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ГЕОЛОГИЯ ЖӘНЕ ЖЕР ҚОЙНАУЫН ҚОРҒАУ

GEOLOGY AND BOWELS OF THE EARTH

УЧРЕДИТЕЛЬ:
ОО «Казахстанское геологическое общество „КазГЕО“»

ҚҰРЫЛТАЙШЫ:
«Қазақстандық геологиялық қоғам „КазГЕО“» ҚҰ

FOUNDER:
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СОДЕРЖАНИЕ

УДК 55(575)

P. V. Yermolov[1], Ye. G. Malchenko[1], V. S. Portnov[2], D. K. Makat[2]
([1]Joint venture IPCON, c. Karaganda ; [2]State Technical University, c. Karaganda)

GEODYNAMICS AND METALLOGENY OF ZHONGARO-BALKASH TERRAIN FROM THE POSITIONS OF ISOTOPE GEOLOGY

Іздеу критерилері мен металлогениялық болжаудың жаңа принциптерін, олардың геодинамикалық жаралу жағдайларының қазіргі таңдағы ғылыми позициясы тұжырымдамасын, кенді магманың жаралу терендігі мен құрамы бойынша классификациясын, геологиялық және кенді объектілердің жасын аныктауға мүмкіндік беретін Орталық Қазақстан үшін алғаш рет U-Pb және Sm-Nd изотопты мәліметтер базасы жасалды.

Есептеу балансы негізіне $^{144}Nd/^{143}Nd$ және $^{147}Sm/^{144}Nd$ жер бетінде көптеп таралған, магмалық тау жыныстардағы, мантиядан жер қыртысына жылу-массатасымалдау формасында ұзак (ондаған және жүздеген миллион жылдар) өзара әрекеттесу нәтижесінде пайда болған жер қойнауындағы айтарлықтай мантиялық, сиалитикалық және аралық құрамдардағы әртүрлі тереңдіктегі тау жыныстар блоктарын бөлу мүмкіндігі пайда болды. Қазіргі таңдағы терминологияда аралық блоктар амальгамиралық, бұрынғысы – ассимилиралық деп аталады. Мыс-алтынкенді металлогения мен мафиттік блоктар, барит-полиметалды және сиалитикалық арасындағы тығыз кеңістіктік байланыс олардың генетикалық жақындығы жайында корытынды жасауға мүмкіндік береді. Соңғы кездерде Тынықмұхит жиегіндегі вулканды белдеулерде басым көп бөлігі мыс-порфирлі, алтын-мыс-порфирлі және мыс-скарнды кенорындарымен байланысты адакит атты магмалық таужыныстар тобы анықталды. Вулканды белдеулерге ұқсас осы тау жыныстар тобы алғаш рет қазақстандық кенді аймағындағы мыс-порфирлі және осы минерализация типін болжаудағы спецификалық сенімді магмалық іздеу нышаны орнына қарастырылатын Орталық Қазақстанда типоморфты магмалық түр ретінде анықталды. Адакиттердің бірегейлігі – олардың 100 км-ден терең, 600–1200°C температура диапазонында, субдукцияланған мұхит тақтасы мен Жердің литосфералық және астенолиттік сфераларының контакт байланысында қалыптасады.

Тірек сөздер: сиалитикалық кыртыс, литосфералы және астеносфералы мантия, изотоптык булар, терендік геодинамикалык модельдер, сиалитикалык кыртыстың амальгамациясы, адакиттер, мыс-порфирлі кенорындар, іздеу критерилері, металлогениялык болжам.

For the first time ever in Central Kazakhstan the U-Pb and Sm-Nd base was created for isotope data, allowing establishing the age of geological and ore subjects, to classify them in composition and depth of origin of ore-bearing magmas formulate from modern scientific positions the geodynamic conditions of its formation, searching criteria and new principles of metallogenic forecast.

Based on the estimated balances $^{144}Nd/^{143}Nd$ and $^{147}Sm/^{144}Nd$ in magmatic rocks, developed on the surface, extraction into subsoils on different depths blocks of rocks significantly mantle, sialic and intermediate compounds, appeared as the result of long (dozens and hundreds of millions of years) interaction in the form of heat and mass transfer from the mantle into the crust, now it has become possible. In modern terminology the interbedded blocks are called amalgamable, earlier - assimilated. Tight stereoscopic connection of copper-gold ore metallogeny with mafite blocks, barium sulphide -polymetallic with sialic allow to come to conclusion about its genetic affinity. Lately in volcanic belts of Pacific margins of magmatic of the group – adakites were established which are connected with the significant majority of copper- porphyritic, gold-copper- porphyritic and copper-skarn deposits. According to analogy to volcanic belts, this group of refuse stones firstly was highlighted in Central Kazakhstan in the way of typomorphic magmatic type, developed on Kazakhstani ore fields of copper- porphyritic ore, and it is considered as the specific reliable prospecting magmatic feature in the forecast of this mineralization type. The unique aspect of adakit is in its formations at the depth of more than 100 km in temperature range 600-1200°C on contact with the sub ducting oceanic lithospheric plates and spheres asthenolith of Earth.

Keywords: sialic crust, lithospheric and asthenosphere mantle, isotopic flaws, hypo gene geodynamical models, amalgamation of sialic crust, adakit, copper-porphyry deposits, exploratory criteria, metallogenic forecast.

