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Kaçkar Dağlarının Doğal Özellikleri ve Tırmanma Rotaları (KD Türkiye)

Natural Features and Climbing Routes of the Kaçkar Mountain Range (NE Türkiye)

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Öz

Kuzeydoğu Türkiye'de yer alan Kaçkar Dağları, üç bin metrenin üzerinde onlarca yükseltisi, sarp topoğrafyası, buzul gölleri, buzul vadileri, moren yığışımları, çeşitli buzul aşındırma yapıları, alpin çayırları ve otantik yaylaları ile görülmesi gereken doğa harikası bir milli parktır. Bu bölge aynı zamanda adrenalini seven dağcıların ve doğa severlerin tırmanma tutkularını tetikleyen rotaların ve zirvelerin varlığı ile de dikkat çeker. Bu rotaların en önemlileri Kaçkar, Verçenik, Kemerli Kaçkar-Kındeval, Altıparmak-Liblin ve Marsis tepeleridir. Her yıl binlerce doğa sever gezgin dört mevsim Kaçkar dağlarını ziyaret ederek tırmanma, trekking, kayak, kamp ve benzeri sportif aktivitelerde bulunurlar.

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Abstract

The Kaçkar Mountain Range located in northeastern Turkey, are a breathtaking national park that should be visited, with featuring dozens of peaks rising above three thousand meters, rugged topography, glacial lakes, glacial valleys, moraine accumulations, various glacial erosion structures, alpine meadows, and authentic highland plateaus. This region also stands out with its numerous peaks and routes that attract mountaineers and nature lovers seeking adventure and adrenaline. The most significant routes are Kaçkar, Verçenik, Kemerli Kaçkar-Kındeval, Altıparmak-Liblin, and Marsis peaks. Every year, thousands of nature enthusiasts visit the Kaçkar Mountains in all seasons to engage in activities such as climbing, trekking, skiing, camping, nature photography and other outdoor sports.

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Introduction

In the Eastern Black Sea Region (NE Türkiye), the roughly northeast-southwest oriented mountain range is known as the Eastern Black Sea Mountains, which extend eastward into Georgia, merging with the Lesser Caucasus. Different sections of this mountain range are named based on their location: the Zigana Mountains south of Trabzon, the Soğanlı Mountains south of to the Sürmene and Of, the Kaçkar Mountain Range to the south of Rize, and the Karçal Mountains to the northeastern part of Artvin.

Due to its natural beauty, the region where the Kaçkar Mountain Range are located was designated as a National Park in 1994. The northern part of the National Park lies within the borders of Rize, while the southern part extends into the provinces of Artvin and Erzurum, covering an area of approximately 530 km^2.

The aim of this study is to introduce the natural beauties and climbing routes of Kaçkar Mountain Range and its surroundings and to emphasize the importance of the region in terms of nature tourism and mountaineering sports.

The Kaçkar Mountain Range stand out with their dozens of peaks exceeding three thousand meters, rugged topography, glacial lakes, glacial valleys, moraine accumulations, various glacial erosion structures, alpine meadows, endemic plant species, and authentic highland plateaus. At the same time, the region attracts both mountaineers and nature lovers due to its highly challenging climbing routes and extraordinary natural beauty (Figure-1).

Figure-1 a) Climbers' summit journey from Yukarı Kavrun Plateau; b) Kaçkar Mountain peak; c) Yukarı Kavrun Plateau; d) An authentic highland house.

Located in northeastern Turkey, the Kaçkar Mountain Range are one of the country's most significant regions for mountain tourism and climbing routes. There are three main peaks in the region where mountaineers undertake peak ascents: Kaçkar Mountain (3,932 m), Verçenik Peak (3,711 m), and Kemerli Kaçkar-Kındeval Peak (3,562 m). In addition to these peaks, there are dozens of other peaks exceeding three thousand meters. The most popular ones, due to their location and easily accessibility for amateur climbers are Altıparmak Mountain/Liblin Peak (3,492 m) and Marsis Peak (3,334 m). Kaçkar Peak is not only the highest peak in the Black Sea region but also the fourth-highest mountain in Turkey. Verçenik Peak, the second-highest peak in the region, is considered one of Turkey's most challenging mountains in terms of climbing technique.

The main access route to these mountains is through the Fırtına Valley, which follows the Ardeşen-Çamlıhemşin route and its branches. The northern ascent to Kaçkar Peak is via Çamlıhemşin-Ayder and Yukarı Kavrun Plateau, while the southern route passes through Artvin-Yusufeli-Yaylalar-Olgunlar. Verçenik Peak can be reached via the Çamlıhemşin-Zilkale-Çat-Ortaköy-Verçenik Plateau route, while Kemerli Kaçkar and Altıparmak Peaks are accessible from Ayder-Avusor Plateau. Access to Marsis Peak is relatively easier; it can be reached from the north via Arhavi-Ortacalar-Yüksekoba and from the south via Yusufeli-Altıparmak-Yüksekoba. The geographical, geological, and geomorphological features of the Kaçkar Mountain Range, along with the main climbing routes, are described below:

Geographical Features

There are dozens of named and unnamed mountains and hills higher than three thousand meters in the Kaçkar Mountain Range. The main elevations, rivers, large valleys and glacial lakes of the Kaçkar Mountain Range are briefly described below.

