Peculiarities of Development of the Middle Jurassic Magmatism of Georgia

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On the territory of Georgia in the Bajocian time, due to the intensive underwater volcanic activity formed a thick (3000m) series of basaltic volcanites, which covers about 4000km^2 on the territory of Georgia. Volume of the material erupted in the Gagra-Java tectonic zone of the Southern slope of the Greater Caucasus is about 9000km^3. Volcanogenic series is weakly differentiated. Specific proportion of acid rocks in the section does not exceed 1%. Primary magma of the volcanogenic series was of basaltic composition. Low ratio of Sr isotope ($^{87}Sr/^{86}Sr$ ≈0,703-0,704) points to the mantle origin of magma.

At the turn of the Bajocian time, prior to the end of the volcanism, active tectonic movement started (Chegem phase) that reached its maximum in the Bathonian age. Tension and destruction regimes of the Earth's crust had changed by the compression and uplifting regimes. At this time, formed multiphase intrusive bodies connected to different geotectonic zones. Based on a number of criteria we have distinguished separate intrusive complexes that make possible to state development peculiarities of intrusive magmatism. Bathonian intrusives were formed in hypabyssal conditions, in homodrome direction of magmatic processes. The following Middle Jurassic intrusive complexes are distinguished: Gorab-Kelasuri – connected to the Gagra-Java tectonic zone; Kirar-Abakuri - in the Chkhalta-Laili zone; Sanchari-Bzib, Etseri-Mulakhi and Kardivachi complexes connected with the Main Thrust zone of the Southern slope of the Greater Caucasus; Khevi-Chalvani and Loki-Poladauri complexes are situated in the Dzirula and Loki crystalline massifs respectively. According to geological interrelation of rocks in the intrusives, a general model of the magmatism development was defined. First differentiates of basic magma - peridotites, pyroxenites and scarce anorthosites, then gabbros, diorites and granites and finally aplites and pegmatites were formed. Melting of rocks in the crust was provoked by total heating of the crust induced with the Bajocian volcanism and later in local areas by the thermal control of gabbro magmas. We have distinguished this process as a two-stage thermal model.

In Middle Jurassic intrusives, in plagioclases from gabbros, pyroxenites and anorthosites initial ratio of Sr isotopes corresponds to $^{87}Sr/^{86}Sr \approx 0,704\text{-}0,705$ indicating their mantle origin. Granitoid forming magma is of palingenetic origin that is confirmed by high initial ratio of Sr isotopes - $^{87}Sr/^{86}Sr \approx 0,708\text{-}0,711$. Middle Jurassic intrusives are synorogenic formations. Figures of K-Ar age dating of rocks from the intrusive complexes vary within the interval of 165-177 Ma (34 determinations), but figures of Rb-Sr age dating change within the interval of 164-176 Ma. These age data correspond to the Middle Jurassic time.

Based on the spatial and age interrelation between Bajocian volcanogenic rocks and intrusive bodies Middle Jurassic volcano-plutonic association was distinguished.