Впервые для Центрального Казахстана создана база U-Pb и Sm-Nd изотопных данных, позволяющая установить возраст геологических и рудных объектов, классифицировать их по составу и глубине зарождения рудоносных магм, сформулировать с современных научных позиций геодинамические условия их зарождения, поисковые критерии и новые принципы металлогенического прогноза.

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Ключевые слова: сиалическая кора, литосферная и асте-

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Ключевые слова: сиалическая кора, литосферная и асте-

сферная мантия, изотопные пары, глубинные геодинамические модели, амальгамация сиалической коры, адакиты, медно-порфировые месторождения, поисковые критерии, металлогенический прогноз.

Introduction. As it is known, prognostic-metallogenic studies are being done to identification of mechanisms in localization and forming deposits in time and in space, extracting areas and districts, which are perspective for defining the industrial mineralization. The final objective of these studies is replenishment of mineral and raw base, defining the new industrial and genetic types of deposits.

Analyzing the modern position of metallogenic forecast in Kazakhstan, its unsatisfied condition should be mentioned. This is due to the fact, that it is based and it is based on geographical demarcation of territory according to geological and metallogenic properties of separate fragments of these regions – structural and formational zones. Such zones are extracted and in present time, basically, according to data of surficial geology. Along with it, metallogenic load, developed on the surface, had been creating by means of non-stop performance of endogenous deep processes of Earth, and, and in order to understand it, it is necessary to learn and set the connection of deep magmatic and geodynamic processes, which were previous to formation of this load.

In world science, the effective method is used in order to study the hypogene parts of lithosphere and its connections with endogenous ore objects - isotope-geochemical analysis. In Kazakhstan, because there is no corresponding analytical equipment, trained staff, the usage of this method nowadays is possible only by means of publications made by foreign scientists, having the work experience in Kazakhstan and studied the samples of Kazakhstani ore. This present article is the generalization of isotopic copyright data and obtained from the foreign publications. It allowed drawing out the principally new geodynamic, magmatic and metallogenic criteria for Kazakhstan.

Brief scientific basement of isotope analysis. This present article is based on the results of studying the isotopes Sm-Nd. Studying these isotopes in magmatic ores allows to define its origin and metallogenic specialization, when magmatic melt left its substance.

The primary primitive mantle of Earth It is formed of a space nebula and dust, chondrite meteorites and asteroids approximately 4,6 billion years ago. At that time it was formed, and a single primary Nd isotopic reservoir, which had got the name of ***CHUR model,*** (chondritic uniform reservoir). The modern attitude to ^{143}Nd/^{144}Nd in it is 0,512638, and the modern attitude to ^{147}Sm/^{144}Nd in CHUR = 0,1967. It allows to define the attitude to ^{143}Nd/^{144}Nd in CHUR in any other time (t) и to calculate the model age of extraction of this ore sample out of mantle chamber and other parameters. Such kind of the procedure sets the objective to calculate when in CHUR there was the same отношение ^{143}Nd/^{144}Nd and ^{147}Sm/^{144}Nd, as in studied samples, taken from crust. Because the numerical ratio ^{147}Sm/^{144}Nd are very small, the new symbol ***epsilon (ε)*** was used, which is 10^4 times more than any from ^{143}Nd/^{144}Nd attitudes. The positive sign *ε* demonstrates that the breed originated from the residual reservoir phases CHUR after deleting magma from it in earlier period, from depletion mantle. Negative symbol demonstrates that rocks happened from the source, before assimilation or amalgamation of crustal rocks. Approximately 2,8 billion years ago, congeneric reservoir had partial melting. It caused the formation of the area with left solid remains - exhausted, or, depletory mantle, exhausted sources, which had the epsilon +2 and up to + 5 (Figure 1) and areas, representing the concentration of sialic material, chondrite recovered from the reservoir when this depletion (springs enriched or enriched mantle) and having the meaning «*ε*» - 1 and down to -17 and less. Approximately at this time there were ancient cratons, and based on this there was an idea proposed that the top part of the primitive isotropic mantle was depletion (the modern lithospheric mantle), and separated from her lithophilic elements formed the Earth crust. As our studies show, in subsoils of Zhongar – Balkash terrain there are blocks and fragments of different content and origin, which are in charge of this or that metallogeny.

Geographical demarcation of subsoils of Zhongar-Balkash terrain and other regions of Central Kazakhstan. Analysis of literature data of German, Russian and Chinese scientists for the period of 2000 -2016 allowed to create the bank of data Sm-Nd dates at the territory of Zhongaro-Balkash terrain and to emphasize three types of mega-blocks crust and mantle (Figure 1), each was responsible for metallogenic specialization of this territory.

