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Spatial and temporal evolution of metallogeny in connection with convergent margins magmatism in Oas-Gutai and Tibles Mts., Eastern Carpathians, Romania

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The Miocene calc-alkaline magmatism developed in Oas-Gutai and Tibles Mts., in connection with the subduction of the European Plate beneath the Alcapa and Tisza/Tisia-Dacia microplates. The magmatic rocks belong to two distinct, felsic and intermediate types. The felsic magmatism developed at the beginning of the volcanic activity (15.4 Ma), composed of ignimbrites and associated volcaniclastics outcropping on the south-southwestern part of Gutai Mts. and burried in the central-northern part of Oas Mts., respectively. The intermediate magmatism developed subsequently (13.4-7.0 Ma), emplacing extrusive and intrusive rocks in Oas and Gutai Mts. and a subvolcanic complex in Tibles Mts. The extrusive rocks belong to typical calc-alkaline series (from basalts to rhyolites) whereas the intrusive, subvolcanic and shallow level intravolcanic rocks are very different in composition (from microgabbroes to microgranodiorites).

A complex metallogenic activity had been associated to the intermediate magmatism, with low sulfidation epithermal mineralizations hosted by different rocks, exclusively volcanic or intrusive or by complex structures consisting of both volcanic and intrusive rocks. Adularia-sericite hydrothermal alterations are typical for most of the epithermal ore deposits in Oas and Gutai Mts. The epithermal mineralizations consist of polymetallic and gold-rich vein systems predominantly and breccia-pipes/dykes and stockworks. A hidden porphyry copper system is developed in the southeastern part of Tibles Mts.

In Gutai Mts. (Baia Mare metallogenic district), the hydrothermal activity had taken place during Pannonian, (11.5-7.8 Ma, according to the radiometric data, K-Ar data achieved on adularia and illite and Ar-Ar data achieved on adularia). Two main phases have been emphasized: Lower Pannonian (11.5-10.0 Ma) in Ilba-Nistru base metal and Sasar gold –silver metallogenic fields in the southwestern part of the area and Upper Pannonian (9.4-7.9 Ma) in Herja-Baiut base metal+gold metallogenic field in the eastern part.

In Oas and Tibles Mts., the metallogenic activity is contemporaneous with the second phase of the metallogenic activity from Gutai Mts. (9.6-7.8 Ma). The Poiana Botizei subvolcanic unit, emplaced between Gutai and Tibles Mts. had a base metal + copper metallogenic activity, corresponding to the metallogeny of Herja-Baiut field in Gutai Mts.

The spatial relationships between the hydrothermal mineralizations and the host magmatic rocks reveal the predominance of the complex magmatic mineralized structures consisting of volcanic and intrusive rocks as host rocks, especially in Gutai Mts. There is a link between the hydrothermal mineralizations and the intrusions from the mineralized structures, the Oas-Gutai mineralizations being typical intrusion-related epithermal systems.

The temporal relationships between mineralizations and the host magmatic rocks, inferred from field observations and based on radiometric datings have emphasized some important features. The youngest hydrothermal processes (7.9 Ma, based on Ar-Ar age achieved on adularia from the Main Vein in Baia Sprie ore deposit) are younger than the youngest magmatic rocks with one exception: the basalts from Gutai Mts. (8.1-7.0 Ma), which ceased the magmatism from the region. None of the mineralized structure contains magmatic rocks younger than the hydrothermal mineralizations. There is a gap between the main magmatic phases and the associated hydrothermal processes, of 0.5-1,5 Ma, similar with other occurences from the subduction zones.