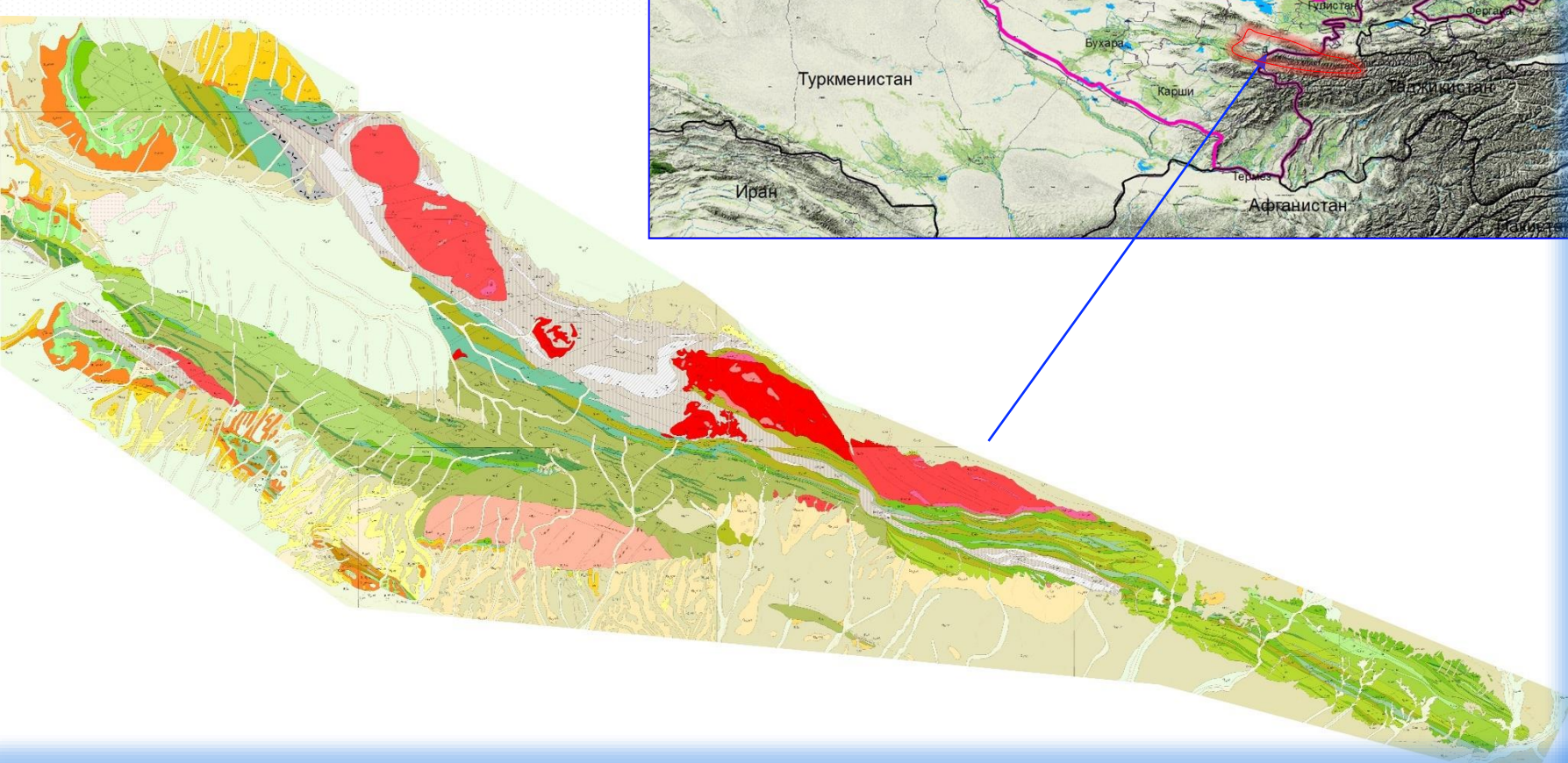


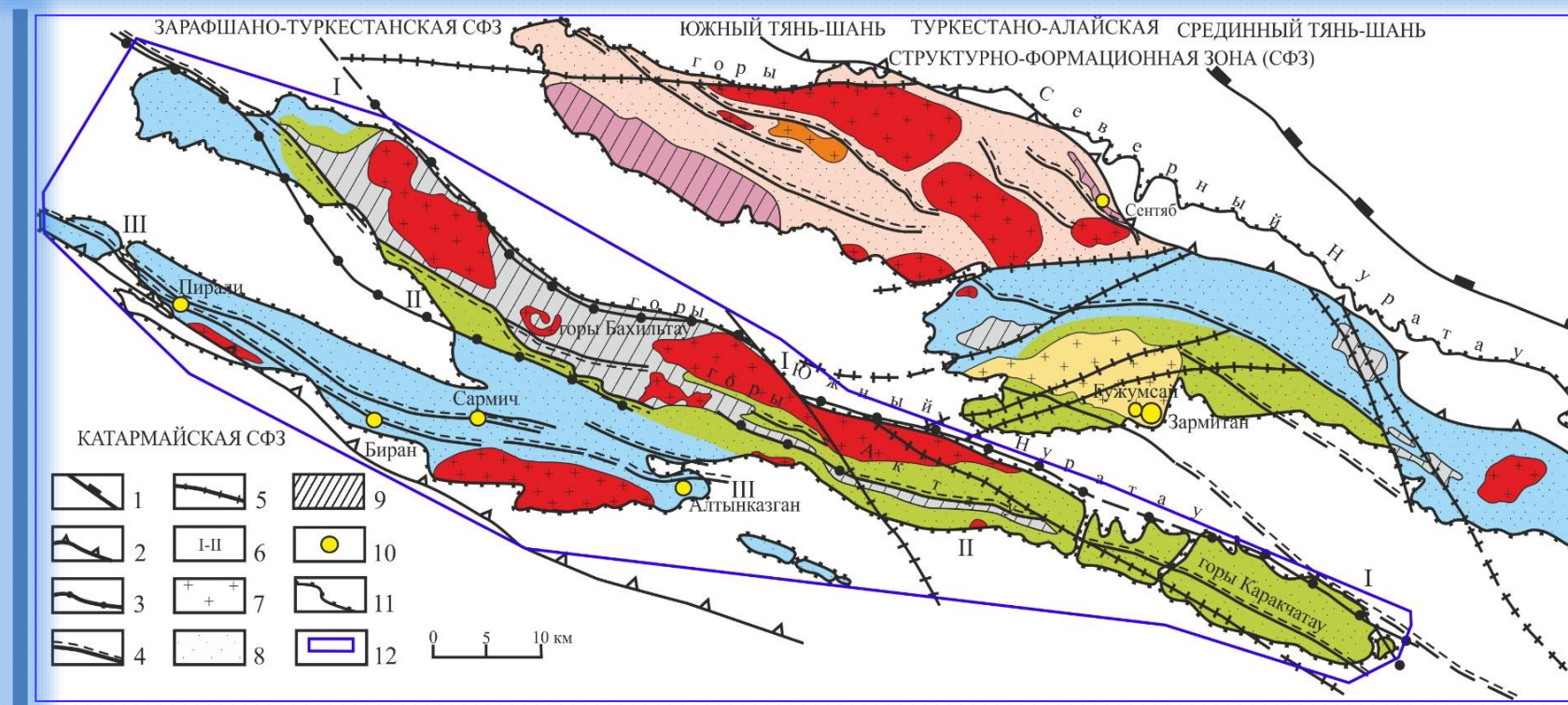
**Research area**



The study of the problem is devoted to the analysis of the results of geochemical prospecting for gold within the Southern Nurata mountains, which showed that geochemical studies in this region were mainly carried out within the Karatau mountains, while the Pashattau, Bakhiltau, Aktau and Karakchatau mountains were covered only by metallometric surveys at a scale of 1:50,000, made in the late 50s - early 60s.

