GROUP POISK

СЕВАСТОПОЛЬСКИЙ ГОСУДАРСТВЕННЫЙ УНИВЕРСИТЕТ

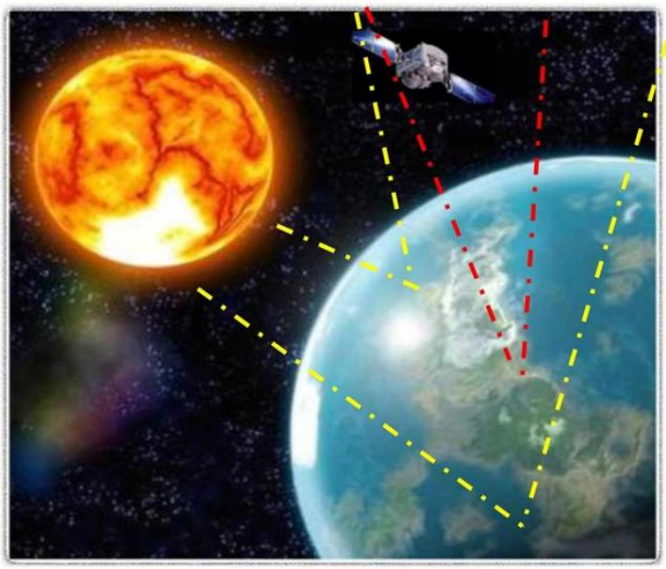
RSS-NMR SEVSU Poisk

THE EFFECTIVE METHOD OF GEOLOGICAL EXPLORATION

by the POISK GROUP:

Nuclear magnetic resonance in geophysics, Using the NMR Effect to Find Minerals

Radiation-chemical treatment of analogue aerospace photographs



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NAME FIRST NAME title	DATE	ACTION
Michel L Friedman (DESTOM Chartered 67/11)	2018/07/21	Creation rev. 00
Michel L Friedman (DESTOM Chartered 67/11)	2019/01/30	Redesign rev. 00
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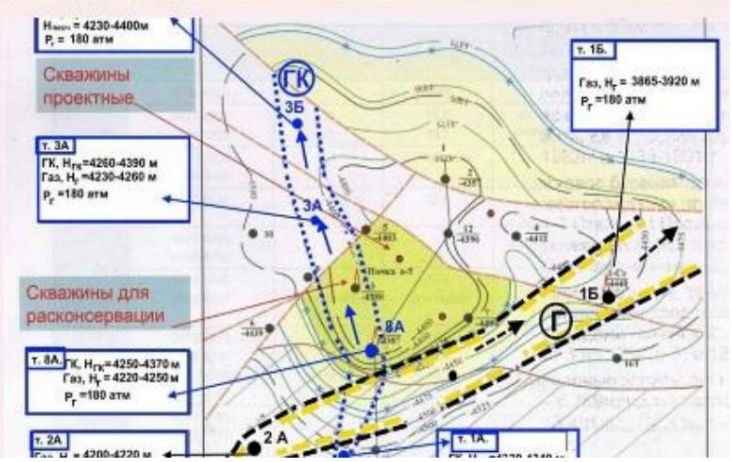
Operating sequence

№	list of works of remote detection and investigation of deposits
1	***Preparatory works*** Order and obtaining of aerospace photographs of the investigated territory. Order and obtaining of ultra-pure chemical reagents. Laboratory manufacture of test gel-wafers. Recording of electromagnetic spectrum of the sought-for substance on test wafers.
2	***Object identification*** Radiative processing of aerospace photographs on research nuclear reactor with test wafers of the sought-for substance and sensitive X-ray film. Chemical processing of negatives that have undergone radiative and energoinformational impact in the nuclear reactor.
3	***Contour object deciphering*** Visualization of object contours and also incoming and outgoing torrents with the help of Kirlian-camera. Obtaining of computer image with the help of digital camera connected to Kirlian-camera.
4	***Photogrammetric calibration*** of computer image of the object (geographic connection of the image's points and the area).
5	***Object's fixation*** – definition of its size, form and location on the area according to the photograph.
6	***Analytical data processing*** obtainment of coordinates of beds and calculation of supplies
7	***Preparation of report*** and providing the Customer with it



1 INTRODUCTION

LLC "Poisk Group" jointly with Sevastopol State University presents to your attention
Our very effective and proposed method for searching for minerals which is based on the use of the nuclear magnetic resonance (NMR) effect by measuring the spectra of the nuclear spins of the atoms of substances in the Earth's magnetic field.

This effect was used to create a set of research equipment and associated methods and technologies, which have the general name of

“Poisk Geo Holographic Equipment Set”.

The entire set of equipment, methods and technologies themselves were developed by specialists of our Laboratory in cooperation with scientists from Sevastopol State University.

Our equipment and technology are protected by patents and copyright certificates for methodology and calculations.

In the field of geological exploration, our method allows you to considerably reduce the costs of research and delimitation of deposits by marking areas which present the presence of the desired material.

Before embarking on a 2D/3D seismic campaign This makes it possible to reduce the exploration area to smaller and easier to manage areas, or even to plot according to the geology and geophysics of the area in order to have blocks to Vibrate which will be homogeneous.

Then, thanks to our method, we can make very specific exploration wells instead of carrying out a systemic drilling campaign. Thanks to Geo Holography you will be able to carry out so-called “exploratory” drilling in predetermined locations and reduce the number of exploration wells to a minimum per zone highlighted during the first phase.

RSS-NMR is also used for very special research in a discreet way

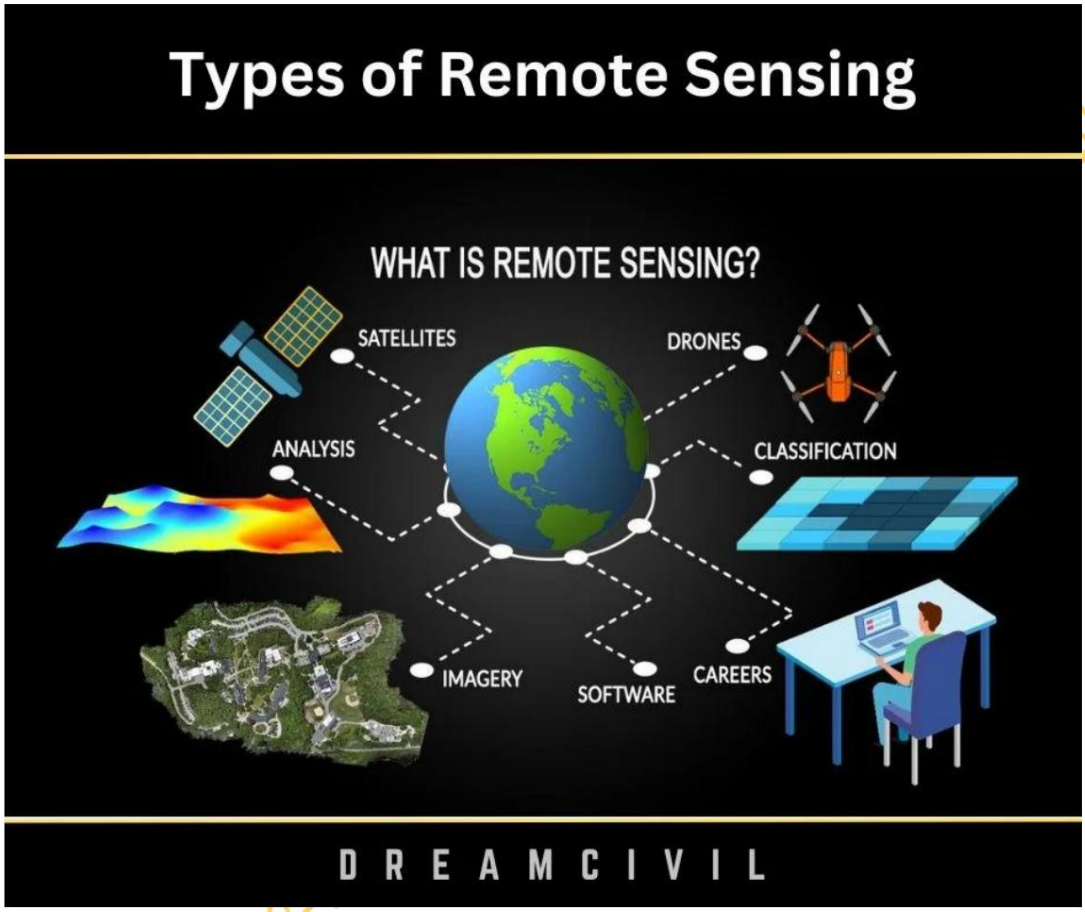
- Illegal dumping with the burial of dangerous substances such as explosives, • Toxic substances from diverted strategic ore loads. • Galleons at the bottom of the sea with loads of gold or silver • Ships with historical value

