THE STRUCTURAL AND METALLOGENIC ANALYSIS OF THE ZONE OF CENOZOIC AUTONOMOUS ACTIVATION

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Almost in the middle of the Balkan peninsula, there is a relatively narrow zone with diffuse boundaries and of uneven width which was known even earlier as the zone of Cenozoic autonomous tectonic-magmatic activation (Janković, Petkovic, 1974, Grubic, 1974) Fig.1. In general, this zone stretches from the Alps in the ESE direction, curved in the central part of the Balkan peninsula in the NW-SE direction later to return to a WNW-ESE direction. The activation zone cuts across all earlier formed geotectonic units, mainly definitively consolidated at the end of the Styrian phase: the Alpine-Dinaric frontier zone, the Pannonian horsts, the Inner Dinarides, the Vardar zone, the Serbian-Macedonian massif, the Struma zone and touches the Rhodope Massif. The zone of Tertiary autonomous activation on the Balkan peninsula which was assumed earlier has been confirmed by remote sensing and morphostructural analysis (Petkovic 1978, Kocneva, Romic, Petkovic 1978, Jankovic, Petkovic et al.1979).

The interpretation of satellitic imagery and morphostructural analysis have enabled us to understand the processes which preceded the formation of the zone of Cenozoic activation. Apart from the Pelagonian planetary structure (structure B on Fig.2), which represents a typical ringlike arch structure, there is an irregular but still ringlike planetary structure caused by the depression of the Pannonian basin (structure A). Although the central parts are depressed in one case and elevated in the next, the effects of the process of tension of their marginal parts were the same. In these processes, system of open fault structures were formed which served as chanels of ascent of magma. Only when we realized that just these marginal parts of the Pannonian and Pelagonian planetary structure had served as a space for localization of the zone of Cenozoic autonomous activation did it become clear why the zone changes its general WNW-ESE direction into the NW-SE direction.

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The zone of Tertiary autonomous activation of the Balkan peninsula is characterized by a specific structural plan, multiphase volcanic-intrusive magmatism and interesting mineral deposits.

Striking transcurrent faults can be recognized from air and satellite pictures, striking in the same direction as the zone of activation, as well as systems of smaller parallel faults, systems of diagonal jagged faults and systems of straight, tension faults. A special characteristic of the zone of autonomous activation is its many ringlike structures. These megastructures correspond to broad, gentle arches, are elliptical or circular in shape and have a diameter of 60 to 100 km. Their internal structure features a wealth of forms. They are built of concentric ringlike segments, and sometimes have the appearance of a coil. The central parts are usually raised, the other rings are alternately lowered and raised. The radially arranged faults separate the internal parts of the megastructure into sector blocks. These structures are contoured along the periphery by depressions which are either bow-shaped or oval-shaped. Within the megastructure there are numerous smaller ringlike forms ranging from several hundred meters to a few kilometers in diameter.

The first signs of magmatic activity in the zone of Tertiary autonomous activation had already occurred at the end of the Eocene, but it is still not clear what connection they have with this zone. The magmatism culminated in the Miocene, while it gradually calmed down in the Pliocene, occasionally extending into the Quaternary. The magmatic rocks correspond to the volcanic-intrusive granodiorite complexes, chemically they belong to the Ca-alkali rocks and in later phases are rich in potassium. Besides dacite-andesites, we also find trachyandesites, quartz-latites, latites, trachybasalts, trachytes and subordinate leucite rocks (lamprophyric facies). The rocks are accompanied by pyroclastics, agglomerates and breccia. Tuffs are extremely rare. Intrusives of quartzdiorite, granodiorite and quartzmonconites are, in principle, synchronous with analogous volcanic rocks. Magmatic rocks are consolidated at the subvolcanic-volcanic level, in the process of which plutons are formed as "high plutons". According to more recent ideas, granites in the zone of autonomous activation were formed by metasomatic transformation of granodioritic plutons.

