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POST-MAGMATIC (ORE) TRANSPRESSIVE DEFORMATION CONTROLLING THE LATE CRETACEOUS BASIN EVOLUTION – A CASE STUDY FROM THE PANAGYURISHTE STRIP, CENTRAL SREDNOGORIE ZONE, BULGARIA

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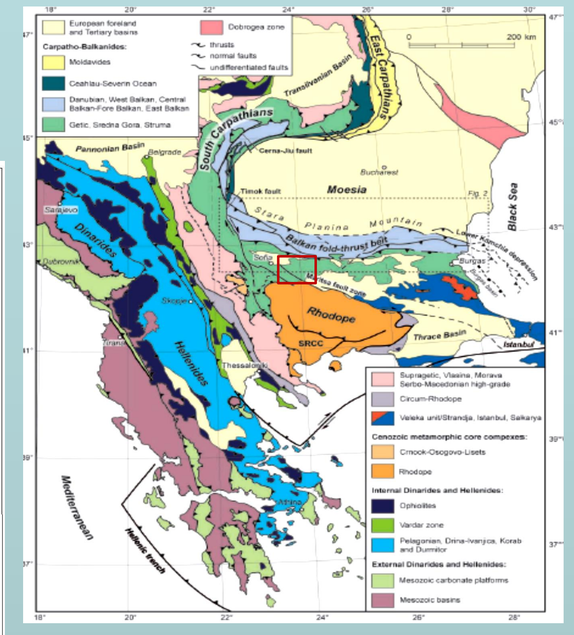
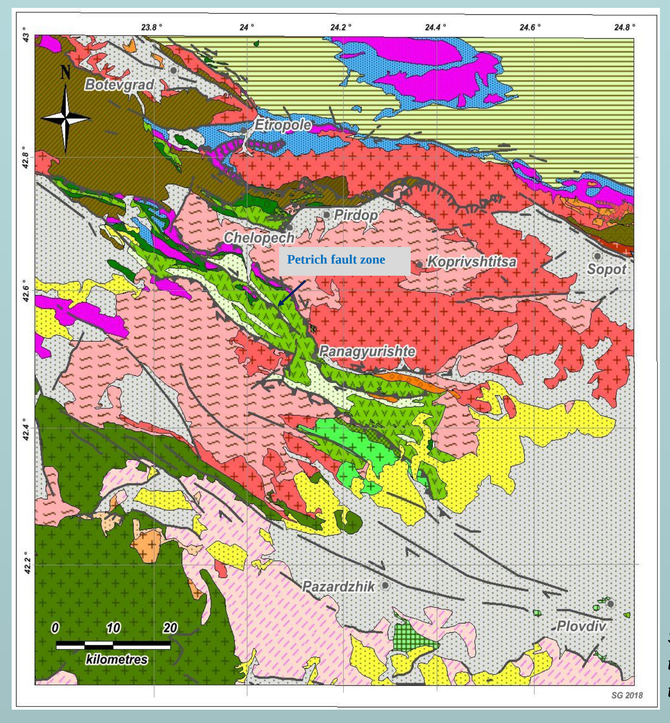
The Panagyurishte strip of Central Srednogorie Zone, Bulgaria is a part of the Upper Cretaceous magmatic arc belt Apuseni-Banat-Timok-Srednogorie. At the end of the Cretaceous the basin evolution is controlled by transpressive deformation as a result of the oblique southward rejuvenating subduction with retreat and roll-back of the slab of the Neotethys Vardar ocean beneath the European continental margin. Several regional deeply penetrative oblique-slip faults with NW-SE orientation are bounding segments of the volcano-sedimentary local basins. Some of them control or displace porphyry copper epithermal deposits and their study is significant to decipher the position of the ore systems.

