Methodology for the search for minerals and hydrocarbons using the technique of Geo Holography and RSS-NMR

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Brief description

The application of **RSS-NMR** (Nuclear Magnetic Resonance by Satellite) in oil and mineral exploration represents a significant advance in the detection of natural resources. This innovative technology allows to identify and characterize hydrocarbon reservoirs and other minerals at depths of up to 5-7 kilometers, without requiring complex data interpretation.

Principle of operation RSS-NMR works by emitting a directional signal specific to the substance being searched for, such as oil or gas. When this signal reaches the target, it is re-emitted and captured at the surface, providing direct information on the presence and characteristics of the deposits. This process is based on the phenomenon of magnetic resonance, which allows precise detection without the need to interpret complex data[1][3].

Advantages of RSS-NMR

- Reduced cost: The technology allows drilling sites to be located with a budget up to ten times lower than that of conventional methods.
- Speed: Results can be obtained in just 30 days, allowing rapid planning of operations [1].
- Efficiency: With an accuracy of 90 to 95%, RSS-NMR outperforms traditional seismic methods, providing a reliable assessment of reserves [1][3].
- Minimal environmental impact: The use of this method requires little or no intervention on the land, which reduces environmental disturbances[1].

Specific applications

1. Oil exploration: RSS-NMR is used to map hydrocarbon reservoirs, determine their thickness, depth and pressure, while identifying relevant geological horizons. Re-exploration of old reservoirs helps extend the useful life of the oil field.

2. Mining Exploration: In addition to oil and gas, this technology can also locate aquifers and other mineral resources, making its use versatile in the mining sector [3][4].

In summary, the application of RSS-NMR in oil and mining exploration offers a modern and efficient method to detect natural resources accurately and at low cost, while minimizing environmental impact.

Quotes:

ÿ [1] https://www.linkedin.com/pulse/use-rss-nmr-green-fields-refurbish-brown-oil-gas-part-friedman-
ÿ [2] https://www.senat.fr/lc/lc230/lc230.pdf
ÿ [3] https://rss-nmr.info
ÿ [4] https://www.cmco.com/fr-fr/Industries/industrie-mines-petrole-et-gaz/
ÿ [5] https://rss-nmr.info/index.php/outil/
ÿ [6] https://rss-nmr.info/index.php/exposition-technique-scientifique/
ÿ [7]https://www.researchgate.net/publication/200802375_Applications_of_NMR_
ÿ [8] https://rss-nmr.info/index.php/strategies-dusage/

I. Search for minerals (Mining)

Fands-llc part of Poisk group provides operational research, delimitation and measurement of depths of various mineralized objects, as well as oil and gas deposits. The technology and equipment used are tested and patented.

The technology of remote search for mining anomalies is based on a combination of traditional methods of registering halos of diffusion of metal atoms from a deposit on the ground surface when deciphering digital satellite images, as well as the method of "visualization" of its origin on an analog satellite image of electromagnetic fields above the deposit in the form of "high brightness zones". Areas of "increased brightness" are visualized on high-resolution analog space photographs (aerial photographs) after processing with special chemicals (gels).

Each type of metal-bearing ores (minerals) in a deposit is characterized by amplitude-frequency spectra of electromagnetic radiation, which are recorded above the deposit by highly sensitive spectral geophysical equipment installed on aircraft.

To reliably identify the “high-brightness zones” characteristic of a particular ore, analog satellite images are preprocessed with chemical reagents. The reagents include phosphors, sensitizers and fine nanopowders of rare metals with the necessary properties, as well as lithium niobate powder. Chemical reagents are selected experimentally to identify the desired metal in the ore with its specific concentration (background or industrial - minimum, average, maximum). Ore samples are usually provided by the Customer.

A set of stationary equipment of the Poisk complex allows studying the composition of ores, recording information-energy electromagnetic spectra (reconnaissance) and NMR spectra of the main metals included in ores from ore cores and host rocks.

Highly sensitive blocks of fixed equipment are used to decipher analog space images (describing "high-brightness areas") after they have been treated with chemicals and exposed to gamma radiation fields (to increase the intensity of the "glow" depending on the concentration of metal in the ore).

To calculate the depth of mineralization (see below) of an anomaly using geocosmic methods, it is necessary to determine the value of the "boundary displacement" of this anomaly, determined from two analog satellite images taken from two aircraft and having different angles of inclination of the orbital axes. The calculation of the depths of occurrence is carried out at two or three points for each anomaly with a content of industrial metals in the ore (with "background" concentrations, it is impossible to determine the depth of occurrence).

Based on the measuring points, depth sections of the anomaly are constructed and the forecast resources are calculated. The step-by-step technology for remote search of mineralized anomalies, their delimitation and determination of mineralization depths consists in the sequential implementation of a number of activities, namely:

1) Purchase of necessary consumables, equipment, auxiliary technical means, installation and control of geophysical equipment before the start of work. Obtaining maps of the research area.

2) Delivery of samples (cores) of ore and host rock characteristic of the study area from neighboring deposits.

3) Recording from cores of the information-energy spectra of the ores and the NMR spectra of the atomic elements included in the desired ore and selected as reference points (with characteristic recognition spectra).

