

# NEW U-Pb ISOTOPE-GEOCHRONOLOGICAL DATA ON THE BUULGEN METAMORPHIC COMPLEX AND ON THE ASSOCIATED WITH THEM PRE-ALPINE MAGMATITES OF THE GREATER CAUCASUS MAIN RANGE ZONE

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The Buulgen metamorphic complex occurs in the Pass subzone of the Greater Caucasus Main range zone (the Greater Caucasian terrane). At the base of the Buulgen complex lies the Gvandra suite composed mainly of metapelites. It is followed by a monotonous amphibolitic Klich tectonic plate (the Klich suite according to a number of authors), and then occurs the suite built up mainly of mica schists.

According to some researchers [1, 2, et al.] in the Buulgen complex two stages of regional metamorphism manifested: the pre-Variscan and the Late Variscan, while by the others [3] the regional metamorphism is monocyclic–Late-Variscan.

Pre-Alpine plagiogranites, gabbro-diorite and diorite orthogneisses, quartz diorites and leucocratic granitoids are confined to the Buulgen metamorphic complex. Biotite and two-mica bearing plagiogranites present in the lower part of the metamorphic complex, occurring in the form of rootless lenses and concordant or cross-cutting bodies. They belong to I type granites. Hornblende-bearing gabbro-diorite – diorite orthogneisses, known as Klich intrusive occur in the upper part of the Gvandra suite. Rocks of the Klich intrusive correspond to a weakly differentiated low-K series. It generated in the subduction zone of the depleted mantle or in lithosphere at a little depth of ensimathic zone [2, 4]. Zircons of the gneisses of the Klich intrusion are dated by U-Pb classical method and a concordant age - 320 Ma is obtained. Among the Late Variscan granitoids widespread in the Buulgen complex biotite- and biotite-hornblende bearing quartz-diorite intrusive, known as the Sakeni intrusive, is the largest. The last one belongs to mantle-crustal I type low-K granitoids [4]. Leucocratic granitoids are represented by cross-cutting or concordant bodies of plagiogranites, granodiorites, granites, garnet-bearing alaskites and aplites. They are spread in metamorphites, and also cut all pre-Alpine magmatites of the Buulgen complex. The granitoids belong to the S type granites.

The formation of gabbro-diorite - diorite orthogneisses, quartz-diorites and leucocratic granitoids, along with other factors (subduction heat, radioactive heat, etc.), is induced by the Macera nappe formed during the Saurian orogeny [1, 2]. As a result of overthrusting of the upper part of the Buulgen complex - mica schists from the Pass subzone to the Elbrus subzone of the Greater Caucasus Main Range zone, the crust was thinned out not less than by 2500 m. The above-mentioned magmatites formed during the Sudetian orogeny in the relatively thinned crust of the lowermost parts of the Buulgen complex as well as at deeper horizons.

The zircon U-Pb age determination was conducted at National Chung-Cheng University of Taiwan. From all above-mentioned metamorphites and magmatites 4 samples from each, 212 local determinations are conducted by the U-Pb LA-ICP-MS zircon method. Besides of detrital zircons, with the age interval 2685-714 Ma (29 determinations) three age groups of zircons are distinguished: 1) 671-550 Ma (21 determinations), 2) 503-404 Ma (33 determinations) and 3) 351-299 Ma (129 determinations) Ma. The first age group corresponds to regional metamorphism of the earliest Cadomian (Baikalian) stage, the second – to the Caledonian stage of plagiogranite formation, while the third coevals with the Variscan regional metamorphism and the age of magmatites formation.

According to geological and new isotope-geochronological data the existence of two stages of regional metamorphism of Buulgen metamorphic complex and age limits of the pre-Alpine magmatites formation are established. The age interval of Variscan zircons is specified. In particular, two important facts are taken into account: 1 – in the faunally dated Upper Carboniferous-Permian Kvishi suite the Kasimovian and Gzhelian stages of the Upper Carboniferous are established [5], age interval of which, according to the most recent geochronological scale is 307-299 Ma. The Kvishi suite contains washed out material of the Greater Caucasus crystalline basement metamorphites and magmatites [5]; 2 - It is also taken into account that within the Greater Caucasus at the end of the Sudetic orogeny an unusually rapid exhumation of deeply submerged parts of the Earth's crust took place [2]. Therefore, the age of above-mentioned regional metamorphism and magmatism do not have to be younger than 310 Ma. It should be noted that ages younger than 310 Ma only in the core of the zonal zircons are recorded. This indicates that some zircons were less affected by Pb-loss than core domains, that is well known in scientific literature.

## REFERENCES

1. Gamkrelidze I., Shengelia D., Chichinadze G. Macera nappe in the Crystalline Core of the Greater Caucasus and its Geological Significance. Bull. Acad. Sci. of Georgia, V. 154, №1, 1996, p.p. 84-89.
2. Gamkrelidze I., Shengelia D. 2005. Precambrian-Paleozoic Regional Metamorphism, Granitoid Magmatism and Geodynamics of the Caucasus. "Nauchni Mir", Moscow, 2005, 479 p (in Russian).
3. Somin M. Pre-Jurassic basement of the Greater Caucasus: brief overview. Turkish Journal of Earth Sciences, Geology of the Circum-Black Sea Region – Part A Caucasus. 20, 2011, p.p. 545-611.
4. Okrostsvaridze A., Tormay D. Evolution of the Variscan Orogenic Plutonic Magmatism: The Greater Caucasus. Journal of Nepal Geological Society, V. 43 (Special Issue), 2011, p.p. 45-52.
5. Khutsishvili O. Stratigraphy and fauna of the Kvishi formation. A. Janelidze Geological Institute, Proceedings, New series, Vol.33, 1972, p.p.1-92 (in Russian).