Zircons U-Pb geochronology of the xenoliths of the Adjara-Traileti orogenic belt plutons: evidence for destruction of the Pre-Jurassic crystalline basement

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From the Late Cretaceous to the Eocene, the Adjara–Trialeti fold-thrust belt with a length of more than 350 km is clearly expressed from the east of Tbilisi to the west to the Black Sea. It was interpreted as a back-arc rift that formed in the north of the Mesozoic island arc of the Lesser Caucasus (Gamkrelidze, 1974). Timing of the Adjara–Trialeti volcano-sedimentary sequence was initially constrained by paleontology) and subsequently, by laser ablation ICP-MS U–Pb geochronology of the plutonic rocks zircons (Okrostsvaridze et al., 2018).

Several plutons of different sizes are exposed in the Adjara–Trialeti belt. Their bodies cover about 7 % of the surface area of the belt, but dominantly crop out in the western part of the belt. The plutons of the belt are dominantly composed of syenites and monzonites, but minor gabbroic, gabbro and monzo-dioritic phases are also observed. Field investigation show that these Middle Eocene monzo-syenite plutons contain numerous xenoliths of granites and basalts, as well gabbroid restites, of different ages.

Zircons U-Pb geochronology of the xenoliths of the Adjara-Traileti plutons indicate that the magmatism in the basin began in the Early Eocene (~50 Ma) associated with the formation of pyroclastic rocks. The mafic intrusions (~46–44 Ma) led to the assimilation and contamination of sialic crust and formation of monzo-syenite melts emplaced at ~43–42 Ma. The Eocene monzo-syenite plutons contain xenoliths of Paleozoic granites (312±7 to 474±5 Ma) and tholeiitic basalts that contain inherited zircon grains ranging in age from Neo-Proterozoic (747±33 Ma, 632±29 Ma) to Cambrian (515±9 Ma).

Obtained zircons U-Pb geochronology results demonstrate that the riftogenic basin of the Adjara–Trialeti belt developed on the pre-Jurassic crystalline basement, from Late Cretaceous to Eocene into a back-arc extensional geodynamic regime. It should be noted that these data are in full agreement with the previously proposed model of the formation of this belt (Gamkrelidze, 1986).

References

Gamkrelidze I., 1986. Geodynamic evolution of the Caucasus and adjacent areas in Alpine time. Tectonophysics vol. 127, pp. 261–277.

Okrostsvaridze A., Chung S.-L., Chang Y.-H., Boichenco G., Gogoladze S., 2018. Zircons U-Pb Geochronology of the ore-bearing Plutons of Adjara-Trialeti folded zone, Bull. Geor. Natl. Acad. Sci. vol. 12, no. 2, pp. 90-99.