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GEOMONUMENTS
who tell the story of Albanian Earth

By: Alfred FRASHËRI

Chapter of the book:

GJEOMONUMENTET
qe tregojne historine e tokes shqiptare

(in Albanian, summary in English):

TIRANA, ALBANIA,
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Vlora Bay, and Sazani island

Tëlutem moj baltë e varrit
Mos i rëndo mëmëdhetarit
Po bèjindere shqipëtarit.
Abdyl beu ngreu nga varri,
të shohësh Adriatiknë
që u bë i Shqipërisë
qëti luftove dhe punove deri sa vdiqe!

Populli i këndon Abdyl Frashërit

Nga të gjithë c’kemi kënduar
Për tën johur vetëhenë
Kaqë gjë kemi mësuarë
Tënderojmë mëmëdhenë

Naim Frashëri

Jezercja Mountain, Albanian Alps-
Tropoja Region
"The eternal mystery of the world is its comprehensibility"

Albert Einstein

Introduction

Albanian land and geological structures that extend, which the geologists named Albanides, with a history of about 430 million years development, despite the small surface of 28 thousand kilometers, was present to visitors the natural monuments that are unique in the Balkans and in Europe. These geomonuments have stunning landscapes and rare beauty, as well as express particular geological phenomena. They are located in good climate zones and with great and diverse amusement holiday opportunities. Show cognitive phenomena of great importance to read nature and to know the history of the evolution of the Albanian territory.

Traveling through Albania to appear beautiful fields and green hills around, mountains that are lined with forests, but also cliffs that rise up, mountain’s rivers and streams with very steep slopes or terraces on both sides. The sea coastline is flat and with beautiful sandy beaches, but in some sectors the coastline is cliffed, where can observed the submersion of the mountain slopes to the sea. Different types of rocks build geoenvironment. In some zones the rocks are no layered, in others the visitor walks alongside the stratified rocks, like the pages of a book. These layers can be flat or folded, even thrusted in any zone.

By browsing these rock layers like the pages of a book, you can read and understand how rocks are formed, their structure, and the geological history of the region where you are traveling. And knowing the nature, it becomes more beautiful, more attractive and more interesting journey.

One day, my grandson and friend, publicist engineer Ilir Mati, who in Albania has traveled not less than geologists told me: write a simple book on the geology of Albania that travelers understand how it build the land where the walk. The trip was made more attractive. And I started to write this book.

Let’s read the book, and through the geomonuments will learn as created Albanian land, will know the geology of Albania. The knowledge will help us to discover the nature

1. HOW WAS BUILT ALBANIAN TERRITORY OVER MILLIONS OF YEARS

Passenger plane flying in the Western Balkans behold panoramas of high mountain ranges, which are very beautiful. In these ranges, the mountains of Albania lie between those of the Dinarides in the North and Hellenides to the south (Fig. 1, 2). These ridges are formed in new geological times, and built by geological structures which are called the Dinarides, Albanides and Hellenides. They form the southern branch of the Mediterranean Alpine Folded Belt.

The Albanides represents the assemblage of the geological structures in the territory of Albania. Two major peleogeographic domains form the Albanides: the Internal Albanides in the eastern part and the External Albanides in the western part of Albania (Fig. 3).

INTERNAL ALBANIDES

The Internal Albanides are characterized by presence of the immense and intensive tectonised ophiolitic belt, which is displaced from east to west as overthrusted nappe. There are two viewpoints about the placement of the ophiolites: Autochtone and Allochtone character of the ophiolitic belt.

The here tectonic zones represent the Internal Albanides:
1. **KORABI** zone (K). In this zone, the oldest formations of Albania are present, and are represented by sandstones, schistose conglomerate and metamorphic limestone of Silurian, Devonian and Carboniferous ages, and sandstone-conglomerate and anhydrite of lower Permian-Cretaceous age. In some places, there are also some volcanic and sub-volcanic rocks with basic and acidic-alkaline contents. In the Korabi zone, some folds, thrust fault and cover rocks are presented.

2. **MIRDITA** zone (Mr). This zone represents a wide belt along the whole length of the country, from northeast to southeast (Fig. 5). During the different orogenic phases, three tectonic units were formed in Mirdita zone. The ophiolitic belt of the Albanides is genetically unique and tectonically split into two sunbelts along its length. The lower tectonic stage is made up of ophiolites. Ophiolitic belt has its biggest thickness is about 14 km in its northeastern extreme, in the ultramaphic belt of Kukes. Towards northwest and southeast this thickness reduced to 2 km. Geophysical data are represented the arguments for overthrust character of ophiolitic belt, under which the formation of Krasta-Cukal zone is laid (Fig. 4).

