

Latam Advanced Smart Exploration (LASE) is a joint venture. A strategic partnership.

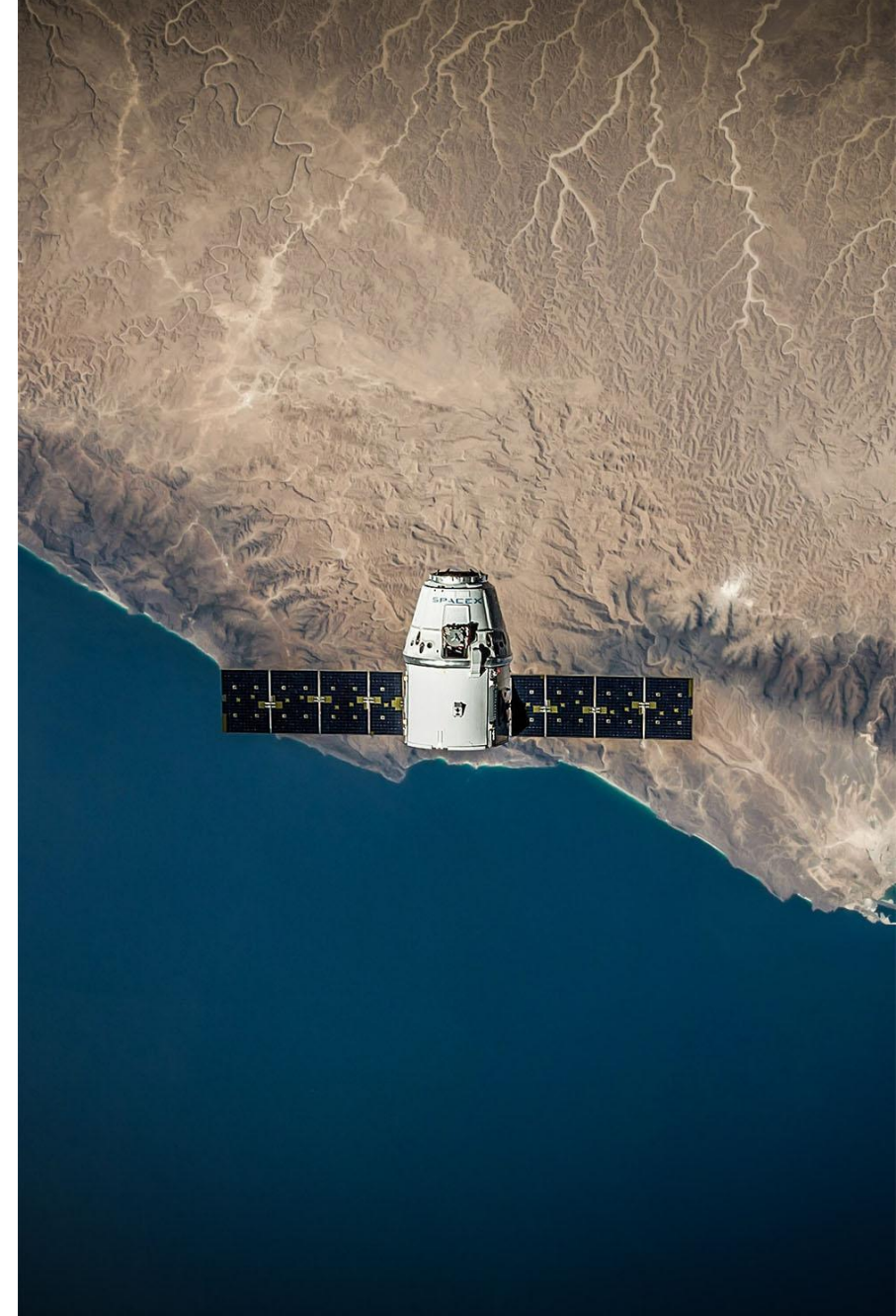


WHAT IS LASE?

Latam Advanced Smart Exploration (LASE) is a joint venture, a long-term strategic partnership between Latam Investment Group (LIG), a company widely recognized in the development of small-scale mining projects with safe extraction of metals and non-metals based in more than 10 countries in Latin America, and Advance Smart Exploration (ASE), and collaboration with teams of high-class scientists and professionals, research centers, which has developed innovative technologies for the search and investigation of mineral deposits, Remote Earth sensing technologies (satellite technologies through satellite image processing) for mineral prospecting, complex data interpretation, decoding of thematic information, innovative and traditional geophysical search methods and technologies, integrated search systems based on the use of UAV / UAS (Unmanned Aerial Vehicles / Unmanned Aerial Systems) and has achieved a wide projection in the international market in recent years.

LASE's objective is to develop innovative exploration projects of mineral deposits using new and modern technologies that are capable of facilitating the BOT (Build / Operate / Transfer) investment processes of small, medium and large investors, reducing the risk factors of the exploration phase as it is carried out using highly effective methodologies that allow estimating more accurate returns than traditional methods.

- **Website:** <https://laselat.com/>
- **E-mail:** info@laselat.com
- **Phone & WhatsApp (Asia / Europe):** +(38) 0975255545 +(38) 0950041306
- **Phone & WhatsApp (America):** +(56) 228334584
- **Headquarters:** Av. Ramón Pérez Opazo 2040, Office 701 Iquique, Chile.
- **Directors:**
 - Alexei Mankov (amankov@laselat.com)
 - Mauricio Mora (mmora@laselat.com)

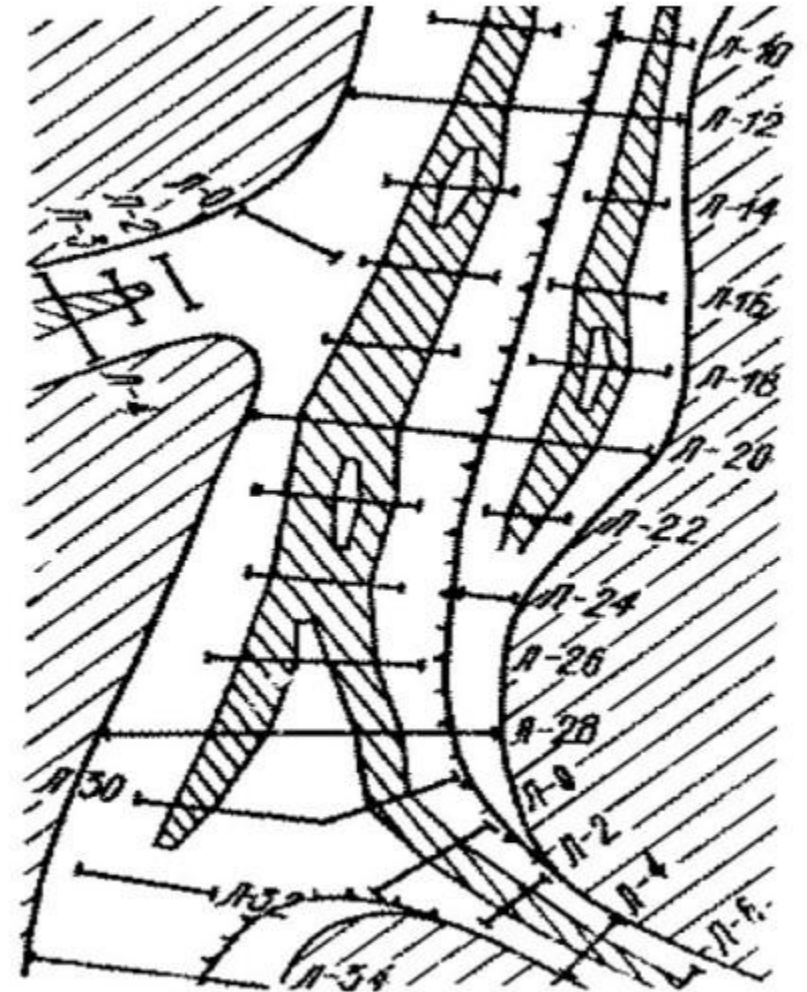


Relevance

For the rational use of drilling and the optimal placement of its volumes, geophysical research methods are used:

- at the prospecting stage when studying the features of the geological structure of gold-bearing areas covered with loose sediments
- to localize promising areas for detailed geophysical and drilling operations
- in the study of loose sediments and the relief of bedrocks
- to determine the primary sources of gold

The method of electrotomography is gradually being introduced into the practice of work in prospecting and prospecting for placers of gold, but the possibilities of the method remain not fully disclosed. The use of induced polarization makes it possible to locate the sites of sulfide mineralization, that is, to determine the sources of gold

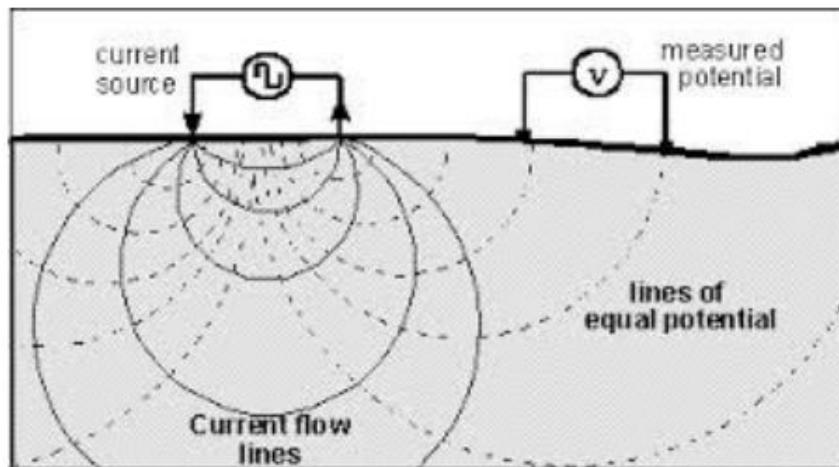


About the method

Electrical resistivity tomography is a modern modification of the vertical electrical sounding method and induced polarization.

Electrotomography (ERT) is based on the difference between electrical resistivity of rocks.

Induced polarization (IP) measures the transient response and aims to determine the subsurface chargeability properties.