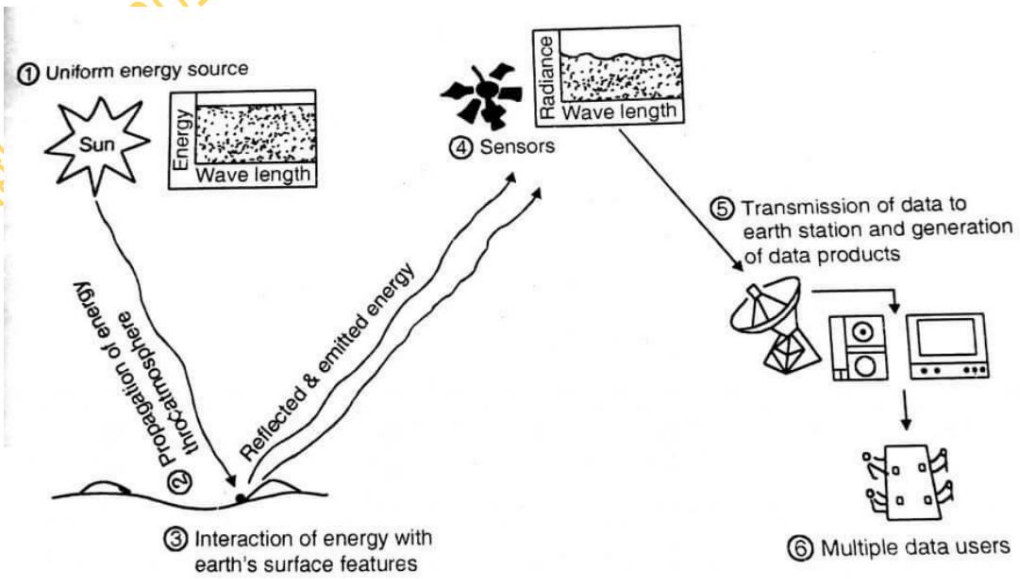
- Ships or planes that have sunk in the deep sea with strategic cargo
- Search for “lost” nuclear sources.

RSS: **Remote Sensing Survey** A crucial discipline for event identification and prevention. If you are unfamiliar with this complex science, go to https://civilcrews.com/remote-sensing/

More very technical information at https://dreamcivil.com/types-of-remote-sensing/

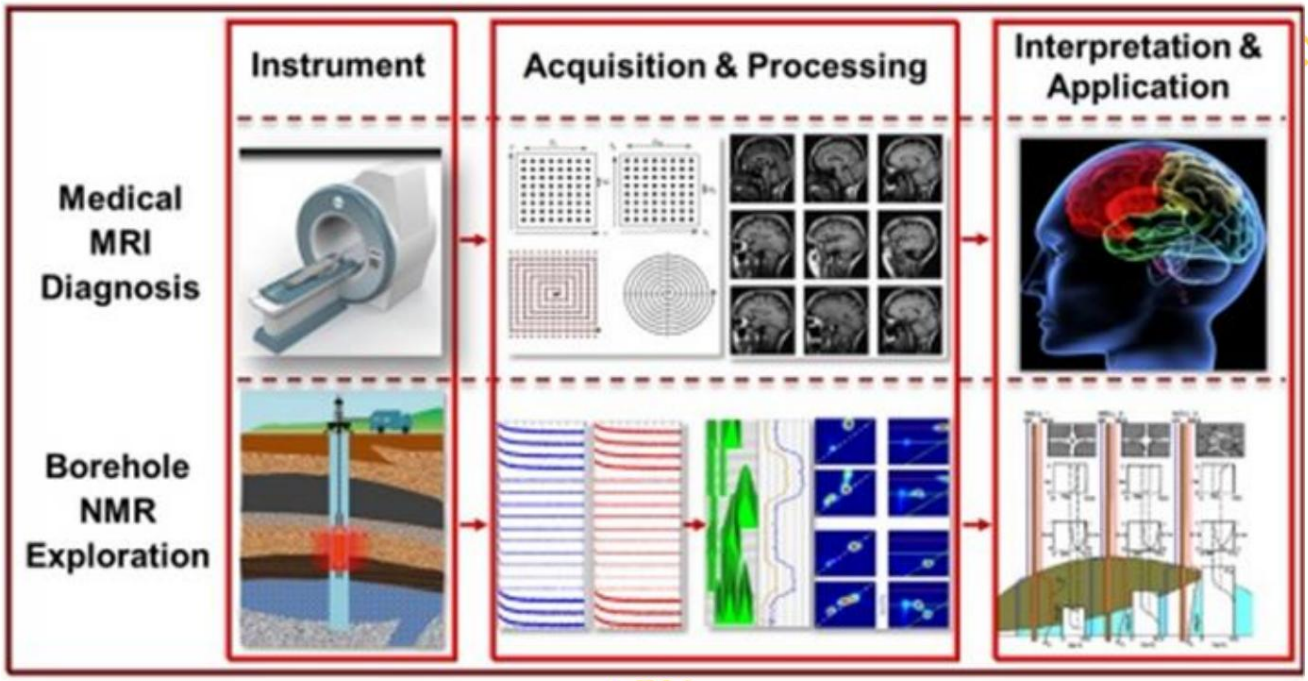
Investment and mining project tools https://investingnews.com/daily/resource-investing/precious-metals-investing/gold-investing/introduction-to-remote-sensing-and-mineral-exploration/





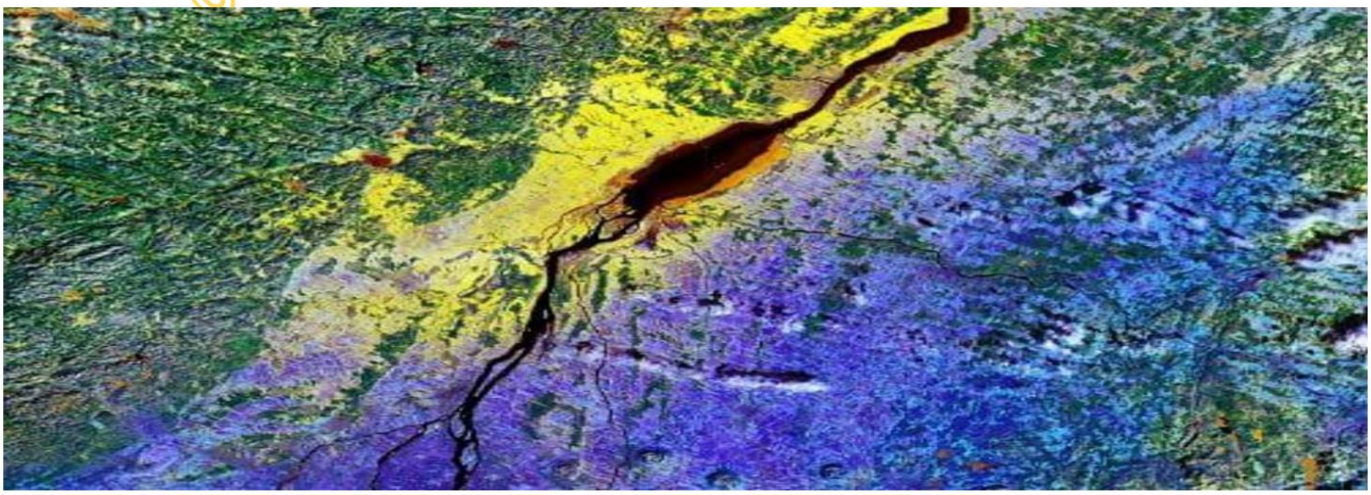
NMR: Nuclear Magnetic Resonance

NMR is a spectroscopic method for analyzing matter, based on the magnetic properties of certain atomic nuclei. The sample to be studied, placed in a very intense magnetic field, acquires nuclear magnetization which is detected by its resonance with an electromagnetic field.



Holography

This is an important area of modern optics. The first holograms were made by D.
Gabor in 1948. These were of poor quality due to the difficulty of obtaining a coherent luminous background. Since the appearance of the first laser (1962), producing holograms is now easy. Several recording methods have since been developed and make it possible to obtain three-dimensional images of remarkable quality. Although spectacular, the production of three-dimensional images is not the only application of holography. Interferometry has also benefited from this new technology and now makes it possible to interfere with waves recorded at different times. It is now possible, for example, to study the natural modes of vibrations of surfaces or complex volumes.



General Idea

A large number of different signals is obtained in the process of shooting. Signals that are of interest to us representing the molecular structure of minerals are in the infrared (IR) range. Their level is very low and can be captured only by analogue images.

In line with this, our task is to filter useful infrared range signals with the help of resonance and, further, to subsequently visualize them (transfer of IR range signals into the visible frequency range). The general diagram of this approach is shown in fig. 1 and fig. 2.