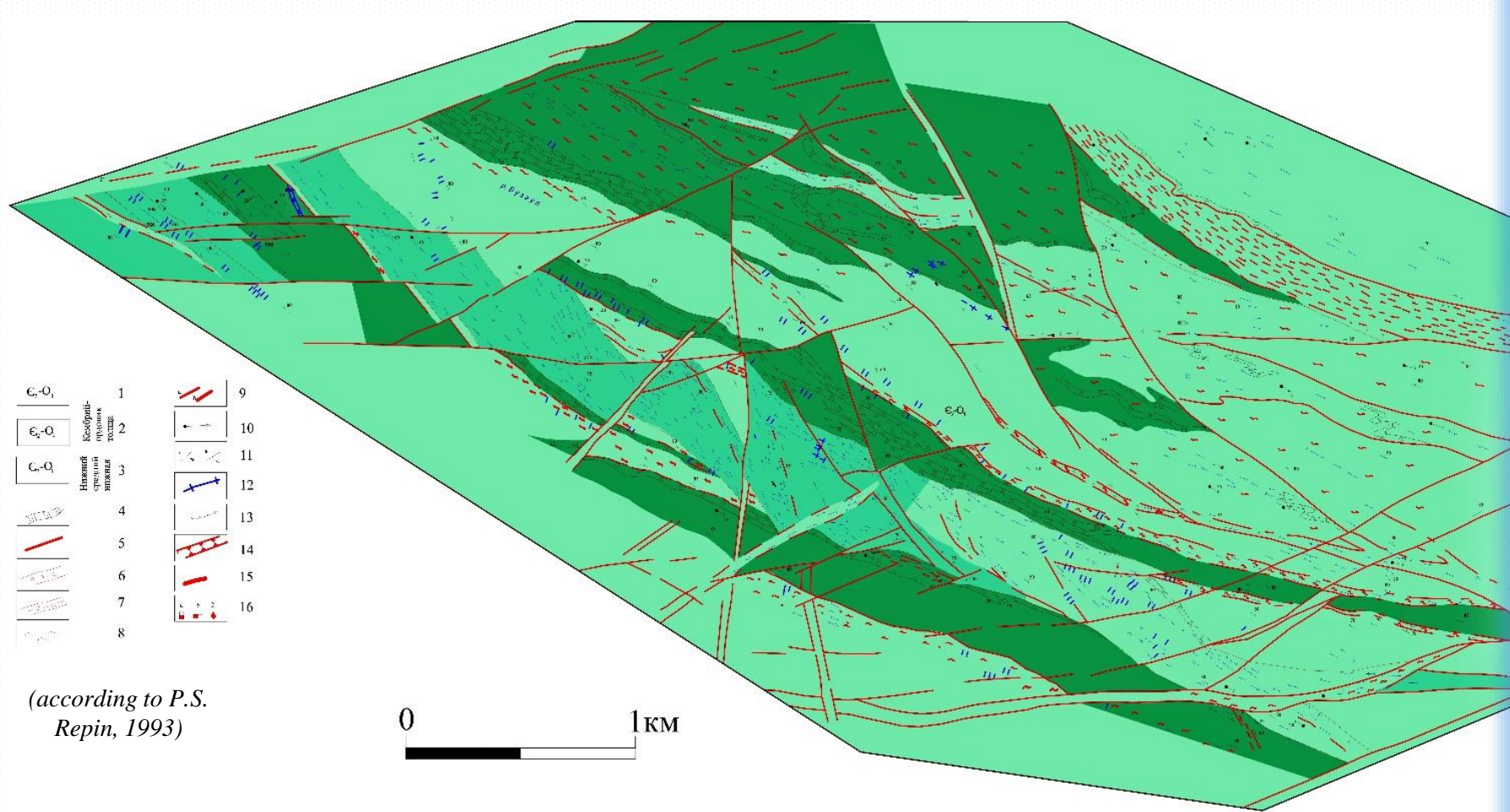
Kh.M. Abdullaev, I.Kh.Khamrabaev, K.L. Babaev, I.M. Isamukhamedov, Z.M. Abduazimova made a great contribution to the study of geology, mineralogy, geochemistry, patterns of formation and distribution of gold deposits and ore occurrences in South Nurata, A.K. Bukharin, E.B. Bertman, V.D. Tsoi, G.E. Zavyalov, P.F. Ivankin, S.M. Koloskova, N.I. Nazarova, Yu.S. Savchuk, R.S. Khan, I.V. Koroleva, V.G. Kharin, K.V. Pyatkov, M.M. Pirnazarov and many others.