4) Calibration of equipment for recording rock samples with metals as well as with a set of different specific in metal mineralization. , concentrations of

5) Production of materials for “test” matrix supports, recording on them the resonant electromagnetic spectra of ore samples (cores) and the NMR spectra of reference metal atoms (markers). Activation of matrices using radiochemical technologies in a research nuclear reactor or in a higher-power gamma installation.

6) Production of aerospace photographs of the area studied (aircraft, drone, spacecraft) or purchase of digital and analog satellite images (high resolution) from specialized centers for remote sensing of the Earth (RF, EU, USA) and environmental monitoring of the environment.

7) Obtaining analog satellite images covering the area with a control well to determine from them the possibility of recording anomalies with different concentrations of mineralization located at great depths.

8) Radiation processing of the resulting satellite image series (after application of chemical reagents) and their interpretation using fixed equipment (preliminary equipment is tested at a control well to detect a known deposit).

9) Visualization and delineation of the boundaries of halos of metal mineralization on the soil surface on analog satellite images, and then identification in them (on a new series of high-resolution satellite images) of anomalies with an industrial (specified) concentration of metal in the form of “zones of increased brightness” (for each concentration - its own interpretation algorithm prepared satellite images with an individual selection of chemical reagents and additives).

10) Evaluation of the results of detection, identification and delimitation of the boundaries of mineralized zones with industrial anomalies. Establish a map of the survey area indicating the boundaries of the detected areas with ore and placer anomalies of a particular metal.

11) Determination of depths of industrial ores at 2 ÷ 3 measurement points on anomalies using geocosmic detection tools

12) Preparation of reports, cartographic and tabular documents.

The reliability of the results obtained reaches 65-70%. The error in measuring the depths of mineralization does not exceed 2%.

II. Onshore and offshore research of hydrocarbon and gas deposits (CH4, H2)

The technology makes it possible to identify and delineate anomalies associated with hydrocarbon accumulations, to assess reservoir depths, to identify tectonic faults, but also to carry out a predictive assessment of resources in the identified anomalies.

Remote sensing technology for hydrocarbon deposits relies on several important physical and chemical processes occurring in the Earth's environment:

– Migration by diffusion of volatile hydrocarbons and gas from the deposit to the ground surface. As a result of these processes, hydrocarbons and gases accumulate in the subsurface soil, with the subsequent formation of a diffusion halo of hydrocarbons and various metals on the soil surface. Diffusion halos are well recorded by means of space reconnaissance.

– The formation of metal oxides and metal-containing minerals due to physicochemical processes and various chemical reactions in the host rocks of the Earth's environment, caused by accumulations of hydrocarbons. These processes create characteristic electromagnetic fields in the Earth's magnetic field and lead to changes in the magnetic properties of the Earth's environment, which can be recorded in the form of frequency-amplitude spectra of electromagnetic fields at the ground surface (directly above the deposit). These fields appear on analog space photographs as areas of "increased brightness" and are recorded using highly sensitive spectral equipment. The spectral equipment uses automatic depth modulation measuring radiometers, which eliminate the influence of noise signals.

To record by direct methods the diffusion halos of hydrocarbons on the ground surface and the characteristic amplitude-frequency spectral features of electromagnetic fields above the deposit, patented methods of "visualization" of electromagnetic fields on analog satellite images are used after their special processing with chemical reagents (to enhance "high-brightness zones").

To reliably identify areas of "increased brightness" in analog space photographs, chemical reagents, phosphors, sensitizers, and fine metal powders, as well as **lithium niobate** (LiNbO3) is a chemical compound of niobium, lithium, and oxygen, are applied to photographic paper. This results in an increase in the glow ("high-brightness areas") on an analog satellite image (directly above the UV anomaly).

Space images are deciphered after exposure to gamma radiation fields. For each type of identified hydrocarbons and hydrocarbon reservoir rocks, as well as for deep salt waters, different types of sensitizers and powders of the necessary rare metals (established experimentally) are selected. High-purity nanopowders are obtained using microbial technologies or purchased abroad.

A set of stationary equipment allows you to study the chemical composition of oil samples, determine the concentrations of nickel and tungsten metals, as well as other metals and impurities in oil, record information and energy (electromagnetic) spectra of oil samples (with a specific composition of metals), hydrocarbon gases (methane, ethane, propane), oil and gas reservoir rocks and rock formations with salt water, transfer the recorded NMR spectra to organometallic carriers (matrices).

Fixed equipment is also used to delineate UV anomalies when interpreting high-resolution analogue satellite images and to ensure their preliminary radiochemical processing.

The sequence of steps is as follows

– Study oil samples and record their information-energy spectra and NMR spectra of the metals that make up the oils.
– Identification and delimitation of each type of hydrocarbon anomalies (oil, gas, gas condensates) and determination of the depths of their occurrence are carried out by deciphering a series of high-resolution digital and analog satellite images taken in various spectra of electromagnetic radiation (visible, IR, UV and invisible spectra).
Based on the visible spectra of the reflected radiation, areas with signs of hydrocarbon deposits (carbon diffusion halos) are determined and the invisible spectra of characteristic electromagnetic fields are "visualized" as "high-brightness areas" on high-resolution analogue satellite images directly above the hydrocarbon deposits.