The highest point of this mountain range is Kaçkar Peak, located within the Kaçkar Mountains, with an elevation of 3,932 meters. This peak is the fourth-highest in Turkey. The second-highest peak in the region is Verçenik Peak, standing at 3,711 meters. The major elevations in the region are concentrated around Kaçkar Peak and Verçenik Peak. The primary peaks include: Altıparmak Mountain / Liblin Peak (3,492 m), Kemerli Kaçkar / Kındeval Peak (3,562 m), Güngörmez Peak (3,523 m), Tatos Peak (3,550 m), Kuşaklı Peak (3,433 m), Leşkayası Peak (3,478 m), Karaçelle Peak (3,331 m), Çiftegöl Peak (3,420 m), Çatalkaya Peak (3,476 m), Çaymakçur Peak (3,420 m), Naletleme Peak (3,404 m), Öküz Yatağı Peak (3,462 m), Vacakar Peak (3,458 m), unnamed peaks around Kaçkar Mountain (3,589 m, 3,703 m, 3,781 m, 3,711 m, 3,633 m, 3,500 m), Salağın Peak (3,468 m) and Marsis Peak (3,334 m). These are among the most significant elevations in the region (1).

The rivers originating from the northern slopes of the Kaçkar Mountain Range flow northward into the Eastern Black Sea, while those originating from the southern slopes flow southward and merge with the Çoruh River. The major rivers flowing northward into the Black Sea include İkizdere, Taşlı Dere, Sabuncular Stream, Hemşin Stream, Fırtına Stream, and Çağlayan-Büyük Stream. The main rivers flowing southward into the Çoruh River are Aksu Stream, Çamlıkaya Stream, Davalı Stream, Bulut Stream, and Büyükçay Stream. Numerous smaller streams and creeks join these rivers, most of which are fed by the waters of glacial lakes.

Valley systems, predominantly shaped by glacial activity, have developed on both the northern and southern sides of the Kaçkar Mountain Range. The main valleys on the northern side include Kaçkar, Avusor, Palakçur, Kavrun, Çaymakçur, Palovit, Tirovit, Elevit, Tatos, Verçenik, and Cimil Valleys. On the southern slopes, the major valleys are Hastaf-Plateaus, Davalı, Hunut, Ovit, Salaçor, Dargit Yayla, and Pişenkaya Valleys.

The Kaçkar Mountain Range are home to more than 250 glacial lakes of varying sizes and depths. Around 40 named and unnamed lakes are located in the vicinity of Verçenik Peak alone. Among the largest lakes with the highest water volume are: Sulak Göl, Tatos Gölü and Moçar Gölü, east of the Tatos Mountains, Kapılı Göller and At Gölü, east of Verçenik Peak, Mal Gölü and Deli Göl, south of Verçenik Peak, Yedigöller (Seven Lakes), Aksu Gölleri, Dört Göller (Four Lakes), and Sefkar Gölleri, southwest of Verçenik Peak. Yedigöller is particularly significant for tourism due to its size and popularity as one of the most frequently visited locations. In the Kaçkar Mountain region: Büyük Deniz Gölü and Meterez Gölü are located to the north and Deniz Gölü is found to the south. In the Altıparmak Mountains: to the north: Ambar, Kaçkar, Neknar, and Ergis lakes, along with Çifte Göller (Twin Lakes), Samlıgöl, and Alaca Göl, and to the south: Libfer Gölü, Öküz Gölü, Karagöl (Black Lake), and Demirkapı Gölleri. Additionally, Büyük Göl is located southeast of Avusor Plateau, while Karadeniz Gölü is found south of Yukarı Çaymakçur (Figure-2).

Figure-2 Glacier lakes; a) Yedigöller; b) Tatos Gölü (Photo by E.Özer); c) Ambar Gölü (Photo by E.Özer); d) Kaçkar Deniz Gölü

Geological and Geomorphological Features

Eastern Black Sea Region and Kackar Mountain belt is geologically an ancient magmatic arc, primarily comprising volcanic and granitic rock formations, along with some sedimentary rocks. Numerous geological and geomorphological studies have been conducted on the region (2, 3, 4, 5). During the Late Cretaceous period (100–66 million years ago), extensive volcanic activity in the region led to the formation of andesite, basalt, dacite, and associated pyroclastic rocks. Around the same time (90–65 million years ago), different types of granitic masses were emplaced, resulting in the formation of the composite Kaçkar Batholith, one of the largest granite masses in the Alpine-Himalayan system. Today, granitic rocks can be observed at elevations of up to three thousand meters in the Kaçkar Mountain Range. These rocks originally formed several kilometres beneath the Earth's surface through the slow cooling of magma. Due to tectonic movements, they were uplifted by approximately 5 kilometres, eroded over time, and acquired their current positions. Uplift in the region continues at a millimetre scale per year. Magmatic activities ceased at the end of the Late Cretaceous. During the Paleocene period (66–56 million years ago), the region began to rise and undergo erosion. In the Eocene period (56–33 million years ago), renewed magmatic activity led to the formation of andesite, basalt, and related pyroclastic rocks. This volcanic activity was accompanied by plutonic activity, resulting in the emplacement of younger granitic masses, particularly in the northern part of the Kaçkar Mountain Range.

