Rhodope Belt along the SW border of the Rhodope Metamorphic Province and the Mandrica greenschists in the Eastern Rhodopes.

The Rhodope Metamorphic Province includes, in addition to the Rhodope Mountains proper, also the Rila and Pirin Mountains and the Serbo-Macedonian Massif. These different massifs are separated by basins of Paleogene and Neogene age. The Rhodope Metamorphic Province in Bulgaria and Northern Greece has been affected by significant extensional tectonics since the Middle or Late Eocene. An important fault system active in the Eocene and Early Oligocene includes the Ribnovo Fault on the eastern side of the Mesta Basin in Bulgaria and the Vertiskos-Kerdilion Fault in Greece. Together with several minor normal fault relicts identified during our studies, these represent an originally west-southwest-dipping, low-angle (at least at the end of faulting) normal fault with greenschist facies mylonites in the footwall and cataclasites along the fault plane, the Mesta-Kerdilion Detachment, exposed over ca. 150 km along strike and about 50 km parallel to the slip direction. The Mesta-Kerdilion Detachment system removed the Vertiskos-Ograzhden Unit from the top of the Sidironero-Mesta Unit. The along strike horizontal displacement amount was more or less constant. The Ribnovo, Vertiskos-Kerdilion, and Alikochov faults accommodated the collapse of a thickened orogenic wedge above the subduction zone in which the Apulian plate is retreating. In that sense, the Late Eocene Mesta-Kerdilion Detachment system corresponds to the onset of Aegean extension. During the intrusion of several plutons in the Pirin Mountains at ca. 32 Ma, the footwall of the fault was uplifted to form a large anticline parallel to fault strike, and the fault was offset by a system of antithetic, northeast-dipping normal faults along the northeastern flank of this anticline (Dobrotino and Breznica faults). The Mesta-Kerdilion Detachment was later, in the Miocene, again crosscut and offset by the southwest-dipping Strimon Valley Detachment which accommodated important, core-complex-like exhumation to the south, strongly diminishing and finally ceasing towards north. This rotational activity of the Strimon Valley Detachment represents the onset of the extension that led to opening of the Aegean Basin. The Mesta-Kerdilion Detachment can be viewed as a precursor of this, but with slightly different kinematics (i.e. not involving significant vertical-axis rotation) and separated in time from the following events by a phase of relative tectonic quiescence in the Late Oligocene.

Petrological and petrochemical characteristics of the rocks of the Kushla caldera, East Rhodope massif

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The Kushla caldera is located in the East Rhodope massif, in the border area of Bulgaria and Greece. The volcanic activity is realized during the Early Oligocene in subaerial environment. Several volcanic stages are distinguished: pre-caldera – dacite-trachydacite, latite and trachyte; syncaldera – acid pyroclastic rocks (mostly ignimbrites), and post-caldera – elongated subvolcanic bodies and dykes of basaltic andesite and shoshonite. Different tendencies of magmatic evolution are found which is probably related to magma differentiation in comparatively isolated core chambers that are settled at different level. Despite the fractional crystallization as the main process of magmatic differentiation for the separate tendencies, the processes of contamination and mixing are also important. The mixing is probably the triggering mechanism for the acid ignimbrite caldera-forming eruption. The magmatic evolution of the volcanic rocks of the Kushla and Ostren Volcanic Subcomplexes is due to fractionation of plagioclase, sanidine and in less extent of hornblende, biotite and pyroxene as well as the fluid factor that controls the P_2O_5, K_2O and Na_2O. The magmatic differentiation of the Gorski izvor and Uchkaya shoshonite is related to the fractionation of pyroxene, plagioclase, olivine, magnetite and apatite. The lower pressure of the hornblende from the acid pyroclastics of the Ostren Volcanic Subcomplex (1.4-1.9 kbar)

supports the idea for the presence of shallow magmatic chamber after which empting the main caldera-forming eruption is realized. The pressure of the Chatalalmdere Volcanic Subcomplex is comparatively higher (2.2–2.6 kbar) which is in accordance with the later eruption of deeper levels of the same chamber.

The Moho's structure in West Bulgaria obtained from receiver function

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In September 2005 Geophysical Institute of Bulgarian Academy of Sciences after procurement procedure selected the Refraction Technology, Inc. to upgrade the existing National Operative System for Seismological Information (NOTSSI) to a modern digital seismological network. At the beginning of December 2005 all the equipment supplied were installed on seismological stations and acquisition and processing software was operating in the data center. The network became operational on 08.12.2005. The Bulgarian Seismological Network was equipped with broad-band sensors and digital acquisition systems. It enabled application of modern techniques of analysis of the velocity structure in Bulgaria. This study presents one of the first results from application of the receiver function technique. The Receiver functions were computed using scripts written on Seismic Handler program by Sodoudi F. The Western part of Bulgaria is characterized by mountains, river valleys and small fields between the mountains. Two stations of the network Musomishte (MMB) and Krupnik (KKB) were chosen in south-west of Bulgaria and also station Vitosha (VTS) which is close to Sofia and known as the station with lowest noise. These sites are located in areas of complex tectonic structures manifesting high seismic activity during recent years. As starting models we used shear wave velocity models for the territory of Bulgaria, obtained in Raykova R, 2004. For the study were used earthquakes in epicentral range 35 - 90o and with a magnitude more than 5,5 – 6 also with clear P-onset. All earthquakes from the end of 2005 to the summer of 2009 were used and a good azimutal covering was reached. From the seismic survey and gravimetric measurements is determined a Moho depth between 30 km and 50 km. The crust is shallower in the north-eastern part of the country and thicker in the south-western part. The obtained results show ticker crust than expected Earth crust. This can be an effect of reflections/refractions on the object close to the station. They show only the main trends of the Moho depth for the whole country but not local effects in some part, beneath the mountains for example. Further detailization of the structure of the Moho boundary could be done after estimation of receiver functions for other stations of the network. The results show also very good the faults close to stations KKB and VTS.

Metabasic rocks from the Chepelare variegated complex, Central Rhodope massif, Bulgaria – preliminary studies

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Metabasic rocks in the Chepelare area occur in two different tectonic settings. Lences of garnet amphibolites are part of Chepelare mélange embedded in migmatic gneisses of Arda 1 tectonic unit. They reach length up to 15 m and in the variegated complex closely associate whit garnet-kyanite schists, impure marbles and granitoid migmatic gneisses. Whereas numerous small bodies of retrogressed eclogites trace out the ductile shear zone between Arda 1 and Arda 2 tectonic units.

Garnet, amphibole, plagioclase, ± diopside, ± quartz constitute the main minerals in garnet amphibolites from the Chepelare mélange. Accessory minerals are rutile, titanite, ilmenite ± apatite. Garnet occurs as lobate and resorbed porphyroblasts, up to 5 mm in