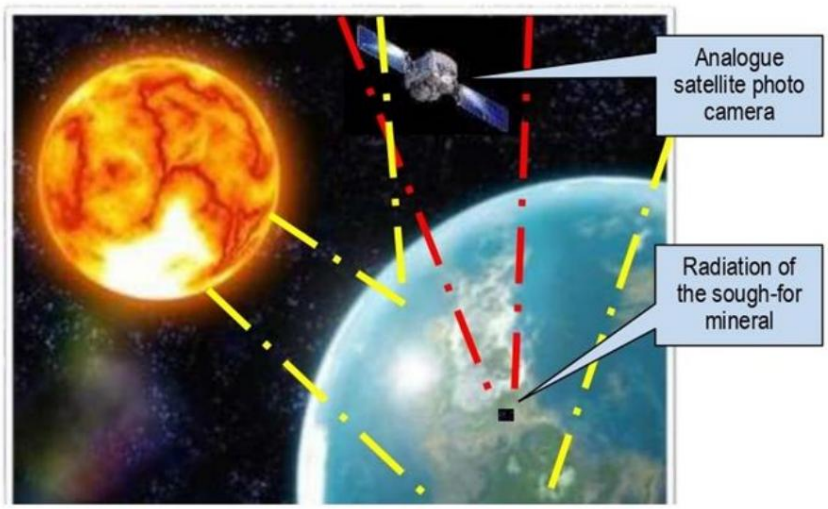
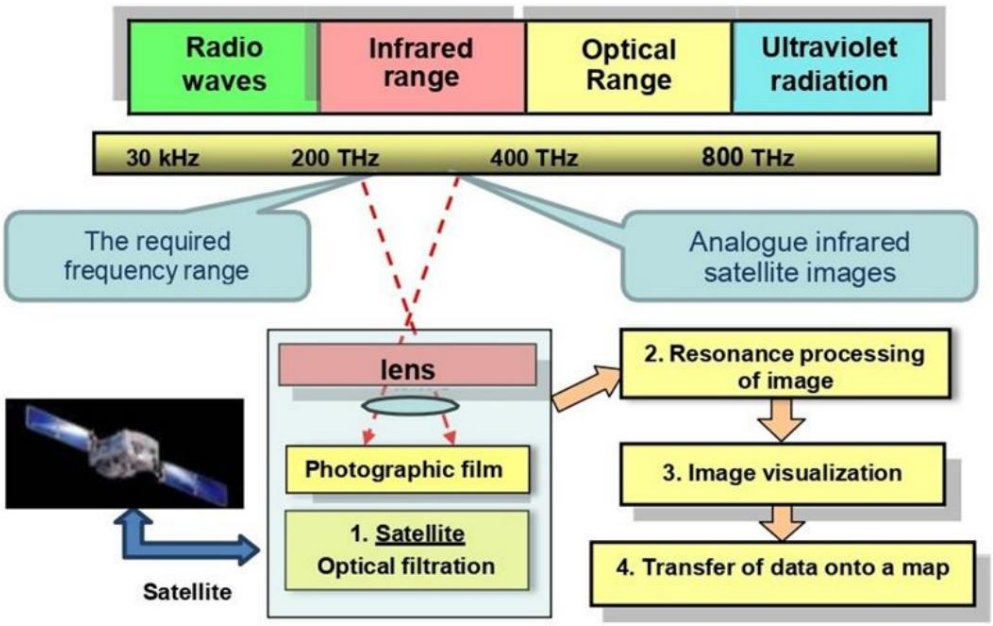
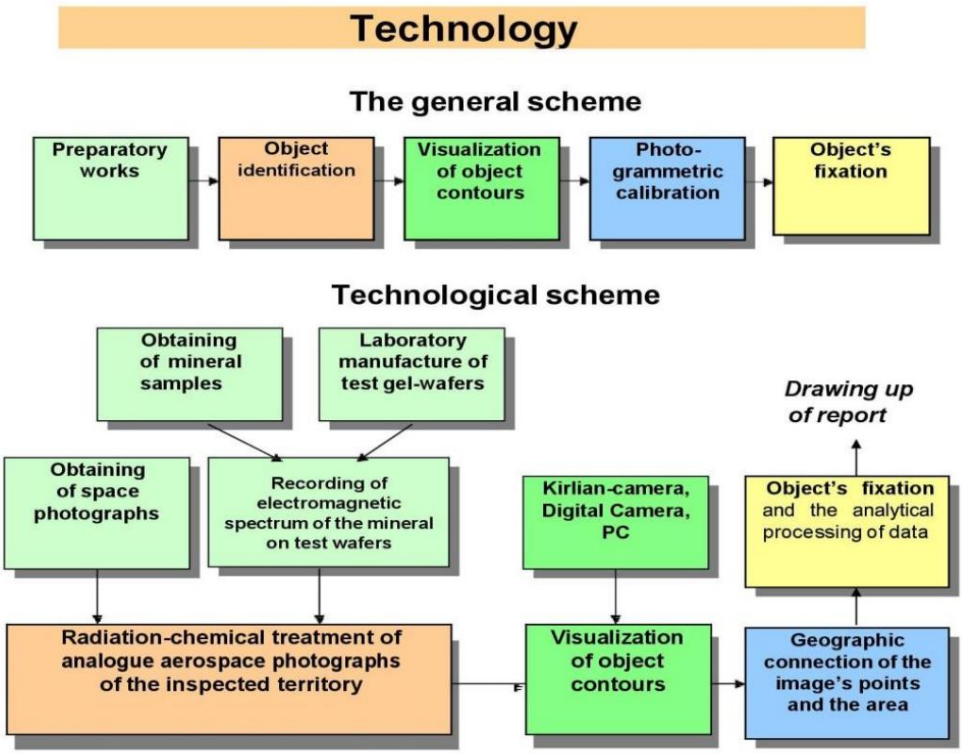


Fig. 1



2. Operational part of an RSS-NMR exploration operation



PHOTOS FROM SPACE or RSS

The first step in investigating an area of interest on the Earth's surface begins with acquiring and processing satellite images of the area using Earth Remote Sensing (ERS) methods.

Satellite images are processed on a set of special stationary equipment to identify possible anomalies of the desired substances and determine promising search areas.
To process satellite images, spectral data of samples of targeted substances obtained using the IR-100 nuclear research reactor are used. The WGS 84 system is the basis of our geographic reference system. **(WGS84: World Geodesic System) -**
revision of 1984).

It is a terrestrial coordinate system, based on a reference geoid taking the form of an ellipsoid of revolution. WGS84 is a coordinate system comprising a model of the earth. It is defined by a set of primary and secondary parameters:

- the primary parameters define the shape of the earth's ellipsoid, its angular velocity, and its mass.
- secondary parameters define a detailed model of Earth's gravity.

These secondary parameters are made necessary by the fact that WGS84 is used not only to define coordinates, but also to determine the orbits of GPS navigation satellites. This system is not based on the Eurasian plate, continental drift means that it cannot be used

for precision better than the meter (plate movement of 0.95cm per year). For this reason, the legal system for expressing geographic coordinates in France is the RGF93 system.

The reference ellipsoid of the WGRS84 system is GRS 80 (semi-major axis a = 6,378,137.0m, 1/f = 298.257,222,101). The "GPS coordinates" returned by a GPS receiver are actually a latitude, longitude and altitude in the WGS84 system. WGS coordinates are unique and do not change,
GPS coordinates are based on a complex system of satellites see https://www.garmin.com/fr-FR/aboutgps/ .

GPS SIGNAL ERROR SOURCES

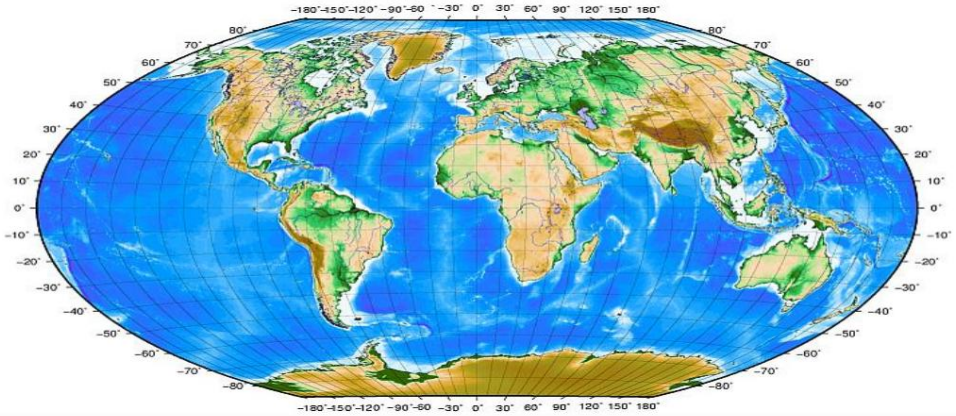
Factors that can affect GPS signal and accuracy include:

- **Delays caused by the ionosphere and troposphere:** satellite signals slow down when they pass through the atmosphere. The GPS system uses a built-in model to partially correct this type of error.
- **Signal multi-pathing:** The GPS signal may be reflected by objects, such as tall buildings or large rock surfaces, before reaching the receiver, increasing signal travel time and causing errors. The L5 signal improves the receiver's ability to sort reflections and line-of-sight signals.