The explanation was obtained even regarding the cases of contrast metallogeny, when on one district at one age level or even the regional zone It appeared next to rare metal and copper deposits, and rare metal deposits of polymetallic profile. In addition, on one level ore Permian proved rare metal and gold, previously considered incompatible. Based on the map of actual material (Figure 2, upper map map, the numbers near the digit columns are the same as numbers of source in list of literature [1–13]) hypogene demarcation of

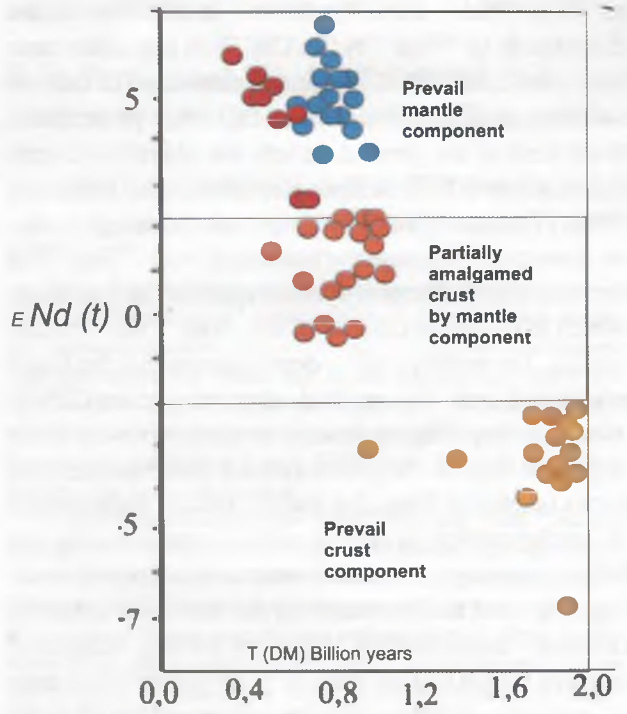

Figure 1 – eNd(t) – T (DM) diagram for magmatic rocks of deposits of Junggar –Balkhash terrain and Central Kazakhstan *1*– copper-porphyry deposits of Junggar-Balkhash terrain, as well as Nurkazghan and Bozshakol deposits of Central Kazakhstan; *2* – volcanic and intrusive rocks of central part of Shingiz terrain; *3* – magmatic rocks of rare metal deposits of Junggar-Balkhash terrain in relation with amalgamed encient upper crust of craton-type : *4* – outcropped upper crust of craton type on surface

Zhongaro-Balkash terrain was performed (Figure 2, lower map) from the surface until the borders of Mokhorovichich (deviding the Earth's crust from upper mantle). Once again, it is surely shown; that the surface metallogeny is exactly something like the reflection of discreteness deep subsurface and complicated deep geodynamic processes, in which energetics is regulated by the core and mantle of the Earth.

Figure 2 demonstrates that the central part of terrain is occupied by the area of distribution of mafite ores mainly of mantle consistence (exhausted source). On the surface seven copper-porphyritic are associated with it, one copper -nickel, one copper-skarn and a few gold ore deposits. Before this area was outlined according to the geophysical methods as gravity anomaly called Balkhash asthenolith. Even though the real content and age of paradox stayed unclear. Now based on isotope analysis it was clear, that it was the fragment of depletion mantle (exhausted in accordance lithophilic elements in source), the same as in axial part of Shingiz ridge (Figure 3), where a few copper-sulphide and one copper-porphyry deposit are concentrated, and under ore fields Nurkazgan and Bozshakol (Figure 3). The geology of all mentioned copper-porphyry deposits agrees with the conclusions of the relations with ore-magmatic systems with deep source, enriched mantle component. The indicator is dominating in consistence ore-magmatic systems of dioritoid: greenstone, tonalite, quartz diorite, trondhjemites-sodic and potassium granodiorite, andesine and dacitic, especially high-magnesia. This group of ores is outlined in petrology in recent decades into special group of **adakites,** which has its special geodynamic meaning. The name is given to dominating group in copper-porphyry deposits and as part of suprasubduction magmatism Adak Island in the Aleutian arc. Later it was proved that adakites are present in all island arcs of western frame of Pacific Ocean.

Formation of adakites, conceivably, is due to the oceanic crust submerged in the form of subduction "slab" plate to the depth around 100 km at the temperature approximately 1000 degrees from oceanic basalts, transformed the deep metamorphism in amphibolite and eclogite with a low content of metasedimentary rocks and with participation of mantle surrounding areas. Deep geodynamics adakit magmatism and its association with calc-alkaline magmatism and high-niobium basalts are shown in Figure 4 [15].

The main peculiarity of adakites according to [16-18] are shown below

Main characteristics of adakits

High content:

1) $SiO2 \geq 56\%$: $Al_2O_3 \geq 15\%$

2) It could be obtained by partial melting of eclogite or garnetiferous amphibolite with the pressure 2,5-3 GPa at the depth of 70-100 km

Low content:

Y – It indicates the presence of garnet, amphibole and pyroxene in source;

Yb – It indicates the presence of a residual phase garnet;

Nb,Ta It indicates the presence of titan magnetite and amphibole in source;

heavy rare lands TR - the presence of garnet in source

High content:

Sr - It indicates a complete melting of plagioclase and its absence (plagioclase) in the residue;

low melting degree of substance with formation of basalts N – MORB.

The most significant characteristic feature- significantly different from typical island arc andesite and dacite, reflects the high content Sr in case of low content of Y. Presence of adakite magmatism in copper-porphyry deposits of Kazakhstan is shown [5] in figure 5.