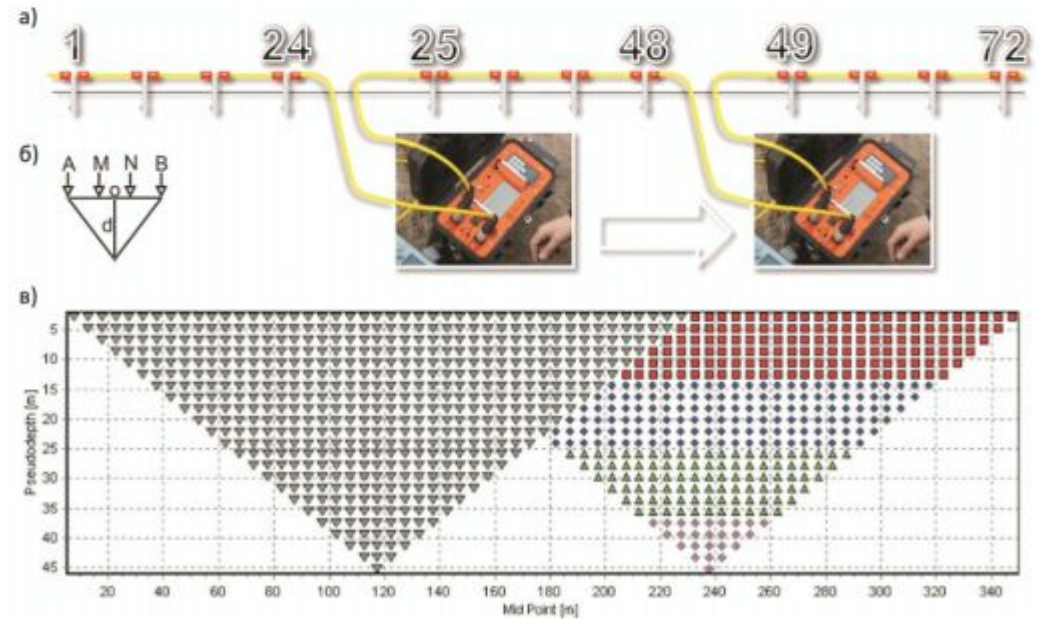
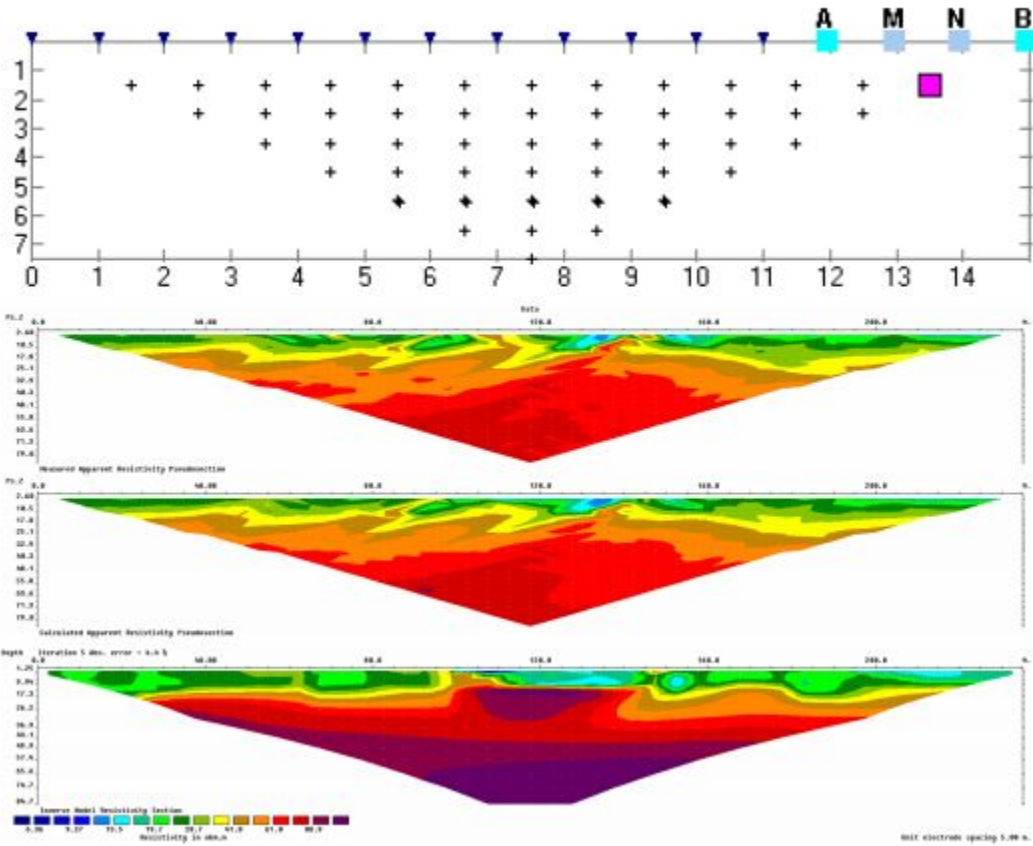
The method of measuring subsurface resistivity involves placing four electrodes in the ground in a line, applying a measured AC current to the outer two electrodes (A and B), and measuring the AC voltage between the inner two electrodes (M and N).

A measured resistance is calculated by dividing the measured voltage by the measured current. This resistance is then multiplied by a geometric factor that includes the spacing between each electrode to determine the apparent resistivity.

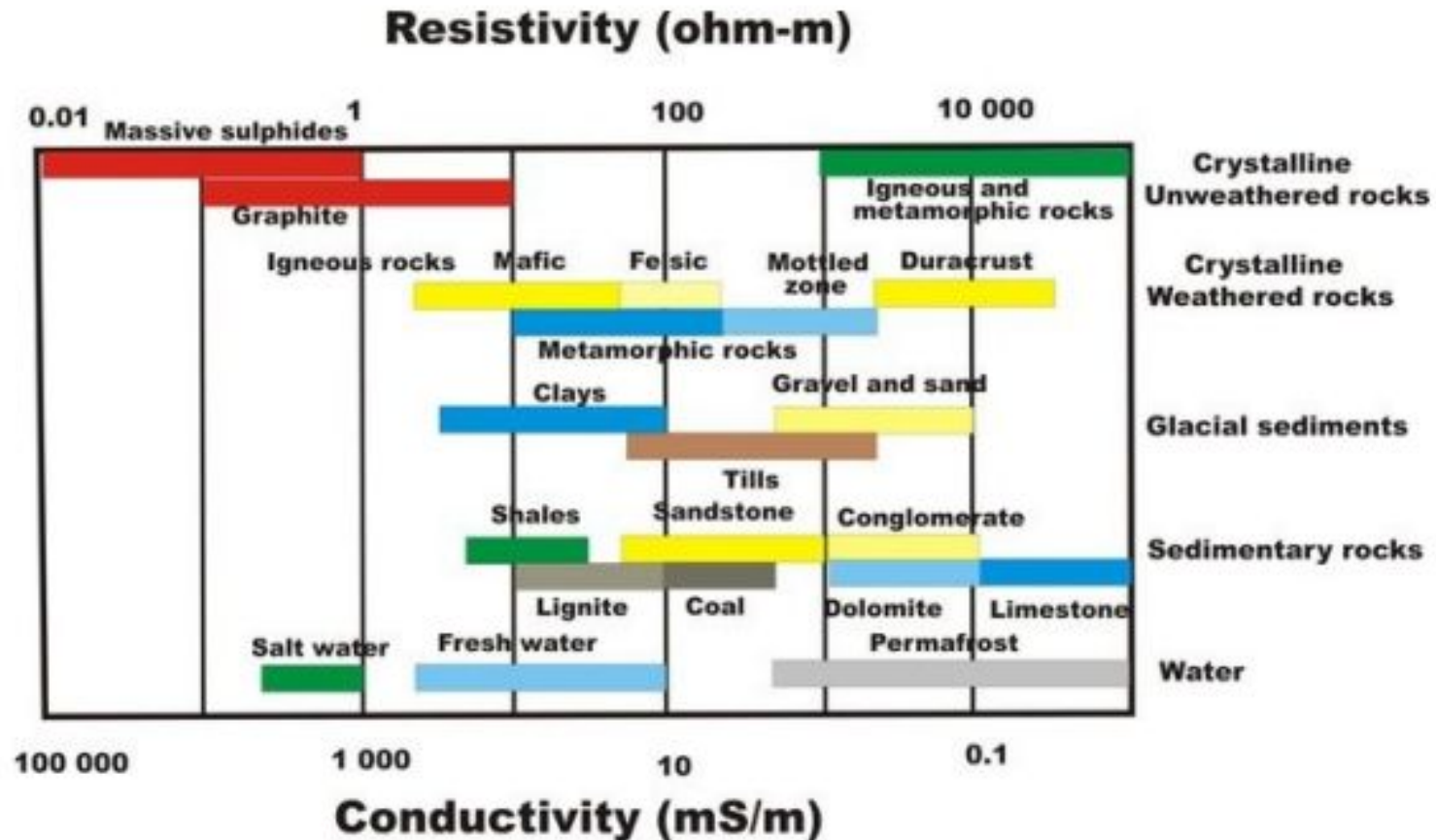
$$\rho_K = k \cdot \frac{U_{MN}}{I_{AB}}$$

The principle of electrotomog

- Multi-electrode measurements
- 2D and 3D automatic data inversion

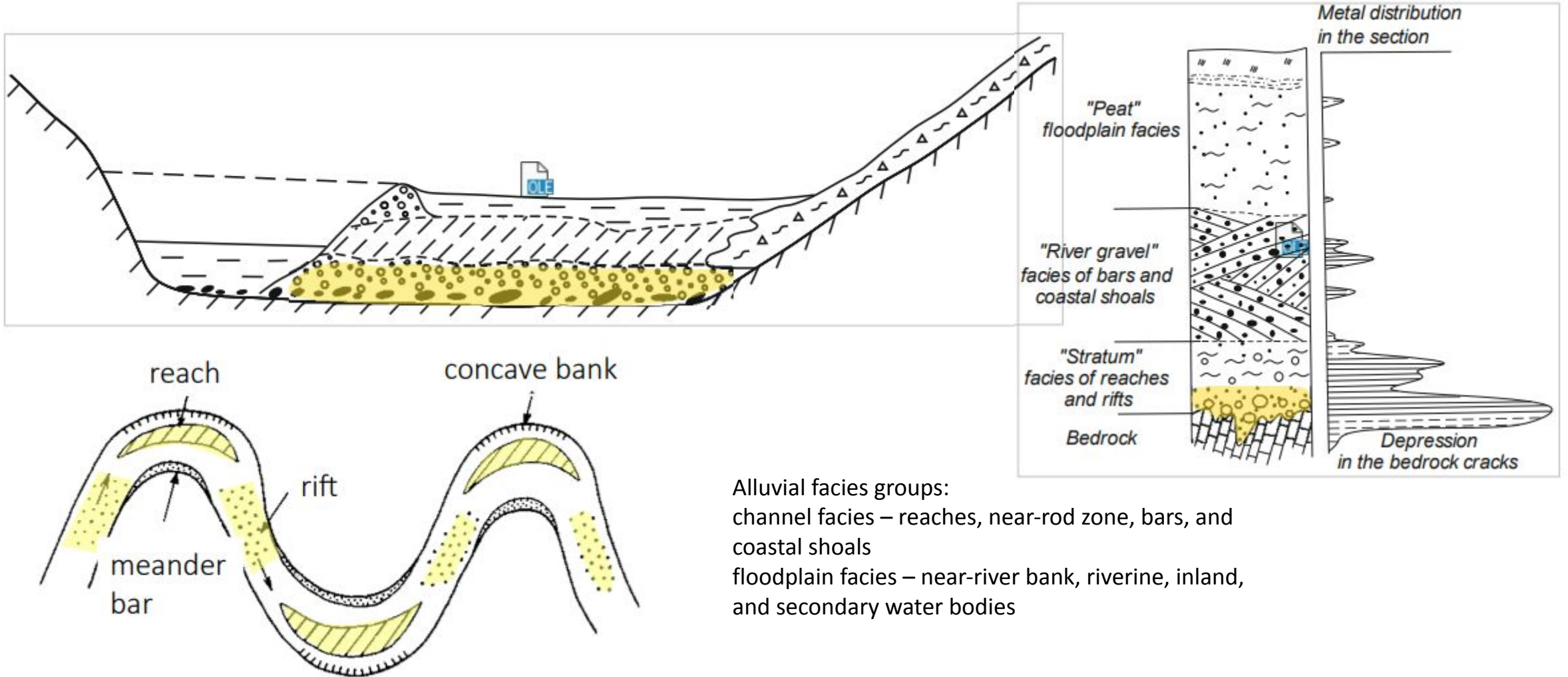


Principles of Geological Interpretation Electrical properties of rocks



Geological Substantiation of Interpretation Criteria

The structure of the alluvial placer



Alluvial facies groups:
 channel facies – reaches, near-river zone, bars, and coastal shoals
 floodplain facies – near-river bank, riverine, inland, and secondary water bodies

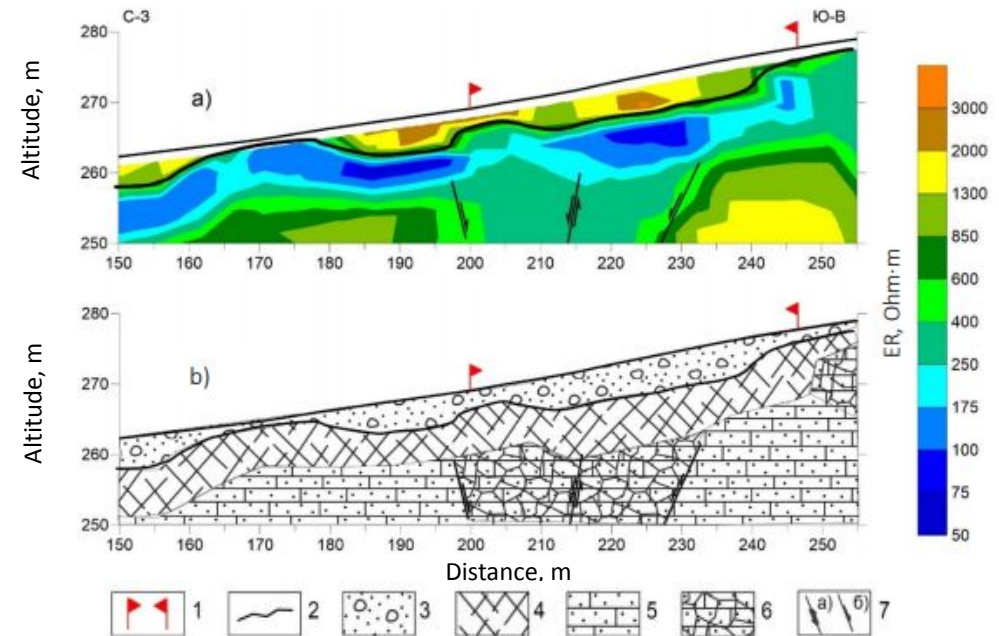
Geological Substantiation of Interpretation Criteria An example of allocation of sediments of the channel facies

Geoelectric section along the exploratory trench (a) and its interpretation (b) with account for geological data

Weathered rocks of the bedrock



The boulders of the channel facies



1 — mining allotment boundaries; 2 — top of the main bottom according to the geophysical and overburden data; 3 — loose deposits of the channel facies; 4 — weathering crust of the main bottom, crushed rock; 5 — sandstones; 6 — crumbling sandstones of the fault zone; 7 — faults: a — main fault, б — edge fault.