- **Receiver clock errors:** A receiver's built-in clock may exhibit slight timing errors, because it is less precise than the atomic clocks of GPS satellites.
- **Orbital errors:** The reported position of the satellite may not be accurate.
- **Number of visible satellites:** the more satellites a GPS receiver can “see,” the better the accuracy. When a signal is blocked, position errors may occur, or even the position cannot be read. GPS devices don't typically work underwater or underground, but high-sensitivity receivers can track certain signals inside buildings or under trees.

- **Satellite geometry/shading:** Satellite signals are most effective when satellites are placed at wide angles to each other, rather than in a line or close grouping. This is why altitude is generally not as accurate as horizontal position.
- **Selective Availability (SA):** USDOD formerly applied SA to satellites, which made signals less precise in order to prevent “enemies” from using highly precise GPS signals. The government deactivated SA in May 2000, which improved the accuracy of civilian GPS receivers.

- **AMAS:** Since 2004 we have noticed a drop in oil discoveries, we attribute this to the South Atlantic Magnetic Anomaly) or for protection the satellites flying over the area are placed in off mode due to magnetic radiation. There are therefore errors which completely distort the taking of coordinates, not at the time of their taking and recording but when we go from seismic to test wells by the movements of the poles, the setting changes by the movement of the pole .



Geographic Coordinate Systems with lines of Latitude, parallel to the equator, and lines of Longitude, which start with the Greenwich meridian (near London)

LABORATORY Stage 1

At this stage, a comprehensive analysis of the satellite images is carried out with the identification of promising search areas, a preliminary delineation of anomalies identified by spectral analysis methods and the map information is prepared for traveling to the area of interest

Spectral matrices are also being prepared for the field part of the Poisk equipment. To obtain spectra, rock samples from the studied deposits or similar
are used. For this task, various devices of Poisk equipment are used.

FIELD WORK Stage 2

Then the work continues in the field, with a departure towards the search area of the search group, armed with mobile field equipment. On-site measurements are carried out, anomalies found are described in detail, equipment surveys are carried out to construct a three-dimensional model of the ore bodies and areas of occurrence of the required minerals thus depths are determined.
The terrain of the "Poisk" complex makes it possible to determine the presence of the substances sought up to 6000 m, both Onshore and Offshore.

PRESENTATION OF THE RESULTS OF THE WORK

Based on the data obtained from preliminary studies and field measurements, a report is drawn up on the results of studies of a given area with the provision of cartographic information, profiles and contours of deposits, etc. to the customer.

Recommendations are given for drilling test wells with columns of approximate depth. Fossil resources are evaluated for the identified deposits.

Depending on the tasks set by the customer, certain calculations and construction of three-dimensional models of deposits are carried out. The prospects for using existing wells in hydrocarbon fields, water, etc. are evaluated.

Thus, the proposed method of geological exploration, based on the methods of the nuclear magnetic resonance effect, allows you to significantly accelerate the geophysical exploration of mineral deposits, reduce the cost of work by 100-1000 times while which can significantly increase the accuracy of searches.

Thus, the geological exploration method proposed to your attention, based on our author's methods using the effect of nuclear magnetic resonance, allows you to significantly accelerate the geophysical exploration of mineral deposits, reduce the cost of work on 100 to 1000 times and considerably increase the precision of searches. The dignity of the method has been confirmed by more than 280 works carried out by our collaborators, each of which evokes positive feedback and gratitude.

Our collaborators, together with scientists of Sevastopol State University, have published more than 300 scientific articles and works devoted to the theoretical foundations, development and use of the NMR method and, in particular, Poisk equipment used in geophysical mineral exploration.

EXPERIENCE

The list of technologies we have already developed allows us to explore the following minerals:

- Hydrocarbons (oil, gas, gas condensate), • Water,
- Copper ore, • Uranium ores, • Gold, silver, molybdenum, manganese ores, • Other metal and poly metal minerals, • Polymetallic nodules from the seabed, diamonds (tracing of the Kimberlite source rock),
- Uncontrolled dumping with the burial of dangerous substances (explosives, toxic substances, etc.)
- Much more, such as galleons at the bottom of the sea, boats or planes that have sunk in the deep sea.

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For each of the listed items, we have experience working in various regions of the world - Russia, Ukraine, Italy, UAE, Saudi Arabia, Africa, USA, Bahamas, Mongolia, Indonesia, Australia, etc.

Mineral exploration is carried out both on land and on the shelves of the seas and oceans.

The Reliability of the method has been confirmed by more than 280 works carried out by our collaborators, each of which causes positive feedback from customers and together with scientists of Sevastopol State University, published more than 300 scientific articles and works devoted to the theoretical foundations, development and use of the NMR method and, in particular, Poisk equipment used in geophysical exploration of minerals.

Main Principles of the Technology

Our scientists have developed and successfully apply an innovative technology of remote search and prospecting of minerals deposits

Classification

"Direct" method of remote sounding of Mineral Deposits

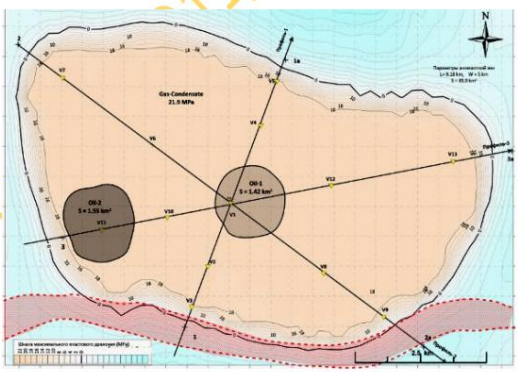
Nuclear magnetic resonance

Use of aerospace photograph	*Work on site*

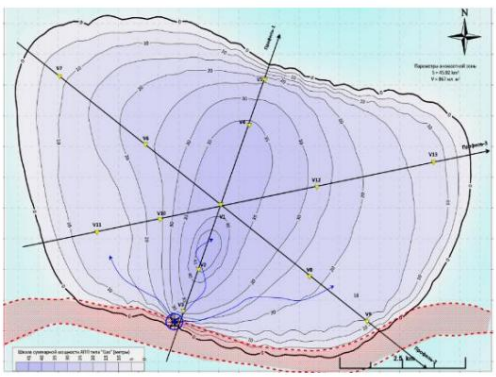
Thanks to resonance, which we arouse in sought-for substances, we “see” deposits of minerals underground and precisely define their parameters

Detailed remote survey of deposits (3D)

- Survey areas can range from units to hundreds of square kilometers. The duration of the exam is 1/4 month.
- As a result of the survey, we obtain the following data:
  - updating of the ground contours of deposits and fault zones,
  - areas and viewpoints for well drilling,
  - the number of horizons, their thickness and depth,
  - the presence of gas plugs and the pressure in them, water horizons;
  - transverse & longitudinal sections of the deposits, 3D model;
  - the available reserves of the deposit



OIL



GAS

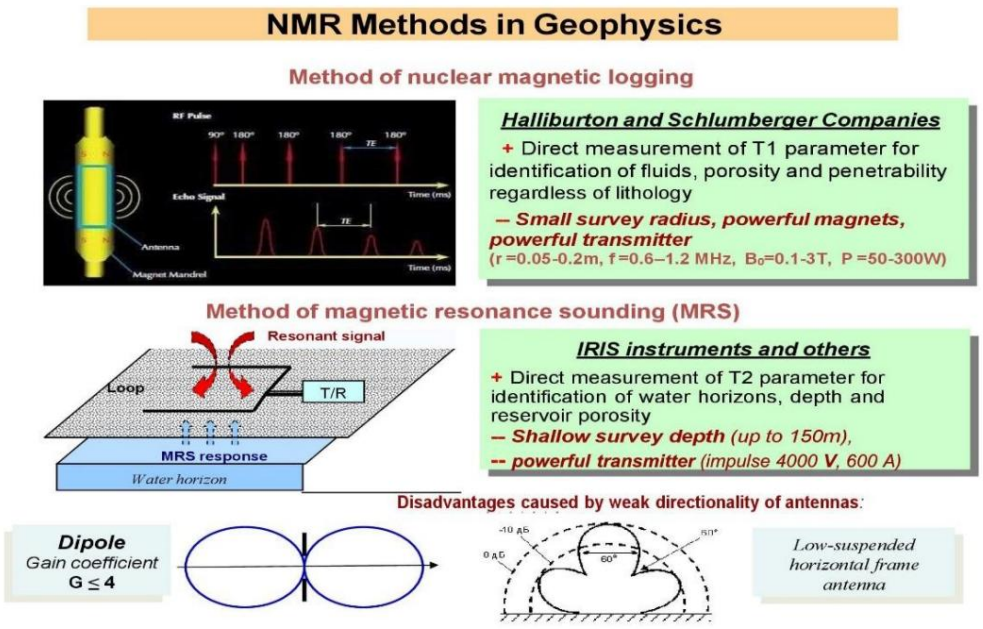
Scientific part

STAGE 1 OR THE FIRST STEP

The first step in mineral exploration is to remotely survey (using satellite images or aerial photographs) a given search area, identify promising areas, and prepare the data for field work . To do this, the following procedures are carried out sequentially:

The study of samples of oil, gas, ores with different concentrations of metals or groundwater (potable, weakly mineralized or salty geothermal waters), recording information-energy spectra from them (atomic spectra of metals and non-metals in a wide range and spectrum) or the atomic spectra of reference (typical) metals are included in their composition.