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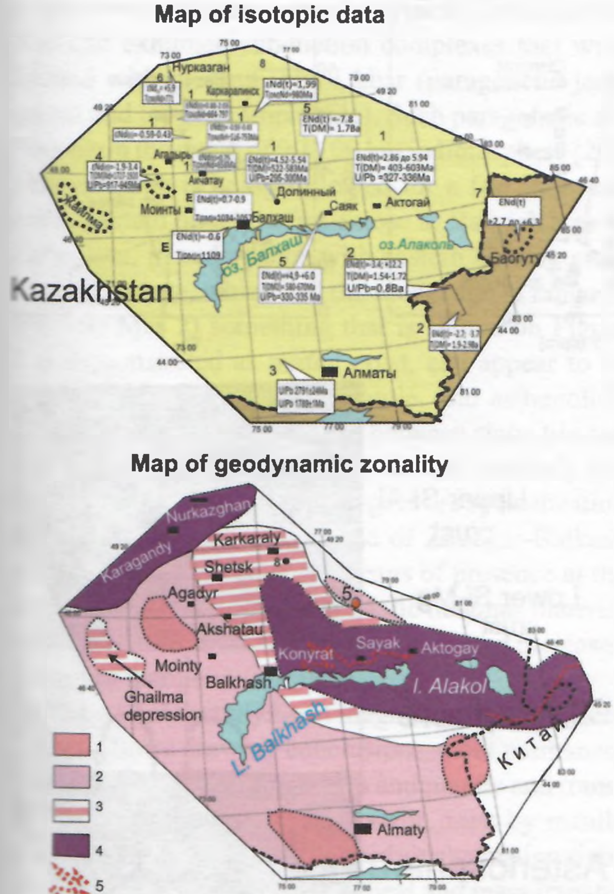

Figure 2 – Junggar-Balkhash terrain: A – map of isotopic data ; B - Map of geodynamic zonality Legend on lower part of the figure is presented for map of geodynamic zonality only: : *1* - upper Si-Al crust covered by Paleozoic complexes; *2* – the same, outcropped on surface; *3* – amalgamered upper crust by mantle derived magmas; *4* – lower maphic crust with large maphic components, see fig. 1; *5* – fragments of Itmurundy ophiolite belt on surface. Explanation of map of isotopic data on fig 2 see in the text. Addition information about of methods of using Sm-Nd isotope system in geology see in [14]

Application of the ore-bearing rocks copper-porphyritic deposits of Kazakhstan to petrographic group of adakit out of the borders of Zhongaro-Balkash террейна is proved also on deposits such as Nurkazgan and Bozshakol [12, 13], which correlates with data in Figure 1 and 2. All constructions are done in accordance with recommendations of monography by G. For «Basis of isotope geology» [14].

Southwestern part of terrain (indicated as 1 and 2 in legend of the lower map of Figure 2) is occupied ancient sialic median massif. The separate fragments come to the modern erosion part. Uranium-plumbic dating rocks (granite, rhyolite, porphyroids) show the age 1.8; 2.8; 0.8 and 0.9 billion years [2, 3, 4]. Index εNd_{10} in Figurere 1 is in the range of -2; -5, indicating species belonging to the Early Proterozoic or to the Late Archean cratons. All mentioned data tells about

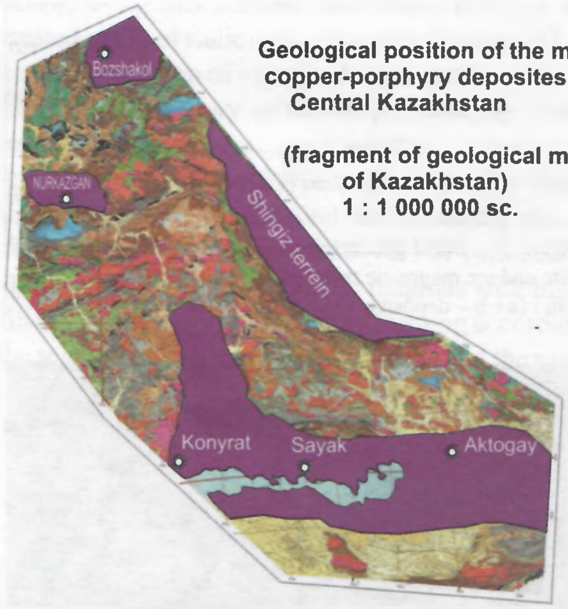

Figure 3 – Position of ancient blocks with prevail mantle component in deep horisons in Eastern Kazakhstan and copper-porphyry deposits over them on surface