At the summits of the Kaçkar Mountain Range, especially Verçenik Peak, Eocene-aged basaltic-andesitic volcanic rock formations are exposed. The steep topography of the region is likely due to the younger Eocene volcanism, which erupted along fault lines formed by regional tectonic movements. The Kaçkar Mountain Range acquired their current morphological structure primarily by glacial movements during the Late Pleistocene period (20,000–25,000 years ago). The present-day topography is shaped by glacial erosion of granite formations. While the granitic basement exhibits a lower-relief morphology due to erosion, the Eocene-aged volcanic rocks form steeper and more rugged landscapes. Having lower erosion rate of volcanic rocks compared to granites is interpreted as being likely due to their younger age and the reduced impact of glacial erosion on steep slopes. As a result of glacial activity, widespread moraine deposits have accumulated at the mountain foothills and valley slopes. Additionally, modern glaciers continue to exist at the summits of the Kaçkar Mountain Range (Figure-3).

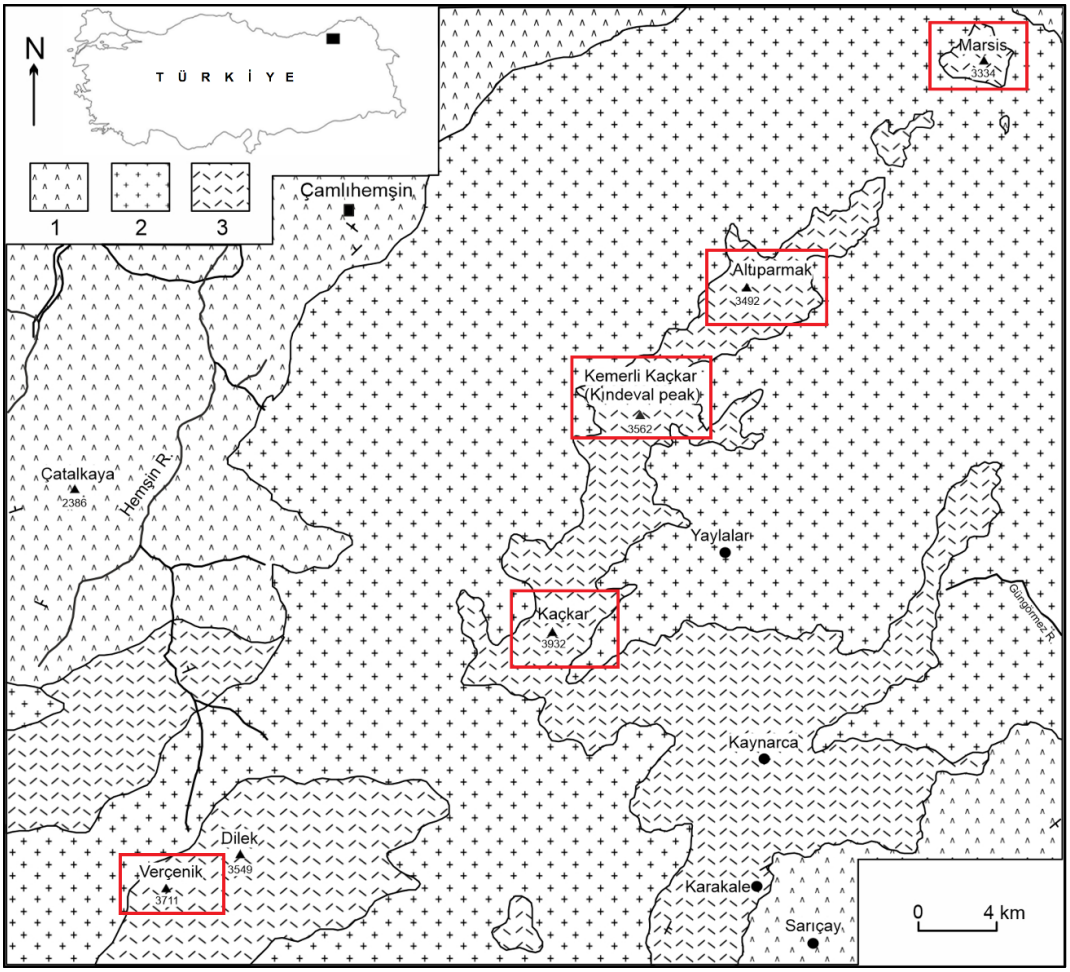

Figure-3 Simplified geological map of Kaçkar Mountain Range and main peaks; Legend: 1) Late Cretaceous volcanics; 2) Late Cretaceous-Paleocene granite; 3) Eocene volcanics (4, 5).

