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Eötvös Loránd University Student Chapter of the Society of Economic Geologists presents

Field trip to NE Greece

05/10/2023 – 05/15/2023



Acknowledgements:

We would like to extend our heartfelt gratitude to Professor Vasilios Melfos from Aristotle University of Thessaloniki (AUTH) and the AUTH Student Chapter of SEG. Their dedication and expertise played an important role in making our geology excursion not only possible but also highly professional. We deeply appreciate their commitment to enriching our learning experience, and without doubt we can say, that we all thoroughly enjoyed and benefited from this memorable adventure. Thank you for your invaluable contributions!



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Introduction:

The Hungarian Eötvös Loránd University Student Chapter of the Society of Economic Geologists embarked on a remarkable field trip to Northeastern Greece, an expedition that unfolded as an enlightening exploration of Greece's rich tapestry of raw materials and the intricate processes that govern ore formation. This unforgettable excursion provided a unique opportunity for our dedicated group of raw material enthusiasts to delve deep into the heart of Greek geological landscapes and unravel the truth of ore deposits.

Our journey into the geological wonders of Greece was a comprehensive study of various deposit types that included granitic intrusion-related, epithermal, porphyry, supergene, VMS, magmatic oxide, and contact, as well as regional metamorphism related deposits metamorphic deposits. Studying the regional geology of Greece presented a perfect backdrop for understanding the complex ore formation processes, offering a fertile ground for comparison with our homeland's deposits. The similarities and differences we uncovered during this immersive experience promised to deepen our comprehension of the geological forces at play, enrich our knowledge of ore formation dynamics, and foster a global perspective in our pursuit of economic geology excellence.

With our notebooks ready, geological hammers in hand, and an insatiable thirst for knowledge, our journey through Northeastern Greece promised to be a transformational chapter in our academic pursuits, as we embarked on a voyage of observation and discovery.



ELUSCSEG alongside AUTH S.E.G.



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On our first day of the excursion, we traveled to Thessaloniki through Serbia and Macedonia, enjoying the scenic views, and discussing structural geology along the way.

05/11/2023

The following morning, we gathered at AUTH, where we joined Greek students for a series of enlightening lectures. Ferenc Molnár kicked off with a presentation on "Porphyry and Epithermal Systems in Hungary." Next, Gabriella B. Kiss delved into "Fluid-Rock Interaction in Submarine Volcanic-Hydrothermal Systems: Mineralogy, Geochemistry, and Ore Deposits." Finally, Vasilios Melfos shared insights on "Tectonics and Metallogensis in NE Greece: The Case of Maronia." These lectures provided a valuable cross-cultural learning experience and expanded our geological knowledge. During the afternoon, we had the opportunity to explore the city. We made our way to the iconic White Tower of Thessaloniki, savored local cuisine at charming restaurants, and relished the delightful flavors of Greek coffee, making it a memorable and satisfying part of our excursion.



Professor Ferenc Molnár gives a lecture to the Hungarian and Greek student chapters of SEG

05/12/2023

On the third day we made our way to Kavala. The Palea Kavala ore system is an intrusion related gold system found in northeastern Greece. It consists of about 150 minor occurrences of Fe–Mn (Pb± Zn±Ag), Fe–Mn–Au, Fe–As–Au, Fe–Cu–Au, and Bi–Te–Au centered in and around the Kavala (or Symvolon) pluton, a granodiorite body which intrudes the metamorphic rocks of the Paleozoic Rhodope Massif. This intrusive body shares the same age as the Cu–Au–Ag–Zn–Pb ore complex at Recsk, Hungary, a uniquely preserved and explored porphyry-skarn-epithermal system. The similarities between these two deposits are not coincidental; they vividly illustrate a clear and significant geological relationship.



Professor Vasilios Melfos presenting the geology of the Kavala Pluton

At our initial outcrop, we placed our primary focus on the examination of sulphide veins, engaging in discussions regarding the notable orientation of ore fluid pathways, which predominantly show an SE–NW trend. This distinctive alignment is primarily influenced by the Kavala–Komotini Fault and other smaller structural features in the area. Recognizing the role of these structural controls is essential in comprehending the formation of intrusion-related gold systems within the region, providing valuable insights into the geological processes at work.

Continuing our fieldwork, we examined the Kimmeria Au-bearing magnetite-pyrrhotite skarn deposit. At Kimmeria, the granodioritic intrusion contacts with the marble unit of the Southern Rhodope Core Complex, resulting in a mineral assemblage containing garnet, clinopyroxene, epidote, hematite, wollastonite, vesuvianite and secondary amphibole, chlorite, quartz, and calcite. The Au-Cu-Fe skarn-type mineralization appears in 2 paragenetic stages: pyrrhotite and magnetite rich assemblages, associated with pyrite and chalcopyrite, and chlorite and sericite as alteration minerals.

05/13/2023

The following day proved to be both demanding and rewarding, as we embarked on an extensive exploration of diverse mineral deposits. Our way took us to witness the Xylagani VMS deposit, followed by a visit to the Perama Hill, where we encountered intriguing epithermal (Cu)-Au mineralization. Our day continued with an insightful exploration of the Maronia Cu-Mo porphyry deposit, offering us a comprehensive glimpse into the geological riches of the region.

In Xylagani, first we encountered pillow basalt and chert in our way to the VMS deposit itself – giving us insight about the submarine environment beforehand. The Xylagani VMS shows similar characteristics as a Cyprus-type VMS and has an Au-bearing Fe-Cu-(Zn-Pb) mineralization, which was the spot of active mining from 1900 to 1910.