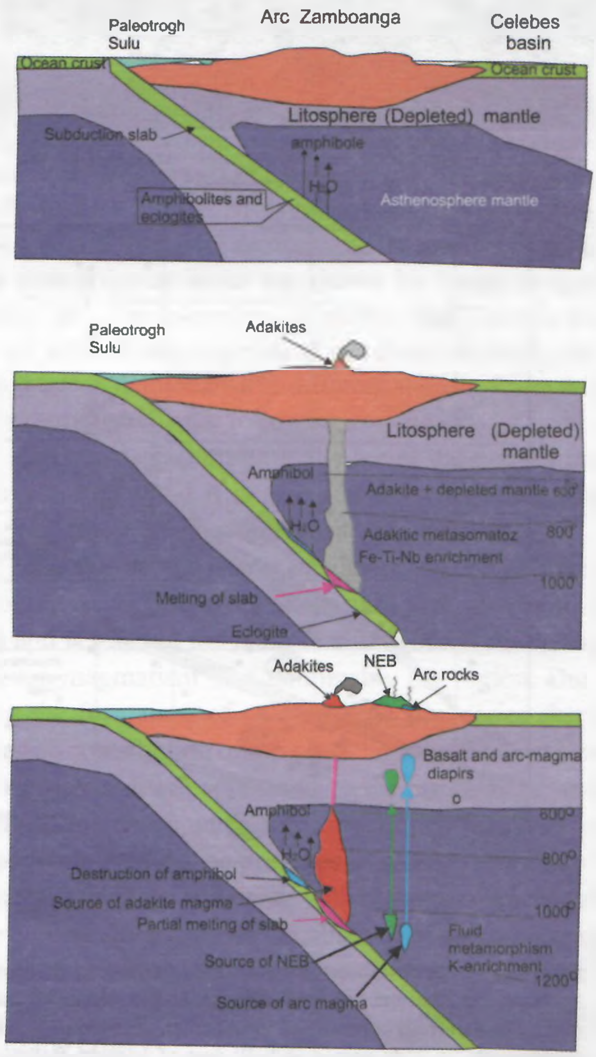

Figure 4 – Geodynamic models of adakit magmatism and co-existing with him arc- magmatism and high Nb basalt: from [18]

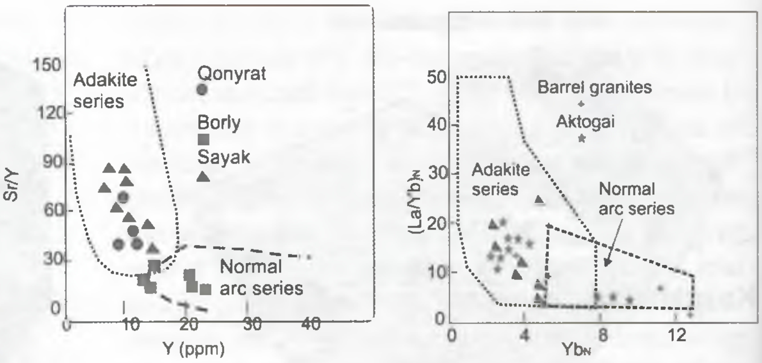

Figure 5 – Some geochemical differences between adakite and arc magmatic rocks of Jounggar –Balkhash terrain : **(a+ b** – deposits: Qonyrat, Borly and Sayak**);** **(b** deposit Aktogai**)**

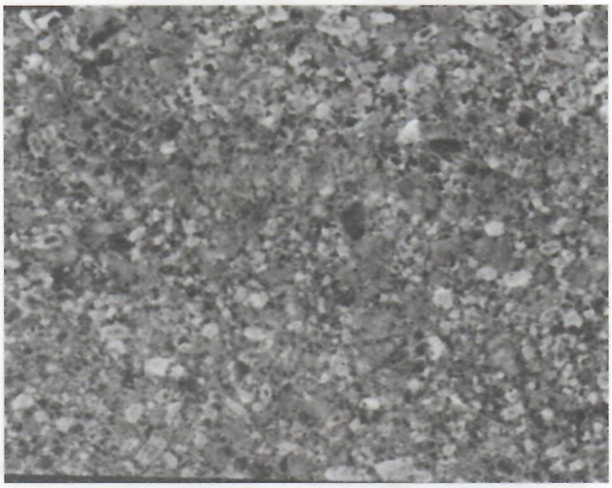

Figure 6 – Sample of partially amallgamazed Si-Al crust by mantle component.

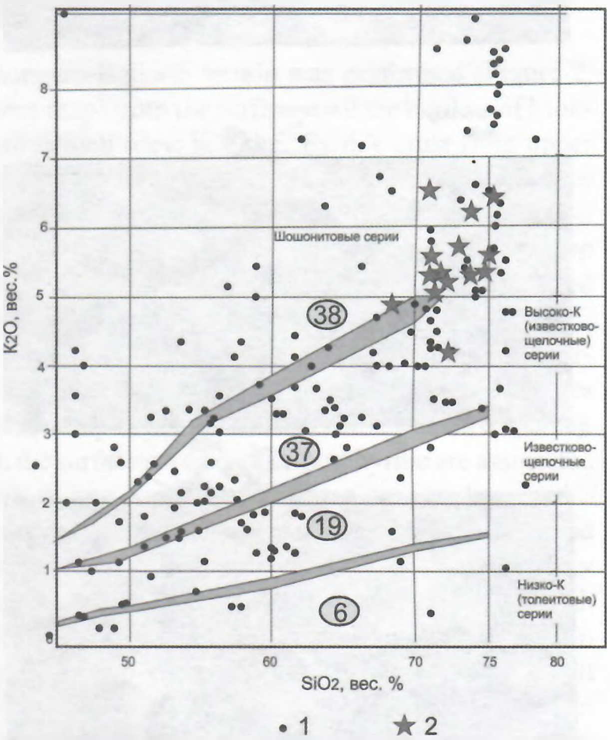

Figure 7 – High potash magmatism and lithophylic ore mineralization in Zhailma ore field (black) and in Aktau-Mointin middle massif (red) as proofs of Si-Al crust, existed by mantle component/ is wide spread in S-W part of Junggar-Balkhash terrein. See text