The transfer of information and energy spectra of research agents (oil, gas, GC, ores of various metals, groundwater, etc.) is carried out on special “test” and “working” media (matrix) , made from nanomaterials and organometallics with radiation.
A subsequent chemical treatment (“stitching”) is carried out and the concentration of the nanomaterials is measured using the neutron activation method.

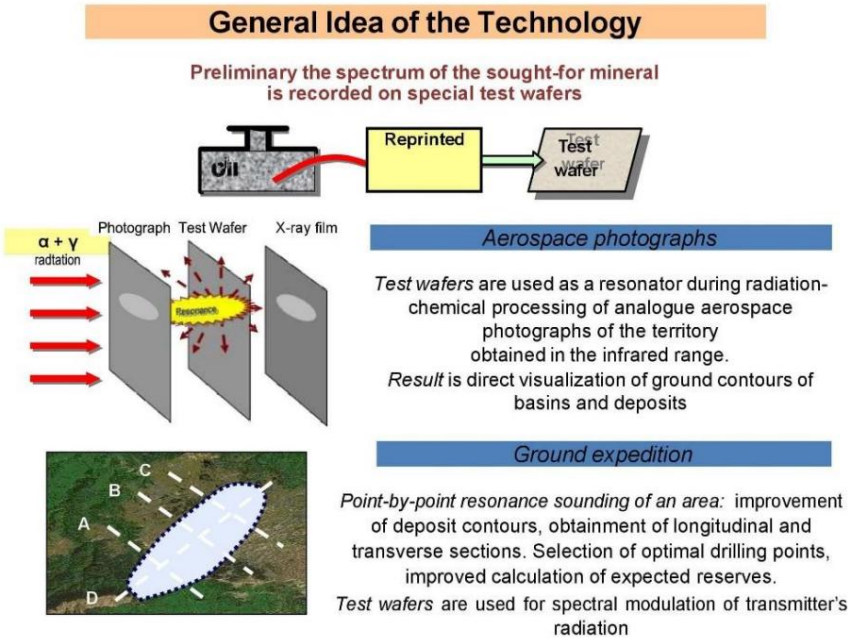


VALIDATION AND CALIBRATION

The equipment of the stationary land survey complex and the mobile geophysical resonance testing equipment (NMR equipment) are verified and calibrated in the Poisk complex laboratory by carrying out remote identification of well-defined samples (standard) under well-established laboratory conditions of use.

Carrying out spatial or aeronautical photographic reconnaissance of the studied area (or purchase of ready-made analog photographs of the studied area).

Processing of space (analog) or aerial photographs with special layers of gel solutions and phosphors, then irradiation of these with doses of 5 X104 Rem.



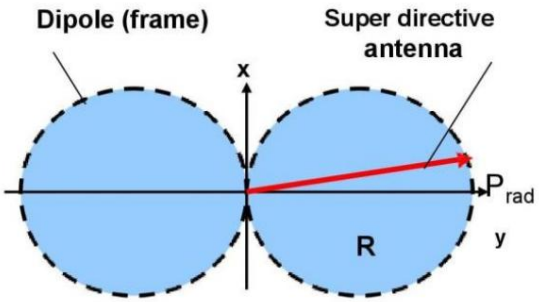
Visualization on these is obtained of areas with specific hydrocarbon anomalies because in each photograph there is only one type of hydrocarbon to highlight or ore anomalies of various metals since each photo shows only a specific type of ore with a specific concentration of metal). Similar treatment of photographs for areas containing groundwater (for each salt concentration).

The anomalies visualized from the spatial images are transferred to a georeferenced satellite image (using Google mosaics, Landsat, etc. with a coordinate grid) then to a map of the area studied. We proceed to determine the areas of detected anomalies.

We have the determination at one point of the anomaly of the approximate depths of the occurrence of oil and gas reservoirs, or mineralization of various metals or aquifers, of various waters (fresh, slightly mineralized, saline, geothermal). The depths of occurrence are calculated by the magnitude of the displacement of the boundaries of an anomaly, obtained simultaneously on 2 satellite images, but carried out with different inclinations of the satellite orbits. The duration of the work of the first stage can last up to 3 months. The probability of detecting and delineating the anomaly based on the results of the first stage is 65-70%.

Our way - Increase of Radiating Power

Application of super directive antenna



Antenna's radiating power:

$$P_{rad} = \eta_A \cdot G_A \cdot P_{tr}$$

where **Ptr** is transmitter power,

η_A – antenna's coefficient of efficiency,

GA – antenna's gain coefficient,

For dipole $G_A \sim 4$,

For directive antenna:

$$G_A = S_1/S_A = 4\pi \cdot R^2 / S_A,$$

where S_A is effective antenna area.

With R = 1m and $S_A = 10^{-6}$ m^2 we receive power increase of superdirective antenna

$$G_A = 4\pi \cdot 10^6 \sim 12 \cdot 10^6$$

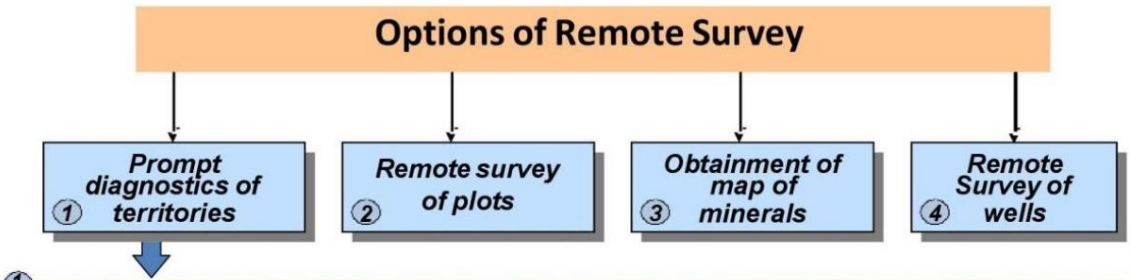
Increase of Prospecting Accuracy

The considered systems use sinusoidal resonance signal. However, oil consists of 1,000 substances, therefore in order to reach maximum identification of the sought-for mineral it is necessary to excite resonance in all types of molecules of the sought-for substance

Thus, the main idea of the innovative method lies in

"Point-by-point sounding of an area with frequency spectra that excites resonance in the sought-for substance"

Options of Remote Survey



1 Diagnostics of territories and blocks is conducted on areas of up to 10,000 sq. km and more

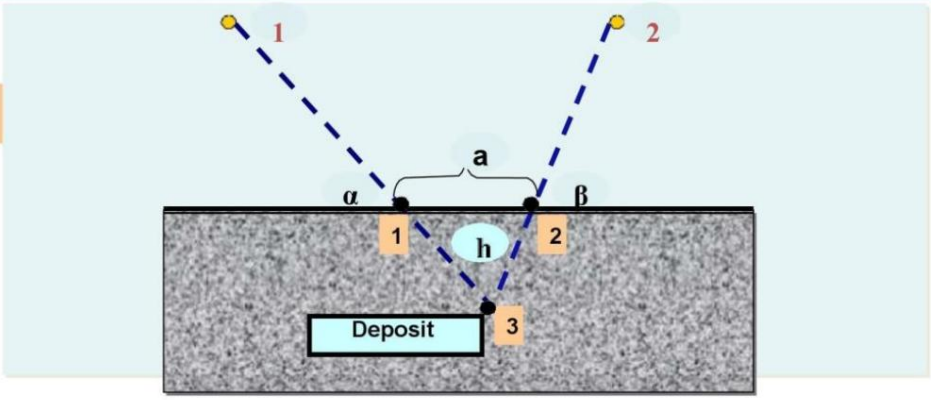
Solved tasks:

- Prompt detection of deposits and reservoirs of hydrocarbons in large territories, underground flows of fresh water and other minerals at request.
- Definition of ground contours of deposits, estimation of number of horizons and their possible occurrence depths.

Diagnostics allows to quickly evaluate the prospects of different territories.

The procedure for measuring the depth of occurrence of deposits using analog satellite images

1. Use space images the investigated area obtained at different elevation angles **α** and **β** from the satellites 1 and 2.
2. Obtain ground mapping point **3** in two different positions, "**1**" for the first satellite and "**2**" for the second.
3. We calculate coordinates of points **1** and **2**, calculated by different images.
4. Determine the amount of displacement "and" between them on the ground.
5. In the triangle **1-2-3** side **a** and the adjacent interior angles **α** and **β** are known. Such a triangle is called a solution.
6. After the evaluation is determined by the depth of the deposit **h**.



