are true siltstones. Principally, shales and siltstones look very similar, especially when their thin (several mm) layers intercalate. Hypothetically, up to half of the entire sedimentary succession may consist of siltstones. The studied siltstones contain small (< 0.25 mm), angular and subangular grains of quartz (50–70%), feldspars (5–10%), mica (up to 2%), clasts of carbonates rocks (up to 10%), and pyrite (< 1%) (Fig. 5A). The rock lamination is visible under the microscope (Fig. 5B). These siltstones have basal cement, which constitutes up to 40% of the rock and consists of argillaceous material (kaolinite, montmorillonite, and hydromuscovite) and chamosite. Such minerals as goethite and calcite are present in subordinate amounts, and there are also clasts of volcanic glass. It can be hypothesized that the chamosite inherits the volcaniclastic material. These rocks are also enriched in organic matter.

Of big interest are sandstones sampled in the considered geosite. They form single layers < 1 m thick. They contain small (~0.1 mm) angular grains of quartz (45–50%), feldspars (10–15%), and clasts of siliceous rocks (5–10%) (Fig. 6A). Sandstones are massive and well-sorted. They

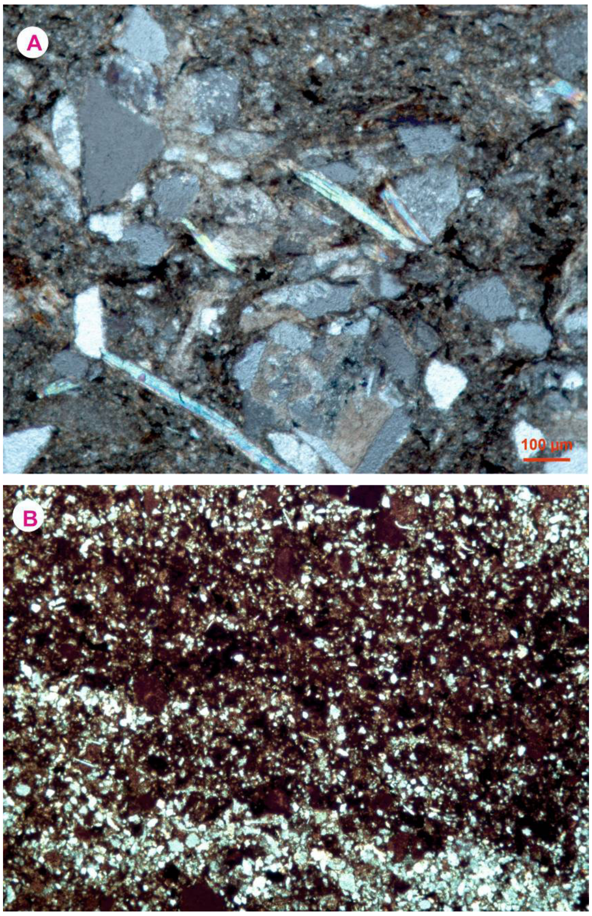

Figure 5. Petrological features of Lower–Middle Jurassic siltstones in thin sections (P.P.L.): A) general view and large muscovite grains (100 μm scale bar is in the lower right angle), B) thin lamination and significant amount of argillaceous–chamosite cement (200 μm scale bar is in the lower right angle).