Geomorphological Features**;** The Kaçkar Mountain Range have been shaped by Late Pleistocene glaciations and associated glacial movements. Various glacial erosion and deposition features have developed in the region, including: glacial lakes, glacial valleys, hanging valleys, valley floor lakes, moraine accumulations, freeze-thaw structures and glacial striations. Below is a brief description of the main characteristics of these glacial features and their typical locations within the Kaçkar Mountains (6,7).

Glacial Valleys and Hanging Valleys; In the Kaçkar Mountain Range, river valleys have been deepened and widened by glacier activities, transforming into broad, U-shaped glacial valleys. Moraine deposits have also contributed to valley formation. The best examples of these valleys can be observed in the Verçenik, Kavrun, and Ovit Valleys. In smaller tributary valleys, the glaciers were not as powerful in eroding the valley floor as those in the main valleys. As a result, when the glaciers retreated, these smaller valleys remained elevated above the main valleys, forming hanging valleys (Figure-4).

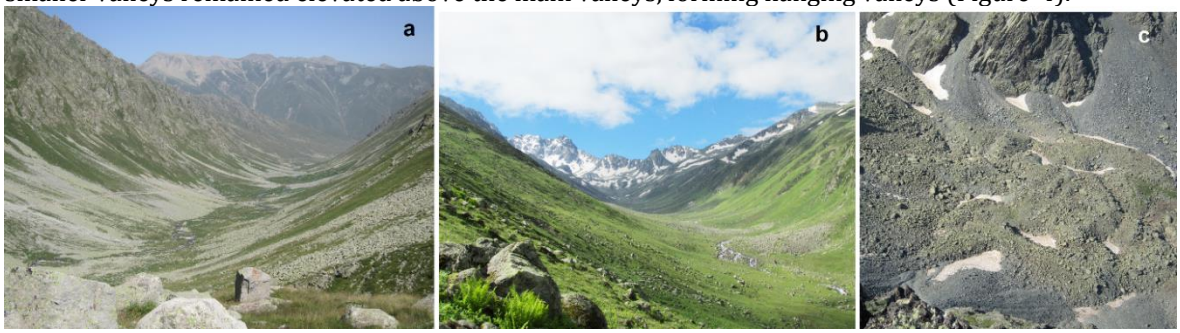

Figure-4 Glacier valleys; a) Verçenik Valley; b) Yukarı Kavrun Valley, c) Morain deposition-Verçenik

Glacial Lakes; At high altitudes, glacier erosion has carved out bowl-shaped depressions (cirques). Over time, these depressions filled with water, forming mountain lakes. The Kaçkar Mountain range contain hundreds of glacial lakes, varying in size, primarily located on granite formations.
Moraines (Glacial Deposits); Moraines include rock fragments carried by glaciers and materials that fell onto the glacier from the valley walls. These materials range in size from fine clay particles to large boulders and are deposited chaotically, without layering or cementation. Extensive moraine accumulations can be found on the mountain slopes. These formations are mainly composed of andesitic rocks, with smaller amounts of basaltic rocks.
Freeze-Thaw Weathering and Rock Fragmentation; In cold climates, when water freezes, it expands by approximately 9% in volume. As a result, water trapped in rock cracks and crevices expands and fractures the rock. Repeated freeze-thaw cycles are among the primary forces accelerating rock fragmentation. In the Kaçkar Mountain Range, the weathering and breakdown of granite formations are strongly influenced by freeze-thaw processes. Similarly, volcanic rocks that form the mountain peaks have also undergone weathering and fragmentation due to freeze-thaw cycles.
Glacial Striations; As a glacier moves downhill, rock fragments embedded in the ice scratch and abrade the bedrock or each other, creating erosion marks and striations. This process also results in a smooth, polished rock surface due to friction. In many areas of the Kaçkar Mountain Range, glacial striations and abrasion marks can be observed on the rock surfaces.
Glacial Valley Floor Lakes (Paternoster Lakes); These lakes form when glaciers erode the valley floor, leaving a series of depressions that later fill with water. These depressions are typically linked by a stream, forming a chain of lakes. A classic example of this is the Kapılı Göller, located at the base of Verçenik Peak, where four sequential lakes are connected by a flowing stream.

Climbing Routes of the Kaçkar Mountain Range

The most significant peaks and climbing routes of the Kaçkar Mountain Range are located south of the Çamlıhemşin district in Rize province. Verçenik Peak (3,711 m) is situated south of Çamlıhemşin-Zilkale, while Kaçkar Peak (3,932 m), Kemerli Kaçkar-Kındeval (3,562 m), and Altıparmak-Liblin (3,492 m) peaks are located in the southeastern part of Çamlıhemşin-Ayder Plateau. There is also a climbing route to Kaçkar Peak from the south via Yusufeli-Plateau Village. Another peak in the region is Marsis Peak, located south of Arhavi-Ortacalar. This peak can be accessed both from the north via Arhavi-Ortacalar and from the south via Yusufeli-Yüksekoba. The main characteristics of these routes, including campgrounds and accessibility, are explained below (Figure-5).