Despite such a thorough study of the issue, when constructing a consolidated geological-genetic model of the formation of gold mineralization in ore-bearing environments of South Nurata, numerous unresolved issues remain.



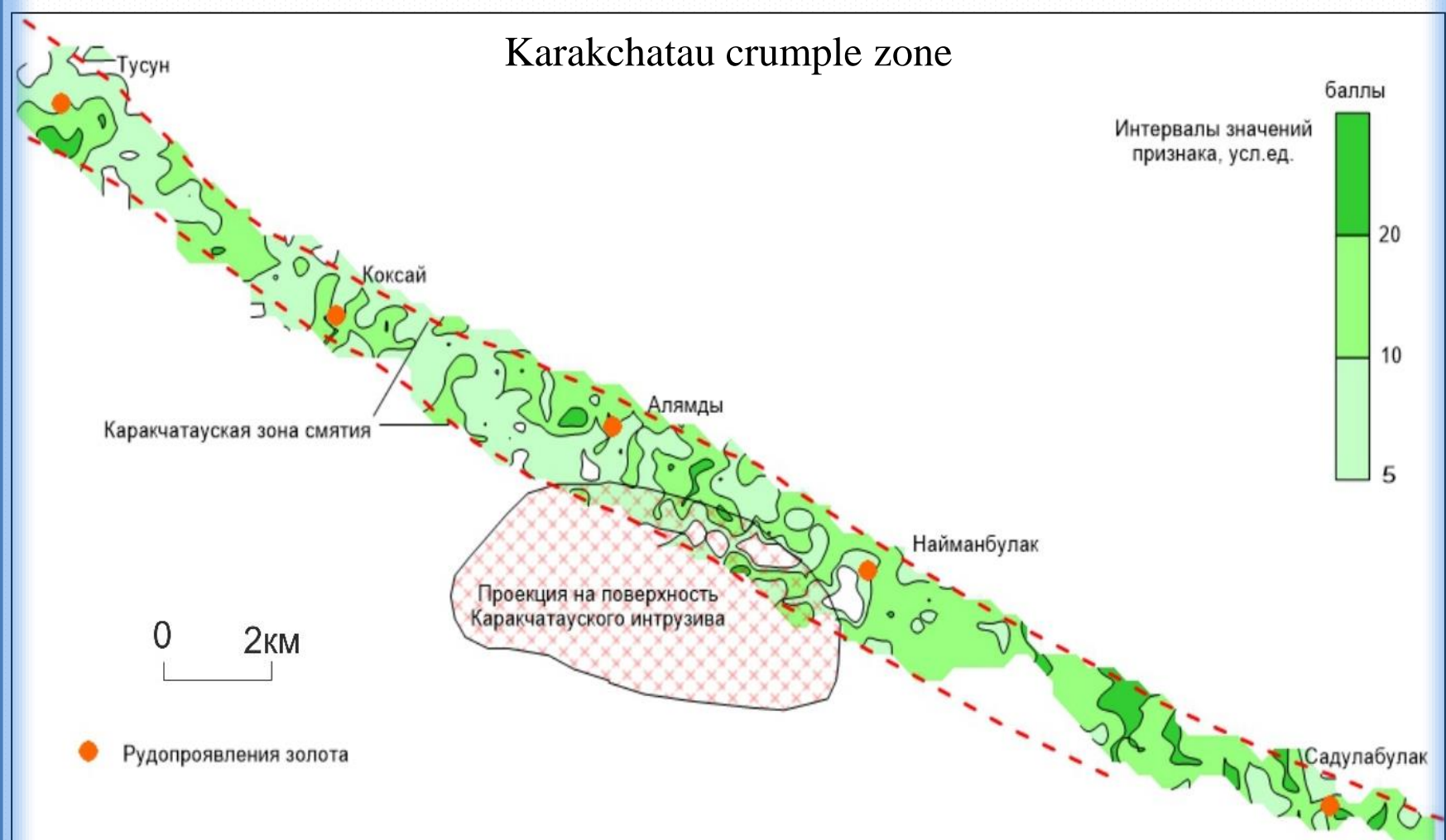
The mountains of Southern Nurata in regional structures are located within the Zarafshan-Turkestan structural-formational zone, with which the predominant part of the industrial gold-bearing potential of Western Uzbekistan is associated. Regional ore-controlling structures of the first order are the branches of the South Nurata deep fault - Northern and Southern (N.I. Nazarova et al., 1988). An ore-controlling structure of a similar genetic type in the western part of the South Nurata mountains is the Karatau collapse zone, which is subparallel to it.

**Geological map of the Buzgul site**



In South Nurata there are a number of deposits and areas of gold, among which one can distinguish Biran, Sarmich, Altyn-Kazgan, Pirali, Maulyan and others. Yu.V. Shumakov, V.I. E.B. Bertman, Yu.I. Loshkin, N.I. Nazarova, P.F. Ivankin, V.D. Tsoi, A.K. Pyatkov and others, and most of those referred to gold-sulfide-quartz geological-industrial type.