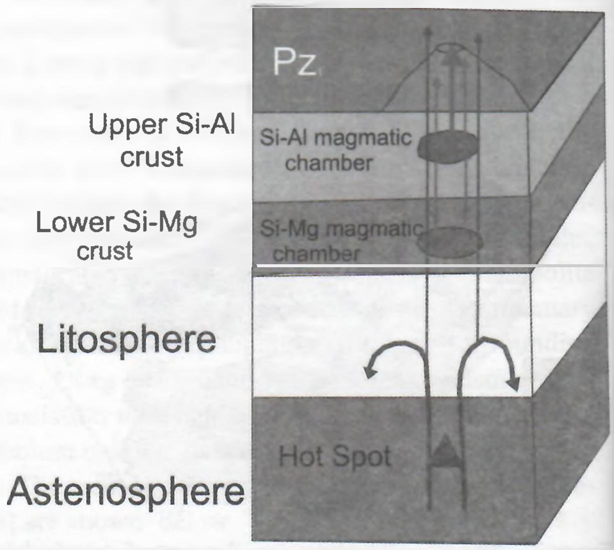

Figure 8 – Geodynamic model of Zhailma ore-magmatic system D_{2-3}

such fact that in structure of terrain its western flange takes the position of top sialic crust, overlapped by Paleozoic accretionary complexes and Cenozoic formations. During the current 2015 year, it was emphasized that the same crust, or, its fragments, which are present on Northeast flange of terrain. So as the result of sample selection of leucocratic granites of small bodies in Prichingize for comparison with leucocratic granites of Sayak ore district [5], unexpected results were obtained (spot №5 on the map of actual material of Picture.2): eNd = - 7,8; $T_{(DM)}$ = 1,7 Va. The same indicators have spots 2 and 3 in South-Western part of terrain in boundary region with China (Figure e 2). To define the distribution scale of cratonal crust in Prichingize is impossible because of poor number of isotopic data. However, new data [5] allow to suppose that Plate craton crust was on the whole or on the biggest part of terrain area, but how and when in the center there was large fragment of mafite crust: such versions are possible: **1)** sialic crust in some period of history in this district actually it was absent and now we have erosional window of bottom of Paleo Asian ocean [19]. It can be indicated by Itmurundinsk melange, in which there are rocks, typical oceanic crust, also and exhumed subduction complexes that were formed with pressure of 14 kbar (paragenetic jade, quartz and icy blue amphibole). Such paragenetic are formed on the depth of 90-100 km in lithosphere [20]. This melange is being followed for a few thousand km in eastern direction from close to Balkash area to Zhongaria, in accordance with eastern bearing crust of oceanic type, which had the model age in range of 400-700 Ma; **2)** something that is shown on Figure 2 is demonstrated as mafite crust, can appear to be a fragment of lithospheric mantle, and asthenolith, implemented in tile-to-tile gap between sialic tile and lithospheric mantle. But both versions similarly explain the appearance of copper-gold ore specialization of metallogeny of central zone of Zhongar-Balkash terrain, and in particular by means of presence at the level of origin of mineralized mafic magmas material with high content of mantle component and increased energy of mantle in this place.

The complex studying of magmatic ore on modern surface allows drawing conclusions about permanent and active interrelation of crust and mantle and transformation of low horizons of sialic crust by mantle processes, i.e. permanently flowed amalgamation sialic crust with help of processes of heat and mass transfer mantle injections from deep horizons of mantle into sialic crust.

As it is known, that space, which is occupied now by Balkash Lake in late Carbon there was huge volcanic-plutonic structure, which had formed the torangylykskiy volcanic-plutonic complex C_3 (U/Pb age =305±2 Ma). The unique feature of explosive rock is an abundance of deep mafic xenolith, which was saved through quenching processes enclosing rhyolite matrix in subsurface and surface conditions. The following aspects were found and studied: coarse and coarse-grained black and grey anortozite and gabbro-anorthosite; medium- and coarse-grained gabbro; medium and coarse rutile basic granulites; medium- and coarse-grained pyroxenite; coarse migmatized granulite-gneiss. In addition to mafic rocks, there are bytownit-hedenbergit-andradit skarnoids and molten-grained spinel metapelites. Relic minerals in matrix high-K rhyolites before the grains of plagioclase, clinopyroxenitic and orthopyroxene. As the result, the composition of the rock has very no equilibrium mineral composition (Figure 6). It fine-grained quartz-K-feldspar matrix the described above micro xenoliths and xenocrysts are placed very chaotically, demonstrating solid-phase mixing rhyolite magma with basit (mantle) component. As it would be shown below, using this scheme assimilated districts were created in top of sialic crust, shown in Figuree 2 (lower map). Correlation of top of sialic crust and mantle was happening in history of terrain permanently. One of examples is volcanic complex, which is connected with mineralization of Atasu type in Zhailminskiy depression. Volcanites of shoshonit series, taking place in this volcanic complex about 30-40% of volume, have all the features of mixing mafic magmas with high-K silicic. In other words, they were forming according to the scheme, which was described regarding the sample in Figure 6. In Figuree 7 for diagram $SiO_2 - K_2O$ there was more than 170 silicate analysis from work [21].

Volcanism was actively developing in this structure in range from middle till late devon including. According to amount of silica picrites rocks vary from rhyolites to ultra-acid and alkalinity - up from the low-K series shoshonite. In Picture 7 the position of spots of silicon analysis is shown on discrimination diagram $K_2O - SiO_2$. Diagram is constructed Rickwood [22] summarizing of data from five previous authors of private geochemical collections: Peccerillo and Taylor (1976), Ewart (1982), Innocenti et al., (1982), Cart (1985), and Middlemost (1985). Applying to Zhailminsk depression 164 analysis of Y.A.Vasyukov and V.B. Boldyrev [21] were used with additional information from R.M.Antonyuk and I.V. Glukhan. Numbers in grey oval demonstrate the number of spots in series. Series limits are shown by linear circuits with light gray coloration. Its narrow width proves the high level of convergence of geochemical fields and its borders, defined by five different authors. From this diagram, there is the following conclusion:

1. Low-potassium tholeiitic series did not get the development, and it is rare and not connected spot belong, mostly, Caledonian base and Pz_1 history.

