



Preliminary structural and geochemical data from the Serbo-Macedonian massif (south Serbia, southwest Bulgaria and Macedonia)

Milorad Antic (1), Alexandre Kounov (1), Branislav Trivic (2), Irena Peytcheva (3), Albrecht von Quadt (4), Ianko Gerdjikov (5), Todor Serafimovski (6), and Goran Tasev (6)

(1) Institute of Geology and Paleontology, Basel University, 4056 Basel, Switzerland. E-mail: m.antic@unibas.ch, (2) Faculty of Mining and Geology, University of Belgrade, 11000 Belgrade, Serbia, (3) Geological Institute, Bulgarian Academy of Sciences, 1113 Sofia, Bulgaria, (4) Institute of Geochemistry and Petrology, ETH-Zurich, 8092 Zurich, Switzerland, (5) Faculty of Geology and Geography, St. Kl. Ohridski University of Sofia, 1504 Sofia, Bulgaria, (6) Faculty of Natural and Technical Sciences, University "Goce Delčev" - Štip, 2000 Štip, Republic of Macedonia

The last twenty years brought a significant amount of new knowledge concerning the palaeographic position and tectonic evolution of a number of crystalline terrains (e.g. Tisza, Rhodopes) previously considered to be ancient micro-continents trapped within the Alpine orogenic belt. These recent works revealed that such terrains are complex collages of reworked continental (and locally oceanic) crust and sediments actively involved in several phases of Alpine deformation. Among these terrains, the position of the Serbo-Macedonian massif (SMM), outcropping in eastern Serbia, southwest Bulgaria, Macedonia, and partially in Greece, however still remains enigmatic. Its affiliation to European or African plate basement is still questionable due to the lack of reliable geochronological dating and detailed structural investigation of its boundaries. This massif is a key area to understand the bipolarity of the Alpine orogenic system including the northeast-vergent eastern Alps and Carpathians, and the southwest-vergent Dinarides and Hellenides as well as the interaction of the Pannonian and Aegean back-arc extension during Cenozoic time. Moreover, recent studies in the Greek part of the massif reveal a complicated metamorphic and tectonic history, including an intense Alpine overprint which shows that probably the Serbo-Macedonian massif does not present one-single tectonic unit.

Our new project is aiming to unravel the origin of the crystalline basement of the Serbo-Macedonian massif by determining its protolith age and resolving its complicated tectonic evolution. For this purpose detailed structural studies and mapping will be combined with a wide range of isotope-geochemical and geochronological methods including U/Pb, $^{40}\text{Ar}/^{39}\text{Ar}$ and fission-track analyses of basement rocks as well as clastic sediments.

Our preliminary field data provide structural evidence for the existence of at least two deformational phases present in both, the Upper (low-grade) and the Lower (high-grade), units of the SMM. The first phase is related to the formation of isoclinal folds and generally eastward dipping foliation, whereas the second one is presented by open folds with vertical axial cleavage. The sense-of-shear criteria related to the first phase indicate general top-to-east shear.

Geochemical analysis of twenty five igneous and metamorphic rock samples from SE Serbia and NE Macedonia give evidences for at least two different magma sources for the magmatics of the region. Basalts derived layered amphibolites and undeformed diabases show a distinctive MORB tholeiitic signature while the plutonic rocks which intrude this volcano-sedimentary succession, belong to a volcanic arc environment.