During the tarditectonic- neotectonic stages are formed internal Neocene depressions. Neogene molasses have a thickness about 1500 m in the northern part of the Baurreli fosse.

3. **GASHI** zone (G). Beyond its border it continues into the Durmitor zone of the Dinarides. This zone includes metamorphic rocks, terrigeneous rocks, limestone, metamorphic volcanites, and basic intermediate and acidic rocks.

**EXTERNAL ALBANIDES**

The External Albanides was developed out of the western passive margin and continental shelf of the Adriatic plate. The External Albanides are characterized by regular structural belts, which are associated with thrust and over tectonic.

The sedimentary crust has 8-9 km thick in Adriatic seashore and reaches up to 15 km in northwestern regions of Albania. The depth of Moho discontinuity is 40-50 km. Its deepest part is in northwestern part of Albania. The Earth crust in Albanides is interrupted by a system of longitudinal fractures in NW-SE direction and transversal fractures that touch even the mantel. Some of them separate even the tectonic zones. The crust setting and their dynamics are reflected in the geology of the tectonic zones of the Albanides, and their tectonic styles.

1. **ALPS** zone (A). In general, Alps represent limestone monoclines, combined with smaller anticlines.

2. **KRASTA-CUKALI** zone (K-C). Krasta subzone lies like a narrow belt from Shkodra City in northwest region of Albania to Leskovik City at southeast region of Albania. This is an intermediately zone between the Internal and External Albanides. In the northern part Cukal lie older terrigenous and volcanic rocks of middle Triassic and Triassic limestone lower Jurassic-Cretaceous-Paleocene flysch. In the south lie flysch of the upper Jurassic-Early Cretaceous lower, upper Cretaceous limestone and flysch of the late Cretaceous-Eocene.

3. **KRUJA** zone (Kr) lies to the west of the area Krasta-Cukal, south of Shkodra to Leskovik. This area is constructed from Cretaceous-Eocene limestone rocks and less neurotic dolomitic limestone. Above them lies a thickness of about 5 km of Eocene-Oligocene flysch. There distinguish several generations
anticline and synclinal extended for tens of kilometers. In geological formations of the area have deposits of bauxite, coal and industrial minerals and construction materials.

4. **IONIAN** zone (Io). This is the biggest zone of External Albanides and has been developed as a deep pelagic through since upper Triassic. The Permian- Triassic evaporites are the oldest rocks of this zone. Over this formation lies a thick deposits formed by upper Triassic- lower Jurassic dolomitic limestone and Jurassic-Cretaceous-Paleogene pelagic cherty limestone. Limestone are covered by Paleogene flysch, Aquitanian flyschoidal formation, thin section of Burdigalian-Helvetian and partially of Serravalian-Tortonian, which mainly fill the synclinal belts (Fig. 5). Burdigalian deposits are placed in angle discordance over anticline belts. This has brought about two-stage structure. During the Liassing rifting affected External Albanides including Ionian zone and in this last were formed three tectonic blocks that represent the structural belts.

5. **SAZANI** zone is the continuation of Apulian platform. A thick Cretaceous- Eocene limestone and dolomite section builds this. Marly deposits of Burdigalian are place trangressively over carbonate formation.

The interpretation of the recent geological geophysical data represents a new structural model and the tectonic styles of the External Albanides. Tectonic zones of the External Albanides are in compression tectonic regimen since upper Jurassic-Cretaceous periods. Only in western part, Apulian zone and South Adriatic basin, are in continues extension tectonic regimen. Over thrusting style of the south-eastern part of the External Albanides, with a great southwestward overthrust of the anticline chains, the presence of the old transversal faults at the present are well known. The lubrication substratum is represented by evaporites during the over thrusting movement. The regional neotectonic phenomena are also the back thrusting tectonic in the Ionian and Sazani zones. The formed structural-tectonic models are represented the results of interference of two main effects, that of southwestward over thrusting and that of secondary and newly northwards over thrusting.

6. **PERI-ADRIATIC DEPRESSION** (PAD. Overlying Peri-Adriatic Depression covers the Ionian, Sazani and partly Kruja tectonic zones. This is a fore depression filled with middle Miocene and Pliocene molasses, which are mainly covered by Quaternary deposits. Tortonian- Messinian- Pliocene molasses consist of a considerable number of sandy-clay mega-sequences. From south-east to north-west, the thickness of the molasses increases, reaching 5000 m. Sandstone-clay deposits of Serravalian and Tortonian are placed trangressively over the oldest ones, up to the limestone creating a two-stage structure. In the Neogene sandstone layers there are many oil and gas deposits (Fig. 5).