An example of prospecting work

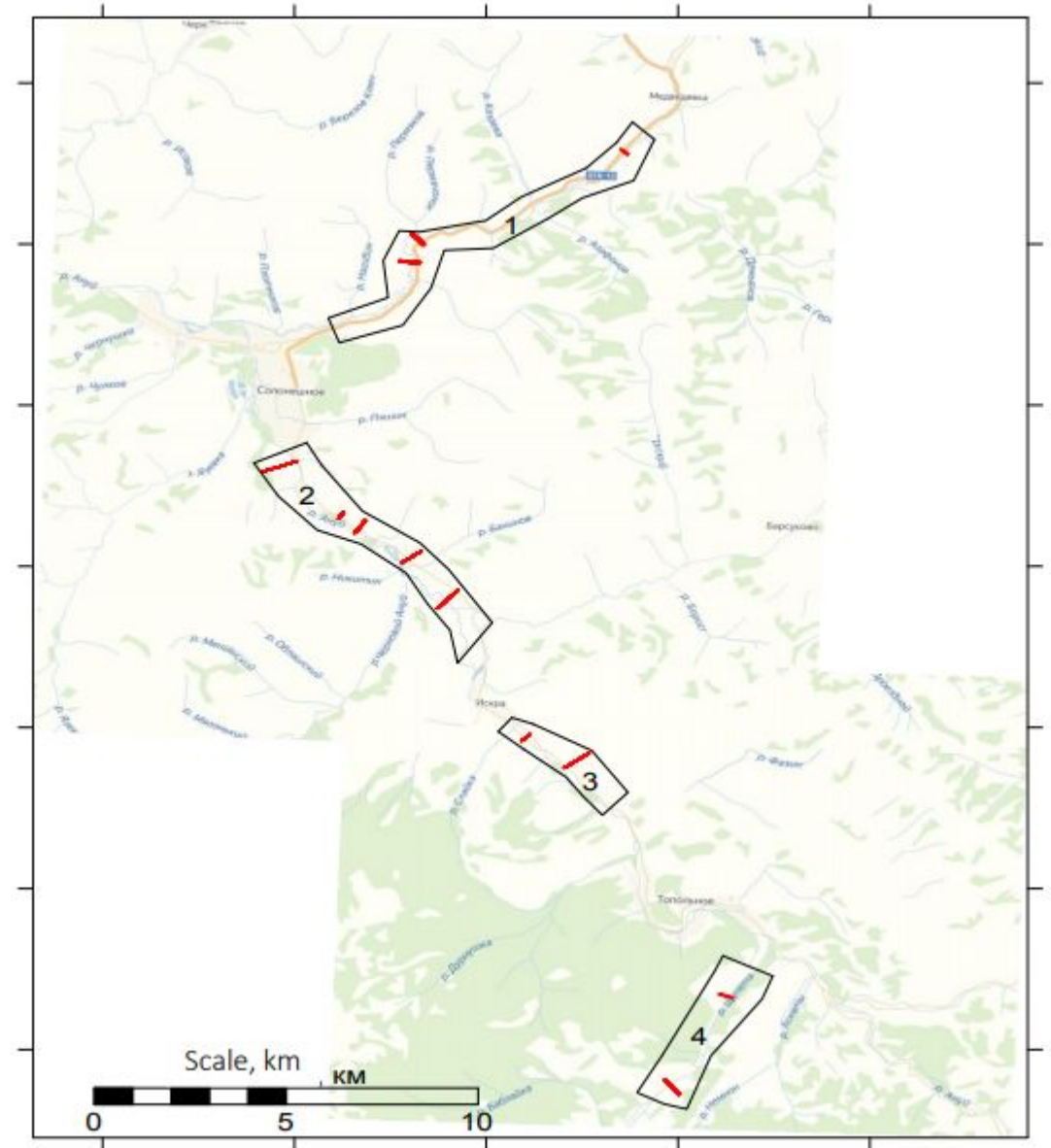
Method of work:

Profile length - from 235 m to 955 m

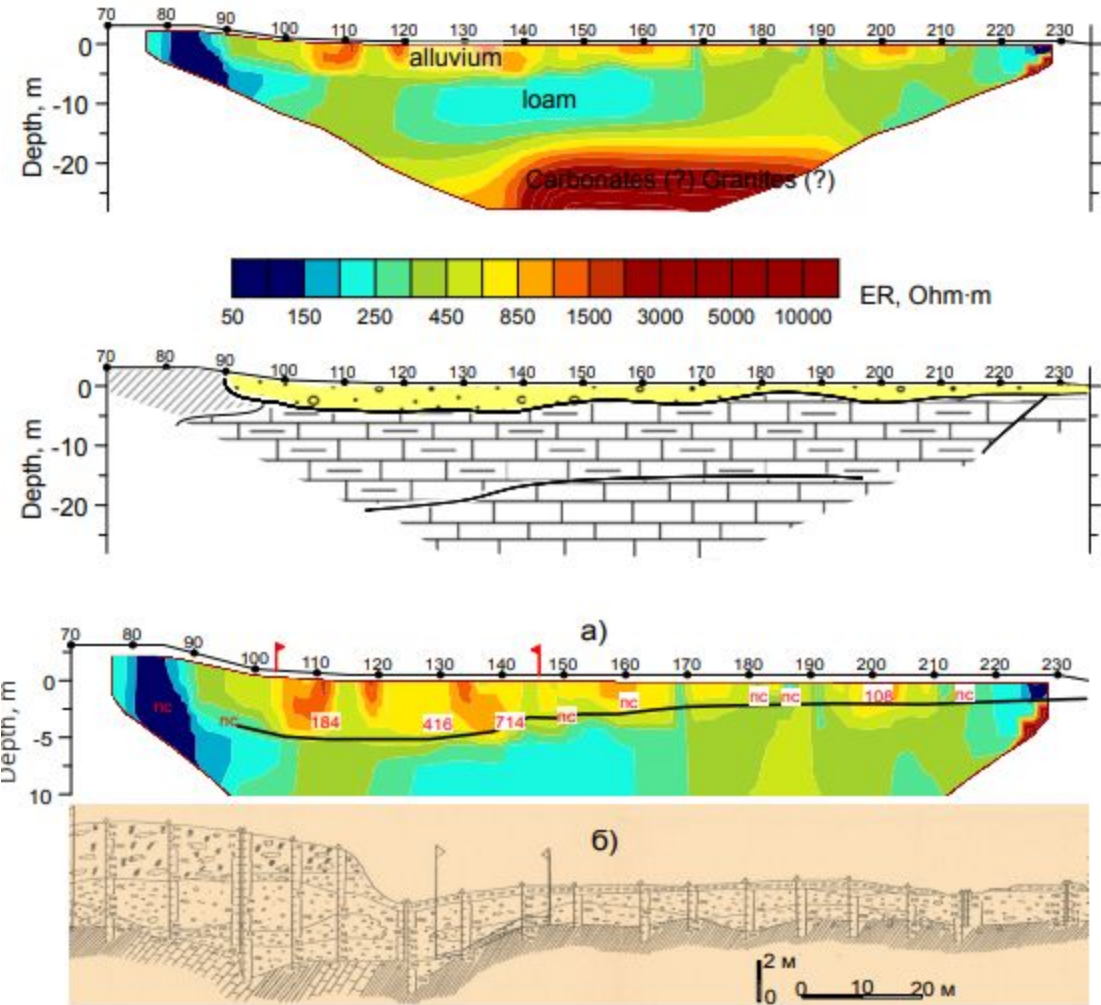
Measurement step along the profile (inter-electrode distance) - 5 m

Instrument - Skala 48k12 (SibER48k12)

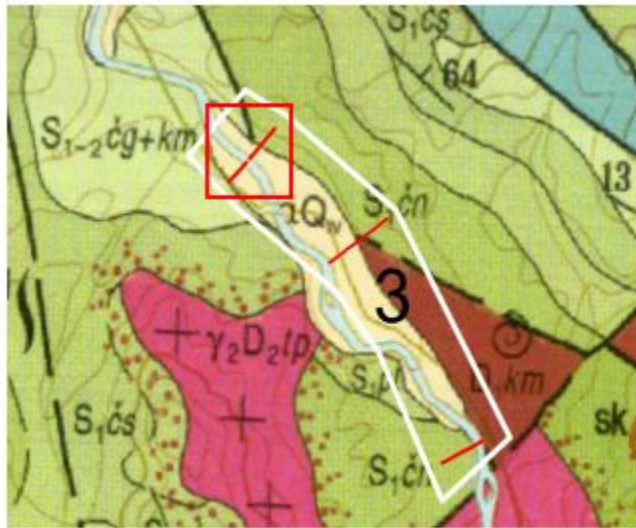
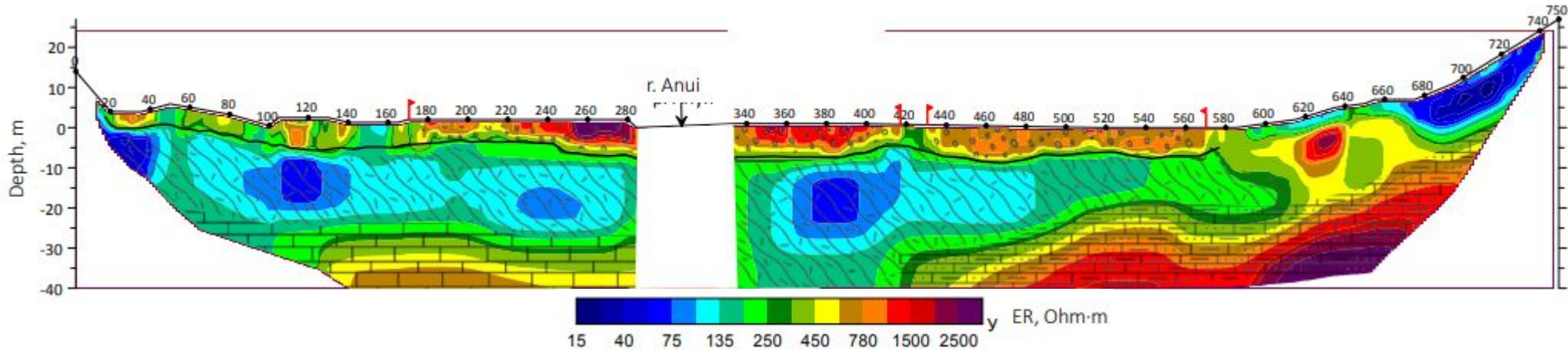
Arrays - dipole-dipole, Schlumberger.