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INTERNSHIP 2 OR SECOND STAGE IN THE FIELD

The second stage of work consists of sequential measurements with mobile resonance test equipment on each anomaly with the following measurements:

Examination of the continuity of anomalies, clarification of their boundaries, determination of the coordinates of points located on the boundaries of the contours of anomalies by resonance testing, excitation of atoms of the searched substances in the anomaly and recording of resonant electromagnetic fields occurring above anomalies.

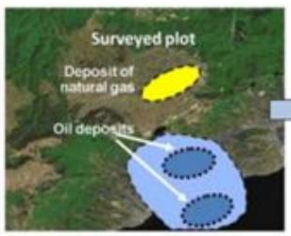
Peculiarities of work on site

Deep probing of a deposit is carried out pointwise using a narrow-beam spectrally modulated signal that resonates in the sought-for substance

Transmitting part of the complex of mobile equipment

Work on location is completely harmless to humans and the environment

2 Remote Survey of Plots



Solved tasks:
1. Detection, localization and obtainment of ground contours of deposits;
2. Definition of number of horizons of deposit;
3. Definition of occurrence depths of horizons;
4. Definition of thickness of each horizon;
5. Evaluation of reservoir rock;
6. Calculation of forecast volume of deposit reserves.

Result is achieved within 2 months

3 Obtainment of map of minerals

Mapping of deposits of various minerals in large areas of land and shelf.

4 Remote survey of wells

Survey results:
- presence or absence of deposit of the sought-for mineral in a drilling point (or close to it), if "yes" then the following is defined:
- ground contours of deposit, number of horizons, occurrence depth and expected thickness of horizons.

Results is achieved in 2 months maximum

Determination of depths of occurrence of hydrocarbon reservoirs and horizons, mineralization and accumulations of groundwater, their thickness at selected measuring points on geological sections (with the required interval between measuring points).

Determination of reservoir rock types and their porosity at measuring points, metal concentrations in ores and gas pressures in gas horizons using resonance testing equipment.

Registration on the reconnaissance deposit of resonance frequency spectra of electromagnetic fields resulting from NMR excitation of atoms of reference elements that make up a mineral (NMR excitation of elements is carried out in the natural magnetic field of the Earth at using microwave generators with a rotational electromagnetic field).

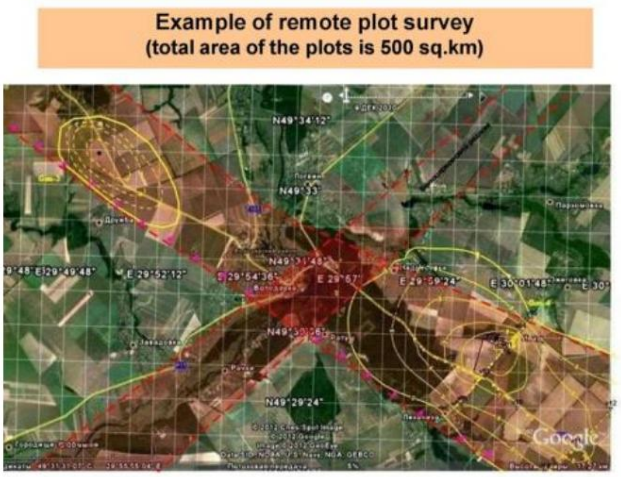
Field work is carried out on site using a mobile set of equipment from the “Poisk” complex with recordings of the spectra of the sought substances (ore, water, hydrocarbons, etc.) prepared initially. The mobile kit can be placed on a car or boat.

Field measurements are necessary for more accurate delineation of deposits, determination of depths, collection of information for subsequent construction (at the third stage) of profiles of ore bodies, calculation of resources and productivity of deposits .

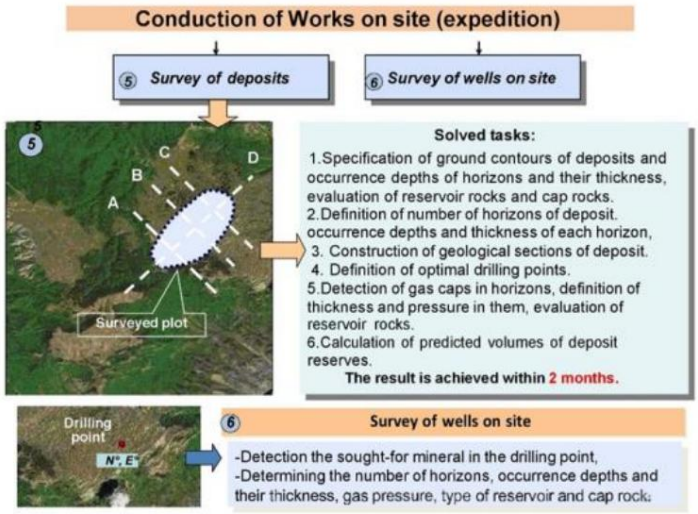
Such measurements make it possible to select control drilling points with the required accuracy, estimate the required depths of exploration wells and collect data for predictive calculations.

Field work increases the percentage of obtaining geological characteristics of the occurrence to 90-95%, while the error of forecast calculations is 30-35%.

The duration of the work of the second stage depends on the remoteness of the research area from transport infrastructure, the size of the studied area and the complexity of the research task (the number of minerals studied simultaneously, etc.) . Usually, the term of fieldwork lasts 1-3 months.



The map shows two deposits of natural gas discovered in complex rocks and two crack zones (shown in red). Prospective drilling sites were selected



THIRD STEP

The third stage of work is carried out on the stationary equipment of the "Poisk" complex and includes the processing of all data obtained during the first stage and field measurements of the second stage. The tasks of the third stage are as follows:

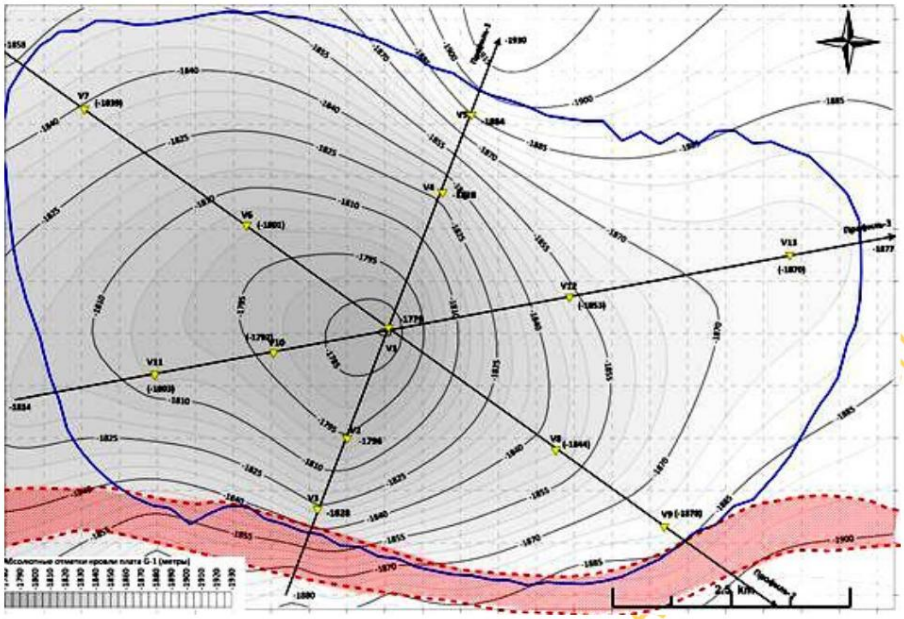


Figure 1 shows a structural map where the black lines are the longitudinal and cross sections of the deposits.

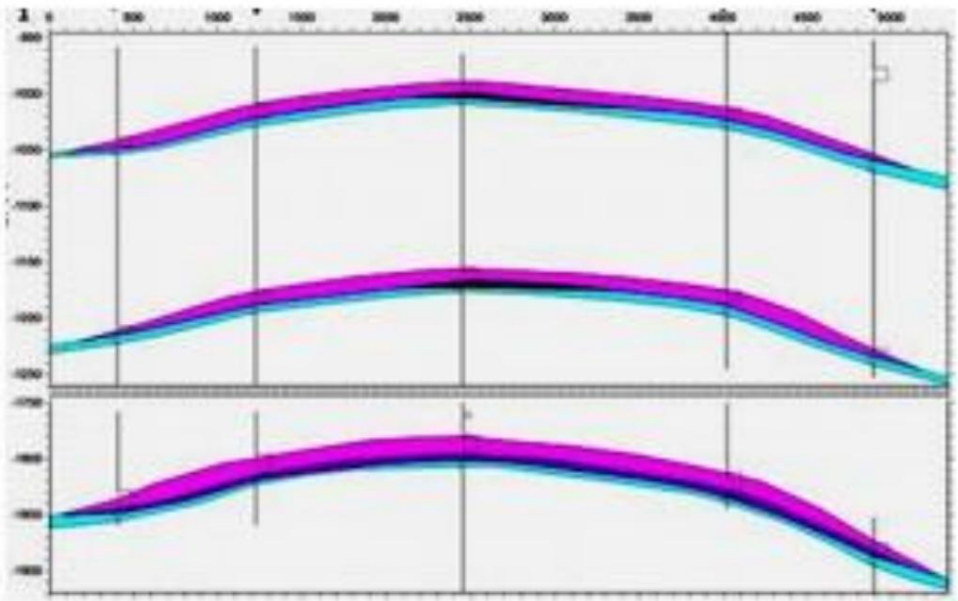


Figure 2 shows one based on longitudinal sections of deposits.

