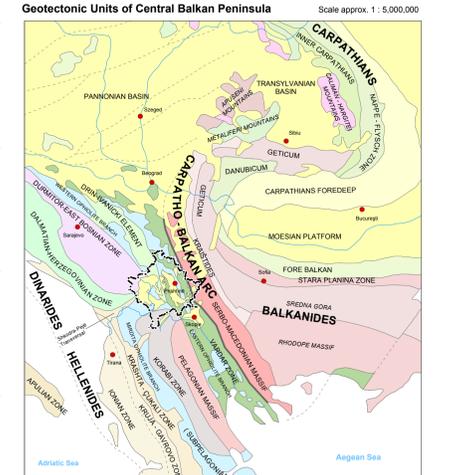
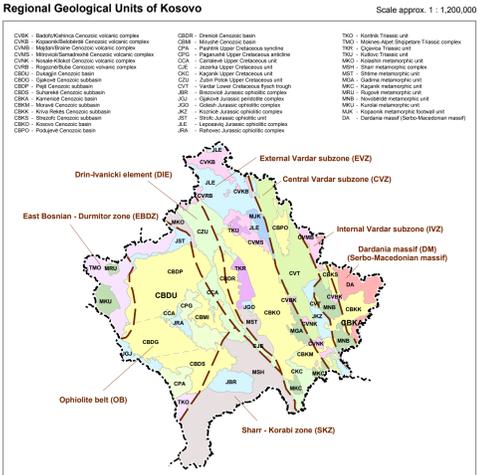
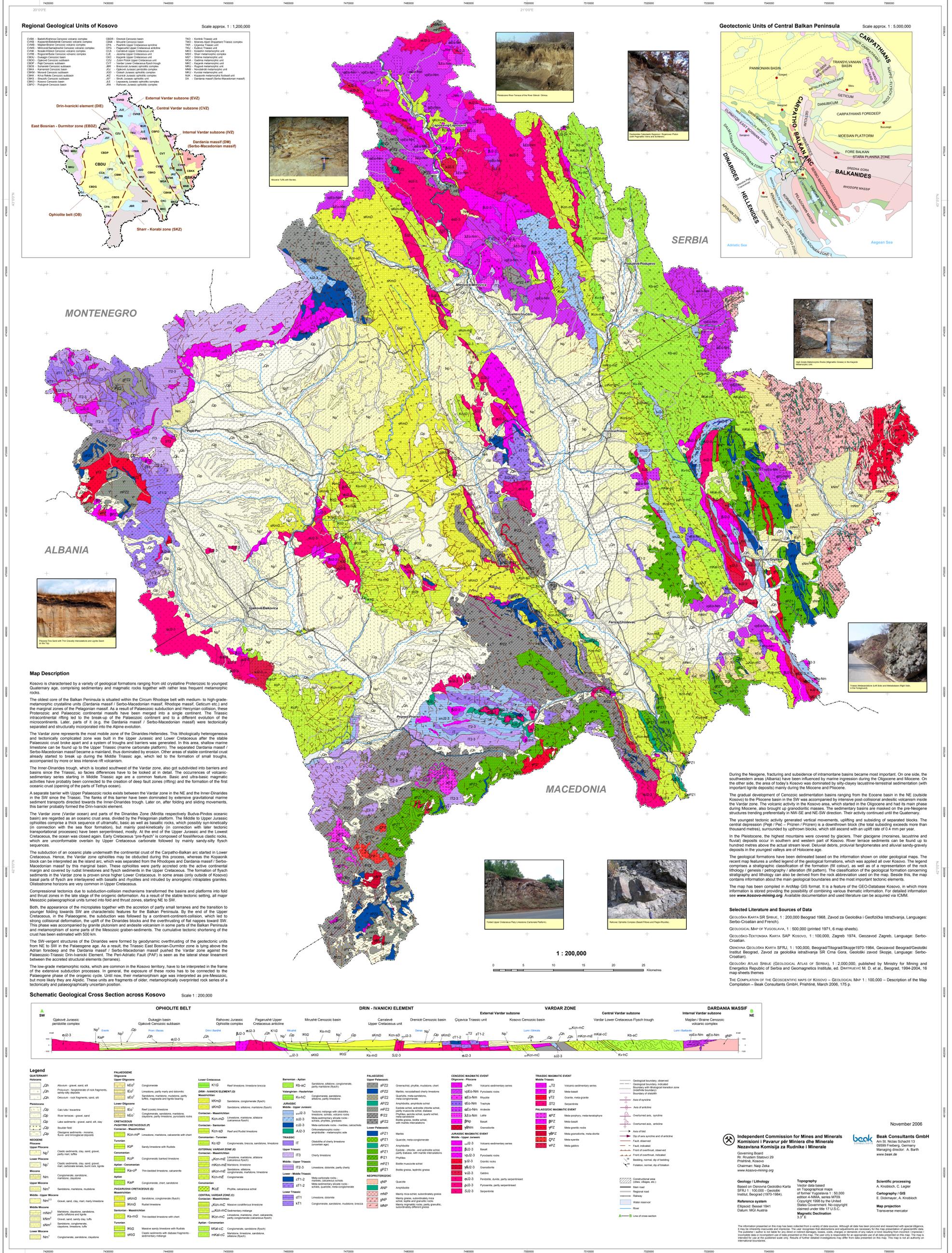


GEOLOGICAL MAP OF KOSOVO

Scale 1 : 200,000



Map Description

Kosovo is characterised by a variety of geological formations ranging from old crystalline Proterozoic to youngest Quaternary age, comprising sedimentary and magmatic rocks together with rather frequent metamorphic rocks.