An example of prospecting works Experimental work at the technological test site



An example of prospecting works

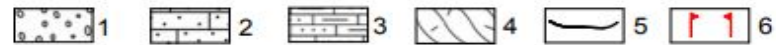
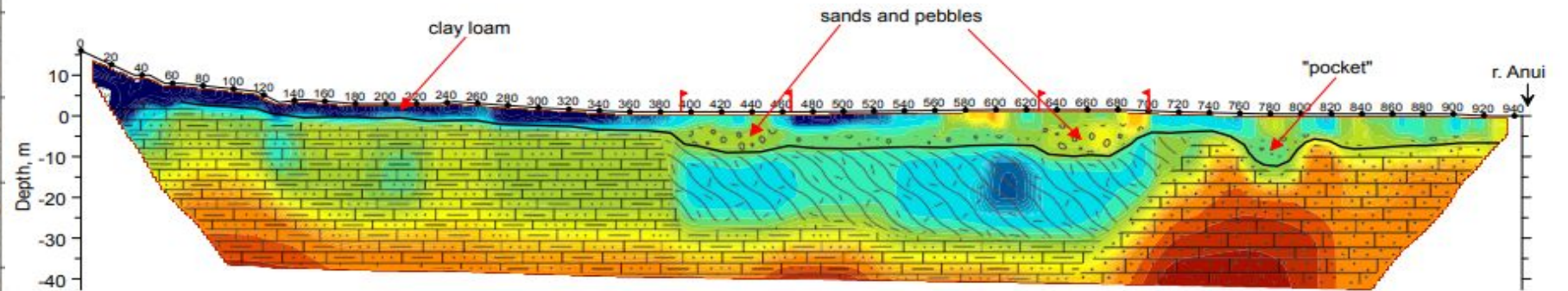
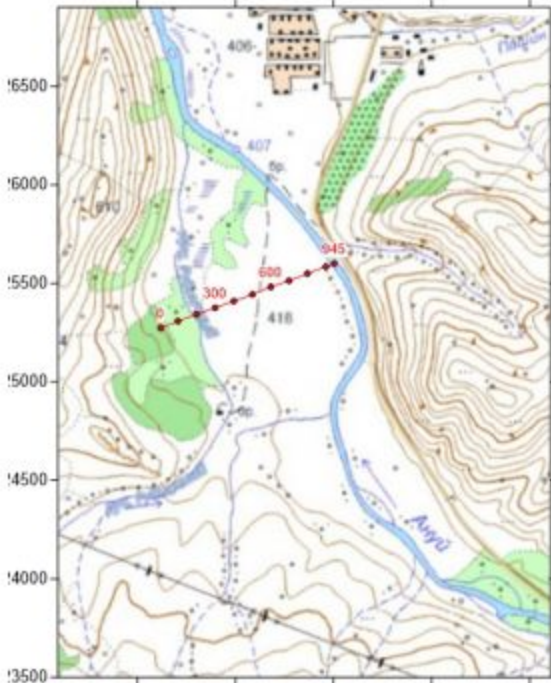


- 1 - channel alluvium; 2 - massive and layered limestones;
- 3 - shales, sandstones, siltstones; 4 - weathered bedrock;
- 5 - base of alluvial deposits (bedrock roof); 6 - the boundaries of the promising area for mining the placer.

Thickness of alluvial deposits 5.5-9.5 m
 Bedrock - shale, sandstone, siltstone

An example of identifying promising areas in a wide valley

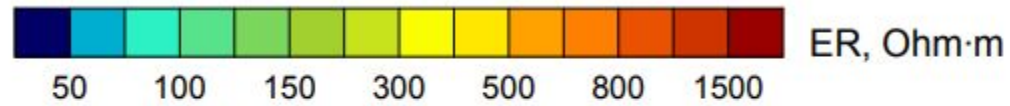
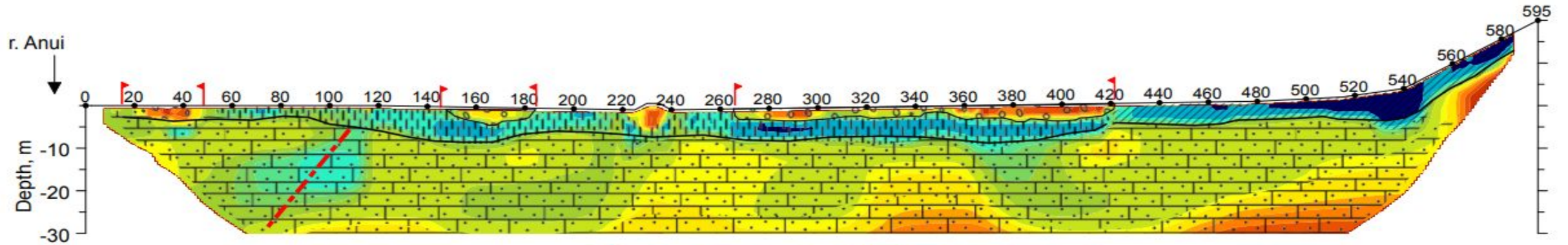
On the 945 m long profile, two promising anomalies of increased resistivity 60 m wide, associated with paleochannels, were identified. Within these anomalies, it is necessary to conduct areal studies to map them in plan.



1 - channel alluvium (pebble); 2 - Devonian sandstones, siltstones, limestones; 3 - Silurian clay shales, siltstones; 4 - weathering crust of bedrock; 5 - base of alluvial deposits (roof of the raft); 6 - boundaries of promising areas of placer mining.

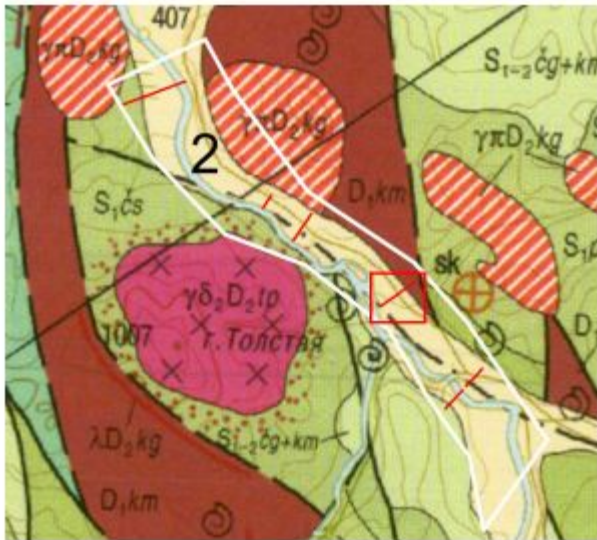
Bedrock - shales and sandstones, siltstones, limestones
The thickness of the alluvial deposits is 8 -11 m

An example of identifying promising areas in a wide valley

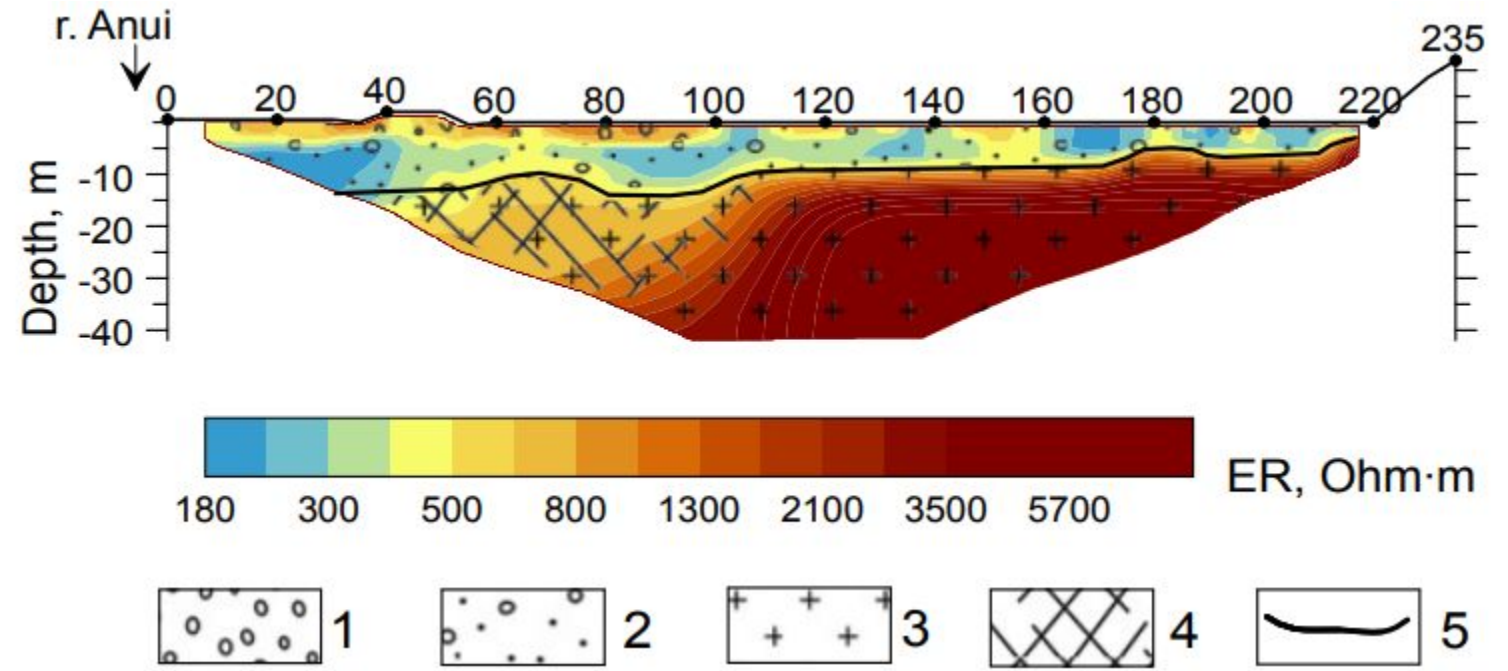
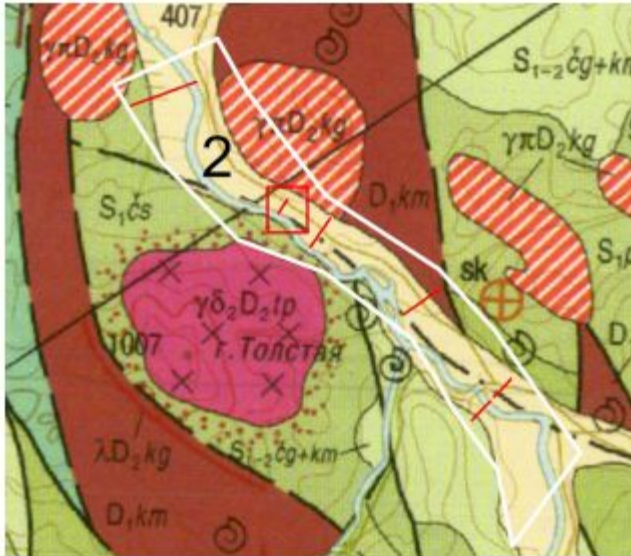


1 - channel alluvium (pebble); 2 - sandy loam; 3 - loam; 4 - sandstones, siltstones, limestones; 5 - bedrock roof; 6 - boundaries of promising areas of placer mining.

Bedrock - sandstones, siltstones, limestones. Thickness of alluvial deposits 6 - 8 m, pebble - 4 m.



An example of prospecting works Channel and valley placers

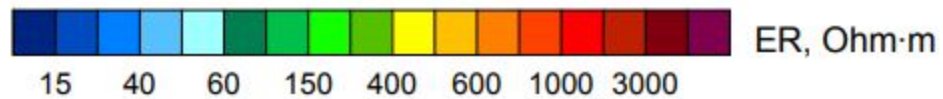
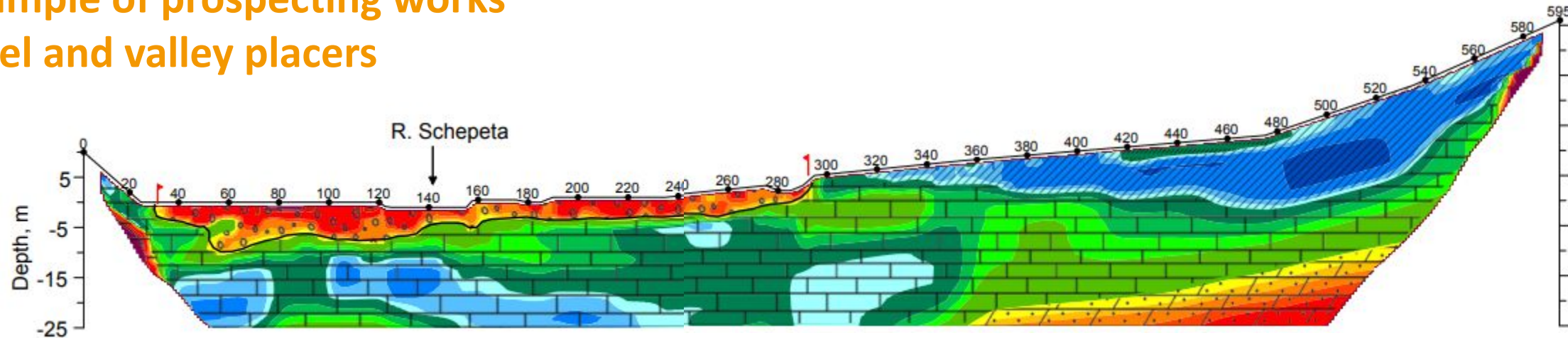


1 - pebble; 2 - sand and pebble deposits; 3 - bedrock; 4 - contact-altered rocks, fractured; 5 - base of alluvial deposits (bedrock top).