The Albanian sedimentary basin continues even in Adriatic shelf with terrigene and carbonate formations.

Based on the analysis of rocks and structures that build Internal Albanides, is presented their paleogeographic development (Geology of Albania 1970, 2002).

During the Triassic period of the Mesozoic era (225-190 million years ago) there has been an open sea basin, neritic, with flat sea-floor, where salt deposits predominate, and have been sedimented carbonate mud in the Ionian Sea area.
During Jurassic period (190-136 million years ago) Internal Albanides area was also an open marine basin where carbonate mud deposition continued. By the end of the Jurassic the Alps had begun to emerge on the water. But again Ionian areas remain under water, as an area where continued marine carbonate mud deposit. Krasta area-Cukali, who was deep trough, continue carbonatic mud deposition. But during Titonian century, in the upper Jurassic period, there was a marine transgression, which include Alps ridge that turned in a flat shallow marine basin. Transgression partly include also Mirdita zone and the sea was extended to the edge of the Korabi zone. The presence of this transgression are evidenced by argillaceous and siliceous limestone layers of bathyal facies.

During the Cretaceous period (136-65 million years ago) all foreign lands Albanides were submerged under water again and there continued sedimentation. Gashi and Korabi zones were on the water and there developed erosion process. Mirdita was partly under water. Cretaceous period sea began to retreat westwards step by step of the Mirdita zone, which toast back on the water and served as feed zone for flysch that began to form in Krasta-Cukali trough, from the end of the Cretaceous. Alps have been a large part of the sea-floor, a great neritic ridge covered by shallow sea, where the carbonatic mud sedimented. Kruja area was a cord with relatively shallow sea. In Ionian trough has been continued the regime that was launched since the Jurassic, there pelagic limestone and argillaceous limestone with ammonite deposited. Sazani zone was a ridge on the sea-floor, which was a western boundary for Ionian trough, where gather neritic carbonate sediments.

New Cenozoic era (65 up to 2, 5 million years ago) is characterized by accelerating the process of orogenesis (mountain-building) in entirety of Albanides and stood large units that make up today's geological ground and underground of Albania. During the Eocene were converted in the mountain ranges the Albanian Alps area Krasta-Cukali zone, was further raised the mountain range in the area of Mirdita and formed depression of Korça. During Oligocene were build mountainous area in Kruja Zone, and during the Miocene those in Ionian zone, turning onshore majority of Albanian territory. During the Pliocene and the following Quaternary, which lies between 2.5 million to 5,000 years ago and continues to this day, out on the water the lowland of western part of this territory, while many mountains areas were covered by alpine glaciers. Under the abrasive action of the ice was formed glacial relief in the high mountains above 1500 m in the north and over 1800 m in the south of the country. More widespread this relief observe near “Leqet e Hotit” (Hoti Road Cascades to valley) in Albanian Alps, Lura mountains, Korabi, Tomori, Nemërçka, Çika Mountain, etc. Main forms of this landscape are glacial valley with washtub form, as valleys in Boga, Thethi, Vermoshi etc. glacial trough, etc. in Alps, holes and glacial circus in Nemërçka, Whit, Korabi, Lucë, Alps, Lura etc.. Are widespread glacial deposits or moraine in Bogë, Theth, “Leqet e Hotit”, Vermosh, etc.

From corrosive activity of rivers, which continued to create their slopes and valleys, thick layers were formed alluvial depositions in plain areas, and took step by step the hydrographic network, creating landscape variety from plain to mountain’s areas. By the neotectonic movements was created the Otranto Strait, who joined the Ionian and the Adriatic seas, Sazani was separated from Karaburun, and Albanian coastline took the step by step the today landscape configuration. Albanian sedimentary basin continues in the Adriatic Sea shelf, with molasses and carbonate formations.

Paleomagnetic studies have shown that Albanides have undergone a clockwise rotation with amplitude of about 45° after Oligocene, analog with the phase observed on the western edge of the Hellenides. Transversal fracture Shkodra-Peja represents a transition zone between the clockwise rotation of Albanides and Hellenides at its south, and county clockwise rotation of the Albanian Alps and the Dinarides to the north. Horizontal displacement of Albania reaches 173 km at its southern edge, in relation to the pole of rotation of located in Shkodra – Peja transversal fracture.
Fig. 1. Mountain ranges of the Mediterranean Alpine Folded Belt in Central and Southeastern Europe: Hellenides (1), Albanides (2), Dinarided (3), Alp (6), Apennines (7), and Rhodope Mountain in Bulgaria (4), Carpates Mountains in Bulgaria and Romania (5).
Fig. 2. Geological Map of Albania, at scale 1:200,000 [Albanian Geological Survey]
Fig. 3. Skema tektonike e Shqipërisë, (Shërbimi Gjeologjik Shqiptar, 2002).
Fig. 4. Regional geological-geophysical profile Albanid-2. Tirana-Bulqiza-Okshtun
(Frashëri A., Bushati S., Bare V. 2009)