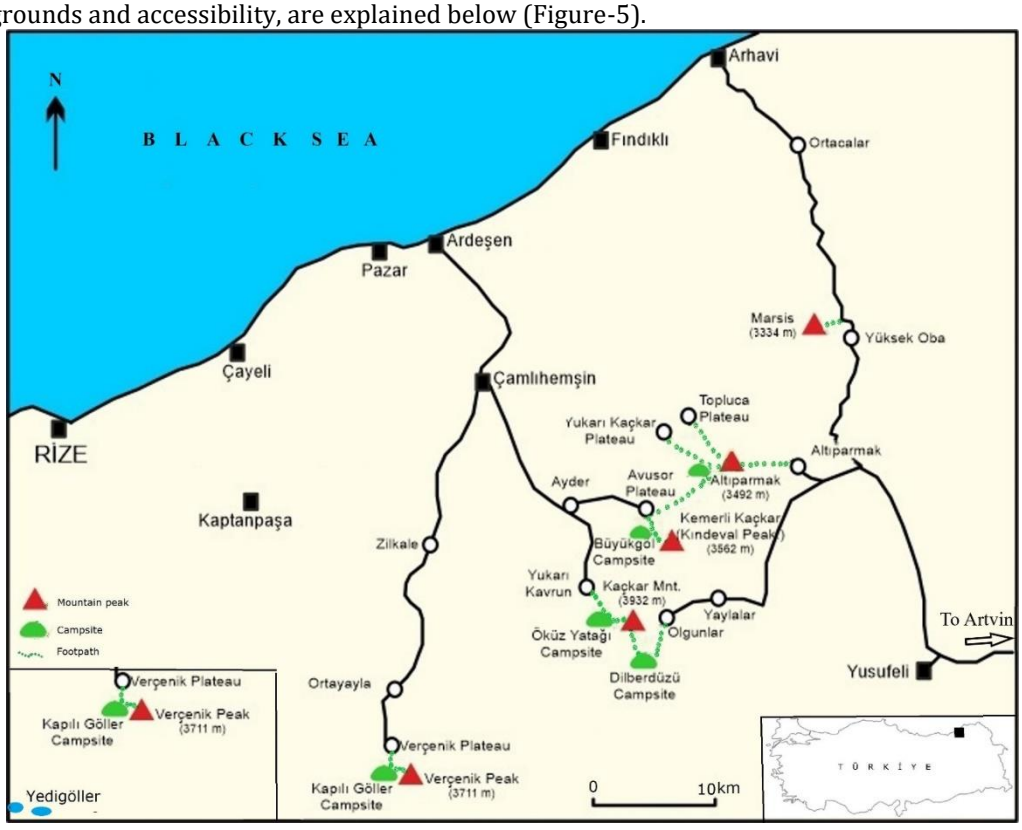

Figure-5 Location map of climbing routes

Verçenik Peak Route

Verçenik Peak is located to the southwest of Çamlıhemşin. The total distance from Çamlıhemşin to Verçenik Plateau is 45.5 km, 38 km from Çamlıhemşin to Ortayayla and 7.5 km from Ortayayla to Verçenik Plateau. After traveling approximately 7.5 km south from Ortayayla, hikers reach Verçenik (Orta Y.) Plateau, which is the last point accessible by car. From this point onward, the journey continues on foot. The distance from the Verçenik Plateau to the Kapılı Göller campsite, located southward, is approximately 3 km (Figure-6). To reach the summit from Kapılı Lakes, climbers must first proceed 1 km to southeast, then 200 m to northeast, and finally 500 m to north for ascending to the 3,711-meter peak. For the final ascent beyond 3,650 meters, ropes and other climbing equipments are essential. This section includes a narrow, chimney-like passage with a steep incline of 80-90 degrees, requiring the use of safety gear for both ascent and descent. The main threat in this section is falling rocks.

Figure-6 Vercenik Peak and climbing route (Photo by E.Özer)

Kaçkar Mountain Peak North Route

Kaçkar Mountain Peak (3,932 m) is not only the highest peak in this region but also the fourth-highest mountain in Turkey. It has climbing routes both from north and south (Figure-7a). On the northern route, the distance from Çamlıhemşin to Ayder is 18 km, and from Ayder to Yukarı Kavrun Plateau is 13 km. Yukarı Kavrun Plateau is the last point accessible by car. From there, climbers must proceed on foot approximately 5 km south to the Öküz Yatağı campsite-first 4 km to south, then 1 km to southeast. At the 3,200-meter-high campsite, it is recommended to stay there for at least one day to acclimatize. From Öküz Yatağı, climbers ascend 1.5 km southeast to reach a ridge known as "Kapı" (the gate). From Kapı, the final ascent follows the ridge to southwest for 750 m, leading to the peak of Kaçkar Mountain (Figure-7a).