The thickness of the alluvial deposits is 6 - 8 m
Bedrock - granodiorite-porphiry

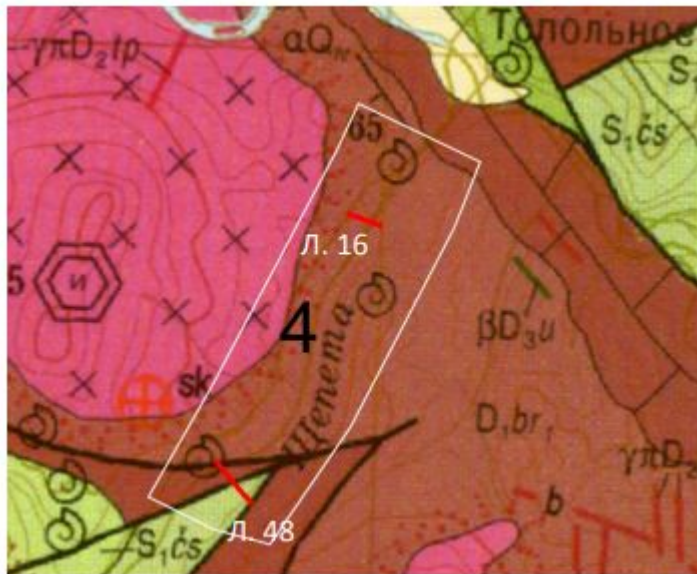
An example of prospecting works

Channel and valley placers



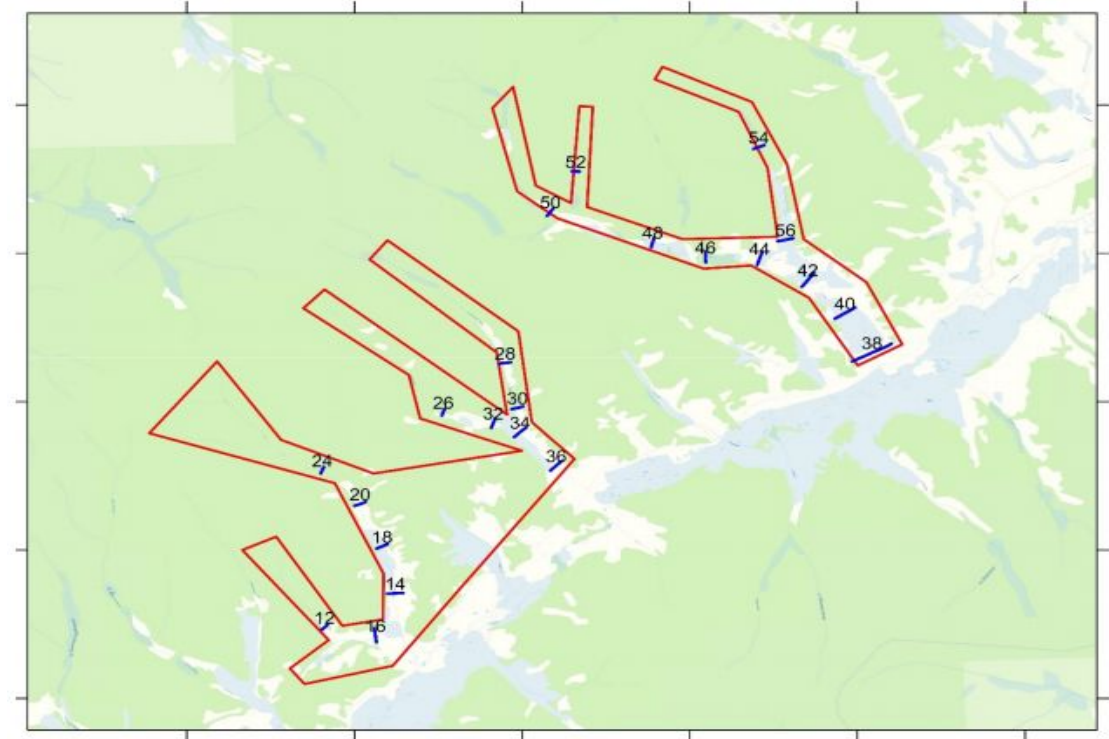
1 - channel alluvium (pebble); 2 - loam; 3 - limestone; 4 - sandstone; 5 – bedrock roof; 6 - boundaries of promising areas of placer mining.

The thickness of the alluvial deposits is 6 - 8 m. Bedrock - limestones Л. 16 Л. 48



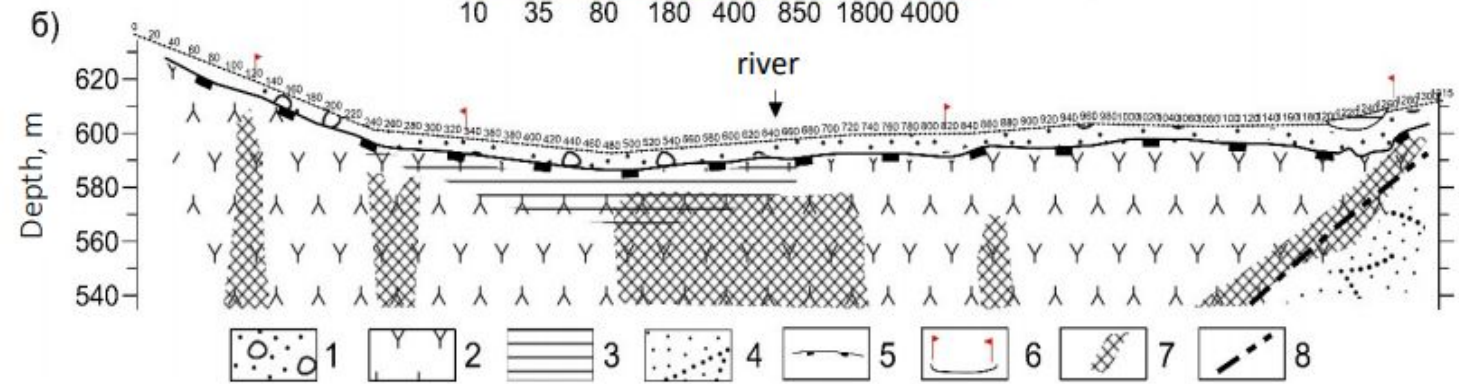
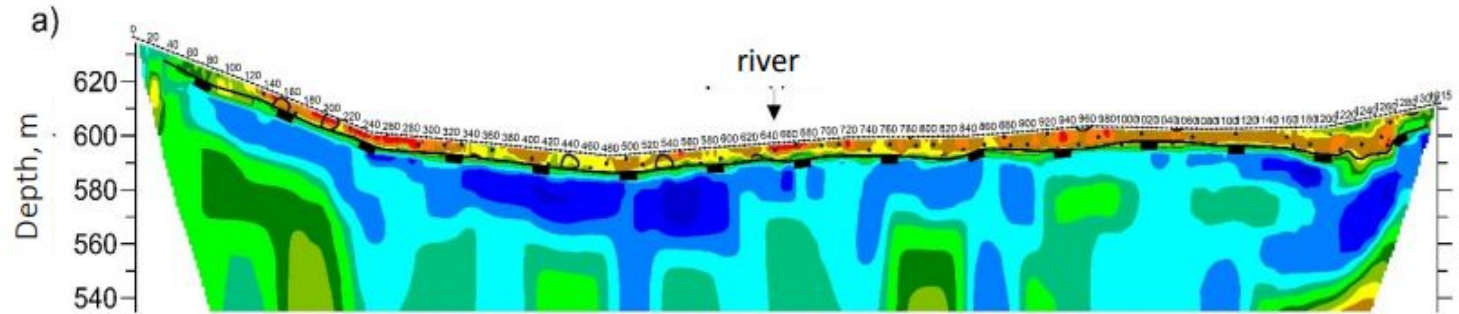
An example of prospecting works

The length of the profiles is from 355 to 1315 m
Inter-electrode distance - 5 m
Instrument - Skala 48k12 (SibER-48k12)
Installation – pole-dipole
The depth is not less than 70 m
Measured parameters - resistivity, IP



Gold in the region is known mainly as alluvial gold. Placers are alluvial deposits. In the upper part of the section, they consist of yellow-brown loams, under which are usually found rivers, represented by coarse sands and a large number of pebbles. Below the pebbles, there are more or less uniform gray, sometimes yellowish-gray sands with a small number of pebbles. The thickness of the entire section is from 3 to 5 m.

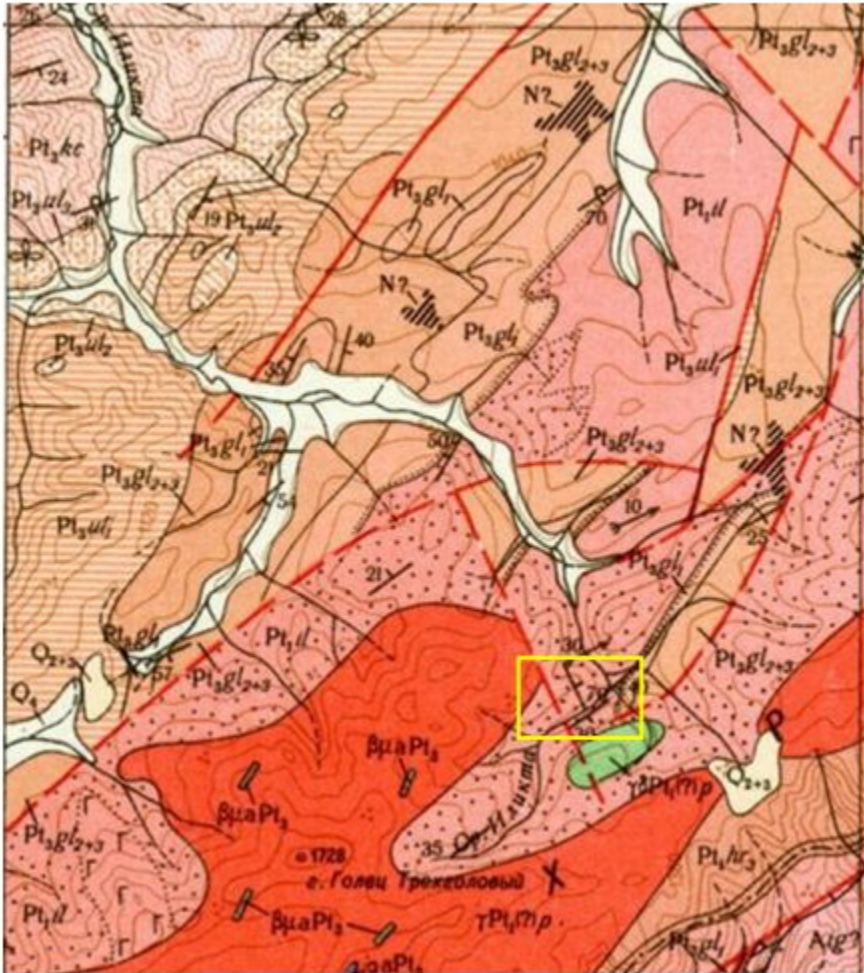
An example of prospecting works



- 1 - alluvial deposits; 2 - trachyandesites; 3 - weathered clayey rocks; 4 - quartz sandstones; 5 - bedrock roof; 6 - boundaries of sediments of the channel alluvium facies; 7 - polarization anomalies (sulfides?); 8 - faults

Bedrock - trachyandesites
Alluvium
thickness - 3.5-7 m

Examples of areal studies Channel and valley placers

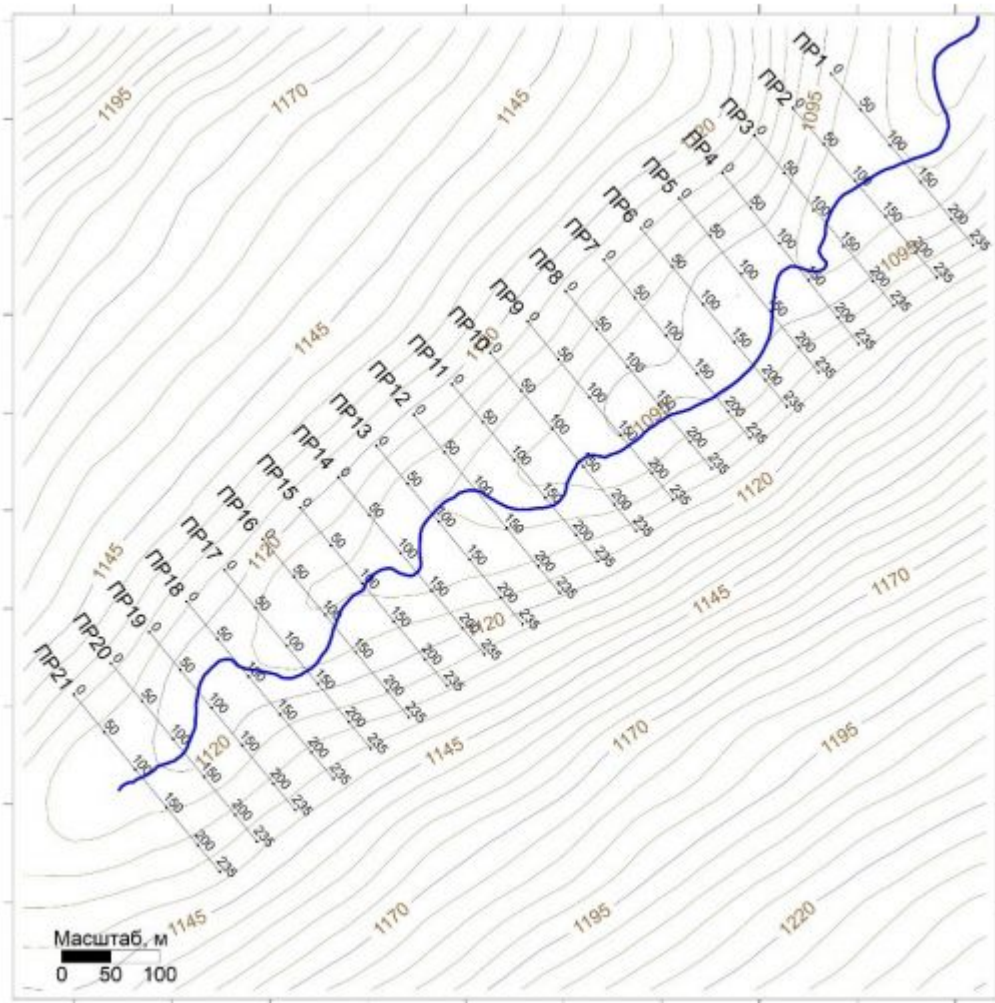


Geological characteristics of the site

The geological structure includes shales, phyllites, metamorphosed sandstones and gravelstones of the Lower Proterozoic.