Fig. 5. Seismic line in Periadriatic Depression, in the Myzeqea field region
(Frashëri A., Bushati S., Bare V. 2009)
2. GEOMONUMENTS IN ALBANIA

Our planet, Earth, keeps tracks of her past memories in minerals, rocks, fossils of living creatures that are between them and in the landscape of its surface relief. Geological information of these memories make it possible for them to "talk" with their language, be read and understood, showing the Earth's geological history.

Earth's geological heritage is represented by monuments, sites and geological parks. These are the study objects, the importance of which exceeds the boundaries of individual countries and serve for international knowledge, for exchanging knowledge and experience. Geological monuments or geomonuments represent elements of geology or ancient changes of the Earth and its inhabitants.

Natural, cultural and scientific values of the Earth heritage have become UNESCO, since 1972, to formulate "Earth Heritage Convention". According to Article 2 of this Convention, natural monuments are determined by the physical and biological formations, which have exceptional aesthetic and scientific value. Geological and physi-geographic formations have universal and scientific value. In 2000, UNESCO adopted the Declaration of the “Rights of the Memory of the Earth", where it is recommended to increase the number of geomonuments and geoparks in different countries, as well as working on the creation of the European Network of Geoparks. Today there are several natural heritage parks in different states Europe’s. Actually are worked to preserve geomonuments, which often named "Earth history textbooks."

In this context, in Albania is organized PROGEO ALBANIA, which is Albanian Geologists Union of Geosciences Heritage, created by initiative and directed by Prof. Dr. Afat Serjani.

Geology of the Albanian land, Albanides, has hundreds of dozens geomonuments and geological heritage centers and parks. Visitor acquainted with them during trips across different itinerary. They have a stunning natural beauty.

Among geomonuments distinct following centers:

- **Outcrops (exposure to the Earth’s surface) of the rocks that form layers with folds and micro folds with a characteristic appearance, and different individualizations.** Typical are layers of the sandstones, conglomerates, limestone, and some magmatic rocks. Among these examples we can mention sandstone layers in Krraba Pass, layers of the rare river’s and lagoon’s depositions in Priska, micro-folds of the flysch layers in Papër near Elbasani, way to Frashër of Përmeti, tabulated limestone layers in Tomorri Mountain, in Albanian Alps et Shqiptare and elsewhere, algal lithotamnic limestone in Priska near Dajti Mountain, pillow lava in Shënpal, and parallel dikes in Reps of the Mirdita, dunite and hartzburgite in Bulqiza, Kukësi, Tropoja and Shebenik, reddish conglomerates ultrabasic rocks in Librazhd, “Terra Rossa” in Pece of Saranda, subaqueous slumping of Malit të Gjerë in Muzina Pass, lourde and rare mineral placers in Rushkulli coastline, morainic deposits in Rrapsh near of “Leqet e Hotit” in Malësinë e Madhe, etj.

- **Tectonic fractures:** local, regional and Shkodër-Pejë transversal fracture.
- **Massifs of the magmatic ultrabasic rocks**, as hi of Bulqiza, Lura, Tropoja, Kukësi, Puka, Gomsiqe, Mount of Skënderbej, Shpati, Shebeniku, Voskopoulo, etc.

- **Massifs of the gabbros rocks**, as hi of Kurbneshi, Shënámëria in Kukësi, Hasi, Qafzezi in Kolonja etc.

- **Volcanic rocks** in Mirdita, Puka, Kukësi, Rejova Korçë, etc.

- **Cliffs** from erosion residue rocks, inhabiting language are named “Guri” (stone). So there are many, but among them are; “Guri Cjapit” in Morava Mountain, “Guri Kajës”, “Guri Topit” and “Guri Nikës” in Gorë-Mokër-Opër-Libradhmit region, “Guri Muzhaqit” in Çermenika, “Guri Prërë” in Gradec of Skraparit, “Guri Peshkosht” or “Sofra Skënderbeut”, “Shkëmbi Kavajës”, etj. In some areas are observed a rock section, which has vertical slope that named “muri”, as “Muri Radohimës”, “Muri Arapit” in Theth-Albanian Alps, etc.

