GEODYNAMIC EVOLUTION OF THE PREALPINE BASEMENT OF GEORGIA (TRANSCAUCASUS).

G. S. ZAKARIADZE[1], SH. A. ADAMIA[2], T. G. CHKHOTUA[3], M. A. KEKELIA[3], I. D. SHAVISHVILI[3] and G. K. TSIMAKURIDZE[3].

[1]*Vernadsky Institute of Geochemistry and Analytical Chemistry, Russian Ac. Sci., 19 Kosigin, Moscow, 117975, Russia.*
[2]*Tbilisi State University, 1 Chavchavadze av., Tbilisi, 380028, Georgia*
[3]*Geological Institute Ac. Sci., 1. M. Alexidze, Tbilisi, 380093, Georgia*

Abstract: The pre-Alpine basement of Georgia represents composite terranes, which include Neo-Proterozoic arc-accretionary complex (810±100 Ma) and gabbroic to dioritic intrusions (607±78 Ma) of Pan-African succession of the Arabian-Nubian Shield. Epi-Variscan complexes are represented by Late Paleozoic suprasubductional granites, which was formed at the southern active margine of Eurasiatic continent**.**

Key words: Georgia, Transcaucasus, Gondwana, Geochronology, geochemistry, geodynamics.

Introduction

: According to recent tectonic models the Eastern Mediterranean area is interpreted as a mosaic of mostly Gondwana derived continental blocks and composite subductional-collisional orogenic belts. All models identified the Permo-Triassic as a time of important rifting event and detachment of microcontinents from Gondwana, but to varying degrees differ from each other in terms of the identity of the active margin involved, the circumstances and timing of oceanic closures, the location and the significance of the resulting oceanic sutures etc. The provenance of some huge continental blocks, which are situated to the north of the main northern Late Paleozoic-Mesozoic paleooceanic suture and experienced extensive Variscan, Cimmerian and Alpine transformations, remain apparently problematic at the background of these controversies. Significant difficulty by consideration of this problem is a strong lack of information on geochronology, petrology and geochemistry of Pre-Middle Paleozoic magmatic and metamorphic events of these terranes, in particular on their oldest paleooceanic and assotiated series. Present paper attempt to cover this gap partially on the example of Loki, Khrami and Dzirula salients of the Transcaucasian massif, the

basement rocks of the Main Range of the Great Caucasus (Laba, Buulguen and Kassar series.

Late Proterozoic and Early Paleozoic complexes of the Transcaucasian massif: Transcaucasian massif is one of the major structural units of the Caucasus situated between the Southern Slope zone of the Great Caucasus in the north and the Lesser Caucasus ophiolitic suture in the south. The massif consists of crystalline basement, exposed in Georgia as a number of salients – Dzirula, Khrami, Loki. Pre-Mesozoic basement of the massif is roughly divided into two main units: a) the oldest Late Proterozoic – Lower Paleozoic metabasic-plagiogneiss-migmatite-basement complex and b) association of Variscan, potassium-rich microcline granites and shallow water subareal high-silica volcanics.

The oldest Late Proterozoic-Lower Paleozoic (?) Metabasic-Plagiogneiss-Migmatite-Basement Complex (MPMBC) include the *ancient sequence* of BT-gneises, plagiogneises, amphibolites and crystalline schists, and younger intrusions of basic and dioritic composition. The *ancient sequences* of crystalline schists and plagiogneises consists of *metabasic* and *metasedimentary* series presented as irregularly piled-up allochtonous slices or as numerous inclusions in the later basic and dioritic intrusions. The *metabasic series* are presented by predominated various massive and banded amphibolites, garnet amphibolites, metadiabases, subordinate variously oriented subvolcanic bodies of metagabbro-diabases, metagabbros. Evidently multistage metamorphism of metabasic series do not exceed conditions of amphibolite and epidote-amphibolite facies of mederate pressure. Conditions of metamorphism of the metasedimentary series correspond to the facies of Bi-Mu gneises and lower temperature part of Bi-Sill-Kfs facies.

Widespread and tightly associated *basic and dioritic intrusions* were formed definitely after regional metamorphism and tectonic piling-up.

Very prominent feature of Transcaucasian massif is the zone of tectonic melange exposed in the eastern part of the Dzirula salient (Chorchana-Utslevi zone – CHUZ) It is composed of a number of allochtonous tectonic slices of different age and facies affiliation-phyllite schists proper, acid volcanics and pudding conglomerates, milonitized microcline granites, and alternating slices of amphibolites, metadiabase, and serpentinite. Dated paleontologically the phylite slices show however rather wide spread of ages from Cambrian to Late Devonian.