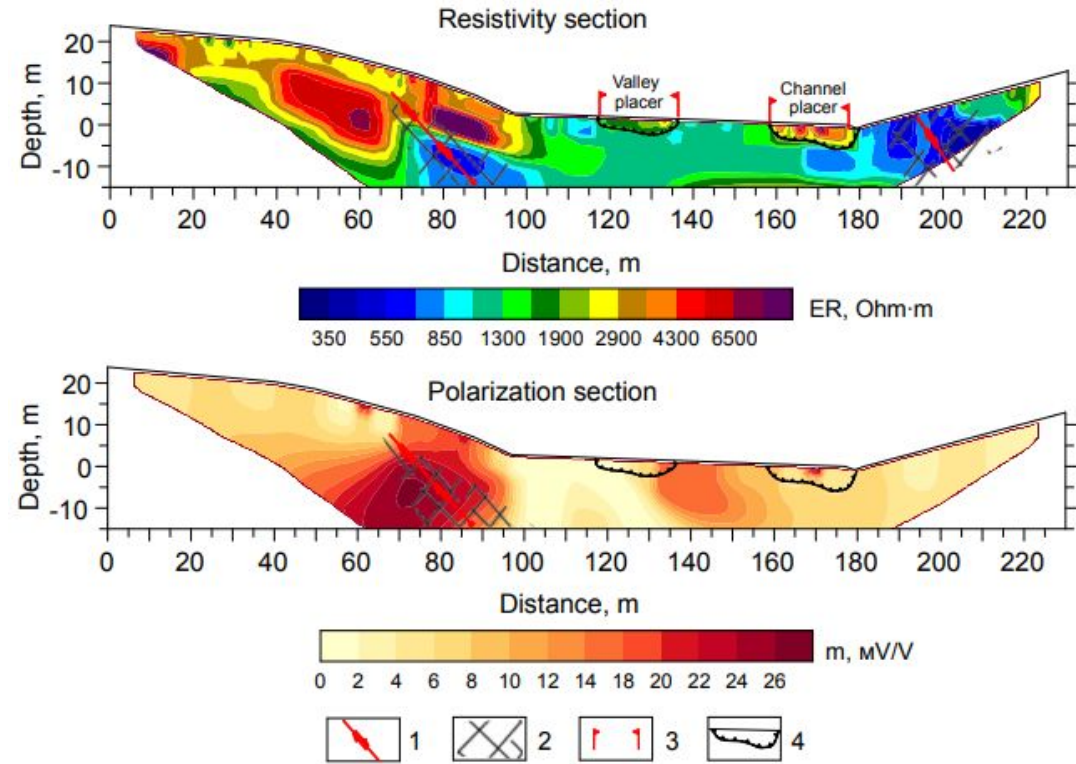
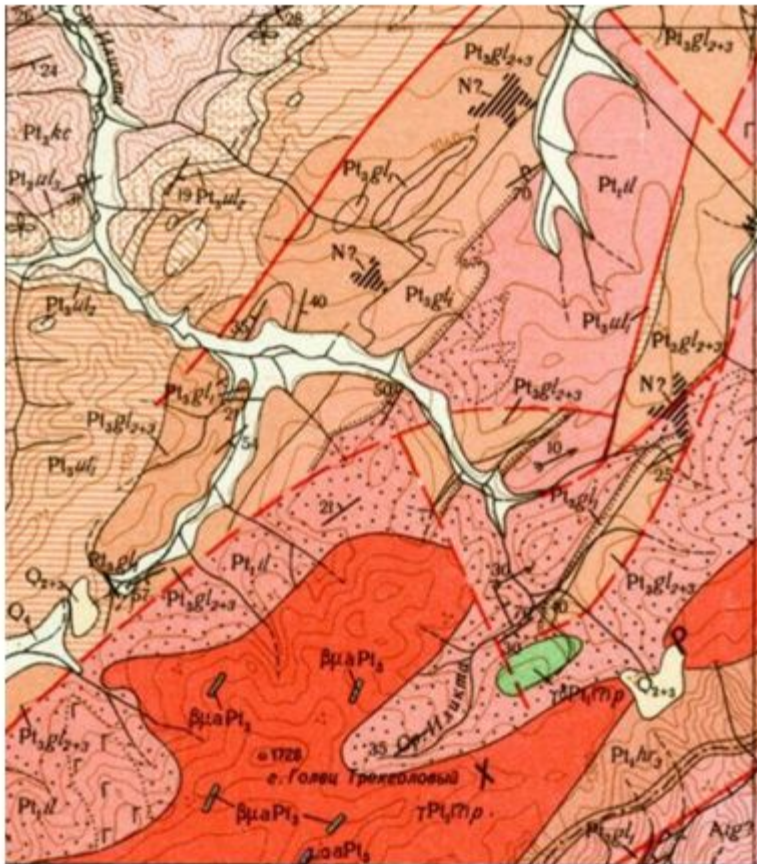
The formation of zones of sulfide mineralization is associated with tectonic activity and magmatism. They are controlled by tectonic dislocations of the northeastern strike, are characterized by increased gold content and, apparently, served as the main sources of metal during the formation of placers.

Examples of areal studies Channel and valley placers



- 21 profiles with an interval of 50 m
- Inter-electrode distance 5 m
- The length of the profiles was 235 m
- The measurements were carried out by a multichannel electrical prospecting station "Skala-48k12" (SibER-48k12)
- The sequence of connecting the electrodes corresponded to the symmetrical Schlumberger array.
- The polarizability of the rocks was measured in the time range of 20-100 ms.
- Chargeability parameter (m) of rocks is the ratio of the integral of the voltage measured in the time interval after turning off the current pulse to the voltage measured at the end of the current pulse.
- Data processing was carried out using the Res2Dinv and Res3Dinv programs. The inversion used the robust method

Channel and valley placers

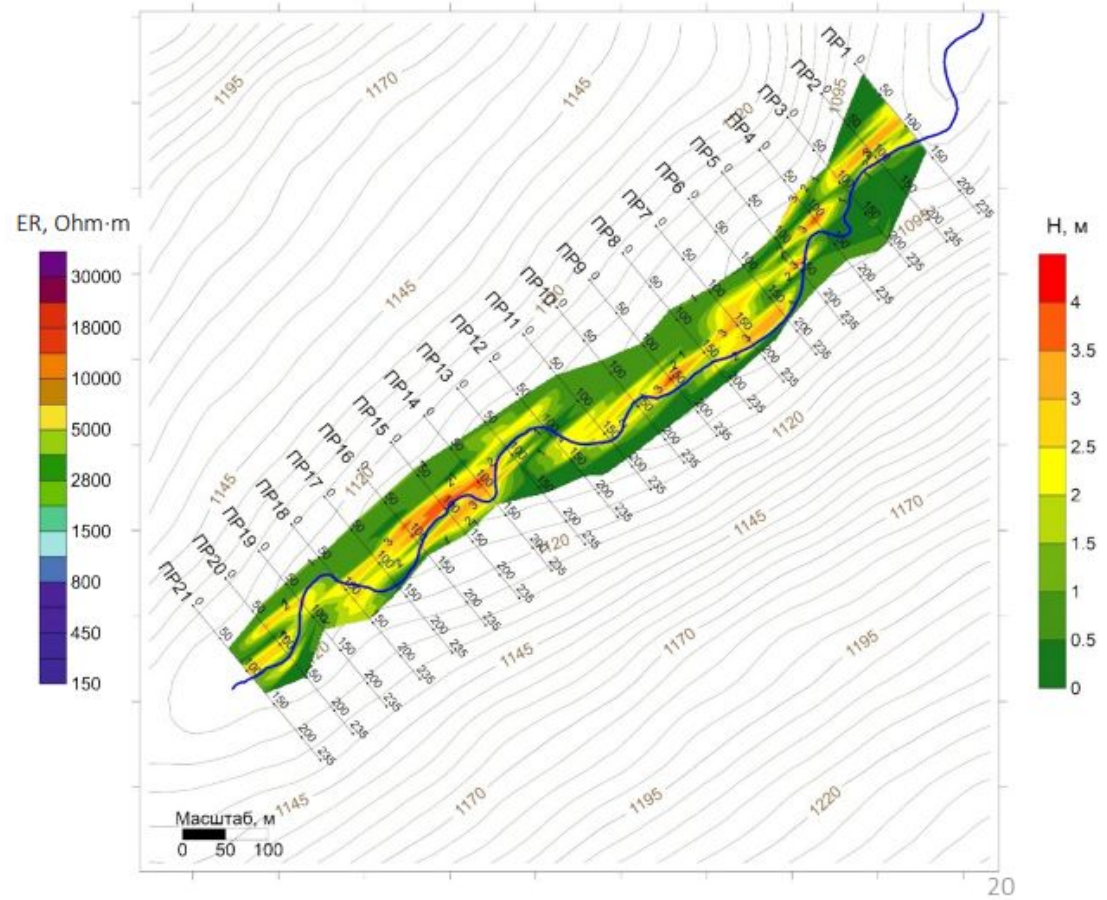
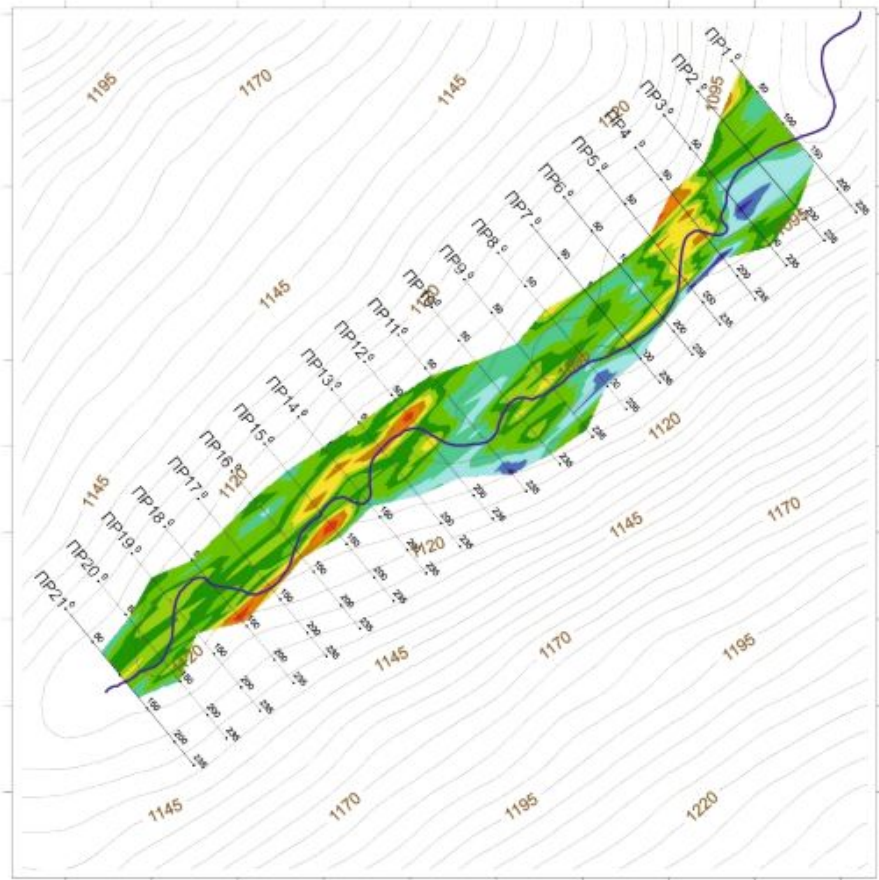


Geoelectric sections based on the results of 2-D inversion with elements of geological interpretation: 1 - fault, 2 - zone of crushing and shearing, 3 - boundaries of alluvial deposits, 4 - base of alluvial deposits.