There are numerous and varied mineral deposits in the zone of Tertiary autonomous activation. Interesting occurrences of tin and niobic tantalum are the only ones genetically linked with the granites (Cer, Bukulja). All the other endogenous deposits are paragenetically linked with the volcanic-intrusive complexes of granodioritic magma. The magnetite deposits (Suva ruda type) magnetite and hematite (Damyan type) - belong to typical metasomatic scarns. The copper deposits are either porphyric (Bucim) or vein-impregnation (Zlatica ' Plavica). The molybdenum deposits are stockwork impregnated (Mackatica). The lead and zinc deposits are of scarn type (Rudnik), hydrothermal-metasomatic (Trepca) or vein type (Srebrenica, Zletovo). The antimony deposits are usually monomineral (Zajaca) but there are also transitions to lead-antimony, arsenic-antimony deposits. Deposits of chrysotile-asbestos (Korlaca) and serpentinized breccia (Rujiste) were formed by the activity of Tertiary hydrotherms in serpentinite. Some magnesite deposits (Bela stena), formed in Neogene lacustrine basins, are typical products of the volcanic-sedimentary processes. The many coal deposits (partly metamorphized) and other deposits of clay, cement marls and building materials are also linked with the Neogene basins.

The autonomous activation zone is also characterized by numerous mineral and thermal waters, intensive neo-tectonic and recent movements and considerable seismic activity.

Logical metallogenic analysis was made possible for the first time by the distinguishing of the megastructures in the Tertiary autonomous activation zone. Thus the megastructures correspond to the ore districts and coincide with the centres of magmatic activity, while the distribution of mineral deposits in them is found to be distinctly laterally zoned. The lesser ringlike structures correspond to the structure of the ore fields or mineral deposits.

The zone of autonomous Cenozoic tectonic-magmatic activation is most probably planetary in character. It begins in the Alps, diagonally cuts across the whole of Yugoslav territory, continues into Greece and Bulgaria, crosses into Turkey and carries on far into the Middle East and Asia.

REFERENCES

Grubić A., (1974): THE GEOTECTONICS OF YUGOSLAVIA (A REVIEW OF CONCEPTS), Mtallogeny and Concepts of the Geotectonic Development of Yugoslavia,443-477,Rud.geol. fak., Beograd.

Janković S, Petković M., (1974): METALLOGENY AND CONCEPTS OF THE GEOTECTONIC DEVELOPMENT OF YUGOSLAVIA. Metallogeny and Concepts of the Geotectonic Development of Yugoslavia, 443-477,Rud.geol. fak., Beograd.

Janković S, Petković M.,Tomson I.N., Kravcov V.,(1979): STRUKTURI NEOGENOVOJ AKTIVIZACIJI SERBII I MAKEDONII I SVJAZ S NIMI ORUDNENIJA. Medj.Tihookeanska konferencija, Habarovsk.

Kočneva N.T., Romić K., Petković M. (1978): REKONSTRUKCIJA STRUKTURA NEOGENE AKTIVIZACIJE U SRBIJI I MAKEDONIJI. IX Kongres geologa Jugoslavije, Sarajevo.

Petković M., (1978): NEOGENA AKTIVIZACIJA I NJEN ZNAČAJ ZA METALOGENIJU JUGOSLAVIJE. II Savet. o Pb-Zn mineralizacijama Jugoslavije, Štip.

Fig.1.Map of metallogenic provinces, metallogenic districts and fields: a) Alpine metallogenic province; b) Pannonian basin, c) Dinaric-Hellenic metallogenic province; d = g) Serbo-Macedonian metallogenic province = metallogenic zone of Cenozoic activation; e) Carpatho-Balkan metallogenic province; f) Moesian plate.

Fig. 2. Morphostructural sketch of Serbia and Macedonia.