The pillow basalt formation near Xylagani VMS

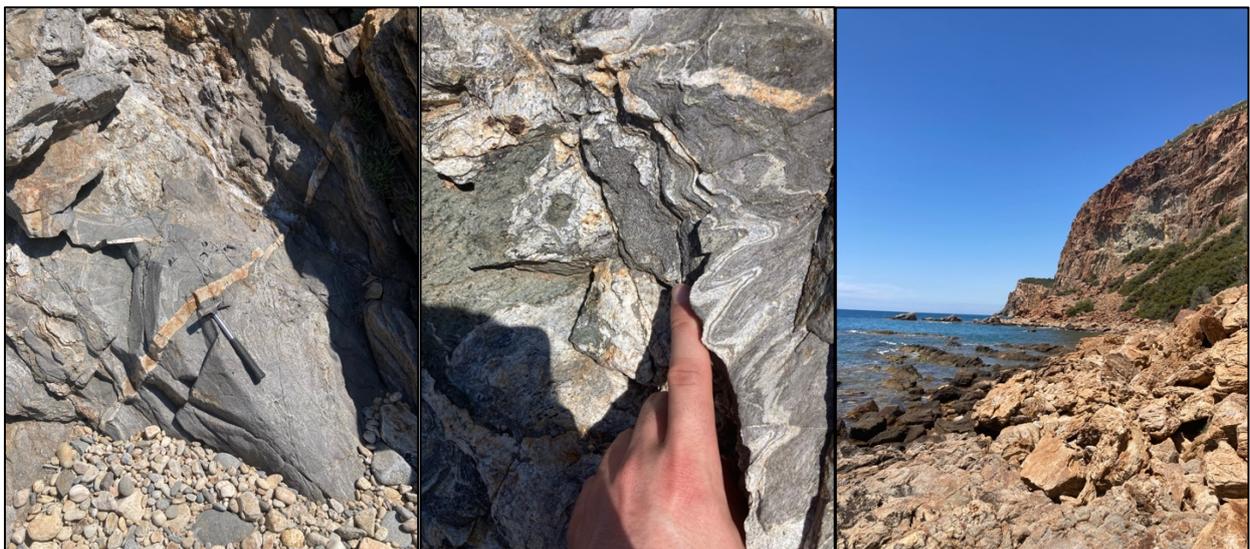
Arriving at our next outcrop, we were fulfilled by the marvelous scenery the Perama Hill had offered. The Perama Hill deposit in the Thrace region of NE Greece is an important gold prospect due to the region's favorable structures and magmatism. The deposit contains approximately 1.36 million ounces of gold and is considered to be a high-sulfidation epithermal mineralization.

The deposit exhibits two distinct mineralization styles, a structurally controlled sulfide-bearing vein-type mineralization in the andesite and a stratabound oxidized mineralization in the overlying sandstone.



Gold underneath our feet – many more deposits to see

In Maronia, a sunny afternoon at the seashore was more than a pleasant occasion to study the outstanding geology of the area. The Maronia Cu-Mo \pm Re \pm Au deposit is spatially related to a microgranite porphyry that intruded an Oligocene monzonite. Just by the beach, we were able to identify different types of veins, each characteristic to this type of deposit, some of them enclosing precious molybdenite within.



Vein types, plastic deformation, and the charming shore of Maronia

05/14/2023

On Sunday morning we made our way back to Chalkidiki Peninsula. Close by the busy city of Thessaloniki we arrived at the mine of Triadi, where we were able to examine the outcrops of obducted ophiolite bodies related to the closure of the Neotethys. We investigated the low-grade greenschist metamorphosed residual mantle hazburgite as well as the enclosed dunite bodies associated with podiform chromitite. Such secondary metasomatic alterations in the area as serpentinization and stockwerk listwaenitization created the second largest magnesite deposit in Greece, which we also encountered. By the end of the day, we learned about liquid magmatic oxide ore formation processes and discussed the similar processes and rocks of Hungary.



Podiform chromitite in dunite body

05/15/2023

On the last day of our excursion, we went to Kopaonik, Serbia to visit an abandoned open pit mine. Because of the thick layers of slippery and unconsolidated mud up the road, we had no choice but to go by foot. When we arrived at Suvo Rudiste, the open pit itself, we realized it was worth the trip. Not only was the scenery mesmerizing, but rockhounds would have definitely envied us. In the area they mined iron skarn, related to an Oligocene intrusion of quartz-monzonite. The skarns are characterized by the occurrence of andalusite, wollastonite and/or garnet, the latter reaching even 2-3 cm in size. We could also collect beautiful specimens of magnetite pseudomorphs after garnet; that was really impressive for all of us.



The open pit mine of Suvo Rudiste, Kopaonik, Serbia

After we found our way back to the vehicles, we summarized all that we have learned during the excursion, discussed the different tectonic events and the related processes and mineralization. We thought we would end our trip and travel back to Hungary right away, but fortunately there were outcrops of beautiful serpentinites just by the edge of a serpentine road that we were coming down from. We collected samples, carefully packed some asbestos, and then we were ready to set off again, once and for all.



'Warmed up in Greece – got cold in Serbia



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*“Jó szerencsét!” – a traditional greeting of geologists and miners in Hungary, meaning
“Good Luck!”*