Figure-7a Kaçkar Mountain Peak and northern climbing route

Kaçkar Mountain Peak South Route

The length of the southern route of the Kaçkar Summit via Yusufeli-Yaylalar Village (Olgunlar Mah.) is approximately 54 km. Olgunlar is the last stop reached by car and the Dilberdüzü camping area is approximately 5.5 km to the southwest. From the Dilberdüzü camping area, the summit is reached by

climbing 1 km to south-west, then 1.5 km north-west passing by the Deniz Gölü and then 1 km in the to north-northeast direction (Figure-7b). Moreover, there is a shorter choise for reaching the southern route of Kaçkar Peak via Arhavi-Ortacalar-Yüksekoba-Balhibar-Altıparmak-Yaylalar Village. The road between Ortacalar and Yüksekoba is a stabilised highland road.

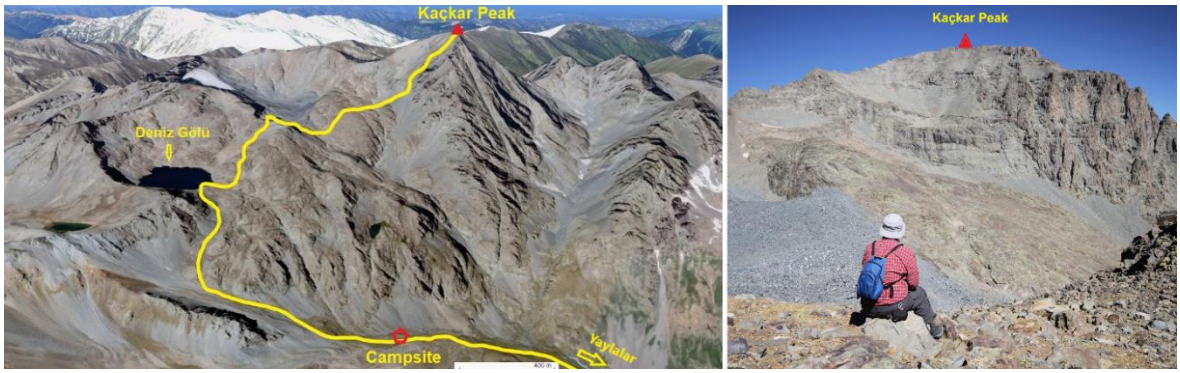

Figure-7b Kaçkar Mountain Peak and the southern climbing route

Kemerli Kaçkar Mountain-Kındeval Peak Route

This route starts with an 18 km journey from Çamlıhemşin to Ayder, followed by an 11 km of travelling from Ayder Plateau to Avusor Plateau, which is the last point accessible by car. The Kemerli Kaçkar-Kındeval Peak (3,562 m) is located about 4 km to southeast of Avusor Plateau. For climbers, Büyük Göl situated between Avusor Plateau and Kındeval Peak, serves as an ideal campsite. The distance from Avusor Plateau to the Büyük Göl campsite is approximately 2 km. From the campsite, climbers ascend 500 m to south and then 1.5 km to southeast to reach the peak (Figure-8).