**Extensiveness of vein-vein silicification by observation points**



The study of quartz typomorphism in the investigated area was based on visually observed signs, the study of transparent and polished thin sections, electron microscopy, and spectral analysis data. The extensiveness of the development of quartz mineralization, observed after 50-75 m, shows a high saturation of the Karakchatau zone of crumpling with quartz bodies.

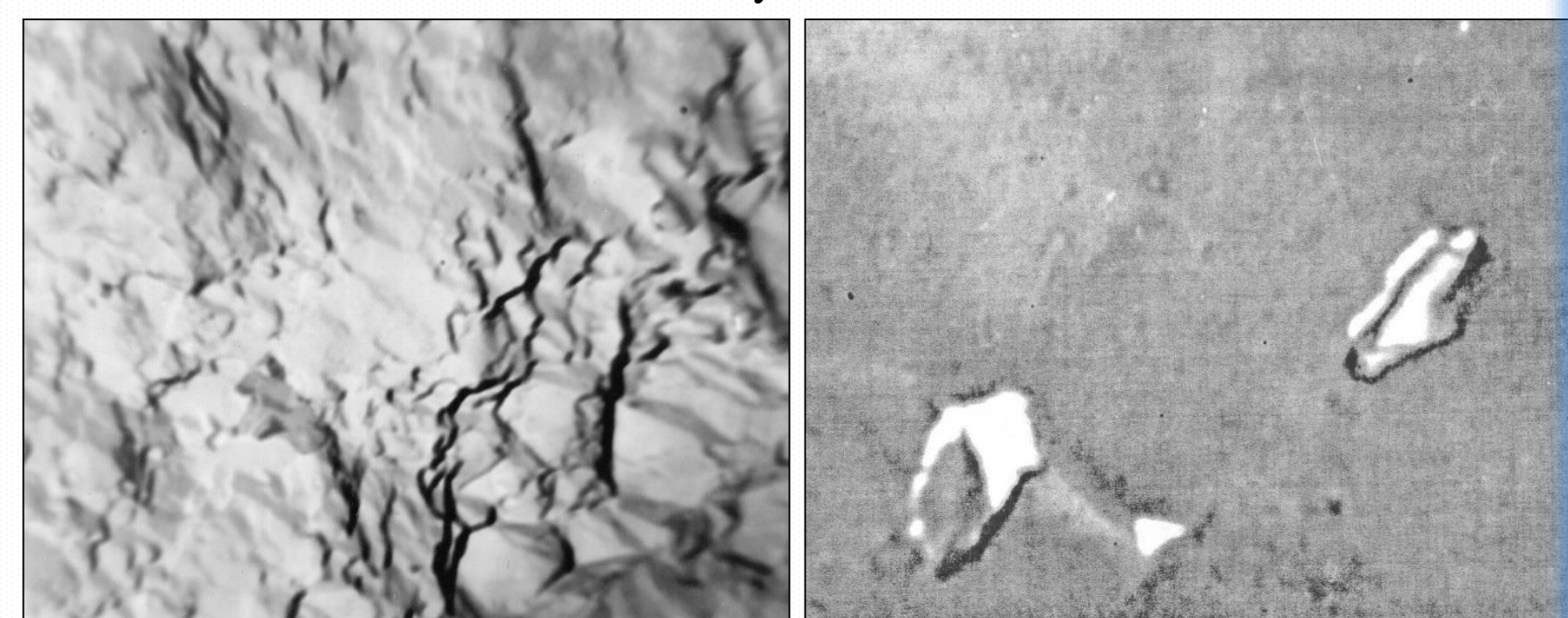
**Mineral and geochemical features of gold mineralization South Nurata mountains**

The results of mineralogical mapping of vein-vein quartz formations in the Karakchatau zone of collapse show: quartz-vein formations are most intensively developed in the central part of the collapse zone. They form linear zones and fields concentrated in local geological blocks; Vein fields develop in the areas of expansion of the Karakchatau zone of crumpling, and in the areas of its pinching, the intensity of quartz mineralization decreases; the placement of fields and their morphology depend on the nature of the block deformation of the crumple zone.

Previous studies by N.A. Akhmedov, Yu.G. Spirin, Yu.I. Loshkin and others in the Karakchatau mountains showed that quartz vein-veinlet mineralization is an indicator of various geological and ore-forming processes, fixing tectonic deformation of local areas. We were the first to carry out a systematic spatial study of quartz-vein formations in the Karakchatau zone of collapse by the method of field mineralogical mapping, which made it possible to study the features of the spatial development of quartz bodies, develop mineralogical and geochemical criteria and signs of the difference between barren and gold-bearing quartz formations.