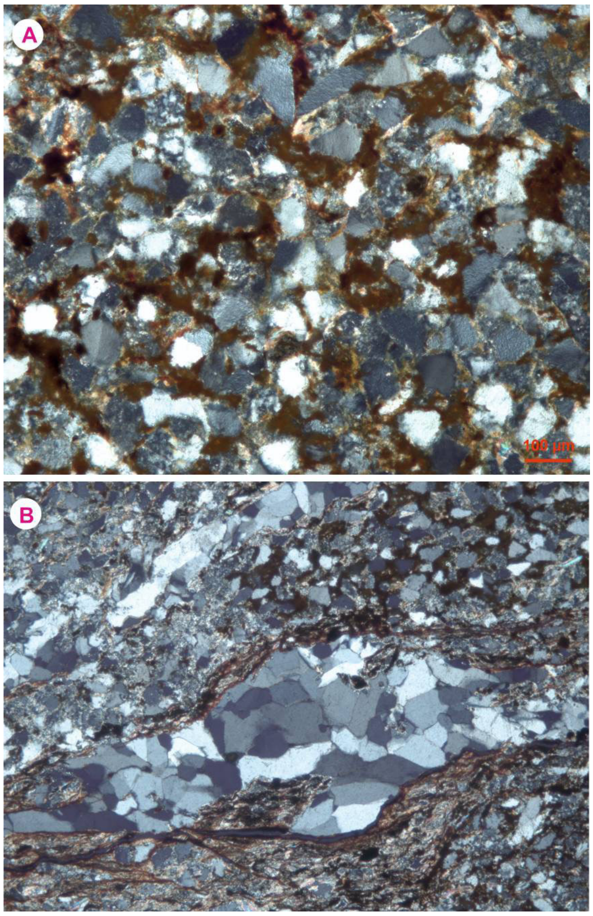

Figure 6. Petrological features of Lower–Middle Jurassic sandstones in thin sections (P.P.L.): A) general view (100 μm scale bar is in the lower right angle), B) secondary quartz grains filling joint-related cavities (200 μm scale bar is in the lower right angle).

have basal cement, which constitutes up to 20% of the rock and consists of chamosite. Multiple joints are filled with small grains of quartz (Fig. 6B). Sometimes, these sandstones also bear goethite. Clasts of volcanic glass are found in these sandstones, and chlorite was formed by their alteration. It cannot be excluded that all chamosite cement was formed via alteration of the volcaniclastic material.

Shales bear rather abundant concretions (Fig. 7A) that consist of argillaceous material with angular grains of quartz and feldspars and some amounts of pyrite grains and probable zeolites (Fig. 7B).

Considering regional palaeogeographical reconstructions (Yasamanov 1978; Ruban, 2006), Lower–Middle Jurassic siliciclastics accumulated in the deep part of the Caucasian Sea, a marginal sea of the Neo-Tethys Ocean, where oxygen depletion persisted. The regular input of volcaniclastic material can be attributed hypothetically to a nearby island arc. The relatively large size (up to 0.4 mm) of mica grains in the siltstones indicates deposition close to the sources of the sedimentary material. Accumulation of siliciclastics on the submarine slope of the island arc seems to be a realistic scenario. The carbonate grains in the siltstones can be explained by the denudation of Triassic carbonate rocks, including Norian–Rhaetian reefal limestones. A trace fossil assemblage in these deposits does not question this interpretation and indicates the activity of some marine organisms on the sea bottom despite oxygen depletion (Ruban *et al*. 2017).