- **Transgressions**, among which is the typical one of Greshica, south of Ballshi town, Mount Dajti Field, etc.


- **Karstic phenomena**, among which is the typical one of “Mali me Gropa” (Mount with holles) at east of Tirana,

- **Canions**, as in Gradeci in Osumi River in Skrapar, Shkopetit in Mati River, Lëngarica in Përmeti, Drini in Koman, Brari east of Tirana, Canions in Gurrë of Kurvelesh, Gorge of Kalvaçi-Poçem Tepelena, etc.

- **River terraces**, as Vjosa riverside, of Shkumbi riverside, etc.

- **Accumulative coastline**, with sandy beaches as in Durrës, Velipojë, Shëngjin, Divjaka, Semani, etc.

- **Erosional coastline**, among which is the typical one of Currila - Bishti Pallës Durrës, Albanian Riviera coastline, etc..

- **Submerged coast** under neotectonic activity. Typical is coastline in Semani and Patok.

- **Erosional pass**, as well-known of Mezhgorani Pass, Muzina Pass, etc.

- **Gravel deposits and sandstone's pores springs** in western fields regions and in the Korça Field, Erseka, Bilishti, and Peshkopia fields, etc.

- **Tectonic fissure springs**, as in Lajthiza in “Qafë Mali”, and “Qafë Shtamë”.

- **Springs from morainic deposits**, as in “Fusha Hidrit” in Bulqiza.

- **Artesian underground waters** of Korça, Myzeqe, “Fushë Kuqe” fields, etc.


**Glacial cirques** as in Jezerc (2690m), Shebeniku (2253 m), Tomorri (2414m), and Nemërçka montains (2185m), etc.

**Geological parks**, which are laid in larger areas, where there are many geomonuments. For each geopark of different regions, according to the itineraries, are describes geomonuments that can be observed and studying. In this paragraph are presented only as names most representative geomonuments, to understand complexities of the geoparks:

- Dajti Mountain area with Neogene transgression, where clearly distinguished the old coastal line, aged about of 15 million years ago, the eastern flank of the limestone structure. Neogene sandstone layers are extended over older formations, such as Oligocene flysch, and Eocene limestone. There can observe also the layers of the lithotamnic limestone in Pri ska village, the kastic phenomena in limestone, disjunctive tectonics, canyon in Brari village, etc.

- “Mali me Gropa” (Mount with holles) and Biza high land.

- Qafë Shtama (Shtama Pass).

- Pllaja e Sarisalltikut (Sarisalltik plateau) in Kruja, and in Korabi, etc.

- Ishëm- Rodoni Cap.

- Dumrea region with halogene deposits, and kastic phenomena in these deposits.

- Ultrabasic massif of Gjinari Elbasan.

- Zvërneci with characteristic phenomena of the sedimentation and fossils cemetery.

- Oil and gas bearing fields, where are oil reservoirs in Neogene sandstone (Patosi, Marinza, Kuçova), and in the limestone reservoirs (Cakrani, Gorisht-Koculi, Ballshi, Amonica, Delvina, Vurgu).

Gas bearing fields where are located gas reservoirs (Divjaka, Ballaj, Frakull, Durrës, and Povelçha).

- Llogara Pass with subduction of the Adria micro plate under the Albanides orogen.

- Çika Mountain with glacial cirque.

- Melesini and Trebeshina mountains Cretaceous-Eocene limestone anticline, covered by Oligocene flysch.
- Mont Tomorri with tabulated limestone, karstic activities, and the Tomorrica region in the Easter slope of Tomorri, with intensive erosion of the Oligocene flysch formation, in both Tomorrica riversides.

- “Mali Gjerë” (Broad Mountain) with canyons, subaqueous slumping in Easter flank, the tectonic and halogene deposits belt in western flank.

- Mesozoic-Eocene limestone covered by flysch anticline belts of Kurvelesh.

- Mount Gramozi (2523 m) and mountain tourist center in Dardha, Korça.

- “Mali i Thatë” (Dry Mountain) and Ohrid-Prespa Lake system.

- Mount Korrrabit with older geological formation of the Albanides, halogene deposits and Korari plateau.

- Bulqizë-Martaneshi region with ultrabasic chrome-bearing massif and large and well-known chromite deposits of Bulqiza, Batra, etc.

- Lurë-Kurbnesh region with ultrabasic massif and copper-bearing gabbros massif of Kurbneshi.

- Rubik-Kaçinar in Mirdita where extends volcanic rocks complex, where are sulphide mineralized zones and large copper deposits as well-known of Rubik, Kaçinar, Perlat, Derven, etc.