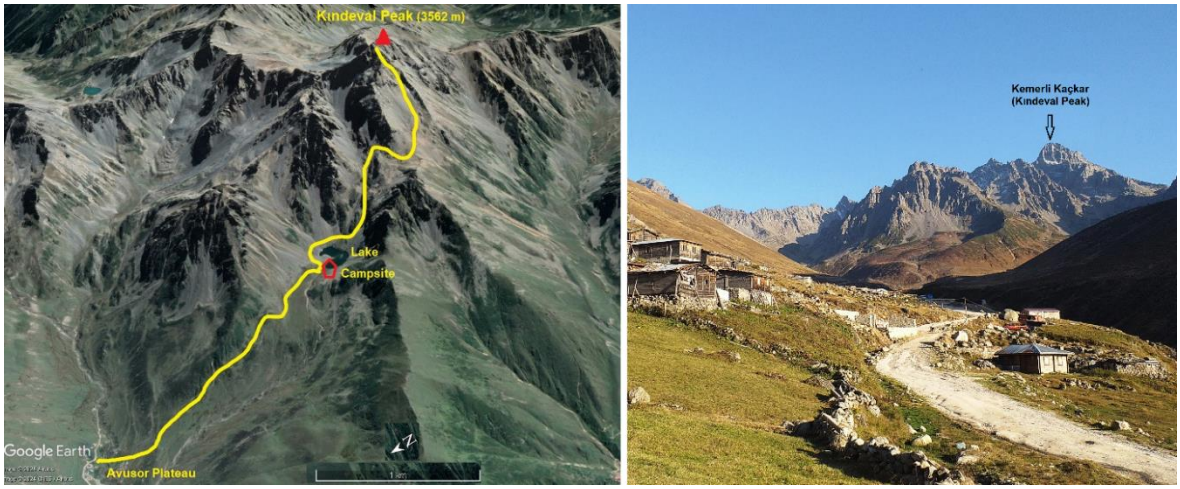

Figure-8 Kemerli Kaçkar-Kındeval peak and climbing route

Altıparmak-Liblin Peak Route

The Altıparmak Peak is characterized by a a rugged mountain range located in the central part of the Kaçkar Mountain Range, extending in a northeast-southwest direction. This range consists of sharp peaks, including Hızarkapı Peak (3,330 m) in the southeasternmost part, Liblin Peak (3,492 m) to the northeast, as well as Çatalkayalar Peak, İsimsiz Peak (3,492 m), Didvake Peak, Altıparmak Peak (3,301 m), and several other elevations (Figure-9). The highest point for climbing in this range is Liblin Peak (3,492 m). Liblin Peak can be accessed both from the north and the south. The northern side offers three different routes to the summit, with the most commonly used and easiest route starting from Avusor Plateau, the last point accessible by car (Figure-10). The distances are: Çamlıhemşin to Ayder: 18 km, Ayder to Avusor Plateau: 11 km. From Avusor Plateau, climbers can reach the summit via three routes: i-4 km to east-northeast from Avusor Plateau, ii-3.5 km to southeast from Yukarı Kaçkar Plateau and iii-3 km to southeast from Topluca Plateau. These three routes converge near the Dadala Pension, located at the base of Altıparmak Mountain. From this point, climbers ascend approximately 1 km to southeast

to reach the peak. On the southern side, the peak can be reached by traveling 3.5 km to west from Norse Mahallesi and Sultan Plateau.

Figure-9 A view of the peaks of Kemerli Kaçkar and Altıparmak

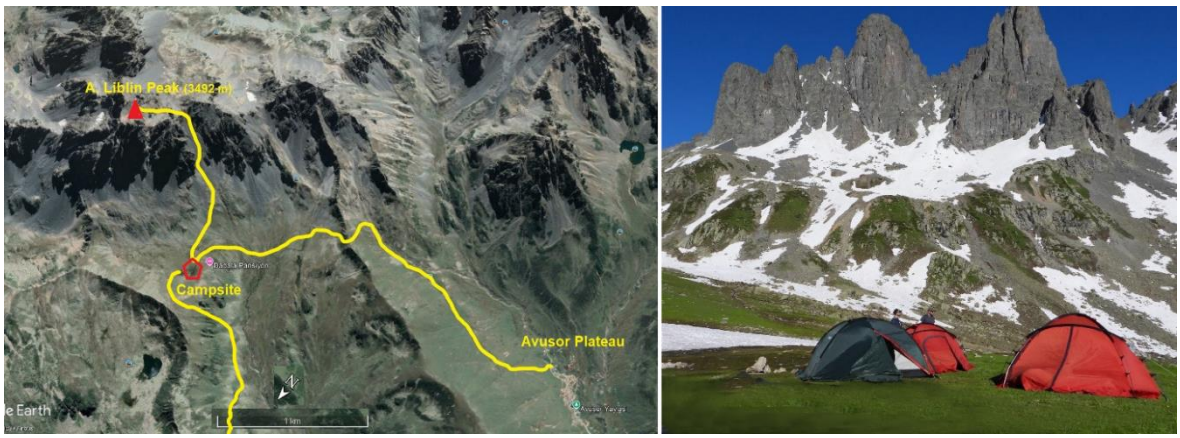

Figure-10 Altıparmak-Liblin peak and climbing route (Photo by M.Keleş)

Marsis Peak Route

Marsis Peak, with an elevation of 3,334 meters, is the northeasternmost climbing route in the Kaçkar Mountain range. It can be accessed from the north via Arhavi-Ortacalar-Yüksekoba or from the south via Yusufeli-Yüksekoba.

The Yusufeli-Yüksekoba Village-Marsis Peak route is approximately 45 km. The Arhavi-Ortacalar-Marsis Peak route is about 50 km. The last point accessible by car is a ridge/pass area located about 4 km north of Yüksekoba Village, along the main road. From this ridge, the summit can be reached via a 3 km hiking route heading south. After hiking 1 km to south, climbers reach a glacial lake. From the north or south side of this lake, a 500 m ascent leads to the mountain's ridge. Following the ridge for about 2 km to south, climbers reach the Marsis summit (Figure-11). Another option is starting from Horhat Plateau, near the source of Çağlayan Stream. From there: hike to south along the valley to a small glacial lake, and from the lake, climb 1 km to east to reach the Marsis Peak. However, the first route (via Yüksekoba) is considered the most ideal and commonly used.

