The absence of vesuvianite and plagioclase, along with the presence of clinopyroxene, garnet, minor calcite and traces of quartz, indicates $0.05<X_{CO2}<0.2$ and temperature range of approximately 650-700°C at 3 Kbar (corresponding to 10-20 km depth). This also implies a volumetric H_2O wollastonite ratio of greater than 7:1. The skarn formation was not the same around the granodiorite, with reaction $CaCO_3+SiO_2 \leftrightarrow CaSiO_3+CO_2$ reaching almost completion to its western margin, rather than its northern one, possibly due to insufficient amount of time and the type of marble permeability. The magmatic fluids interacting with the marble wall rock were gradually depleted in silica content and subsequently enriched in Al, Fe and Mg, forming andradite garnet and clinopyroxene.

Permanent GPS array in Bulgaria with impact on the geodynamics in East Mediterranean

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The presentation outlines results from four years of processing data from permanent GPS stations in Bulgaria and the Balkans. Data from eight stations from the HemusNET network, joint Greek and Bulgaria project, along with another 21 GPS permanent sites on the territory of Bulgaria and another 11 located in the Balkan Peninsula are included in the routine processing. Twelve EPN stations for defining the terrestrial and kinematic frames are included in the solution. The processing is making by the state-of-art GAMIT/GLOBK GNSS software developed in the Massachusetts Institute of Technology. Time series of the coordinates and horizontal velocities of the permanent stations are obtained by processing and analyzing more than three years of data. The obtained horizontal velocities of the stations and the strain rate are in good agreement with the tectonic model of the Eastern Mediterranean and are contribution to the kinematics in the East Mediterranean region.

Separate Eocene-Early Oligocene and Miocene stages of extension and core complex formation in the Western Rhodopes (Bulgaria)

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The basement of the Rhodope Metamorphic Province comprises four groups of tectonic units forming the Lower, Middle, Upper and the Uppermost Allochthons which were emplaced onto each other during a protracted orogenic history from Late Jurassic to Eocene. The Lower Allochthon includes the Pangaion-Pirin Complex, and the Arda, Kardamos/Kesebir, and Byala Reka/Kechros units. The units consist of Variscan basement and, partly, a metasedimentary cover dominated by marble. The overlying Middle Allochthon comprises slivers of both oceanic and continental crust and, in addition, orthogneisses derived from Late Jurassic to Early Cretaceous arc granitoids. It includes, among others, the Kerdilion unit in the Serbo-Macedonian Massif and the Sidironero-Mesta, Starcevo, and Asenica units in the Western and Central Rhodopes. The Middle Allochthon was thrusted towards southwest over the Lower Allochthon during the Palaeogene along the Nestos Shear Zone. The Upper Allochthon crops out most extensively in the Eastern Rhodopes (Kimi Complex) and in the Serbo-Macedonian Massif (Vertiskos/Ograzhden unit). These units represent Variscan continental crust which was affected by HP and partly UHP metamorphism in the Jurassic to Early Cretaceous. The Uppermost Allochthon (not exposed in the Western and Central Rhodopes) consists of low-grade metamorphic (greenschist facies, locally blueschist facies) sedimentary and volcanic rocks, partly of oceanic affinity. It includes the Circum-

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)