The oldest core of the Balkan Peninsula is situated within the Circum Rhodope belt with medium- to high-grade metamorphic crystalline units (Dardania massif / Serbo-Macedonian massif, Rhodope massif, Geticum etc.) and the marginal zones of the Pelagonian massif. As a result of Palaeozoic subduction and Hercynian collision, these Proterozoic and Palaeozoic continental massifs have merged into a single continent. The Triassic intracratonic rifting led to the break-up of the Palaeozoic continent and to a different evolution of the microcontinents. Later, parts of it (e.g. the Dardania massif / Serbo-Macedonian massif) were tectonically separated and structurally incorporated into the Alpine evolution.

The Vardar zone represents the most mobile zone of the Dinarides-Hellenides. This lithologically heterogeneous and tectonically complicated zone was built in the Upper Jurassic and Lower Cretaceous after the stable Palaeozoic crust broke apart and a system of troughs and barriers was generated. In this area, shallow marine limestone can be found up to the Upper Triassic (mainly carbonate platform). The separated Dardania massif / Serbo-Macedonian massifs became a mainland, thus dominated by granite. Other areas of stable continental crust already started to break up during the Middle Triassic, which led to the formation of small troughs, accompanied by more or less intensive rift volcanism.

The Inner-Dinarides trough, which is located southwest of the Vardar zone, also got subdivided into barriers and basins since the Triassic, so facies differences have to be looked at in detail. The occurrences of volcanic-sedimentary series starting in Middle Triassic age are a common feature. Basic and ultra-basic magmatic activities have probably been connected to the creation of deep fault zones (rifting) and the formation of the first oceanic crust opening of the parts of Tethys ocean.

A separate barrier with Upper Palaeozoic rocks exists between the Vardar zone in the NE and the Inner-Dinarides in the SW since the Triassic. The flanks of this barrier have been dominated by extensive gravitational marine sediment transport directed towards the Inner-Dinarides trough. Later on, after folding and sliding movements, this barrier probably formed the Drin-Ivanicki element.

The Vardar zone (Vardar ocean) and parts of the Dinarides Zone (Mirdita respectively Buva-Pindos oceanic basin) are regarded as an oceanic crust area, divided by the Pelagonian platform. The Middle to Upper Jurassic ophiolites comprise a thick sequence of ultrabasic, basic as well as basaltic rocks, which possibly syn-kinematically (in connection with the sea floor formation), but mainly post-kinematically (in connection with later tectonic transportational processes) have been separated, mostly. At the end of the Upper Jurassic and the Lower Cretaceous, the ocean was closed again. Early Cretaceous "pre-flysch" is composed of fossiliferous clastic rocks, which are unconformably overlain by Upper Cretaceous carbonate followed by mainly sandy-siltaceous flysch sequences.

The subduction of an oceanic plate underneath the continental crust of the Carpatho-Balkan arc started in Lower Cretaceous. Hence, the Vardar zone ophiolites may be obducted during this process, whereas the Kosovo block can be interpreted as the island arc, which was separated from the Rhodopes and Dardania massif / Serbo-Macedonian massifs by this marginal basin. These ophiolites were partly accreted onto the active continental margin and covered by turbidites and flysch sediments in the Upper Cretaceous. The formation of flysch sediments in the Vardar zone is proven since higher Lower Cretaceous. In some areas (only outside of Kosovo) basal parts of flysch are interlayered with basaltic and rhyolitic and intruded by anorthogic intraplates granites. Ophiolite zones are very common in Upper Cretaceous.

Compressional tectonics due to subduction-collision mechanisms transformed the basins and platforms into fold and thrust zones in the late stage of the orogenic deformation. As a result of the stable tectonic setting, all major Mesozoic paleogeographical units turned into fold and thrust zones, starting NE to SW.

Both, the appearance of the microplates together with the accretion of partly small terranes and the transition to younger folding towards SW are characteristic features for the Balkan Peninsula. By the end of the Upper Cretaceous, in the Palaeogene, the subduction was followed by a continent-continent collision, which led to strong collisional deformation, the uplift of the Dinarides blocks and the overthrusting of flat nappes toward SW. This phase was accompanied by granite plutonism and andesite volcanism in some parts of the Balkan Peninsula and metamorphism of some parts of the Mesozoic graben-sediments. The cumulative tectonic shortening of the crust has been estimated with 500 km.