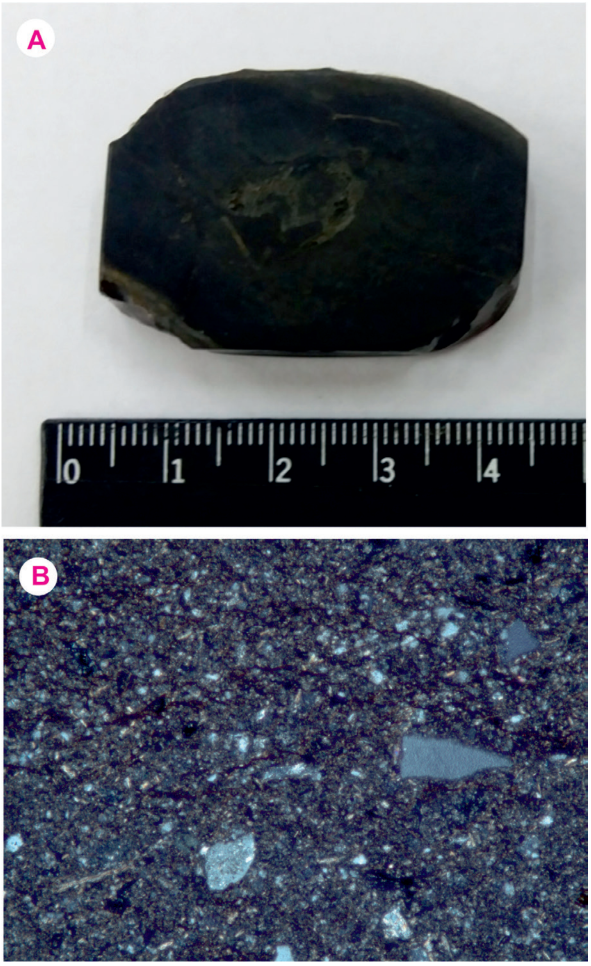

Figure 7. Concretions in Lower–Middle Jurassic shales: A) polished sample (numbers in cm), B) view in thin section (P.P.L., 100 µm scale bar is in the lower right angle).

The tectonic structure of the study area remains poorly understood, and the best outcrops for measuring dip directions and angles are restricted to the geosite. The measurements indicate a complex deformation pattern of the Lower–Middle Jurassic deposits (Fig. 3). The western half of the geosite represents a kind of plunging syncline, the axis of which corresponds to the northwestern part of the inverted landform of the Skazhenny Range (cf. Ruban *et al*. 2022b). The eastern half of the geosite can be related to the northern (or northeastern) limb of the other syncline. Hypothetically, these synclines are separated by a fault but finding their exact position and outlining the exact configuration of the synclines require additional studies outside the geosite (these areas are poorly accessible). Further notable geological features of the Partisan Glade geosite include active landslides affecting the road, large colluvial clasts of Upper Jurassic carbonates (up to a meter and more in size) formed by cuesta retreat, calcite veins, including those developed along gliding planes in shales and siltstones, and hydrological phenomena, including several artificial lakes (Fig. 2B) signifying the geological activity of humans.

Lateral Differences at the Geosite

Five parts can be established in the Partisan Glade geosite (Fig. 3). The lower part starts where the paved road crosses the valley of the Zholobnaya River and extends for ~3 km. It is closest to the town of Guzeripl. This part is characterized by the limited number of small outcrops of Lower–Middle Jurassic deposits (Fig. 4A), which occur sporadically along the road. The latter is slightly curved. The elevations range between 750 m and 1000 m. The visual cues are few, and these are the noted outcrops and landslides. The aesthetic properties of the geological features are minimal, but the landscape is rather scenic because of the dense mixed forest covering the slopes along the road; panoramic views are few. Off-road hiking is almost impossible, although prepared visitors can walk along the valley of the Zholobnaya River for a few hundred meters. Anthropogenic pressure is minimal (the road itself), and touristic infrastructure is absent, except for rare points where vendors sell local honey.

The middle part, which stretches for ~4 km (Fig. 3), does not differ much from the lower part, with some exceptions. The outcrops of Lower-Middle Jurassic deposits are larger (Fig. 4B), and the layering and distortion of these rocks make them aesthetically attractive. Large carbonate clasts occur sporadically. The curvature of the road increases, and 1800-panoramas are available locally (Fig. 8A). The elevations are 1000–1400 m.

The Partisan Glade (it should be noted that this name is used commonly for this particular place, as well as for the entire geosite) is a notable part of the geosite, and it stretches for ~2 km. The outcrops of Lower–Middle Jurassic deposits are abundant, and some are impressive in size. The curvature of the road is significant. The space broadens and includes relatively gentle slopes and a rather flat plot around the artificial lake. The elevations are ~1500 m. Visual cues are numerous and include an artificial lake, outcrops, and landforms (Fig. 4C). The aesthetic properties of this part are exceptional, but they are determined chiefly by the overall landscape scenery, even if the presence of the geological features diversifies the view. Long-distance, 2700-panoramas are available from many observation points: particularly, one can see the cuesta cliff where Upper Jurassic carbonates are exposed. Off-road hiking is possible: for instance, one can walk easily around the artificial lake or climb the Skazhenny Range (long-distance, spectacular views are available from there) via well-established trails. The vegetation is more diverse than in other parts of this geosite: the mixed forest co-occurs with meadows. Anthropogenic pressure is moderate, linked chiefly to the construction of the lake and the bus and car stops. The touristic infrastructure includes also some lodges.