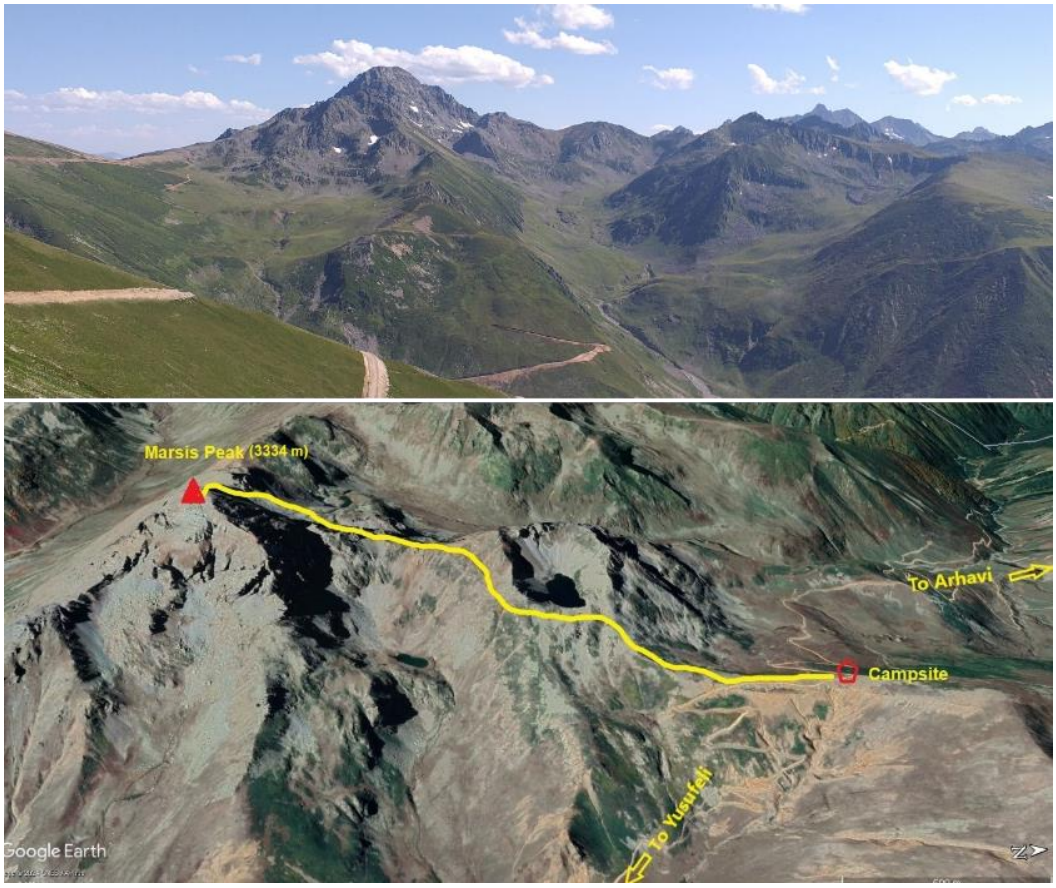

Figure-11 Marsis peak and climbing route

Conclusions and Warnings

Mountaineers planning to climb the Kaçkar Mountain Range must adhere to international mountaineering standards and take the following precautions into account for a safe and successful ascent:

Safety and health are the most crucial aspects of mountaineering. Proper acclimatization to high altitudes and having adequate climbing gear are essential for a secure ascent and descent.

Climbers attempting Verçenik Peak, Kaçkar Peak, or Kemerli Kaçkar Peak should have basic mountaineering training and should be accompanied by guides familiar with the routes.

The unpredictable weather conditions of the Black Sea Region-including rain, snow, lightning, fog, and falling rocks-can negatively impact climbing activities. The presence and guidance of experienced local guides are highly recommended under such circumstances. The most suitable climbing season for the peaks of Kaçkar Mountain Range is from June to the end of October.

Those attempting winter or glacier climbs must have glacier training and be properly equipped with the necessary gears.

All Kaçkar Mountain routes consist primarily of moraine fields and loose rock debris, making balance and stability challenging on steep slopes. Therefore, helmets, trekking poles, and other essential safety equipments are mandatory for all climbers.

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References

(1) 1/100.000 Scale Tortum G45 and G46 Topographic Maps, Map General Command, Ankara.
(2) Akçar, N., Yavuz, V., Ivy-Ochs, S., Kubik, P.W., Vardar, M., Schlüchter, C. (2007), Paleoglacial records from Kavron Valley, NE Turkey: field and cosmogenic exposure dating evidence, Quaternary International 164, 170-183.
(3) Akçar, N., Yavuz, V., Ivy-Ochs, S., Kubik, P.W., Vardar, M., Schlüchter, C. (2008), A case for a downwasting mountain glacier during Termination I, Verçenik valley, northeastern Turkey, Journal of Quaternary Science: 23/3, 273-285.
(4) Güven, İ.H. (1998), Trabzon C29 and D29 Sheets, 1/100.000 Scale Geologic Maps of Turkey, MTA, Ankara.
(5) Güven, İ.H. (1998), Trabzon C30 and D30 Sheets, 1/100.000 Scale Geologic Maps of Turkey, MTA, Ankara.
(6) Korkmaz, S., Erol, S. (2024, The Challenging Route of the Kaçkar Mountains: Natural Features of Verçenik Hill and its Surroundings, NE Türkiye, Inter. Journal of Mountaineering and Climbing,7(1), 28-40.
(7) Huggett, R.J. (2007). Fundamentals of Geomorphology, Routledge, Taylor&Francis, 458 p., Londra.