- One of the most important geological monuments is the Kçira, in the village of the same name, located to the left of road “Bridge Gomsiqes”-Puka town. Kçira exposed geological section from the middle Triassic to lower Cretaceous, belonging to an aging period of about 70-200 million years. The oldest layers are tabulated limestone with middle Triassic to lower Jurassic cherts. They are covered by rocks of the upper Jurassic to lower Cretaceous. In limestone is a very rich ammonite horizon, observed since the well-known geologist Franz Nopcsa, assessed as classic limestone horizon with Amonitico-rosso.

- Munellë- Qafë Bari- Tuçi- Qafë Mali region, with the volcanic rocks complex. With this complex are linked sulphide mineralized zones and large copper and polymetallic deposits, like it Munella, Qafë Bari, Tuçi, Lak Roshi, etj... 

- Shënmëri-Kukës-Morina region, where extends large complexes of ultrabasic rocks, gabbro, volcanic rocks, effusive-sedimentary series, etc. With these complexes are linked large deposits of chromite in Kalimash, of copper in Gjegjan, of ferro-nickel in Surroj, etc.

- Tropojë-Krumë Has- Golaj region, where in ultrabasic rocks of Tropoja massif and gabbro massif in Golaj in Hasi are located well-known chromite deposit of Kam Tropoja, Kepeneku, Ragami, and Paci, also copper-bearing quartz veins in Golaj.

- Granodiorite massif of Trokusit near Çeremi in Gashi tectonic zone, and in Levrushk.

- AlbanianAlps where are mountains and their picks: Pick Markule (2188m), Pick Radomira 2570 m), Thethi, Boga, Vermoshi, “Leqet Hotit”.

- Valbona River valley – Mount Jezerca, Mount Shkëlzeni, “Maja Hekurave”, “Qetat Harushave”, etc., with Mesozoic karstic limestone structures. There are many karstic caves, karstic underground waters springs, and in some sectors are some bauxites showings.
- Hydrographic System of the “Shkodra Lake – Drini River – Buna River”

**Mountains with altitudes above 2500m**

In these mountains, but not only in they, are outcropped so spectacular structures of various geological sedimentary and magmatic formations. These mountains, which represent different geological structures, clad with forests, with mountain stream network, crystal water springs, important historical centers and healthy continental climate, representing areas for develop mountain-cultural and geological tourism.

Among the 41 mountains over 2000m altitude in Albania, ten of them are higher on 2500m: Jezerca (2693m), “Grykat e Hapëta” (2625m), Radomira (2570 m), Pick Papluku (2569m), “Maja e Hekurave” (2560 m), Pick Roshit (2524m) in Albanian Alps, Mount Korabit (2753m), Pick Velivaut (2374m) and pick of Kërçina (2325m) in Deshati Mountain, and the highest peak of Gramozi (2523 m). Holy Mountain Tomorr rises 2414 m and Mount Kulmakës in its south 2173m. Mount Nemërçka with glacial cirques rises 2185m, while the tick of Çika in Lightning Mountains (Acroceraun Mountains) rises 2045m. on the Ionian coastline.

**Marine bay:** of Drini, Durrësi, Vlora, Splilea, Porto Palermo, Kakomea, Saranda, and of Butrinti.

**Lakes:** Ohrid tectonic Lake, Shkodra Lake, Macro Prespa Lake and “Zaveri i Gorricës Vogël” where the water out of the lake and flows into Ohrid Lake, Micro Prespa Lake and cannel that connects the lake with it of Macro Prespa, karstic Dumrea Lake, Butrinti Lake and “Liqeni i Rrëzës” in his east, Alps Lakes, glacial origin lakes (seven Lura lakes, of Allamani, Shebeniku, Valamara), and hydropower plant lakes of Fierza, Vau Dejës, Komani, Ulza, Thana in Lushnjë, Kurjani in Fieri, Gjançit in Korça, and of Deftia in Gjirokastër.

**Lagoons:** Karavasta Lagoon and Loop, Narta, Butrinti, Viluni (at the east of Buna River delta), Lezha lagoons, Orikumit at south of Vlora and Patoku Lagoon north of Rodoni Cape.

**Islands:** Sazani, and Ksamili.

**High plains:** Plain of Korça (850 m), Devolli (850-900 m, Kolonjës plateau (1100 m), tectonic plain of Domosdova, etc.