The upper part of the geosite starts near the Partisan Glade and stretches for ~5 km. Large outcrops of Lower–Middle Jurassic deposits form an almost continuous section along the road (Fig. 4D), which demonstrates significant curvature. The elevations range between 1500 m and 1700 m. The visual cues of the geological environment are moderate in number, and they include noted outcrops along the road, far-located outcrops of Upper Jurassic carbonates in the cliff of the Kamennoe More cuesta, and local landforms. The landscape scenery is impressive. Spectacular 1800-panoramas are available along the road almost everywhere (Fig. 8B). The steepness of slopes and the dense vegetation cover limit off-road hiking. The high amplitudes of elevations make the space look more open despite of the dense vegetation cover (panoramic views are available “above” the forest). Visible anthropogenic pressure is minor (the road itself), and touristic infrastructure is absent.

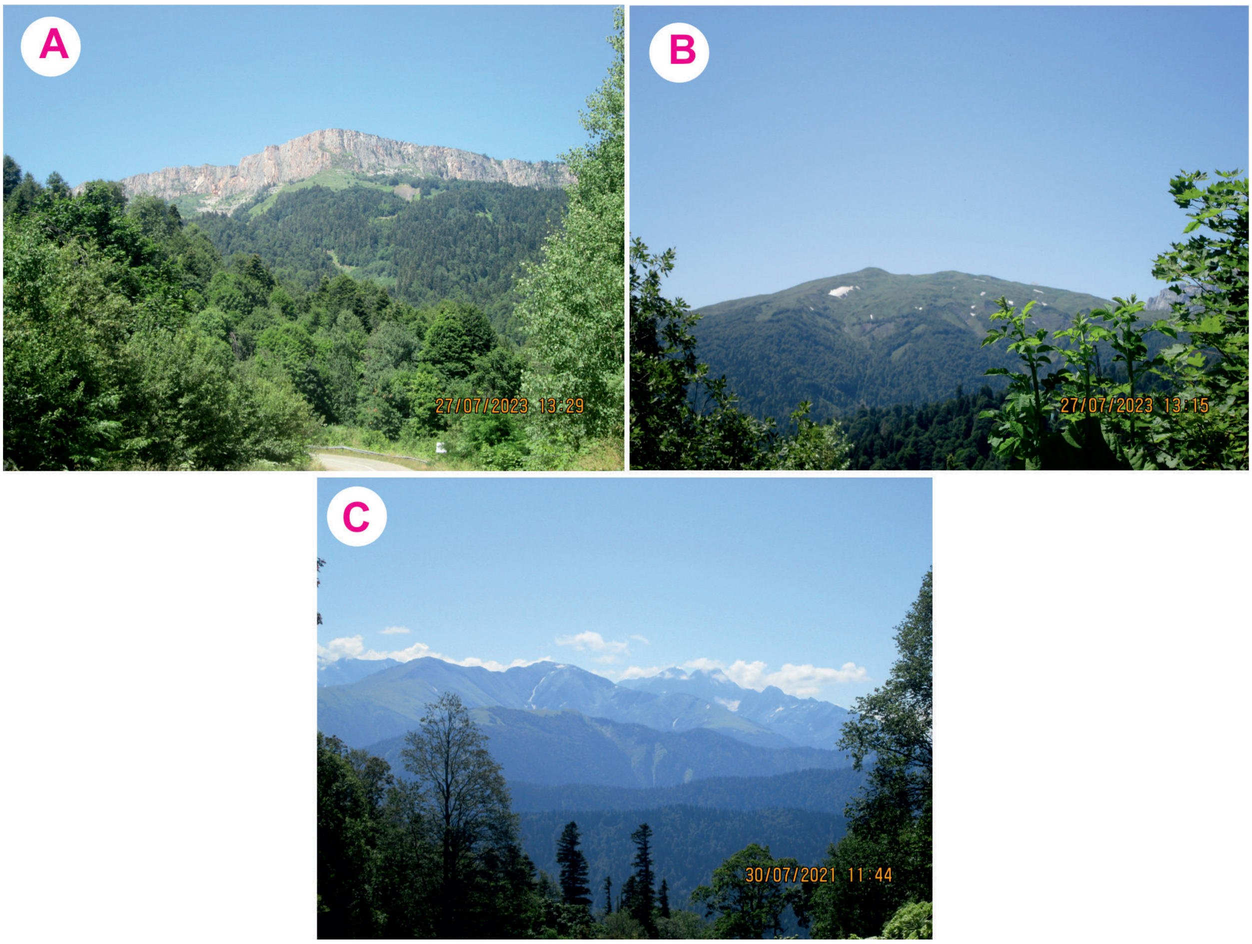

Figure 8. Panoramic views from the Partisan Glade geosite: A) from the middle part of the geosite towards the Nagai-Kosh Mountain, B) from the upper part of the geosite towards the Guzeripl mountain, C) from the Yavorova Glade towards the Main Cauc

Yavorova Glade forms the western edge of the geosite where the paved road ends. This part is ~1 km in size and is the most remote from the town of Guzeripl. Outcrops of Lower–Middle Jurassic deposits are chiefly small and not abundant (Fig. 4E). However, impressive natural exposures of Upper Jurassic deposits in the cuesta's cliffs are visible everywhere, and this place is essential for understanding the geological setting of the entire study area. In contrast to the other parts of the geosite, the space is relatively large and open. In addition to the large car stop, it includes some flat plots covered by forest. The elevations are ~1700 m. The geological environment is diverse, and there are many visual cues. Major geological features such as Oshten Mountain, an exposed Late Jurassic reef, and the landscape dominated by low-density mixed forest covering