2. Calci-alkalic series has short history of functioning fractioning from basalt until andesite (Picture 7) and it was not the main feature when forming the devon magmatism of Zhailminskiy ore region. During the formation of calc-alkaline line series there was no contribution of top crust, and small potassium alkaline condition appears to be the primary one and due to increased admixture of sediment material in subducting plate. The presence in selection of unique analysis of dacite and riolite with big gaps of fractional evolution demonstrates the absence of accumulating magma chamber and mechanism of fractional phase-separation primary magma before its implementation into top crust.

3. The high-potassic calci-alkalic and shoshonit

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3. The high-potassic calci-alkalic and shoshonit

series, all together represent 75% of selection, are equally distributed acrosee the whole evolution chain from main ores to ultra-persilic, reflecting the full history of formating Zhailminsk ore-magmatic system. The primary magma was alkali basalt and picrites. Its small amount in region's geology is evidence that it was energetic conductor of mantle heat-mass transfer, under the impact of which in sialic cruts deep magmatic part was formed. The mantle origin of basic fracture of these series it is proved by the presence of its high and increased content of Phosphorum (P_2O_5= =0,50-1,57%) and Titanium (TiO_2 = 1,5 – 2,5 – 4,3%). The main (sialic) magma chamber, supplied the ore-magmatic system, was located in sialic crust. The evidence is that high-potassium composition volcanits of Zhailminsk depression and complete anaolgy of it with rocks volcanic complexes dated after altynsyngansk (925±9Ma) and urkendeusk (921±5 Ma), as well as intrusive uzunshalsk (917±6 Ma) complex of Aktau-Mointinsk middle massif (№4 on map of actual material in Figure 21). In Picture 7 spots of magmatic ores of Zhailminsk depression and Aktau-Mointinskiy Proterozoic massif are mainly in field of shoshonit series, demonstrating the unity of substances they had been melted of. It does not mean the complete identity of substances in these two regions, but Potassium specialization of magma is obvious in them. At the same time, ores of Zhailminsk depression, demonstrating the content of Potassium 7% and more leads to, perhaps, defining it like consequences of autometasomatic processes.

4. The connection of magmatic and metallogenic processes in all ore provinces appears very clearly. In Zhalminsk depression tracks of mantle metallogeny, as well as the tracks of mantle magmatism, are rather symbolic. In ore rocks there are no industrial concentrations of copper and gold, tracks of mantle proccesses were defined only in shape of highly mobile impurity of mercury in ores of the first stage in Zhairem and Bestyube deposits and rare barium-bras ores of Eastern Zhairem [21]. At this part of terrain based the content of primary ancient crust is proved by the mentioned above petrochemical and metallogenic methods. The same features and the same condition of crust was in Devonian-Early Carboniferous to barite-polymetallic deposits of Akzhal (30 km to the south of Akchatau) and in ore field Tekeli (46 km to the east of Taldy-Korgan city), located in line of sialic Pre-Cambrian middle massif. The significant mantle trace in group of Middle Paleozoic barite-polymetallic deposits had only Karagailinskoye deposit (22 km to the east of Karkaralinsk city). There according to archive data there was the industrial copper, allowing to get the small amount of copper concentrate in case of dominating of Zinc, Plumb and barytic. Interconnectino of sialic crust and mantle was performed basically in shape of interventio of energetic (thermal) flows, and its conductors were breakthroughs dikes and small bodies of mantle sources in the crust (Picture 8).This process, many times repeated during millions and decades millions of years, had been creating in top crust the regions of shoshonit composition, which already had different relations of neodymium isotopes. Here it is necessary to remember the old expression of Escol, which said: «Give me one diabasic dyke and I will explain the whole metaphorism of Fennoscandian Shield» It is, of course, audaciously, but understandbale applying to the Picture 5. Taking into consideration the location of the ore clusters of Atasu type on the surface of terrain, such inerventions were not ordered (for example, rift) character and more possible it had the structure of the chaotic heat spots. The model of heat spot, led to the formation of Zhailminsk ore-magmatic area is demonstated in the Picture 8. It also explains the origins of the enriched ores with Potassium of main and middle content in Picture 7 in sectors 37 and 38. Taking into consideration, in rare metal deposits of the Northern Pribalkash, located in line of middle crust type (Figure 1) dominate the deposits with molybdenite mantle component during the formation of top-crust magma chambers had place according to the model mentioned in figure 8.

Conclusion. The data mentioned in this article allowed defining the new geodynamic aspects in evolution of geological history in Central Kazakhstan and Zhongar-Balkash terrain, accompanying by the geodynamic and metallogenic models:

1. The subsoil resources of the region before forming the main metallogenic belts in middle Paleozoic era they were stratified into blocks of different content, which further served as the source for creation of ore and magmatic systems, forming the content and structure of Paleozoic metallogenic belts.