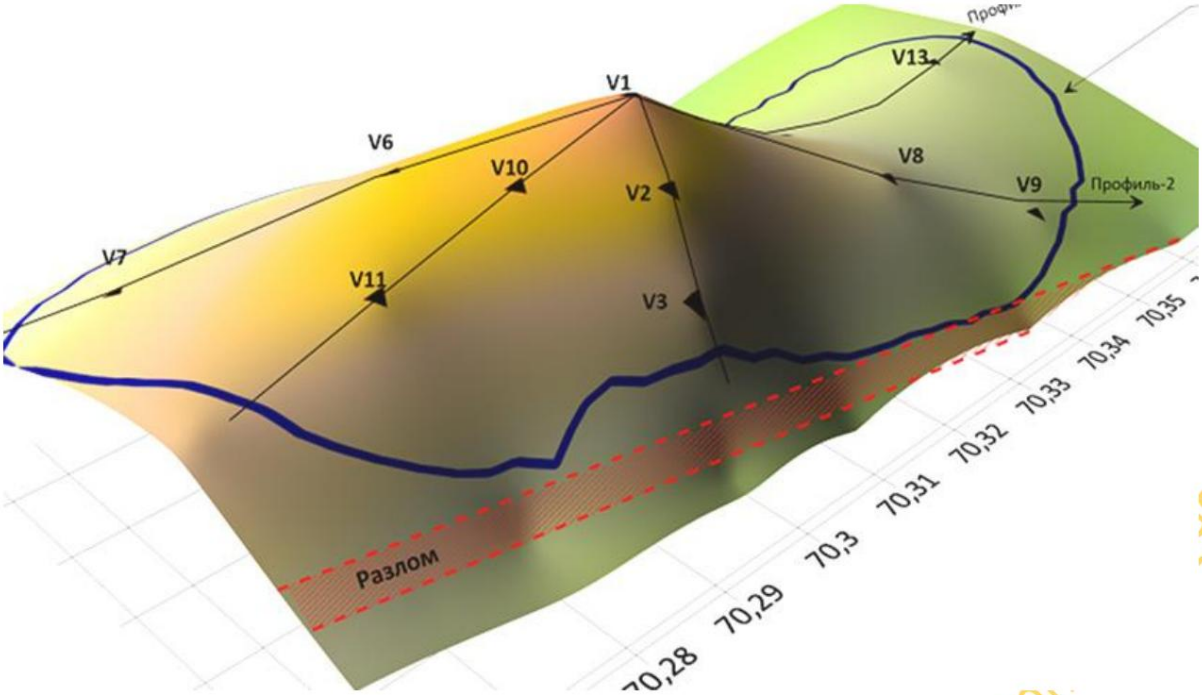
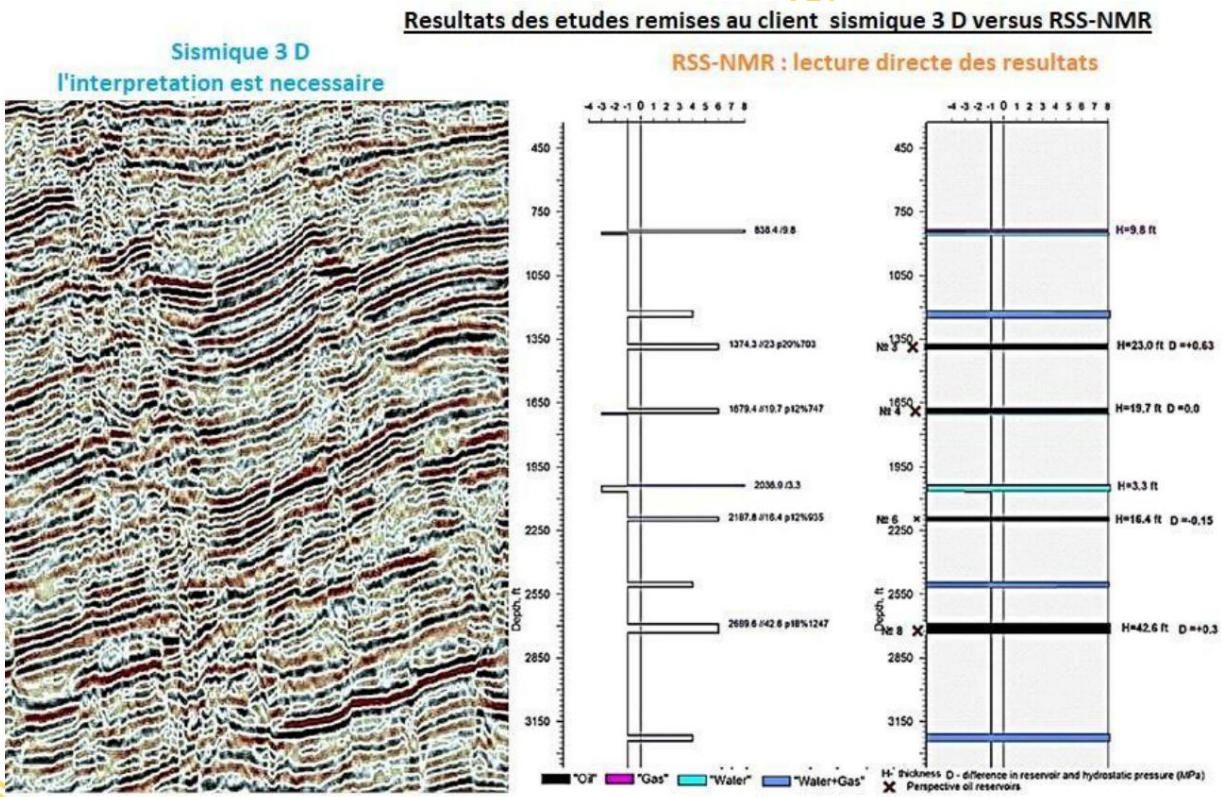


Figure 3 shows a 3D gas horizon model.



• Processing the results of field measurements on stationary equipment, • Calculation of the thickness of oil and gas horizons, groundwater horizons and the thickness of minerals of various metals containing a specific (average) concentration of metals.

• Determination of gas pressures in gas reservoirs and in horizon covers oil tankers.

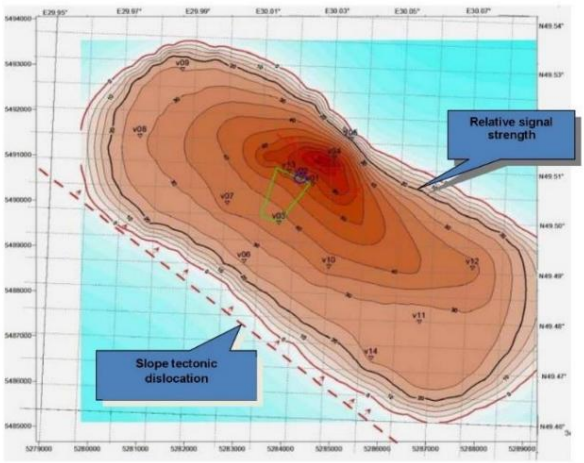
• Visualization of geological sections from the results of measurements of the depths and thicknesses of oil and gas reservoirs (aquatic horizons) or measurements of the depths of occurrence of mineralization at the measurement points.

- Determination of the type of hydrocarbons (oil, gas, gas condensates) and minerals (copper, uranium, molybdenum, silver, gold, etc.).
- Determination and mapping of boundaries and zones of contours of deposit zones, depths of occurrence of hydrocarbon horizons and mineralizations, number of horizons and their useful capacity.

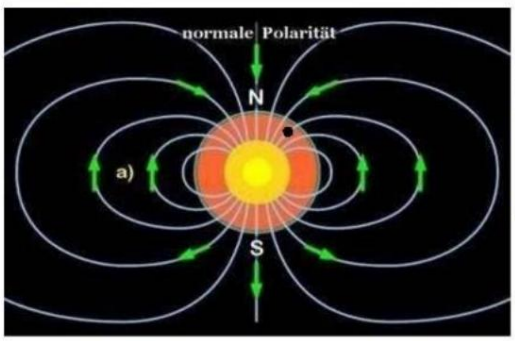
- Draw on the maps the boundaries of the sites and the depths of the horizons of underground accumulations of fresh and salt water, as well as geothermal waters (up to 6000 m deep).