**Mineral and geochemical features of gold mineralization South Nurata mountains**

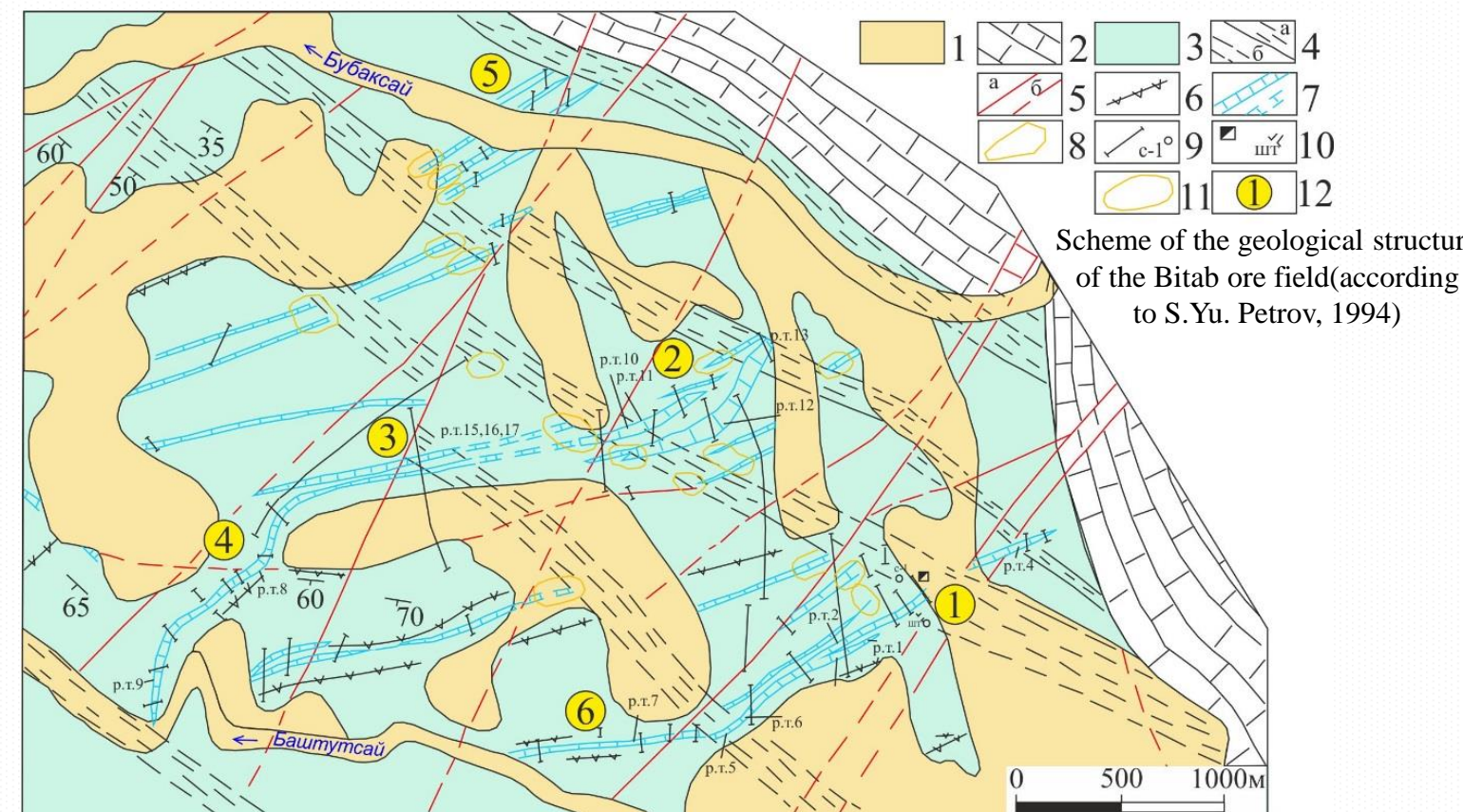
Morphology of gold grains from feldspar-quartz hydrothermal vein of the Alyamdi occurrence



Forms of high-temperature quartz aggregates (Q-3) - pseudo-lamination of coarse-crystalline quartz. Electron microscopy. Coal replica. I took it away. 5400  
 Vacuoles of gas-liquid inclusions in high-temperature quartz (Q-3) are exposed GZHV vacuoles up to 2 microns in size. Electron microscopy. Coal replica. I took it away. 4500

The results of an electron microscopic study of quartz of the third type show a high degree of idiomorphism of crystalline aggregates. Gas-liquid inclusions of irregular shape with jagged edges and drop-shaped, possibly of secondary origin, have an uneven distribution.

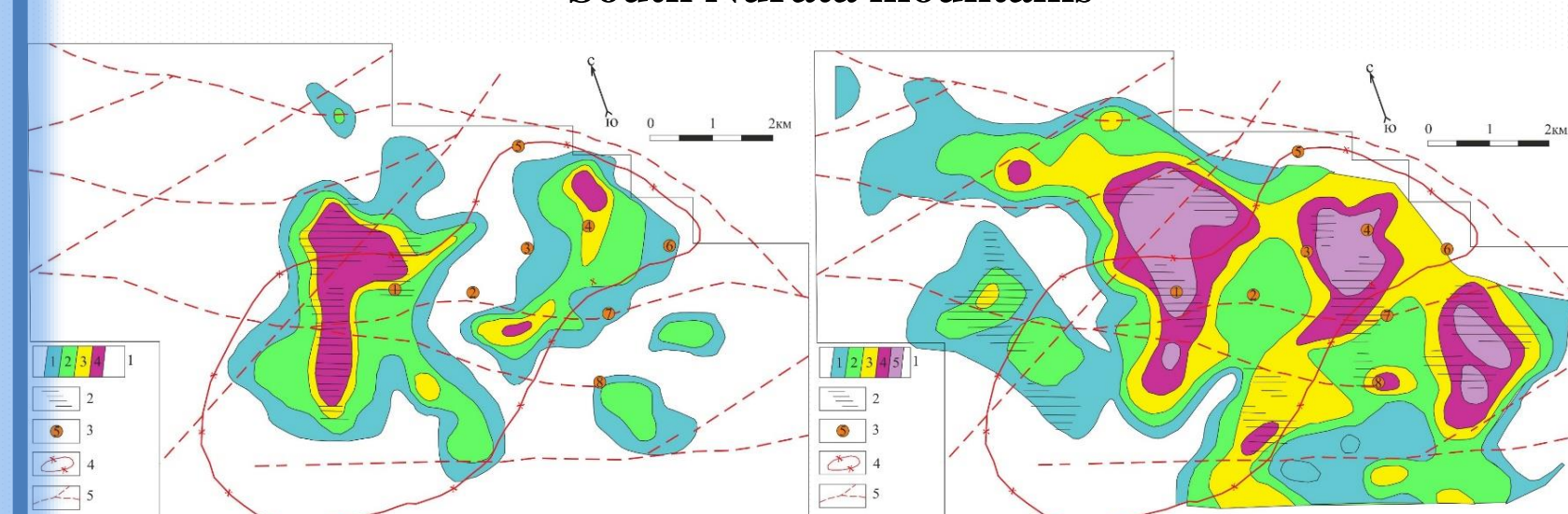
**Mineral and geochemical features of gold mineralization South Nurata mountains**



Reconstruction of a specific model of one of the links of the ore-generating environment of the Bashtut zone of collapse of the containing position of the Bitab ore field was made by studying the relationship between the mineralogical and geochemical features of gold mineralization with ore-bearing rocks.

