Tectonic and structural controls on intrusion-related deposits (Elatsite and Praveshka Lakavica) in the Northern part of Sredna Gora zone, Bulgaria.

Nikolay Petrov[1], Kamelia Nedkova[2]

[1]*Sofia University "St. Kliment Ohridski", 15 Tsar Osvoboditel Bd., 1504 Sofia, Bulgaria; niky_geology@abv.bg*
[2]*Geological Institute, Bulgarian Academy of Sciences, 1113 Sofia, Bulgaria; kamelia_geology@abv.bg*;

The Cu-Au deposits of the Sredna Gora tectonic zone are spatially and temporally related to Late Cretaceous plutonic and volcanic rocks. The plutonic suites were generated by arc-trench-related magmatism. They represent a series of orogen-oblique magmatic centers stepped progressively southward between 92 and 78 Ma, possibly in response to ongoing subduction and collision of the African plate. More specifically, Elatsite and Praveshka Lakavica deposits situated in the northern part of the zone are associated with intermediate intrusions of Srednogorie Plutonic Suite.

Mechanical modeling of the Northern part of Sredna Gora zone combined with regional observations show that strain is unevenly distributed across the orogen. There are zones of extension parallel and perpendicular to the zone axis. The locally extensional domains in an otherwise generally contractional settings, facilitates magma and fluids migration from depth. These local extensional sites are associated with regional scale fault intersection zones between the oblique reverse Kashana and Placalnica shear zones and a set of brittle strike-slip faults. This is the most pronounced magma and fluid flow zone in this part of the orogen.

Relationships between the geometry of the granitoid stocks and the fault/fracture network indicate that the faults may have been important in the localization of stocks. More specifically, the NW and E– striking line of granodiorite stocks and dykes suggests that NW and E - striking dextral strike-slip fault system exerted control on emplacement of these intrusions. In the Elatsite and Praveshka Lakavica deposits, however, magma emplacement and mineralization controlling faults are regionally extensive but are not linked to any regional-scale (>5km length) faults or shear zones.

The observation that these faults (NW – striking) cut earlier compressional fabrics indicates that they probably developed late-syn or post movement along the major thrusts (Kashana and Placalnica) in the end of Early Cretaceous. Dextral reactivation of the NW- striking faults occurred in association with magmatism and hydrothermal activity at 92 Ma. This tectonic-magmatic event may be representing a transitional stress-regime between Early Alpine compressional tectonics and initiation of major movements of the Late Alpine Srednogorie strike-slip system.

Elatsite and Praveshka Lakavica deposits are similar to a porphyry style systems in that mineralization has a close spatial and temporal relationship to intrusions. However, porphyry systems commonly have variably-oriented stockwork and/or breccias at their centers. In porphyry intrusion-related systems concentric and radial vein arrays are common, and reflect magmatic processes.

The critical difference in structural style of Elatsite and Praveshka Lakavica deposits to porphyry systems is that there are regionally consistent stock, dyke, vein and fault orientations both within and outside areas of influence of intrusions and their hydrothermal centers. The hall-marks of true porphyry systems, multidirectional quartz-veinlet stockworks generated as a result of hydraulic fracturing, are absent. Such deposits seem to have formed during relatively passive ascent of magma and magmatic fluids through fracture systems related to district-wide stress regimes.