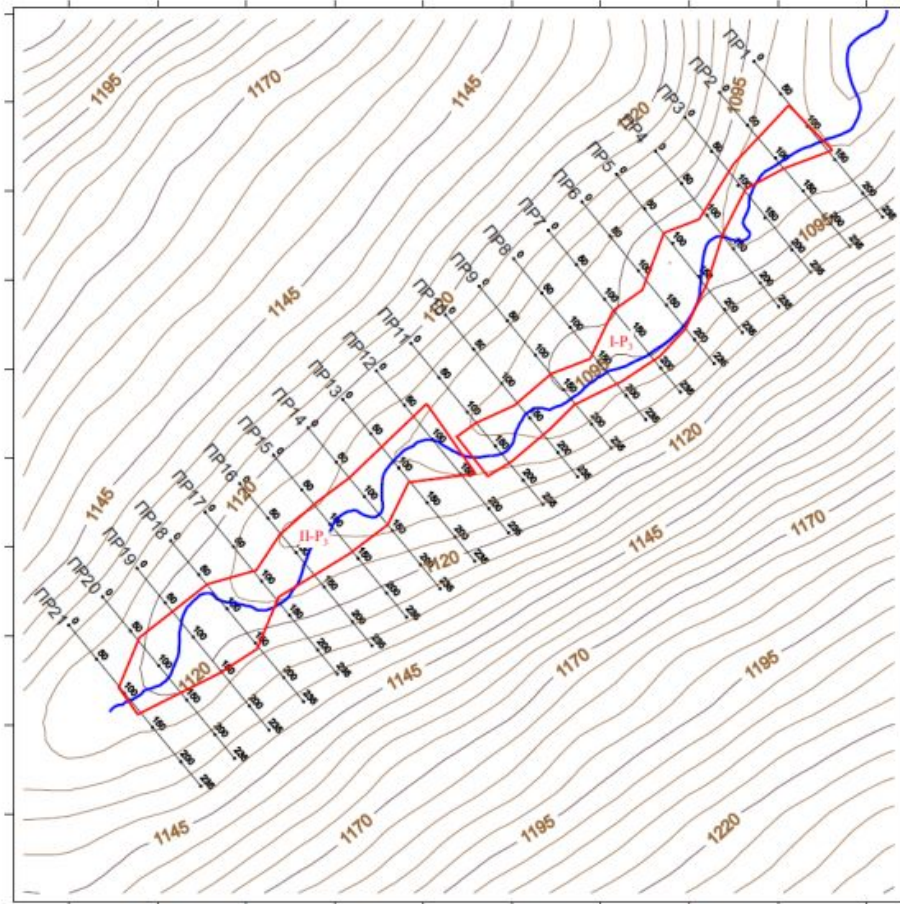
Channel and valley placers

Resistivity distribution map at a depth of 2.5-5.5 m

Loose sediment thickness map



Map of calculating blocks of indicated resources



counting block outline

Estimation of indicated resources

$$P = S \times h_n \times C$$

P - indicated resources of gold

S - block area : S_1 27300 m^2 , S_2 31400 m^2

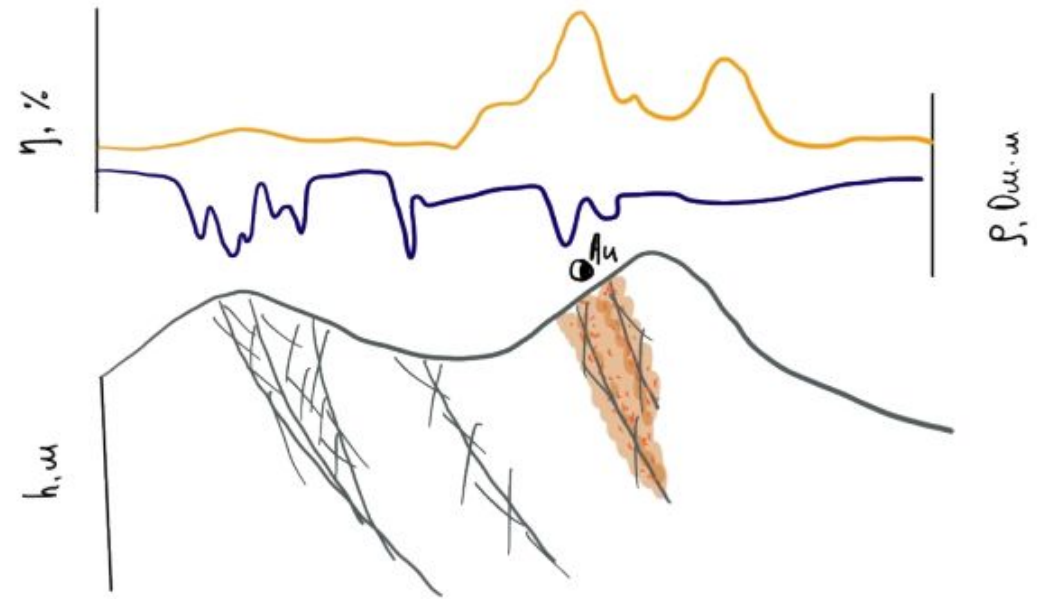
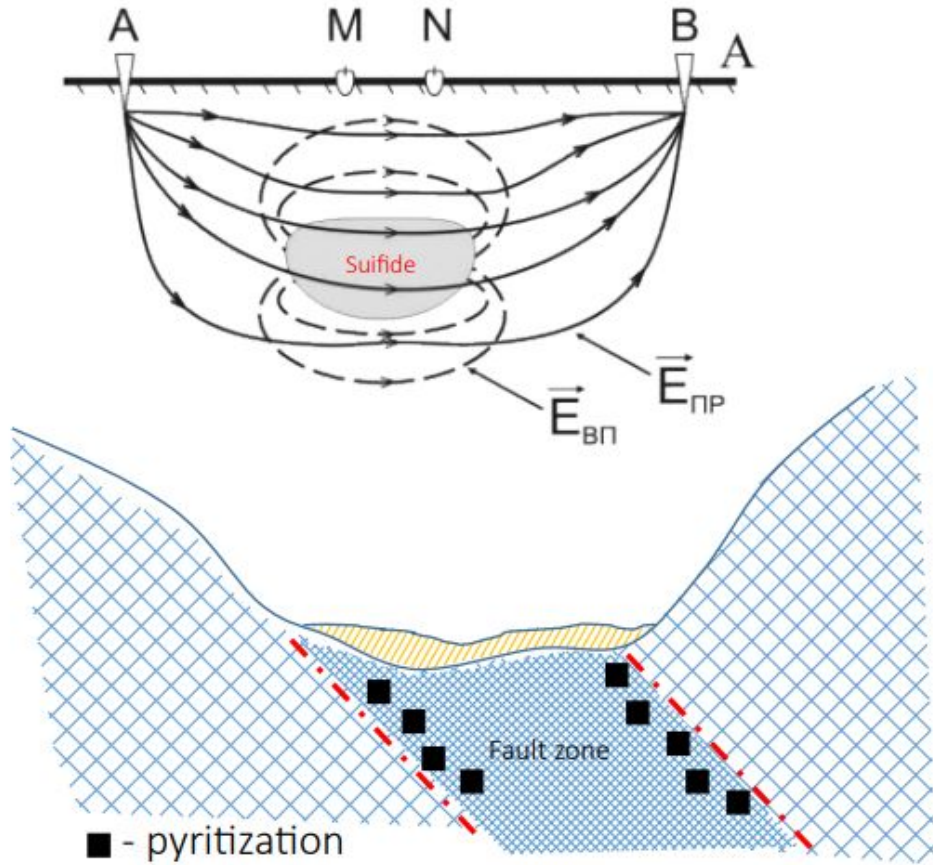
h_n - average reservoir thickness (0.5 m)

C - average gold grade (0.55 g/ m^3)

Block I-P3 - 7.51 κΓ

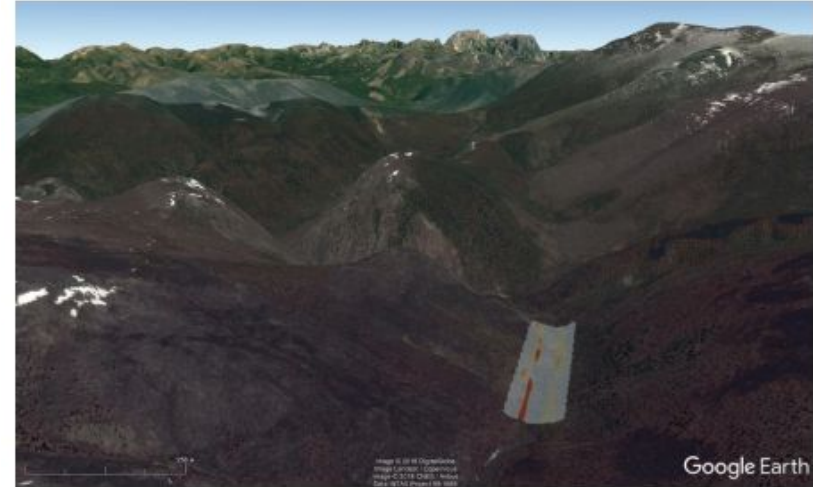
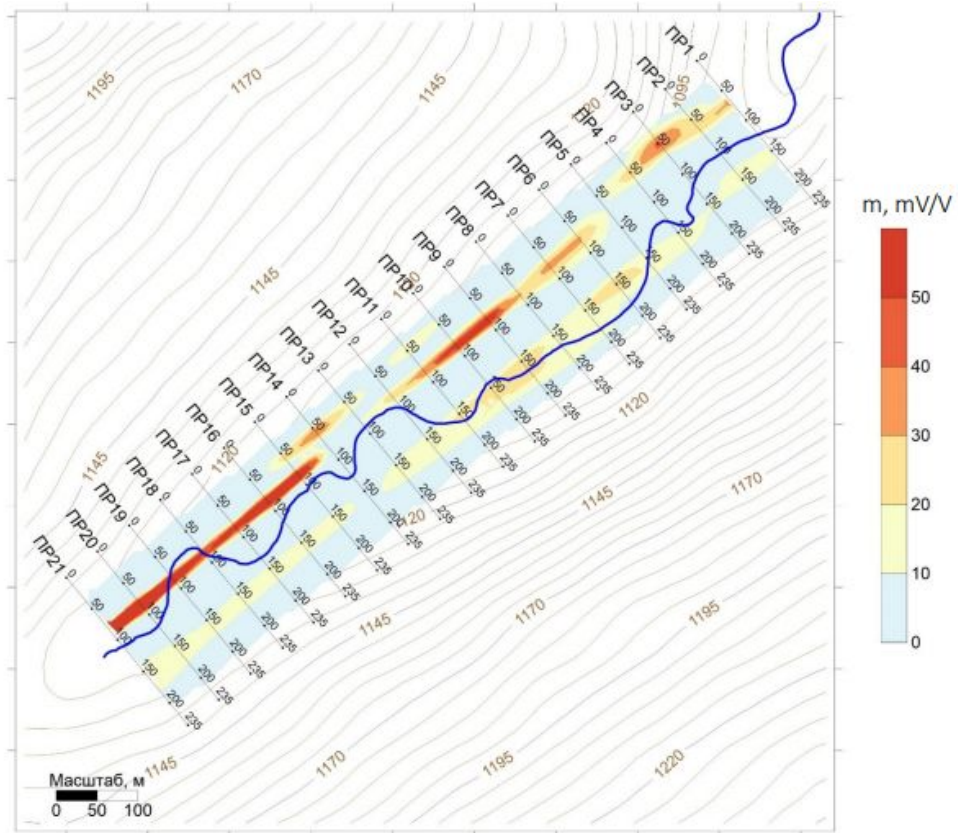
Block II-P3 - 8.64 κΓ