In the modern interpretation, the Bashtut shear zone is a zone of ore-bearing dislocations, bounded in the north by the Bubak faults, in the south by the Yulbasar faults, and traced in the northwestern and eastern directions from the Bitab ore field.

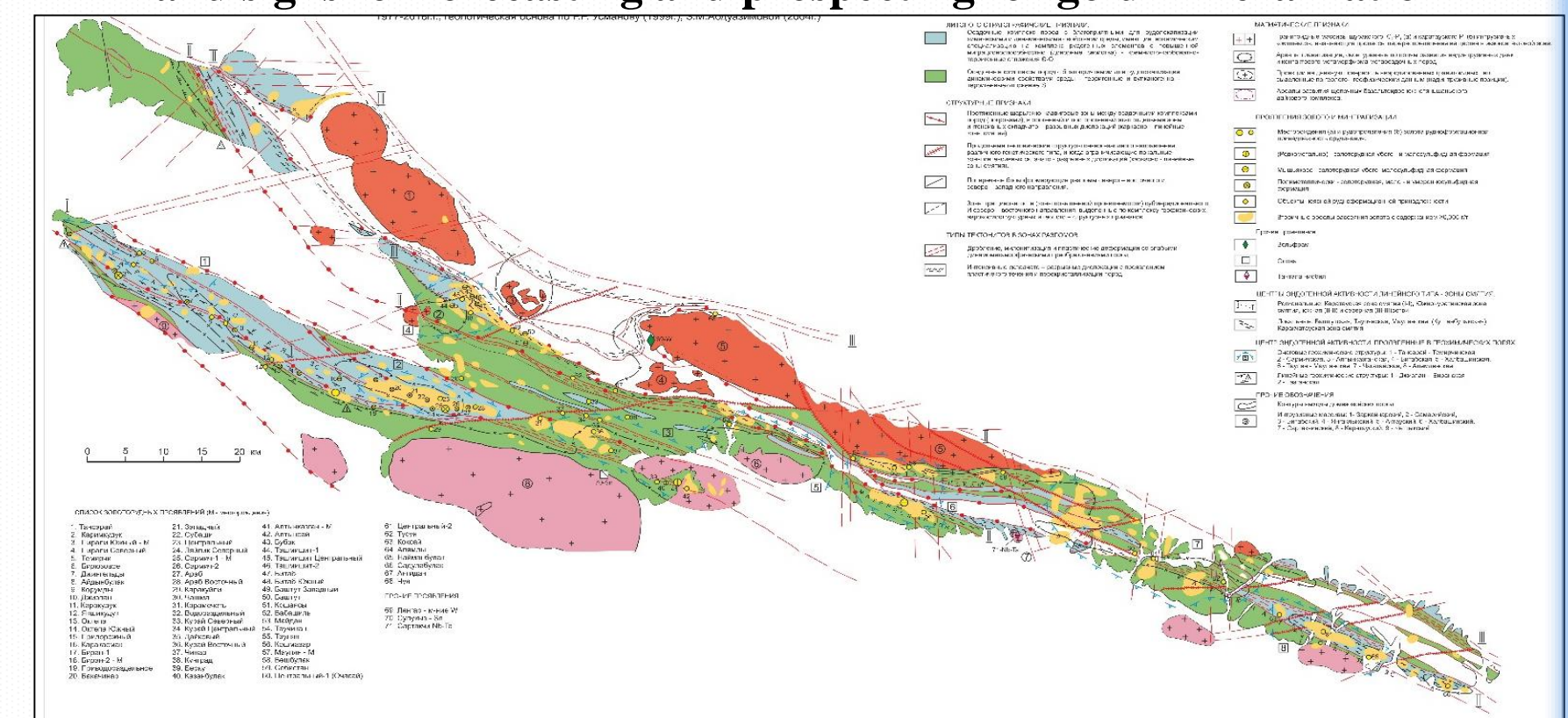
**Mineral and geochemical features of gold mineralization South Nurata mountains**



The structure of geochemical anomalies of silver, lead, antimony, gold and arsenic of the Bitab ore field

The considered features of the location of geochemical fields allow us to conclude: the increased contents of gold, arsenic, silver, lead, antimony, and other metals in the secondary dispersion halos of South Nuratau can be used as prospecting signs of hidden primary gold concentrations of industrial interest, widespread development of secondary halos, dispersion of gold and the accompanying arsenic, and a rather contrasting gold content, established in the bedrock outcrops of metaterrigenous rocks, gives reason to believe that the gold ore potential of this territory has not yet been fully revealed.