1.2. The copper - porphyritic and copper-sulphide ore fields and deposits stereo metrically and genetically related with blocks of mafite, where mantle component is in majority (Figure 2, 3), since such blocks there is something different such as restite (fixed ash) depletion mantle, enriched by heavy elements, including copper and gold. In accordance to isotope indicators (Picture

1) it was formed as the result of depletion was primitive mantle in the period of 0,4-1,2 billion years. Its content was and it still is close to the content of asthenosphere mantle. From this we can observe the following main tasks before the forecast-metallogenic works: detailed studying of magmatic formations, developed on the territory of Kazakhstan, isotope-geochemical methods, with the aim of clarifying the features of the deep structure and allocation of mafic provinces in accordance with the mentioned in top part of the Picture 1, perspective deposits of copper-porphyritic type to be defined; the detailed petrological studying of ores in «mafite provinces » trying to distinguish out of the whole spectrum of magmatic ores of diorites, andesite, dacites with Adakit association, as it was proved by means of conjugation copper- porphyry ores only with them and there is no connection with the calc-alkaline series.

1.3. Empirically the tight paragenetic connection of adakit magmatism with high-Mg basalts and andesite is established, enriched with Nb, having in world literature the abbreviation NEB. This feature has important searching meaning, since there are island arcs, for example Zamboanga arc in Pacific ocean margins (Picture 4), in which all these three types of magmatism tightly joined in space (Picture 4-*c*).

1.4. The mentioned features and criteria allow evaluating the perspectives of the regions. Only in case of establishing of presence in the area of mafic rocks and blocks of deep adakit association, it is possible to move on to the searching for the traditional geophysical methods. The difference is that copper-porphyritic mineralization in accordance with adakit magmatism was formed (decades and even hundreds millions of years), and traditional geophysical methods provide information about modern structure of physical fields, which is not adequate to ancient structures.

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ОБЩИЕ СВЕДЕНИЯ О СТРАТИГРАФИИ И ЛИТОЛОГО-ФАЦИАЛЬНЫХ ОСОБЕННОСТЯХ ВЕРХНЕПАЛЕОЗОЙСКО-МЕЗОЗОЙСКИХ ОТЛОЖЕНИЙ НЕФТЕГАЗОНОСНЫХ СТРУКТУР СЕВЕРО-КАСПИЙСКОГО РЕГИОНА

Солтүстік Каспий алабы мен оның құрлықтық жағалауларының девон кезеңінен бор кезеңіне дейінгі аралықта түзілген таужыныс қатқабаттарының стратиграфиясы мен кейбір литологиялық-фациялық ерекшеліктері қысқаша сипатталған. Солтүстік Каспий аумағында үш түрлі тектоникалық құрылымдар жапсарласатындығы айтылған, олар – Каспий маңы синеклизасының оңтүстік бөлігі, Оңтүстік Ембі (Жем) көтерілімі және палеозойлық жаралымдардың Бозащы дислокациялар жүйесі. Соңғы екі құрылымның алғашқысы Каспий маңы синеклизасының оңтүстік және оңтүстік-шығыс жиегіне сәйкес келсе, Бозащы құрылымы эпипалеозойлық Тұран тақтасының солтүстік өңіріне сәйкес келеді. Аталған құрылымдардың әрбір типі тек өздеріне ғана тиесілі қима типтерімен сипатталады, сондықтан аймақ зерттеушілері, тиісінше, қиманың Астархандық, Қашаған-Теңіздік және Бозащылық типтерін даралаған. Алайда бұл қима типтерін тек жоғарғы палеозой (девон-пермь) жаралымдары тұрғысынан ғана жеке-жеке қарастыру орынды, себебі мезозой эрасынан бастап киманың Астрахандық және Қашаған-Теңіздік типтері «бірігіп кетеді». Бұл жайт аймақтың мезозойлық түзілімдері хақында қиманың тек қана каспиймаңылық және бозащылық типтерін даралауға мүмкіндік береді. Зерттеу аймағына тиесілі түзілімдердің стратиграфиясы мен литологиялық-фациялық ерекшеліктерін хаттау барысында жоғарыда аталған жайттар ескерілген.

Тірек сөздер: Солтүстік Каспий, тектонических құрылым типтері, қималардың жоғарғы палеозойлық-мезозойлық типтері, стратиграфия және литологиялық-фациялық ерекшеліктер.

Приведены краткие сведения о стратиграфии и некоторых литолого-фациальных особенностях девонско-меловых отложений акватории Северного Каспия и его сухопутного обрамления. Отмечено, что в пределах Северного Каспия взаимно сочленяются три типа тектонических структур – южная часть Прикаспийской синеклизы и так называемые Южно-Эмбинское поднятие и Бозащинская система дислокаций палеозойских пород. При этом Эмбинская структура соответствует южному и юго-восточному обрамлению Прикаспийской синеклизы, а Бозащинская структура – северной полосе эпипалеозойской Туранской плиты. Каждый из этих типов структур характеризуется только ему свойственным типом разреза отложений, которые выделены предыдущими исследователями как астраханский, кашаган-тенгизский и бозащинский типы разрезов. Однако раздельного рассмотрения требует только нижняя верхнепалеозойская (девон-пермская) часть разреза, тогда как начиная с мезозойской эры Астраханский и Кашаган-Тенгизский типы разрезов «объединяются воедино», что дает возможность выделить по отношению к мезозойским отложениям региона только два типа разреза – прикаспийский и бозащинский типы. При описании стратиграфии и литолого-фациальных особенностей отложений