the slopes of high mountains, are aesthetically attractive. There are several observation points with 1800, and even 3600, panoramas (Fig. 8C). Several well-established trails start from the end of the paved road and provide excellent opportunities for off-road hiking through the picturesque forest. Visible anthropogenic pressure is locally significant from rapid development of touristic infrastructure. The latter includes car stops, travel centers, lodges, specially modified slopes for skiing in winter, rope parks, and artificial lakes. There is the place also for numerous vendors of local goods and food.

Discussion and Interpretations

The new, systematized description of the Partisan Glade geosite proves its importance in representing the unique geology of the area. It is also suitable for conducting research projects on the Lower–Middle Jurassic siliciclastic deposits, including investigations of their petrology, provenance, and depositional environment. Of special interest will be a detailed examination of the volcaniclastic material found in silt- and sandstones and structural geological mapping of the study area. The former will facilitate understanding of the evolution of the mid-Mesozoic Caucasian Sea, and the latter will shed light on the tectonic history of the Greater Caucasus orogen. The proposed description also indicates the larger potential of this geosite for geological education – at least, it can be used for the explanation of basic ideas of stratigraphy, sedimentology, and engineering geology to university students and development of their skills in structural geology. The lateral differences of this large geosite are evident (see above), but transitions between its five parts are rather gradual, and these parts have much in common. Nonetheless, each part differs from the others, and no single part can be equated to the entire geosite. In other words, the Partisan Glade geosite demonstrates simultaneously spatial diversity and integrity. The full value and integrity of this geosite cannot be comprehended without consideration of its landscape context and scenery.