**Mineralogical-geochemical and structural-lithological factors and signs for forecasting and prospecting for gold mineralization**



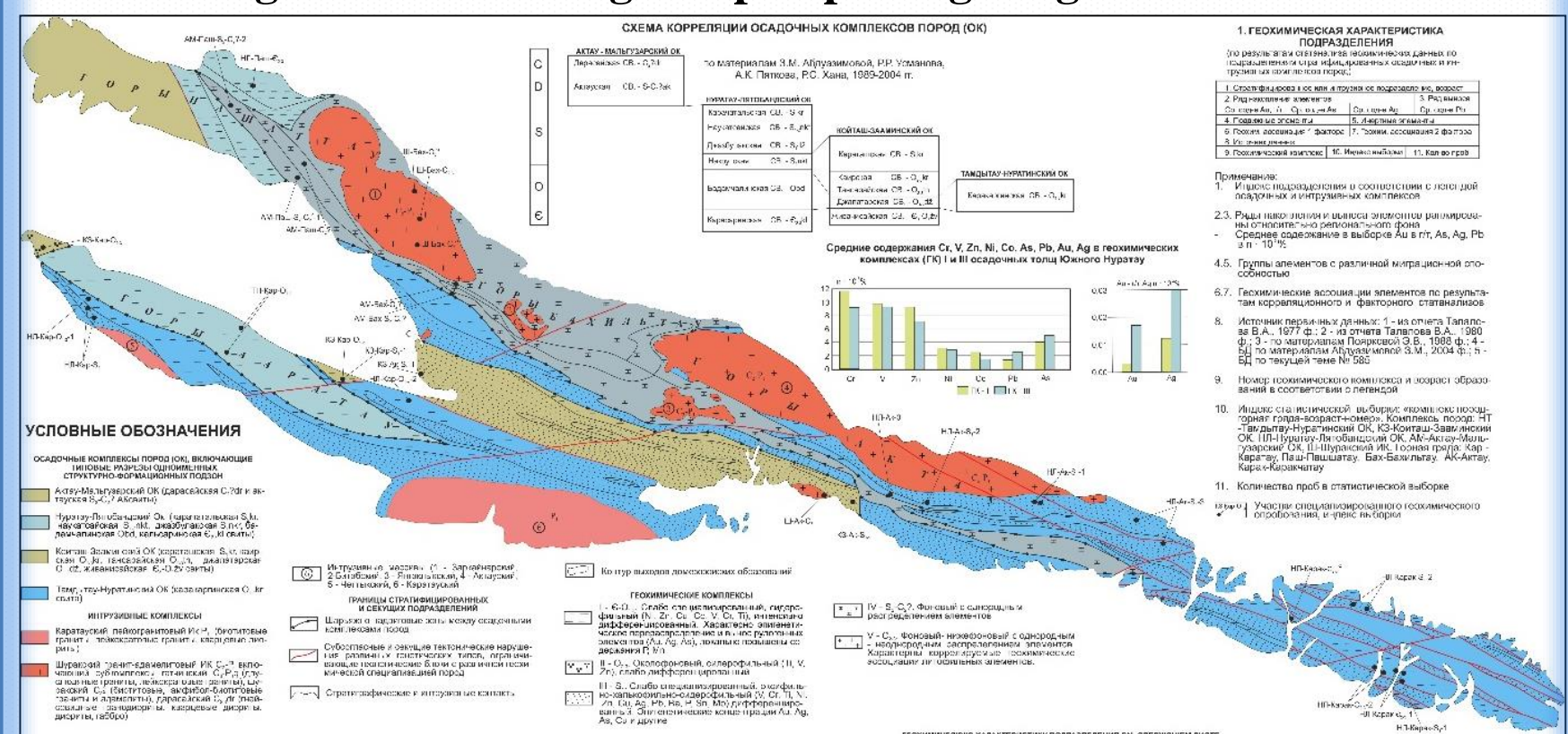
The location of gold mineralization within South Nuratau has a distinct stratigraphic control - confinement to deposits of the cambrian, ordovician and silurian ages.

The rocks composing the cambrian and ordovician deposits, in comparison with the later Silurian sediments overlapping them, are characterized by geochemical specialization for the complex of siderophilic elements - Ti, Cr, V, Ni, Co; the contents of P, Mn, Zn, and Cu are locally increased. Variations in statistical geochemical parameters record the epigenetic redistribution and removal of ore-generating elements (Au, Ag, As), the distribution of which in the O-O deposits has a contrasting character. These elements could serve as one of the sources for the formation of concentrations of gold and other elements.

**Prospects of South Nuratau for gold mineralization**

The use of a complex of field prospecting and specialized metallogenic, ore-formational, geological-structural and geochemical methods made it possible to identify predicted areas in the Buzgul area for setting up specialized prospecting works. The Northern-Buzgul area is located 3 km northwest of the Privodorazdelny ore occurrence and 1 km south-southeast of the Southern-Buzgul ore occurrence. A feature of the site is its location, within the suture zone of the near-latitudinal strike of the intensely crushed, crushed, orogivized and coalified Ordovician rocks (sandstones, siltstones, shales with interlayers in places of carbonates). The site position is determined by the intersection of the shear zone with transverse east-north-east faults. The identified mineralized zone is traced by west-northwestern (near-latitudinal) linearly elongated geological arsenic anomalies that accompany ore-controlling tectonic seams, expressed by crushing and intense alteration with superimposed ore mineralization (Au, Ag, W, Pb, etc.).

**Mineralogical-geochemical and structural-lithological factors and signs for forecasting and prospecting for gold mineralization**



Schematic map of the geochemical specialization of rock complexes in the South Nuratau mountains

The main ore-controlling structure of the study area The southern branch of the South Nurata shear zone extending for more than 200 km (N.I. Nazarova, P.F. Ivankin, 1988) is a multiaxial tectonic structure, in which the boundary seams represent nodular-thrust zones on in the north, between the Aktau-Malguzar terrigenous-carbonate and Nuratau-Lyatobandsky metaterrigenous cage complexes (Gazgan, Bubaksky faults), in the south - between the Nuratau-Lyatoband and Koitash-Zaamin metaterrigenous sedimentary complexes.