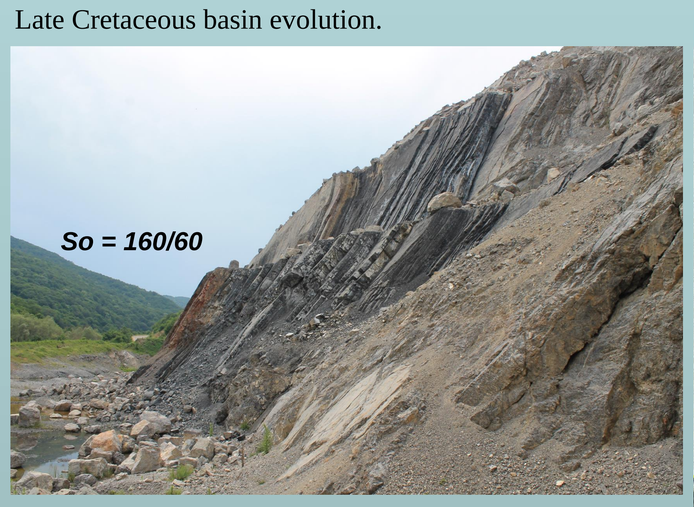
The transpressive tectonics that follow ore mineralizations is preserved and well outcropped in the vicinities of the village of Petrich, Zlatitsa district, where the Petrich fault zone is one of the prominent structures. This area is subject to voluminous intermediate magmatism during the late Turonian to the boundary of Coniacian followed by deposition of carbonate and sandy turbidites till Maastrichtian. The study is focused on the structural analysis and detailed mapping of the Petrich fault zone in order to estimate the deformation mechanisms and its influence on the Late Cretaceous basin evolution.



Geological map of the Eastern Europe after Kounov et al., 2018. The red rectangular shows the location of the Panagyurishte strip (part of the Apuseni-Banat-Timok-Srednogorie magmatic arc belt), given on the figure to the left

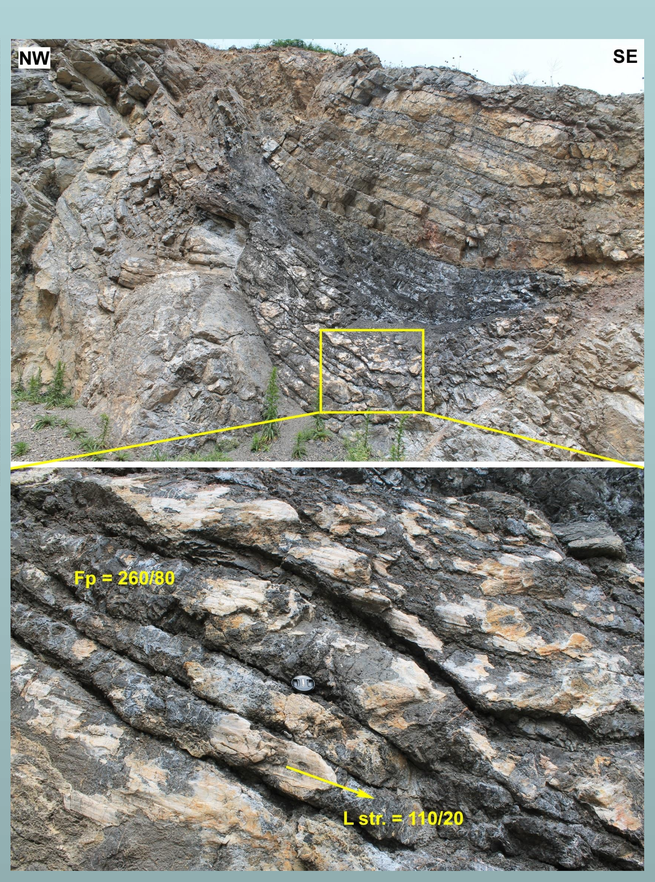


Schematic geological map of the Panagyurishte strip, modified after the National geological map in scale 1:100 000. The blue arrow shows the location of the Petrich fault zone