The importance of the Partisan Glade geosite for geotouristic activities is indisputable. In particular, visitors may be interested in seeing deposits that accumulated on the deep sea bottom with oxygen depletion. They can also search for trace fossils, evidence of ancient life in a rather hostile paleoenvironment. Some visitors may be impressed by deformation structures, landslides, and unusual landforms. Importantly, the noted themes are of interest to the limited number of visitors with an appropriate geological background, i.e., pure geotourists. But most visitors are ordinary tourists, often lacking even very elementary geological knowledge. Apparently, they can also be satisfied. On the one hand, some geological features are attractive in themselves, such as the dark-colored and distorted siliciclastics (Fig. 4B). On the other hand, there are many observation points offering spectacular (also panoramic) views of the local geological landscapes (Figs. 2B, 4E, 8A, B). It appears that the Partisan Glade geosite can be regarded as a viewpoint geosite (sensu Migoń & Pijet-Migoń 2017; Mikhailenko & Ruban 2019; Diniz & de Araújo 2022). The availability of long-distance views and picturesque landscapes makes the road scenic; such roads are always important in tourism (Denstadli & Jacobsen 2011; Otón *et al*. 2012; Qi *et al*. 2022). International experience (Štrba *et al*. 2016; Ranjbaran & Sotohian 2021) indicates the significance of roadside geoheritage for (geo)tourism development. Taking into account the feature of the five parts of the geosite, it is evident that it can be used entirely for tourism, and thus it has socio-economical value. Moreover, the lateral differences do not make this elongated geosite monotonous, which is important in maintaining the visitors' interest during the trip from Guzeripl to the Yavorova Glade.

Implications

The present analysis has two practical implications. The importance of the Partisan Glade geosite makes urgent its adequate conservation. Geoconservation has many approaches (Prosser *et al*. 2006; Gordon 2019; Pescatore *et al*. 2023), but each geosite requires the state-of-the-art development of specific techniques. In the study area, anthropogenic pressure is not high, and it is almost absent in many parts of the geosite. The creation of artificial lakes has modified the landscape but they do not look unnatural. Nonetheless, the rapid growth of the touristic infrastructure at the

Yavorova Glade requires attention. Although human impact on geological features is minimal, if any, it modifies the visual landscape, which looks less natural through the presence of various constructions and forest clearing. Moreover, crowds of tourists and numerous cars contrast the natural wilderness, and this leads to the known negative tourist experience (Ortanderl & Bausch 2023). As interpreted above, the touristic value of the Partisan Glade geosite depends greatly on its scenery, and thus special efforts are needed to protect this geosite from strong visual changes. This means that a clear plan for the long-term maintenance of this locality should be developed. The intellectual resources of several universities in the Russian South can be used for this purpose.

The other implication is that the entire geosite should be considered for (geo)tourism development, although the present activities concentrate on the Partisan and Yavorova glades. This task can be achieved by the installation of interpretive panels explaining the geological context in all five parts, proper indications with special road signs of the panoramic and other spectacular viewpoints, and the development of a well-fixed, multi-stop route along the road through the entire geosite. Such a route can be promoted offline (brochures, guided excursions) and online (especially on web pages focusing on tourism in Mountainous Adygeya). The establishment of the regional, geology-focused visitor center will also contribute to geotourism development.

Conclusion

The present paper reports the Partisan Glade geosite, which is an important locality representing the unique geology of the western Greater Caucasus. Three main conclusions are:

1) the Partisan Glade geosite represents several geological phenomena, studies of which facilitate understanding of Jurassic depositional environments on the northern Neo-Tethys margin and the late Cenozoic development of the Great Caucasian orogen;

2) the Partisan Glade geosite stretching along the paved road for ~15 km demonstrates both lateral differences and integrity, and each of its parts is valuable;

3) the Partisan Glade geosite should be regarded as an important resource as a rising tourist attraction, and it is especially suitable for roadside (geo)tourism.

The main limitation of this study has been its focus on available resources, whereas successful exploitation requires attention to the attitudes, opinions, and preferences of tourists (also potential geotourists) and tourism managers. Nonetheless, the exploration of resources always precedes their full-scale exploitation, and thus an exploration of possible determinants of visitor interest and behavior is left for future research. This work shows that the exploration of geoheritage resources can bring new geological knowledge (e.g., the volcaniclastic material in silt- and sandstones was established via the analyses made for the present geoheritage study), and this knowledge itself increases the scientific interest in geosites.

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Data availability and access

No data are linked to this study.

Authors' contributions

Anna V. Mikhailenko – Conceptualization, investigation, text writing.
Dmitry A. Ruban – Conceptualization, methodology, investigation, text writing.
Svetlana O. Zorina – Methodology, investigation, laboratory analyses, text writing.
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Conflict of interests

The authors declare no competing interests.

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