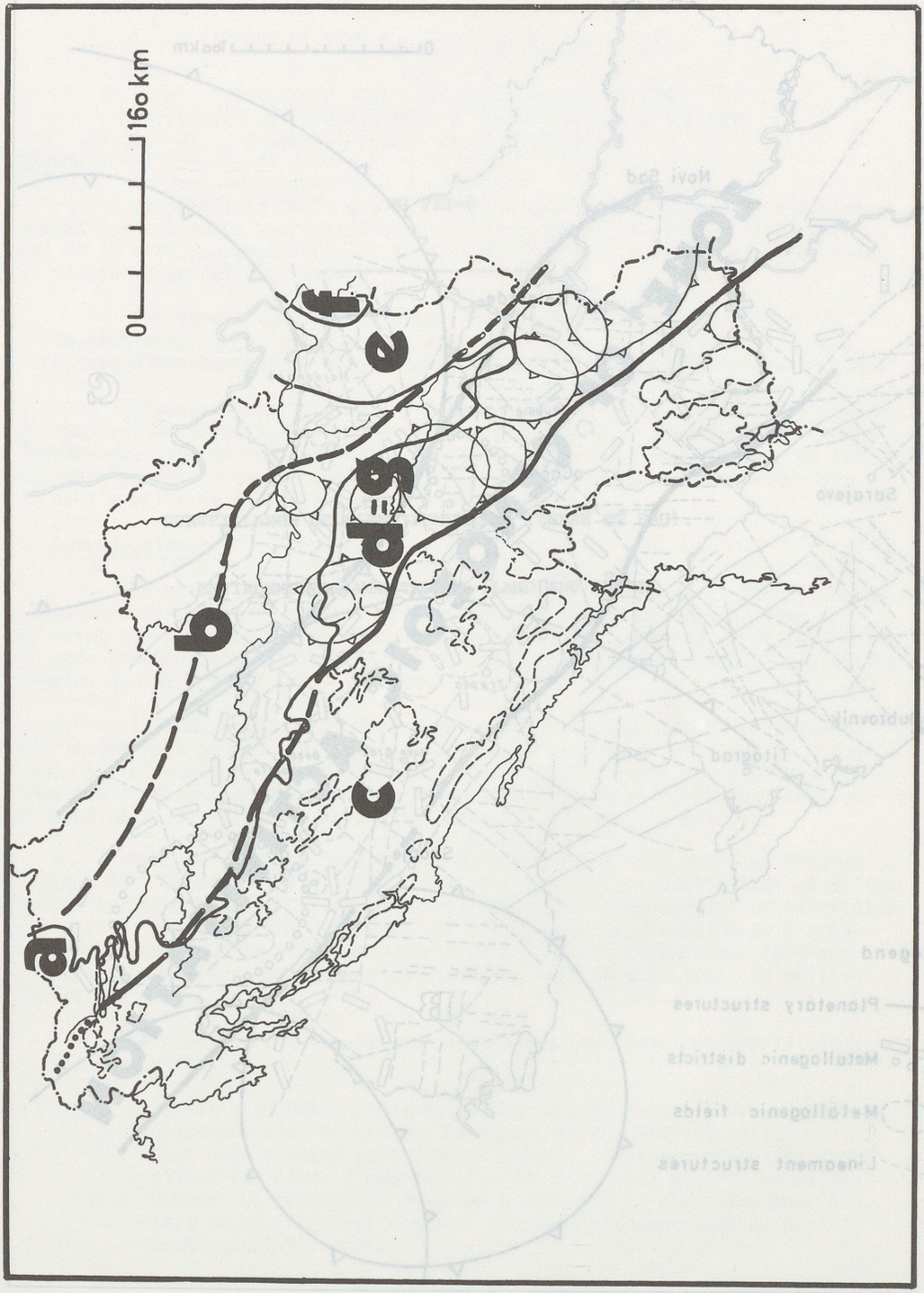

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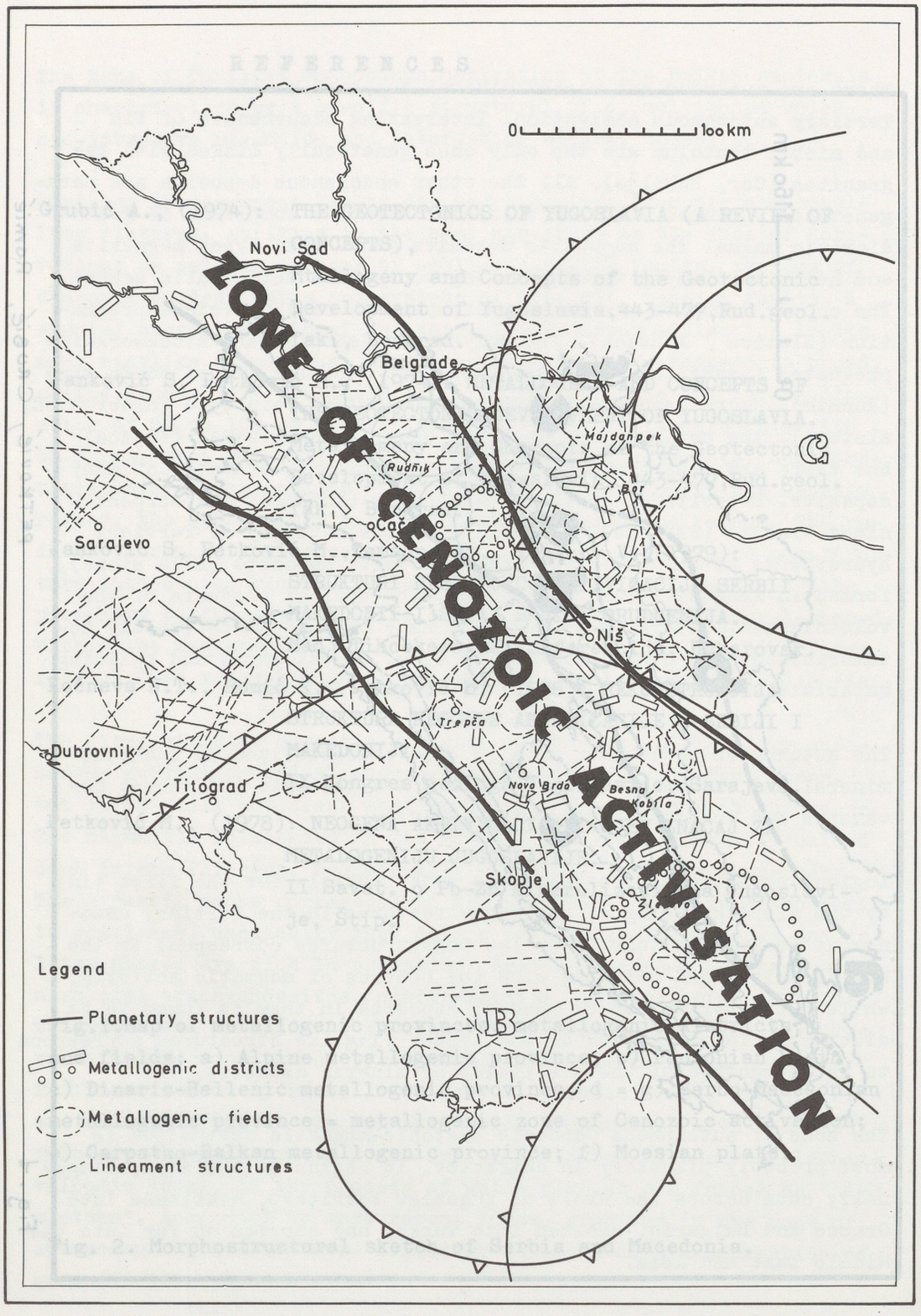
Fig. 1


0
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Novi Sad
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Sarajevo
Dubrovnik
Titograd
Skopje
Niš
Rudnik
Čačak
Majdanpek
Bor
Trepča
Nova Brda
Besna Kobila
ZONE OF CENOZOIC ACTIVISATION
C
B
Legend
Planetary structures
Metallogenic districts
Metallogenic fields
Lineament structures