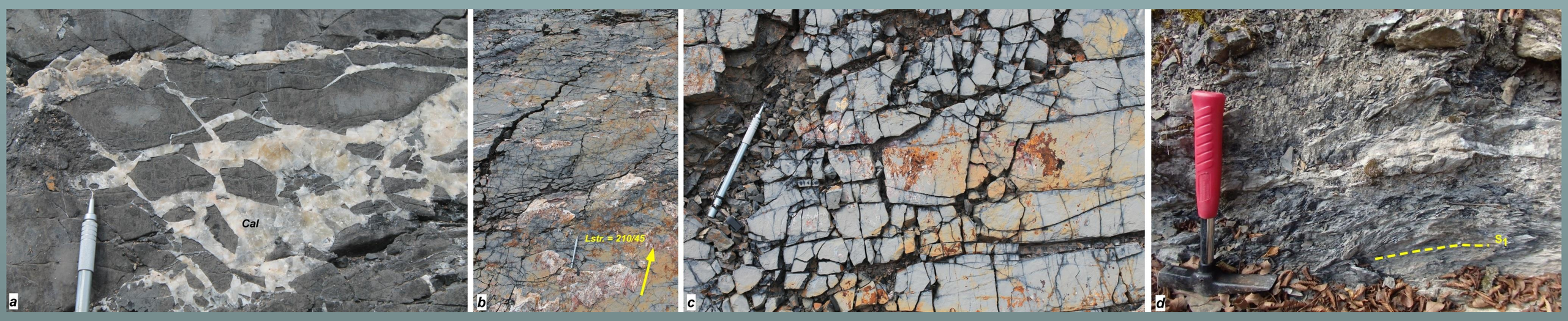
Steep Upper Cretaceous clayey carbonates along the Petrich fault zone, Panagyurishte strip, Central Srednogorie zone

Brecciated and cataclastic Middle Triassic dolostones within the Petrich fault zone, Panagyurishte strip, Central Srednogorie zone

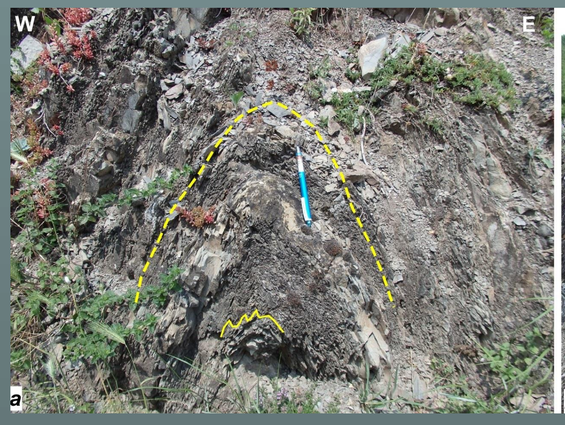


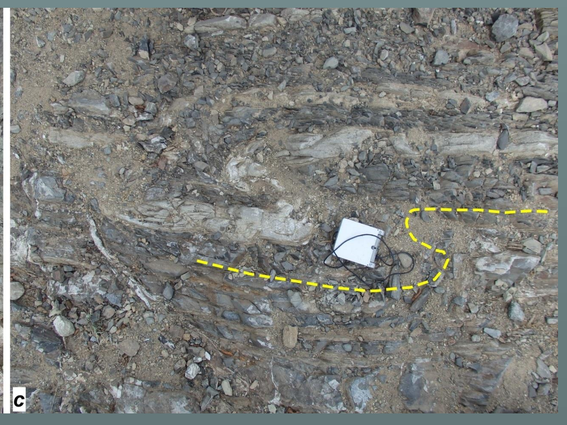
Fault-related folding of the Upper Cretaceous section and slickenlines along the fault plane as a result of oblique-slip faulting, Panagyurishte strip, Central Srednogorie zone

The Petrich fault zone juxtaposes various units from the Late Cretaceous volcano-sedimentary succession and Triassic epicontinental sediments. The fault zone is wide several hundreds of metres. A characteristic feature is the presence of slices of different lithologies forming imbricate fans and contractional duplexes within the fault zone. Push-up blocks of Triassic sediments give evidence for vertical thickening. The fault follows the main NW-SE (130º) orientation of the structures in the Panagyurishte strip and terminates in a horsetail splay. Deformation of affected rocks is brittle to brittle-ductile at macroscopic view. The Middle Triassic dolostones are brecciated and transformed into cataclasites. The deformation of the clayey-terrigenous, epiclastic turbidites and limestones within the Late Cretaceous section is penetrative and presented by several types of folds, flower structures, cataclastic foliation, axial cleavage. The dominant folds are open to isoclinal decametre to metre in scale with hinges plunging steeply (30–60º) to W or NW (280–330º). Folding of primary bedding with subvertical hinges is also often found. Part of the Late Cretaceous section near to the fault zone is overturned. Slickenside fibres, geometry of Riedel shears, parasitic and drag folds indicate dextral transpression.