**Rivers and their valleys,** where outcropped very beautiful geomonuments, where there is rich vegetation and clean water. From northern Albania to south are:

- **Rivers:** Drini, Drini of Lezha, Kir, Gjadër, Mat, Cemit River, Buna
- **Deltas:** of Buna, Island of Franz Jozef and unnamed island.
- **Mati River,** Great Fandi and Small Fandi, Mati River delta.
- **Ishmi and Erzeni rivers.**
- **Shkumbini River** and its mouth.
- **Semani, Osumi and Devolli rivers.**
- **Vjosa River** and its branches Lemnica, Lëngarica, Sarandaporo, Çarçova stream.
- Drinosi River
- Bistrica and Pavla rivers

**Landscape of Albanian Riviera:** Palasë, Dhërmi, Vuno, Himarë, Qeparo, Borsh, Lukovë villages.

As presented above, as part of the Mediterranean Alpine Folded Belt, Albanides represent more complex geological setting segment and with a typical geological evolution history for folded mountains belts, which in this complex do not meet in any of the Balkan or Europe countries. As indicated by geological monuments and parks, which are presented above, on the Albanian territory may be known various rock types: magmatic, sedimentary, and metamorphic, with age from Silurian system, about 430 million years ago, in Korabi Mountain up in the today Quaternary deposits.

Magmatic rocks have formed massifs of different sizes, veins, dikes and are also subjected to physical and chemical changes.

Geomonuments present the most varied structural forms, from the simplest to the most complicated, folded and affected by tectonics fractures.

### 3. TRAVELLING THROUGH ALBANIA TO VISIT GEOLOGICAL MONUMENTS

Geological monuments are rare heritage that Mother Nature has bestowed to Albania. They observed and touch anywhere in Albania, and through them you can understand and study how it is formed Albanian land, when it was builder and how it changed in about 500 million years of its history.

Their description will do the routes, which usually traversed by domestic or foreign travelers, to show them what can observe while traveling that have taken. Description we have begun systematically from northern Albania to the South.

Varieties of rock types and different geological processes have made that in Albania to visit regions and zones with landscapes not only very beautiful, but also storyteller of geological activity during the evolution of hundreds of millions of years. This makes visits to these geomonuments with large international scientific importance, to exchange knowledge and experience. Are these natural beauties that make geomonuments of Albanides as tourist destinations, and Albania as a country can be develop cultural and sport's tourism. His activity will also improve the living standards of communities in different provinces of the country.

Cultural, scientific and health benefits and pleasure that offer the geological-tourist traveling through Albania create the impression that to invite:

Welcome to Albania to visit Albanides! And you'll want to return again!
GEOMOMUMENTS IN ALBANIA
OUTCROPS, ROCKS INDIVIDUALISATIONS, TECTONICS FAULTS

- Zhveshjet si edhe veçime të ndryshme shkëmbinjsh, thyerjet tektonike

Tektonike shkeputese

Transgresion, Greshice Ballsh.
ALBANIAN RIVIERA AND VJOSA RIVER VALLEY

Plazh zhavoror, Rivera Shqiptare

Bregdet akumulativ zhytës Seman

Lumi Vjosa në Grykën erozionale te Mezhgoranit

Morto Palermo

OHRID-PRESPA LAKES SYSTEM REGION

Mali i Shebenikut

Qafa e Thanës

Liqeni i Ohrit dhe tektonika në bregun perëndimor, Pojskë

Liqenet Ohër-Prespë

Dukuria karstike ne brigjet e L. Prespës

Zaveri i Gollombocit

Mbushja e L. Prespa e Vogël
NEMERÇKA DHE DHËMBELI

Lushnje – Fier - Mallakastër

Nemërçka me cirqet akullnjore

Melesi ni shap kë bardhë

Litorali shqiptar parë nga Ardenica

Laguna e Karavasta

Brahantiklinali neogjenik Ardenicës

Dunat e rërës Seman

Bregdet akumulativ, Divjakë

Bregdet zhytës, Seman

Transgresioni neogjenik mbi gëlqerorët eocenikë, Greshicë, Ballsh

Litorali shqiptar parë nga Ardenica
Limestone microfold, Greshicë                   Flysch formation microfolds, Frashër                   Flysch formation layers
Flysch formation microfold, Milot                   Conglomeratic sanstone, Priskë                   Conglomeratic sandstone, Priskë
Ultrabasic rocks, Librazhd                   Reddish conglomerate, Librazhd                   Sandstone, Dajti Mountain Field
Coarse grained sandtone, Priskë                   Muddy-sandy flyschoid, Lepushe, Albanian Alps (5)                   Flysch formation, Dajti Mountain
Flysch formation, Dajti Mountain
Tabulated limestone, Vermosh, Albanian Alps (3)
Limestone, Kruja Mountain