- Determination of the type of rocks in oil and gas reservoirs, calculation of their thickness and distribution by anomaly.
- Visualization of geological profiles of identified hydrocarbon zones and columns deep at well drilling points (up to 6000 m deep).

Survey Example: Natural Gas (ground contours of deposit)



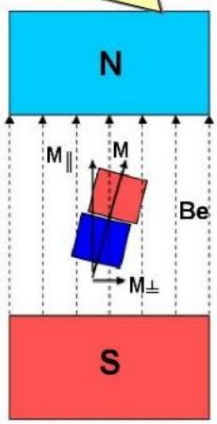
Reception of Response Signal on the Surface of the Earth



1. We will use natural magnetic field of the Earth as a source of constant magnetic field with intensity Be = 0,34-0,66 E

As to shape the main magnetic field of the Earth up to distance of less than three radii close to field of the equivalent magnetic dipole

2. Vector of nuclear magnetization M in relation to Be can be decomposed into two compounds: longitudinal $M_{\parallel}$ that matches with vector direction Be, and transverse $M_{\perp}$, perpendicular to Be.



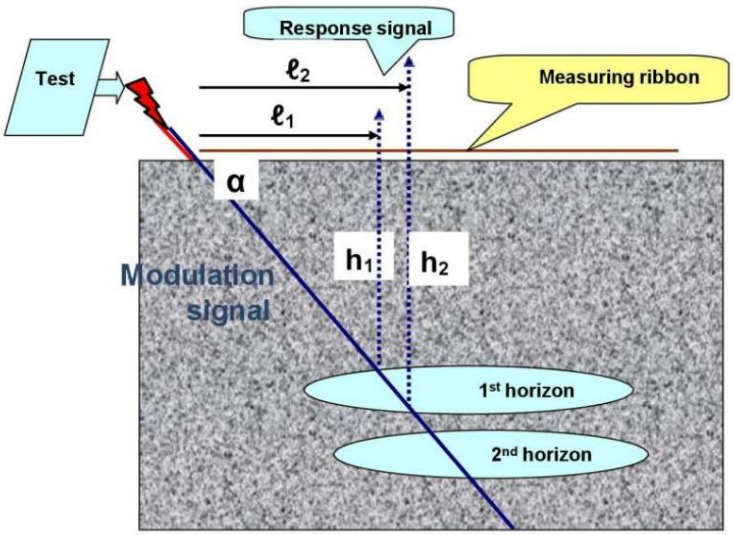
3. **Principle of superposition of magnetic fields:** magnetic field that is created by several moving charges or currents is equal to vector sum of magnetic fields that are created by each charge or current separately.

According to Gauss's law for magnetic field **div *B* = 0** we receive superposition of fields **Be** and $\mathbf{M}_{\parallel}$, i.e. the magnetic field of the Earth ' extract's resonance response of molecules to the surface.

- Identification and mapping of tectonic anomalies (faults and tectonic displacements).
- Draw geological profiles of the identified mineralization, deep columns in selected points for drilling wells or areas of groundwater accumulation (up to 6,000 m depth).

- Calculation of approximate predicted volumes of groundwater resources in identified anomalous areas or volumes of ore anomalies, calculated based on constructed geological profiles of the areas with a step between measurement points of 150 m to 250 m (for ore anomalies - from 15 m to 25 m).
- Selection of depot opening points in identified areas. If necessary, the Client carries out control drilling at the recommended point. A final report with cartographic material is presented.

Diagram of Measurement of Deposit Parameters



In measuring point the modulated laser beam is directed towards deposit under **α** angle. Modulated signal spreads under ground from test wafer.
Operator moves along the measuring ribbon with receiver. Response signal is registered at distance from **ℓ1** to **ℓ2.**
Occurrence depths of a horizon are calculated with the help of the following formulae

$h_1 = \ell_1 \cdot \mathrm{tg}\,\alpha$, $h_2 = \ell_2 \cdot \mathrm{tg}\,\alpha$. Horizon thickness $\Delta h = h_2 - h_1 = (\ell 2 - \ell 1) \cdot \mathrm{tg}\,\alpha$,

By placing test wafers with recording of own frequencies or natural gas at different pressure, we are able to determine presence of gas cap and gas pressure in it.

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Submission of reporting documentation on the research work carried out with provision to the Client of the complete revealed characteristics of the detected anomalies, cartographic and geological information (maps of anomalies, graphic representations of sections, depth columns of selected drilling points, etc. .).

The duration of the work of the third stage depends on the amount of data obtained during the first two stages. Typically, the reporting period does not exceed 3-4 months.

EXAMPLES OF MINIMUM REQUIREMENTS FOR MINERAL SAMPLES

Why do we need mineral samples?

A key element of the work at all stages is the ability to obtain mineral samples from the client. This is essential to be able to carry out the work.

This is very important, because the samples help determine the concentration of reference elements (metals, non-metals) and additional components (impurities) in the rock that contains the mineral. The measuring equipment is adjusted based on the amplitude-frequency spectra read from the samples provided. Direct recording of recognition NMR spectra is carried out by excitation of the atoms of the elements included in the substance studied.

It should be noted once again that the sample allows you to install stationary (laboratory) and field equipment for each specific zone of occurrence of rocks, which increases the accuracy of the research to the maximum values.

Samples according to the products to be discovered At least one of the following conditions must be met before the research can begin.

To achieve maximum search accuracy, it is necessary to provide data for each item. The degree of confidence in the detection will depend on the quality of the samples and data provided.

When searching for solid minerals, you must provide us with:

Three types of samples:

has. Sample with the maximum content of the desired mineral in the rock;

b. Waste concentration sample;

vs. A sample with an industrial concentration (minimum from which the commercial development of the deposit becomes profitable)

Note: Samples b) and c) must be collected from the same location, within 30 km of the research site.

Contact details of the sampling sites from which samples a), b) and c) were taken;

Depth from which samples a), b) and c) were taken;

Rules to follow for sending

The weight of each sample should be approximately 150 g;

- Before shipment, the customer independently carries out a chemical analysis and provides us with the results indicating the type/composition of the ore and/or the composition of the desired substance in the sample;
- Before sending samples, you must provide us photos of each sample for approval ;
- Shipping instructions will be provided upon receipt of photos and analysis results chemical;
- In addition to the sample, it is strongly recommended to provide a lithological description of the rocks present.

Classification des bruts

% S du fioul Rdt % du fioul	Brut TBTS ≤ 0,5 % S	Brut BTS ≤ 1,0 % S	Brut MTS ≤ 2,0 % S	Brut HTS ≤ 3,0 % S	Brut THTS > 3 % S
Très léger **Rdt ≤ 31 % Pds**	Hassi-Messaoud Zarzaitine Nigeria Light	Brent			
Léger **Rdt ≤ 38 % Pds**	Nigeria Forcados Nigeria Médium	Bréga Zuétina	Murban	Qatar Zakhum Berri Umm Shaïff	
Moyen **Rdt ≤ 48 % Pds**	Ekofisk	Es Sider		Agha Jari Ashtart Arabe Léger Tatar	Basrah Kirkuk
Lourd **Rdt > 48 % Pds**	Amna Bassin Parisien Gamba Emeraude / Loango Loango	Emeraude	Grondin / Mandji mélange	Grondin	Buzurgan Kuwait Safaniya (Arabe lourd) Tia Juana Bachaquero Rospo Mare

Sample for oil and hydrocarbons in general

When searching for oil and/or gas and gas condensate, you must provide:

- 150 ml of oil and/or gas condensate taken from a well located up to 500 km away. The closer the search location, the better. It is desirable to have a sample of the same geological structure containing oil or gas;
- Coordinates of the well where the samples were taken;
- Depth from which the sample was taken;
- Before shipment, the customer independently performs chemical analysis and provides us with results indicating the oil type/composition and/or gas/condensate composition of gas ;
- Before sending samples, you must provide us photos of each sample for approval ;
- Shipping instructions will be provided upon receipt of photos and analysis results chemical;
- In addition to the sample, it is strongly recommended to provide a lithological description of the rocks present.

- **Shale gas** Send the mineral where we hope to find the gas (0.500 kg)

- **Other complex products** Consult us before developing projects

- **Uncontrolled dumping with the burial** of dangerous substances (explosives, toxic substances, etc.). Consult us before developing projects

- **Shipwrecks** such as galleons at the bottom of the Caribbean Sea, ships carrying precious metals from the Second World War

- Airplane wrecks following an accident of MH370 or AF 447 for example) which sank in the deep sea. Consult us before developing the projects can have solutions depending on a certain number of factors

- **“Boeing 777 ER 200 Malaysian Airlines MH 370”** project in final formulation phase by **RSS-NMR BY Fands-llc only**

Our web page www.rss-nmr.info