**Conclusion.**

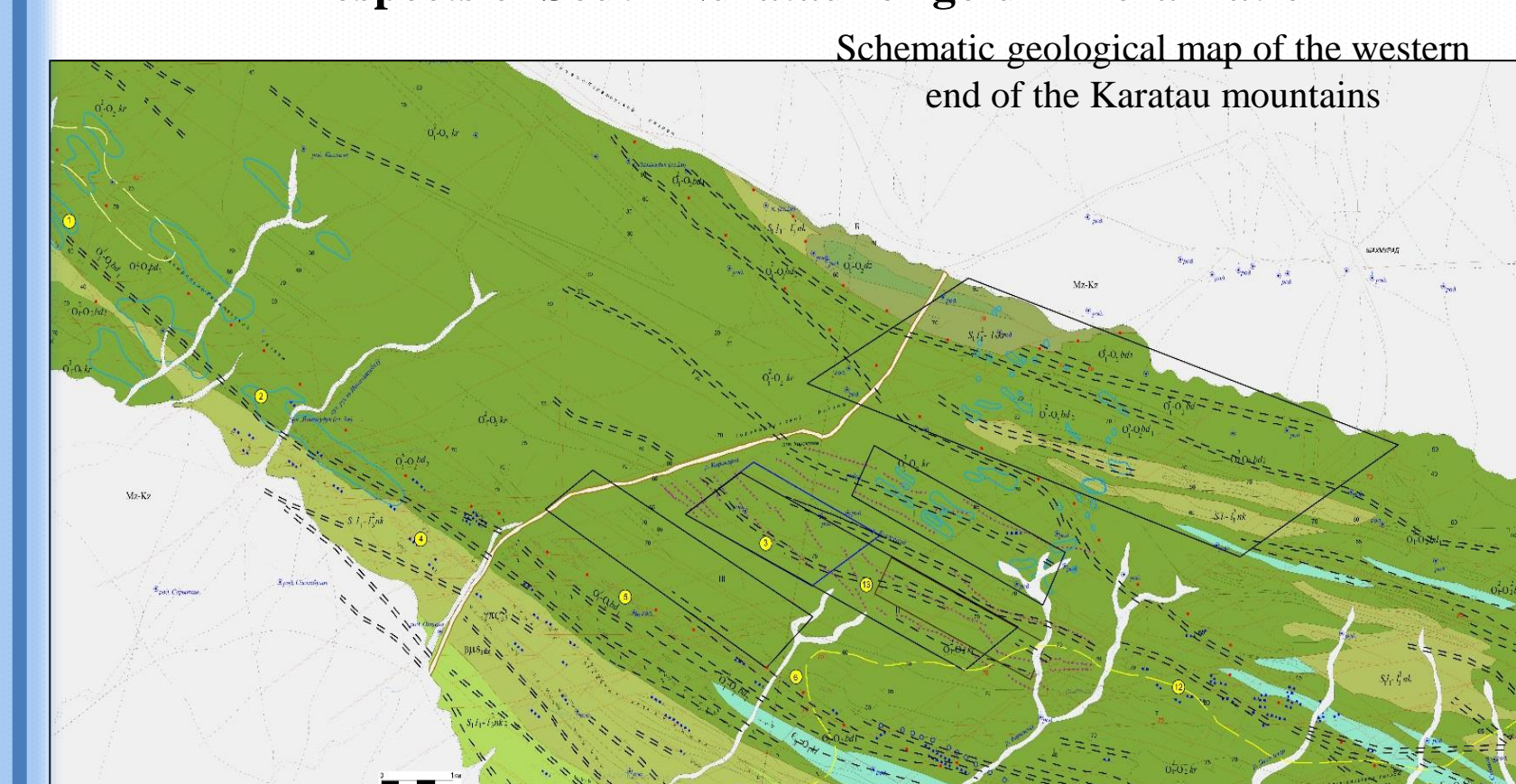
A common feature of focal geochemical structures is the presence of combined geochemical halos of a complete series accompanying early, high-temperature rare-metal and medium-low-temperature gold mineralization. A significant number of promising areas identified by us are located within the identified structures. Recommended for setting prospecting works for gold in 15 areas of ore field rank.

The main types of rocks are sedimentary ages C<sub>2-3</sub>-S, and igneous - dike formations of age S<sub>2</sub>-P. The predominantly northwestern direction of the strike of the early tectonic structures and the north-east direction of the later block-forming ones. Placement of ore occurrences of gold has a distinct stratigraphic control - deposits of the Cambrian and Ordovician age.

Regional ore-producing structure Karakchatau zone of collapse - a link of the South Nurata zone of collapse, ore-supplying block-forming faults. On the regional level, there is a spatial relationship of geochemical structures with the South Nuratau zone of collapse, and a local paragenetic relationship of gold ore occurrences with granitoid magmatism of the C<sub>2</sub>-P<sub>1</sub> complex.

Mineralogical mapping of vein-veinlet quartz formations in the Karakchatau zone of collapse identified five types of stages of mineral formation: of which ore: pneumatolytic-hydrothermal quartz; hydrothermal quartz with sulfides and gold.

**Prospects of South Nuratau for gold mineralization**



The basis for forecasting and identifying promising areas for gold in South Nuratau was a comprehensive analysis of the patterns of formation and localization of gold mineralization.

Research shows: the connection of gold occurrences with regional structures; their confinement to the areas of development of certain igneous formations; dependence of mineralization placement processes on stratigraphic-lithological and structural factors. The geological and genetic foundations of forecasting are lithological and stratigraphic, structural, magmatic, as well as mineralogical and geochemical criteria.

**The practical results of the study are as follows:**

a new method was developed and tested in practice, the isolation and determination of typomorphic mineralogical and geochemical features of vein-vein quartz formations and the difference between barren and gold-bearing quartz;

the relationship of the features of the composition and spatial structures of geochemical fields with a complex of geological predictive and prospecting signs was established, and the belonging of the studied mineralization to the moderate sulfide gold-sulfide-quartz ore formation was proved;

determined the mineral composition of ores, their structure, texture; the geochemical features of ore elements were established and promising areas for prospecting were identified.