active tectonic movements of wider fault zones of Predjama (Postojna cave), Ravne (Polog cave) and Brežice Faults (Kostanjevica cave).

Note on the evolution of a Miocene composite volcano in an extensional setting, Zărand Basin (Apuseni Mts., Romania)

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Bontău is a major eroded composite volcano filling the Miocene Zărand extensional basin, near the junction between the Codru-Moma and Highiş-Drocea Mts., at the tectonic boundary between the South and North Apuseni Mts. It is a quasi-symmetric structure (16-18 km in diameter) centered on an eroded vent area (9x4 km), being buttressed to the south by Late Jurassic to Late Cretaceous ophiolites and sedimentary deposits of the South Apuseni Mts. The volcano was built up in two sub-aerial phases (14-12.5 Ma and 11-10 Ma) from successive eruptions of andesite lavas and pyroclastic rocks with a time-increasing volatile budget. The initial phase was dominated by emplacement of pyroxene andesites and resulted in scattered individual volcanic lava domes associated marginally with lava flows and/or pyroclastic block-and-ash flows. The second phase was petrographically characterized by amphibole-pyroxene andesites and was a result of a succession of pyroclastic eruptions (varying from strombolian to subplinian type) and extrusion of volcanic domes that resulted in the formation of a central vent area. Numerous debris flow deposits have been emplaced at the periphery of primary pyroclastic deposits. The end of the magmatic activity was most probably intrusive as recorded by several andesitic-dioritic bodies and associated hydrothermal and mineralization processes in the volcano core complex area. Distal epiclastic deposits are associated with terrestrial detritic material and coal, filling the basin around the volcano in its western and eastern part. Chemical analyses show that the lavas are of calc-alkaline type and are all andesites (SiO_2=56–61%) in composition. The petrographical differences between the volcano evolution stages, showing an increase in amphibole content at the expense of two pyroxenes (augite and hypersthene), are slightly mirrored in the major element compositions of the rocks; only CaO and MgO contents decrease with increasing SiO_2. In spite of a ~ 4 Ma long evolution, the compositions of calc-alkaline lavas suggest insignificant fractionation processes, resulting from the extensional setting in which they occur that did not favored prolonged magma chamber processes.

Geochemistry and U-Pb zircon age of low-grade metavolcanic rocks from the Biga Peninsula, Northwestern Turkey

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Northwest Anatolia and especially the Biga Peninsula is the area having special important in the case of understanding of geology of Turkey and its surrounding. The Biga Peninsula has a Variscan basement affected by Alpine tectonics which is mainly composed of metavolcanic rocks. NE-SW-directed metavolcanic rocks occur in the basement of Çamlıca

metamorphic association and made up of brown, green, yellowish green metalava, metatuff and small amount of metasedimentary rocks. The common mineral assemblages of the metavolcanic rocks are mainly composed of quartz + chlorite + epidote + albite + actinolite + calcite ± sphen ± zircon. This mineral assemblage indicates that these metavolcanic rocks underwent greenschist-facies metamorphism.

Major, trace and rare earth element (REE) geochemistry for metavolcanic rocks from the Biga Peninsula has been determined to reveal their origin and tectonic setting. The metavolcanic rocks have compositions of andesites with calc-alkaline character. Calc-alkaline chemistry is represented by intermediate SiO_2 content, low MgO and low Cr. Chondrite-normalized REE patterns are moderately fractionated (La_N/Yb_N ~ 2.2 to 8.9). Europium anomalies are variable (Eu/Eu* 0.6 to 1.9) and generally negative (average Eu/Eu* 0.83). The plagioclase fractionation is confirmed by a slight development of negative Eu anomaly. The metavolcanic rocks have a distinct negative Nb anomaly with negative Sr, Ba, Hf anomalies in extended element diagrams. The large negative Nb, Sr, Ba and Hf anomalies in the metavolcanic rocks exhibit a crustal involvement in their derivation. The crustal influence may be related to either partial melting at the base of continental crust or contamination of mafic magma with crustal material. On tectonic discrimination diagrams, all metavolcanic rocks cluster within the volcanic arc field away from either the within plate or ocean ridge fields. Those within the volcanic arc field indicate calc-alkaline magma type. Such a magma type is a characteristic of volcanic arc setting for the metavolcanic rocks. Moreover, negative Nb anomalies are also characteristic of the volcanic arc.

Zircon grains from these metavolcanic rocks, which are euhedral with typical magmatic morphologies, were dated by LA-ICPMS. Zircon ages of two samples yielded 328.6 ± 3.5 Ma and 343.2 ± 2.6 Ma, respectively. These are interpreted as the time of protolith crystallization of metavolcanic rocks. This volcanic episode of the Biga Peninsula can be attributed the Variscan magmatic activity and also collisional event leading to the amalgamation of tectonic units took place during Variscan orogenic event.

Relationship between Cenozoic structures and polymetallic mineralizations in the central part of the Serbo-Macedonian massif

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The geodynamic evolution of the Serbo-Macedonian massif can be reviewed in few geological and geotectonic epochs, but very specific is the Cenozoic evolution from geodynamic, geotectonic, structural, magmatic and metallogenetic point of view. Cenozoic activization at the territory of the FYR of Macedonia enclosed the most complex geotectonic units such as Vardar zone and SMM. Its occurrence is mainly along fissures of general NW-SE direction and activated meridian cracking zones and faulting systems of general NE-SW direction. In such conditions came to complete redistribution of the lineament structures network when on the main direction of Mesozoic structures NW-SE (340^o) occurred fault system of the same direction but slightly different angle (320^o). 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 are their numerous ringlike structures. This activization significantly contributed to the localization of the Cenozoic mineralizations within the Eastern FYR of Macedonia. The disruption structures of of NW-SE direction control three major Cenozoic metallogenetic zones (two of them characterized by the Oligocene-Miocene magmatism and mineralization in the Kratovo-Zletovo and Bucim-Damjan-Borov Dol ore regions and third characterized by Miocene volcanics and related mineralization at the Osogovo ore region). Logical metallogenic analysis have confirmed that megastructures in the Tertiary autonomous activation zone correspond to the ore districts and coincide with the centres of magmatic