The SW-vergent structures of the Dinarides were formed by geodynamic overthrusting of the geotectonic units from NE to SW in the Palaeogene age. As a result, the Triassic East Bosnian-Dumitor zone is lying above the Adriatic foredeep and the Dardania massif / Serbo-Macedonian massifs pushed the Vardar zone against the Palaeozoic-Triassic Drin-Ivanicki Element. The Peri-Adriatic Fault (PAF) is seen as the lateral shear instrument between the accreted structural elements (terraces).

The low-grade metamorphic rocks, which are common in the Kosovo territory, have to be interpreted in the frame of the extensive subduction processes. In general, the exposure of these rocks has to be connected to the Palaeogene phase of the orogenic cycle. Until now, their metamorphism age was interpreted as pre-Mesozoic, but more likely they are Alpidic. These units are fragments of older, metamorphically overprinted rock series of a tectonically and paleogeographically important position.

During the Neogene, fracturing and subsidence of intramontane basins became most important. On one side, the southwestern areas (Albania) have been influenced by marine incursions during the Oligocene and Miocene. On the other side, the area of today's Kosovo was dominated by silty-clayey lacustrine-terrestrial sedimentation (with important lignite deposits) mainly during the Miocene and Pliocene.

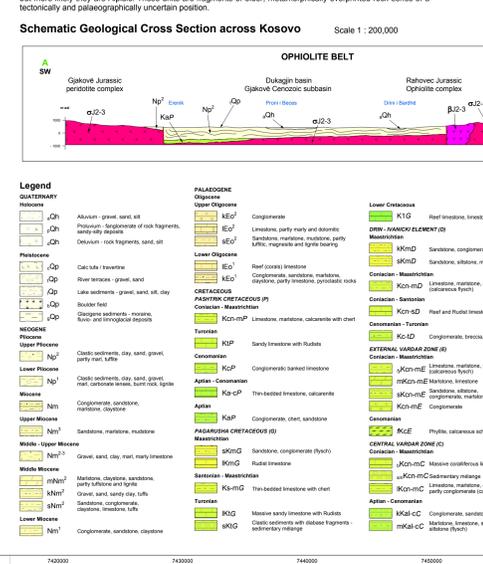
The gradual development of Cenozoic sedimentation basins ranging from the Eocene basin in the NE (outside Kosovo) to the Pliocene basin in the SW was accompanied by intensive post-collisional andesitic volcanism inside the Vardar zone. The volcanic activity in the Kosovo area, which started in the Oligocene and had its main phase during Miocene, also brought up granitic intrusions. The sedimentary basins are marked on the pre-Neogene structures trending preferentially in NW-SE and NE-SW direction. Their activity continued until the Quaternary.

The youngest tectonic activity generated vertical movements, uplifting and subsiding of separated blocks. The central depression (Pishe / Pise - Pizore / Pizore) is a downthrow block (the total subsiding exceeds more than thousand metres), surrounded by uplifted blocks, which still ascend with an uplift rate of 0.4 mm per year.

In the Pleistocene, the highest mountains were covered by glaciers. Their glacialine (moraines, lacustrine and fluvial) deposits occur in southern and western part of Kosovo. River terraces sediments can be found up to hundred metres above the actual stream level. Deluvial debris, proluvial fan conglomerates and alluvial sandy-gravelly deposits in the youngest valleys are of Holocene age.

The geological formations have been delineated based on the information shown on older geological maps. The recent map features a unified legend of the geological formations, which was applied all over Kosovo. The legend comprises a stratigraphic classification of the formation (fill colour), as well as a representation of the rock lithology (genesis / petrography / alteration / fill pattern). The classification of the geological formation concerning stratigraphy and lithology can also be derived from the rock abbreviation used on the map. Beside this, the map contains information about the main geological boundaries and the most important tectonic elements.

The map has been compiled in ArcGIS format. It is a feature of the GEO-Database Kosovo, in which more information is stored providing the possibility of combining various thematic information. For detailed information see www.kosovo-mining.org. Additional documentation and used literature can be acquired via ICAM.



QUATERNARY	PALEOGENE	CRETACEOUS	TRIASIC	TRIASSIC MAGMATIC EVENT	MIDDLE TRIASSIC	TRIASSIC MAGMATIC EVENT
Q1: Alluvium, gravel, sand, silt	Q2: Sandstone, siltstone, conglomerate	Q3: Sandstone, siltstone, conglomerate	Q4: Sandstone, siltstone, conglomerate	Q5: Sandstone, siltstone, conglomerate	Q6: Sandstone, siltstone, conglomerate	Q7: Sandstone, siltstone, conglomerate

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Independent Commission for Mines and Minerals
Nezavisna Komisija za Rudnike i Minerale

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Geology / Lithology
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Scientific processing
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Projection meridian: 21° E

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