The oldest *metabasic* series of the MPMBC and tectonic melange of CHUZ is presented exclusively by basalts — low-potassium moderate and high-titanium, olivine-hyperstene normative, differentiated tholeiites, which in a whole are reliably attributed to the type of basalts of oceanic spreading centers (Zakariadze et al., 1993,1998). Whole rock Sm-Nd isotopic data of the basic

series of CHUZ tectonic melange compose a clear-cut regression line, corresponding to the age of 810±100 Ma and ε Nd_{in} =7.37±0.55 (1σ).

Subvolcanic metabasic intrusions penetrating the oldest *metabasic* and *metasedimentary* series of the MPMBC, correspond to compositional group of fractionated olivine-hyperstene and quartz-normative, low-titanium basalts, basaltic andesites and andesites. All these evidences and Th/Yb-Ta/Yb relations allowed to identify subvolcanic mafic intrusions of TCM confidently as magmatic series of suprasubduction type. For one of the youngest bodies of the series, which apparently postdate diorite and quartz diorite intrusions and predate the emplacement of the Late Hercynian potassium granites, we obtained Sm-Nd mineral isochrone (T=607±78 Ma, and ε $Nd_{in-1.2}$).

Diorites and quartz diorites represent actually more wide range of compositions — gabbros, diorites proper, quartz diorites and granites, although rocks of dioritic interval definitely predominate. Similar to subvolcanic diabases the *dioritic series* display transitional features from tholeiitic to calc-alcaline. Despite of a certain uniformity of geological pattern of dioritic series attempts of estimations of its age reveals rather complicated picture. Bartnitsky et al., (1989) got several different U-Pb zircon isochrones: 747+100/-70 Ma for gneissose granodiorite, and 491+93/-36 Ma for quartz diorite-plagiogranite migmatite (Dzirula), and 370+59/-35 Ma from gneissose granodiorite (Loki). Dudauri et al. (1990) obtained K-Ar estimates for biotites from quartz diorites - 327±9 Ma (Dzirula) and 328±10 Ma (Khrami). Our Sm-Nd mineral isochrone for quartz diorite revealed even younger age 207±48 Ma.

The series of Variscan potassium rich microcline - granites (MGS) form 50% of the crystalline basement of Transcaucasian massif. Two principal groups of potassium granites are distinguished. The first group is presented by products of granitization of the oldest Metabasic-Plagiogneiss-Migmatite-Basement Complex. The second group encompasses massive, uniform granites, alaskites, aplites, muskovites granites and pegmatites presented by veins or stock type bodies. Regional metamorphism related to the emplacement of microcline granites is retrograde and correspond to low temperature level of green schists facies. The series of microcline granites tightly associate with *shallow-water* and *subareal high-silica* Visean-Bashkirian *volcano-sedimentary* sequence. The Carboniferous age of emplacement granites is constrained rather confidently by K-Ar data for micas and U-Pb data for zircons and biostratigraphic data for volcano-sedimentary sequence.

Strong structural, lithological and age interval similarities allows to assert that MPMBC of the Transcaucasian massif was formed within the limits of northeastern part of Arabian-Nubian shield (ANS) during initial arc accretion stages of Pan-African cycle. From the latest Proterozoic TCM

evidently escaped Pan-African continental collision events manifested in ANS (750-650 Ma) and was displaced and fully incorporated into Eurasian margin before the Late Paleozoic due to the strong narrowing of Lower-Middle Paleozoic basin. Clear geological record of this northern oceanic basin sutured in Visean – Namurian (~ 350Ma) is presented in Main Range zone of the Great Caucasus. The continental type crust of TCM was formed during Variscan cycle (330-280 Ma) in the setting of Eurasian active margin. The almost continuous evolution of this margin from Paleozoic to Mesozoic (330-85 Ma) is reliably asserted by suprasubduction type magmatic events manifested at TCM and the Lesser Caucasus ophiolite suture that allows to assume the direct Paleotethyan ancestry of Mesozoic oceanic basin south of TCM.

Georgian Range of the Great Caucasus: The Georgian part of crystalline basement of the Great Caucasus is mainly built up of Variscan granites, gneiss-migmatite, crystalline schist and tectonites, which according to K-Ar, Rb/Sr and some other geological techniques, are dated as the Late Paleozoic. Basite-ultrabasite complex (metaophiolites of Laba, Buulguen and Kassar series) is developed just along the southern margin of the crystalline basement in the form of narrow stripe of tectonic scales that form pre-Alpine accretion prism within the southern margin of the East-European continent. Geochemical and petrological data demonstrate the presence of rock fragments belonging to oceanic and islandarc series within them. The rocks have undergone polymetamorfism within the limits of epidot-amphibolite and amphibolite facies of metamorphism under various pressure conditions of kyanite-syllimonite and andalysite-sylimonite types. Green schist facies are, generally, in accordance with the processes of suprapositioned metamorphism. The lens of marble set within the metaophiolites of Laba series host remains of crinoids, which indicate post-Ordovician age of the rocks (Adamia et al., 1987).

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