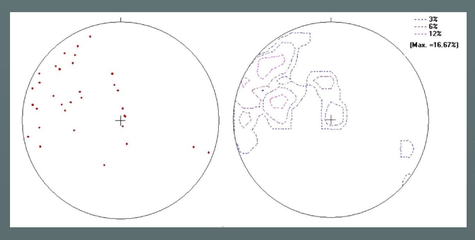


Brittle structures related to Petrich fault zone in Upper Cretaceous clayey limestones and clayey-terrigenous turbidites in Panagyurishte strip, Central Srednogorie zone: a) tectonic brecciation and filling of cracks with calcite; b) slickenlines along the fault plane showing reverse slip sense; c) two sets of joints; d) formation of foliated cataclasites within the fault core

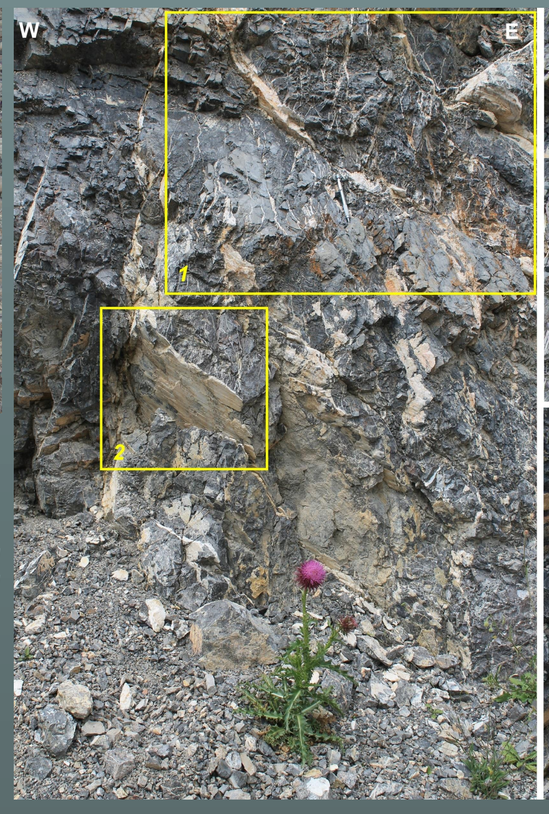


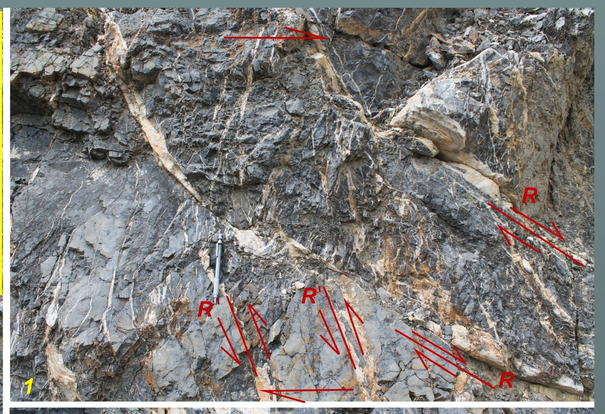


Folds in the Upper Cretaceous section within the zone of the Petrich fault, Central Srednogorie: a) open decametre folding of the primary bedding in clayey-terrigenous turbidites with hinges plunging to NW and formation of parasitic folds; b) isoclinal folding with sheared fold hinge in clayey terrigenous turbidites; difference in the shearing degree of the different beds depending on their competence is observed; c) isoclinal folding with subvertical fold hinges in epiclastic turbidites, plan view



Stereographic projections (lower hemisphere) of measured fold hinges from the zone of the Petrich fault, Panagyurishte strip, Central Srednogorie





Brittle structures (Riedel shears and slickenlines) indicating dextral shearing within the Petrich fault zone, Panagyurishte strip, Central Srednogorie

The present-day fault configuration in the Panagyurishte strip usually reactivates the older strike-slip structures that controlled previously the basin opening and the magmatic-hydrothermal system formation. Dating the later transpressive deformation that led to the basin closure and displacement of the ore systems is significant for the analysis of the post-magmatic tectonics. Some evidence for the age of the latest faults is found in the Panagyurishte region where displaced Paleocene conglomerates are found. The movements along the Petrich fault zone are probably related to the last stages of the Late Cretaceous basin evolution and closure. The exact age will be well constrained by the ongoing thermochronological studies.

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