

Post-conference field trip

Eastern Rhodopes, Southern Bulgaria

Intense collision-related volcanic activity took place in the Eastern Rhodopes (Southern Bulgaria) during the Paleogene. The zeolitized explosive products of the acid phases of this volcanism currently occupy large areas and host huge zeolite deposits. Some of them as well as few typical geological sections of the zeolitized pyroclastic sequences will be visited during the post-conference field trip.

Field trip preliminary itinerary

16 July 2010

14.00 – 15.30 Departure from Sofia, from reception of your hotel.
15.30 – 17.30 Walking tour in the old town of Plovdiv and departure to Haskovo
19.00 - Arrival to Haskovo and accommodation

17 July 2010

09.00 – 12.00 Haskovo – Golobradovo zeolite deposit (42 km) **Stop 1***, Golobradovo - Kardzhali (47.5 km)
12.30 – 14.00 Lunch in the hotel in Kardzhali
14.00 – 18.00 Kardzhali – Dazhdovnitsa (12 km) **Stop 2****; Dazhdovnitsa – Kardzhali (12 km) – Zhelezni Vrata zeolite quarry (5 km) **Stop 3 *****
18.30 Arrival to Kardzhali and accommodation

18 July 2010

09.00 – 12.00 Kardzhali – Perperikon (21 km) **Stop 4 ******, Perperikon – Beli Plast – Haskovo (38 km)
12.30 – 14.00 Lunch in the hotel in Haskovo
14.30 – 17.30 Departure back to Sofia from Haskovo (224 km)

*** Stop 1 - Golobradovo zeolite (clinoptilolite) deposit**

Zeolitized pyroclastics succession at Golobradovo has a total thickness of 80 m. Fine-grained ash tuffs and pyroclastic flow deposits build the lowermost parts of the geological section. They are covered by a layer of coarse-grained epiclastic rocks. A second pumice flow unit, hosting the quarry, builds the topmost parts. The acid pyroclastics of the deposit are covered by epiclastics resulting from erosion of the deposits of the second intermediate volcanic phase. The volcanic glass is replaced by clinoptilolite (Ca-K), building >80% accompanied by clay minerals, adularia and traces of calcite. The deposit will be managed by MINERALAGRO-Z Ltd as the zeolite material obtained here can be used in agriculture and ecology.

After visiting Dobrovolets clinoptilolite deposit, the road passes just by ***Lyaskovets mordenite deposit***. Only few m² of the zeolitized weakly to moderately welded pumice ignimbrites are currently exposed but the deposit was drilled in the 80s of the last century. Mordenite (Ca-Na) is accompanied by some clinoptilolite, celadonite, opal-CT and chalcedony. The zeolite content is about 70%.

***** Stop 2 - Panoramic view of the zeolitized pyroclastics near the village of Dazhdovnitsa***

A 120m-thick succession of zeolitized (clinoptilolitized) pyroclastics is exposed near Dajdovnitsa village, situated close to the inferred volcanic source area. The sequence is built of several thick pyroclastic flow units, intercalated by ash-fall and epiclastic layers. Clinoptilolite (building 67-72%) is the main alteration product replacing volcanic glass in the whole section. Some phyllosilicates, adularia, opal-CT and calcite are also present.

****** Stop 3 - Zhelezni Vrata zeolite (clinoptilolite) deposit***

Zhelezni Vrata deposit has been exploited for 50 years. The extracted material is used in cement industry - as clinker addition for lightening and improving the cement binding properties. The pyroclastics section is built up by several pyroclastic flow and fall units. The volcanic glass particles are replaced by clinoptilolite (50-60%) associated with some opal-CT, Ca-montmorillonite, illite (celadonite has been identified only in the lower pyroclastic layer) and probably adularia. Small quantities of lomontite, gmelinite (?) and traces of mordenite are detected in some of the units. Clinoptilolite chemistry changes gradually through the section: Ca is almost constant, Na increases and K decreases towards the topmost parts.

The same geological section hosts another large zeolite deposit – Belia Bair, we are going to pass by. Bore-hole exploration shows the following parameters: 90 m total thickness with average clinoptilolite content > 50%, and with presence of some other secondary phases such as montmorillonite, illite, opal-CT, calcite and adularia. The CEC values vary from 70 to 130 meq/100g.

Leave Kardzhali we take the route from the day before. Near Chiflik village the road turns northwest traversing Priabonian sediments up to the hill occupied by the archaeological complex “Perperikon”. The road crosses pyroclastics, hosting three large zeolite deposits (Beli Plast, Gorna Krepost and Most) filling a graben in a Priabonian volcano.

Gorna Krepost and Most deposits, building the hills on the NE slope of the Perperk River, are visible from Perperikon. The clinoptilolite content in them is about 80%. Montmorillonite, celadonite and illite, opal-CT and calcite are also present. CEC varies between 80–130 meq/100g.

******* Stop 4- Perperikon***

The hill, occupied by the archaeological complex “Perperikon”, is built up also by zeolitized (clinoptilolitized) pyroclastic rocks used here as building stone.

After the Stop 4 we are going to pass by Beli Plast deposit, located near the village of the same name. It is hosted by a 70-m-thick succession of zeolitized ash tuffs containing 80% clinoptilolite, accompanied by montmorillonite, illite and celadonite, opal-CT, calcite. CEC varies from 90 to 150 meq/100g.

Some hundred meters to the north of the quarry, “Rock mushrooms” (1.50-2.50 m tall) are formed by erosion within the zeolitized pyroclastics. They are visible to the left of the road.

The Priabonian sediments outcrop along the road up to the town of Haskovo where we enter the Neogene Thracian depression and the route back to Sofia is the same as the first day.