Sources of gold



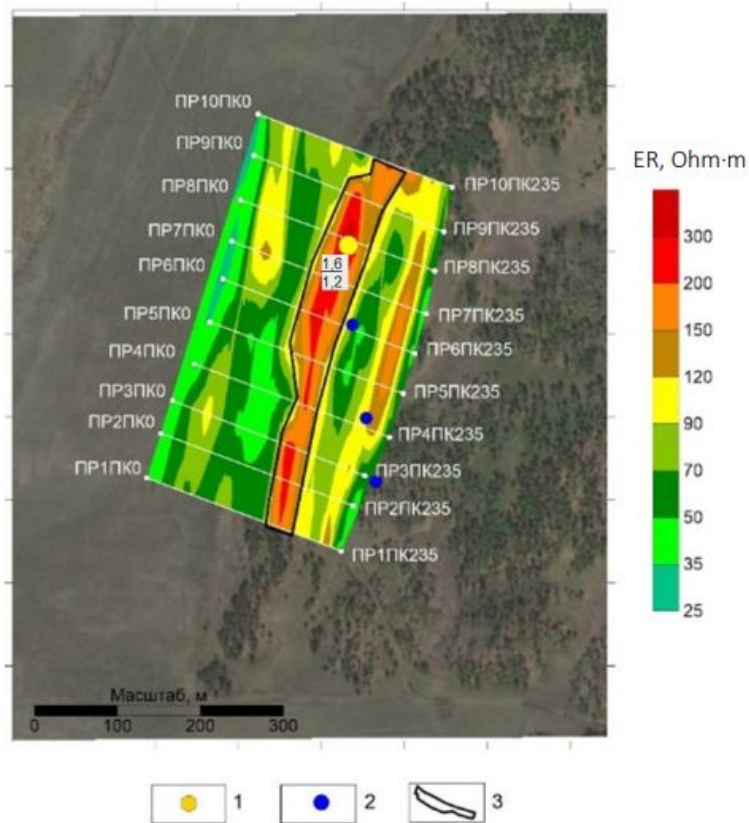
Channel and valley placers

Diagram of the distribution of the chargeability parameter (m) of rocks at a depth of 10 m according to 3-D inversion data

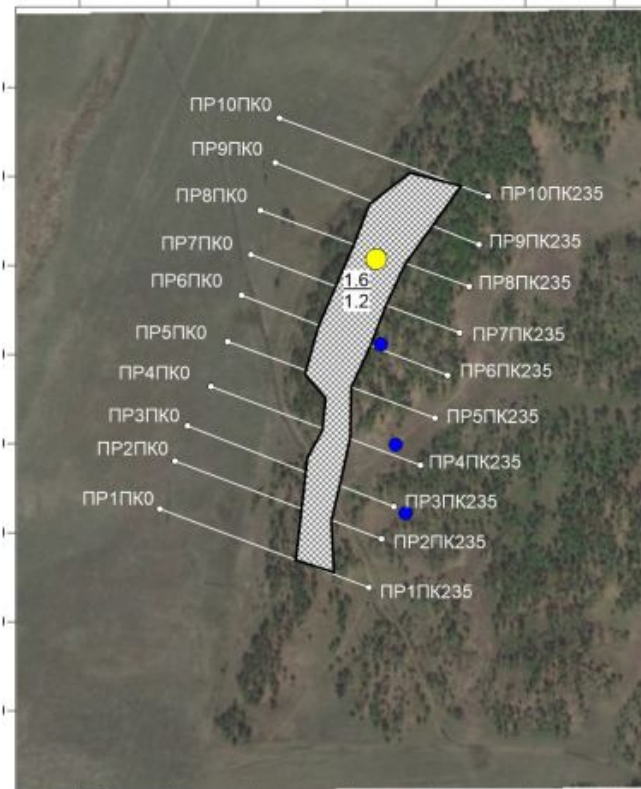


Examples of areal studies Valley placer.

Resistivity distribution map at a depth of 1.7-2 m



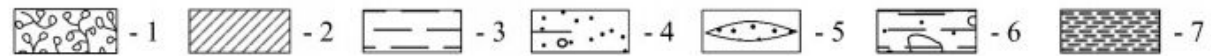
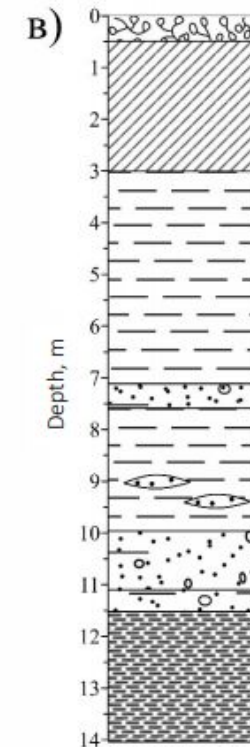
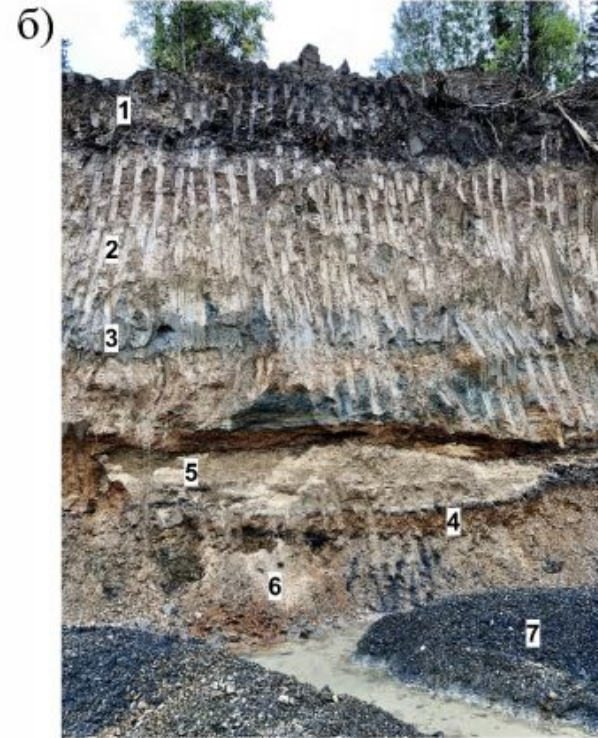
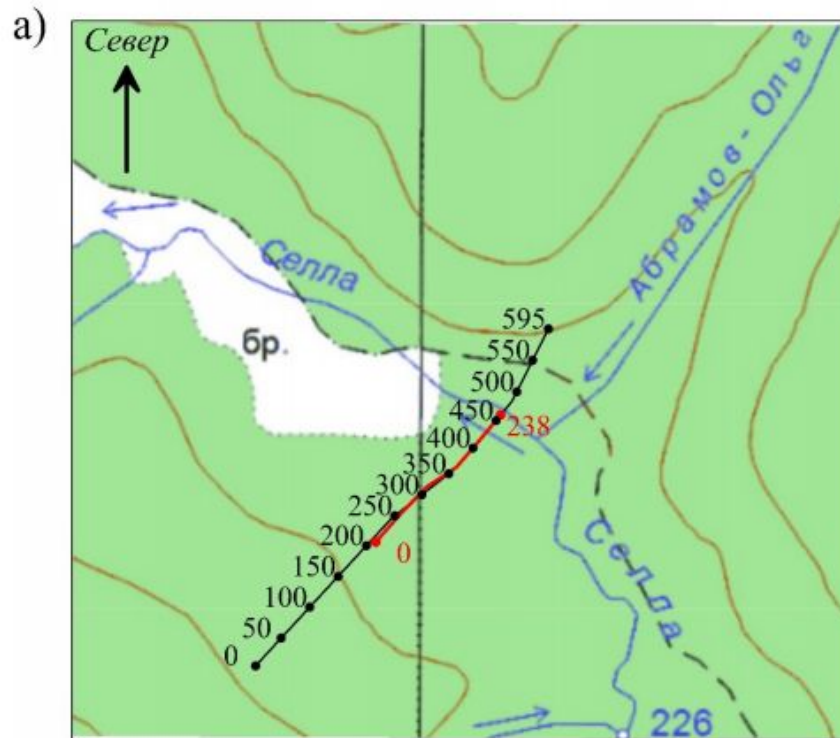
Accounted reserve blocks map



Gold content
Probable
reserves

$S=23000 \text{ m}^2$
 $H=1.2 \text{ m}$
 $V=27600 \text{ m}^3$
 $C=1.6 \text{ г/м}^3$
 $C2 = 22.08 \text{ kg}$

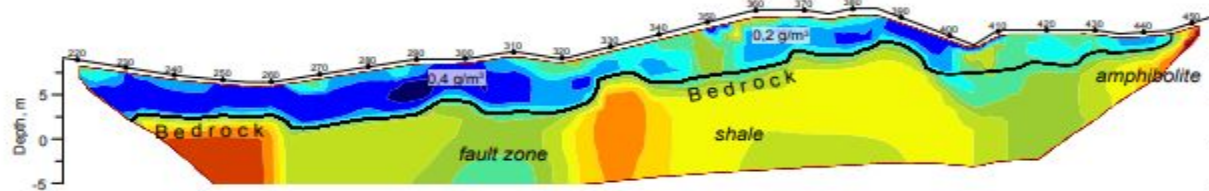
Dump placer



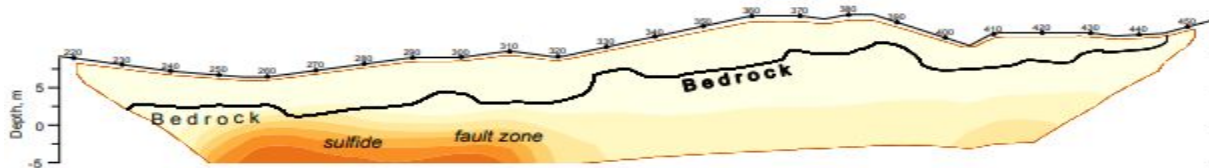
1 - soil-vegetation layer, 2 - Quaternary deposits, loams, 3 - brown clays, 4 - alluvial sand-gravel-pebble deposits with clay cement, 5 - sand lenses, 6 - sand-gravel-pebble deposits with clay cement and boulders, 7 - bedrock, shale with zones of sulfide mineralization

Channel and valley placers

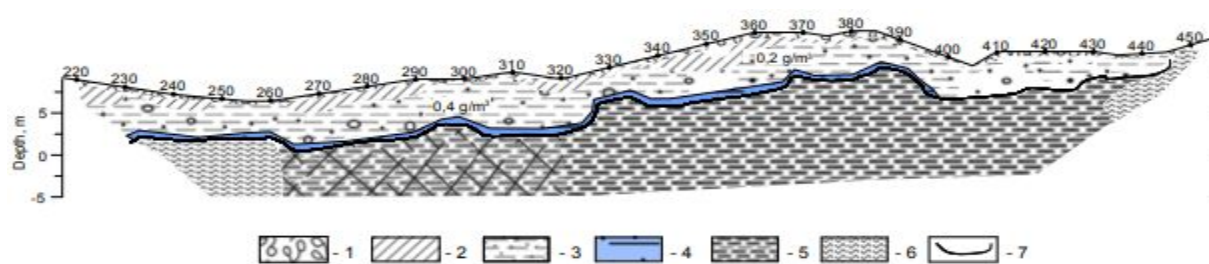
Resistivity section



Polarization section



Interpretation section



1 - soil-vegetation layer, 2 - loams, 3 - sand-gravel-pebble deposits with clay cement, 4 - gold-bearing layer, 5 - shales, 6 - amphibolites, 7 - roof of the bedrock

Conclusion

- The method of electrotomography makes it possible to confidently determine the boundary of loose sediments and bedrocks, and to identify pockets in the base.
- When distinguishing the channel facies of alluvium, the criterion for interpretation is its abnormally high resistivity.
- Additional information on the polarizability of rocks makes it possible to identify mineralized zones in the bedrock, which are sources of metal in the placer.
- Based on the results of the areal ET data, taking into account the borehole testing, it is possible to calculate the indicated resources of the category and even the probable reserves if there is data on the metal content in the reservoir.

Photo of work process



CONTACT INFORMATION

- **Website :** <https://laselat.com/>
- **Email :** info@laselat.com
- **Phone & WhatsApp (Asia / Europe):** +(38) 0975255545 +(38) 0950041306
- **Phone & WhatsApp (America):** +(56) 228334584
- **Headquarters:** Av. Ramón Pérez Opazo 2040, Office 701 Iquique, Chile.
- **Directors :**
 - Alexei Mankov (amankov@laselat.com)
 - Mauricio Mora (mmora@laselat.com)

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