Limestone bed packet, Kruja Mountain
Tectonized limestone, Kruja Mountain
Cretaceous limestone cover volcanic rocks, Mirditë

Cretaceous limestone cover volcanic rocks, Mirditë
Limestone cliff, Dangëlli, Përmet
Morainic deposits, Hot, Albanian Alps

Guri i Qytetit (City Cliff), Përmet
Guri Cjapit (Cjapi Cliff), Moravë, Korça (2)
Guri Cjapit (Cjapi Cliff) fragment, Moravë, Korça (2)
Guri i Kamjes, (Kamje cliff), Gorë

Guri i i Kamjes, (Kamje cliff), fragment (2)

Limestone, Rubik

Muri Radohimës (Radohima Wall), Albanian Alps (3)

Muri i Arapit (Arapi wall), Theth (3)

Tabulated limestone, Prekal Albanian Alps (3)

Kruja Mountain

Glacial circus, Nemërçka Mountain

Vjosa River terraces, Përmet

Limestone anticline, Trebeshina Mountain, Këlcyra

Kamencka Canion, Dangëlli, Përmet
Neogene transgresioni over Eocene limestone, Greshicë, Ballsh

Karstification of limestone, Përmet
Karstified limestone, Tomorri Mountain
Karstified limestone, Vermosh, Albanian Alps

Karstified limestone stone, a fragment, Pogradec
Canion in limestone, Shkrel, Kelment, Albanian Alps

(5) Neogene sandstone layers trangressively extended over flysch formation, Dajti Mountain

Karstified limestone., Theth, Albanian Alps
Contact between limestones and volcanic rocks, Mirdita
Lithotamnic limestone, Priskë, Dajti Mountain Priskë
Morainic deposits, Rrapsh, Alps
Malësi e Madhe

Intensive erosion of the flysch deposits, Tomorrca River valley

Accumulative Adriatic Sea coastline, Buna River; Heavy and rare minerals placer, Rushkull, Lalzi Bay; Erosional Adriatic Sea coastline sector, Karpen, Kavajë

Erosional Ionian Sea coastline, and gravel beach, Albanian Riviera

Erosional Adriatic Sea coastline sector, Vlora Beach and beach in “Ujë Ftohtë” (“Cold Water”).

Gravel beach in erosive Ionian Sea coastline

Submerged coastline, Semani
Channel of the Butrinti Lake  (4)

Islands in Ksamil, Sarandë  ((3))

Geothermal deep well, Shijon, Elbasan  Selca spring, Albanian (3)  Karstic spring “Ixori i Borshit”, Albanian Ionian Riviera

Vjosa River bed, Kalivaç, Tepelenë
THE GEOMONUMENT PARKS REPRESENT THE AREAS OF COMPLEX COMMUNITIES OF MONUMENTS IN ALBANIAN NATURE

Albanian Alps observed from Kalimashi

Geopark of Boga (Malësi e Madhe), where extend the upper Triassic up to upper Jurassic carbonate formations, represented by limestone, dolomite limestone, dolomite [8]
Geopark of Lepusha (Albanian Alps), where extend middle Cretaceous deposits (Mastriktian), të
represented by the combination of flyschoids and clay-sandstone-limestone formations [8]
Geopark of Shkrelli (Albanian Alps), where extend from upper Triassic to upper Jurassic carbonate formations, represented by limestone, dolomite limestone, dolomite [8]
b)

Geopark of Tamarjes, where extend upper Triassic represented by the limestone formations [3]

Gjeoparku i Selcës, where extend Jurassic formations, represented by the limestone [2]
Gjeopark of Albanian Alpet Valbona area, where lie carbonate formations from upper Triassic to upper Jurassic, represented by limestone, dolomite limestone, dolomite, as well as the clay-sandy flyschoid-limestone of Cretaceous (Mastriktian) [4]
Geopark of Tomorri Mountain, build from Cretaceous-Eocene Limestone that are covered by Olygocene flysch formations

In its flanks

Lihtnings Mountain – Çika,
build by Mesozoic carbonate formations
Dry Mountain and Field of Korça, Mesozoic carbonate formations

Këlcyra Pass and Vjosa River
Porto Palermo (Palermo Port), surrounded by Cretaceous limestone

Ohrid Lake, Pogradec and Mali i Thatë (Dry Mountain) - Galičica

Disjunctive tectonics at Ohrid Lakeshore
Geopark of Kraba, where limeststone structure of Dajti Mountain is is covered transgresively by Neogene molasse among which is the coal-bearing suite

National Park “Hotova Fir.tree Forest”, near Frashëri village, Permet