– Processing of analog satellite images to visualize the limits of hydrocarbon deposits in the form of “high brightness zones”.
– Measure the depths and thickness of hydrocarbon reservoirs in anomalies of hydrocarbons.
– Construction of a section of the hydrocarbon anomaly based on measurement points, indicating the number of tanks and their capacities.
– Assessment of hydrocarbon resources expected in each anomaly identified on the basis calculated parameters of the deposit (at 2 ÷ 3 measurement points).
– Determination of recommended points for drilling wells.
– Preparation of the final report. Selection of the most promising anomalies, preparation of the cartographic material.

In this case, the following activities are carried out:

1. Purchase of chemical reagents, consumables, necessary auxiliary technical means, installation and control of the fixed equipment used, which are part of the geophysical complex.
Obtaining maps of the search area and ordering a first series of digital satellite images in different frequency ranges covering the search area.
2. Receipt from the Client of oil samples characteristic of the study area and the coordinates of a reference well in the nearest field.
3. Study the composition of oil, record from oil samples the information-energy spectra and NMR spectra of metal atoms contained in oil samples.

4. Creation of “test” and “working” organometallic matrices to record recognition information and energy spectra of oil samples, and NMR spectra of reference metal atoms.

5. Activation of "working" and "test" matrices using radiochemical technologies and recording on them electromagnetic recognition spectra (information-energy spectra and NMR spectra of reference metal atoms) using recording units of stationary complex equipment.

6. Verification of the functionality and calibration of fixed and field equipment for selective recording of various types of oil samples submitted using “
“work” and “test” categories, as well as expected types of reservoir rocks (from the Poisk Group LLC binder).

7. Obtain digital satellite images and interpret them using traditional technology to determine the boundaries of promising areas showing signs of hydrocarbons.

8. Obtaining analog satellite images covering promising areas with signs of hydrocarbons.
9. Obtaining analog satellite images covering the location of a test well from a near field. Well coordinates are provided by the Client.
10. Processing of analog satellite images obtained with gamma radiation and their interpretation using a patented technology for visualizing “high brightness zones” on a specific type of hydrocarbon anomaly located around the test well.
11. Calibration of the stationary complex equipment to clearly identify a known oil or gas deposit around a test well and to determine the depth of hydrocarbon accumulation.

12. Radiological processing of analog space images and their decoding using proprietary technology to determine the type of hydrocarbon anomaly in the studied area, delineation and transfer of their boundaries to spatial images with a coordinate grid. Determining the size of the anomaly. Chemical reagents, phosphors and sensitizers are selected individually for each type of hydrocarbon anomaly.
13. Radiological processing of an additional series of analog space images to determine from them the depths of reservoirs in the anomaly depending on the magnitude of the "shift" of the boundaries of the anomaly contours, determined from two space images taken from two satellites with different orbital inclinations. Typically, six high-resolution analog satellite images are used for each anomaly, since the depths are determined at 2-3 points on each anomaly.
14. Radiological processing of analog spatial images and interpretation of digital images in the IR range to determine and map a network of tectonic faults with migration of high-temperature fluid flows along them.

The reliability (statistical accuracy) of information (detection of promising anomalies, number of hydrocarbon deposits, their depths and thicknesses) is 60-70%. At the same time, the error in measuring the depths of hydrocarbon reservoirs can be up to 2-3% (on land) and up to 4% (on the shelf).

Confirmed search depth 6000m onshore and offshore (from the seabed)

III. Other related research activities developed using RSS-NMR

Gems: We are talking about diamonds, sapphires, rubies and emeralds which are the precious stones. In this case we do not look for the stones directly but the mother rock of the formation and then with a scouting, go on site and check the presence of the gems

Polymetallic Nodules: We have highlighted 1 field of Polymetallic Nodules in the Black Sea in 2023, so we can use the same technology to highlight these fields by looking for the main metals.

Rich or historic wrecks: We work on the search for wrecks containing gold or precious metals on behalf of private treasure hunting companies, our contribution is the positioning of the wreck on the seabed.

Buried treasures : We have highlighted 10 chests filled with 100 kurush gold coins dating from the First World War which in anticipation of a defeat wanted to shelter the cash of the Ottoman Empire for a reconstitution of the caliphate

Searches for explosives or unexploded bombs : On several occasions the RSS-NMR has uncovered buried bombs or munitions depots. Uses in countries in open conflicts
moment.

Latin American countries / drug control (in the development of an advanced research concept) : We propose a search for clandestine laboratories based on the precursors in greater numbers and also on their mass (weight/volume) which will leave a trace when scanning the jungle of the narco zone by satellites which will give a map with results clearly marking the laboratories. We cannot track means of transport containing narcotics.

IV. Groundwater that currently escapes Humanity. Specific research from the Poisk group using RSS-NMR

There are large underground rivers underground and on the globe in general that are not exploited because it would require oil-type drilling.

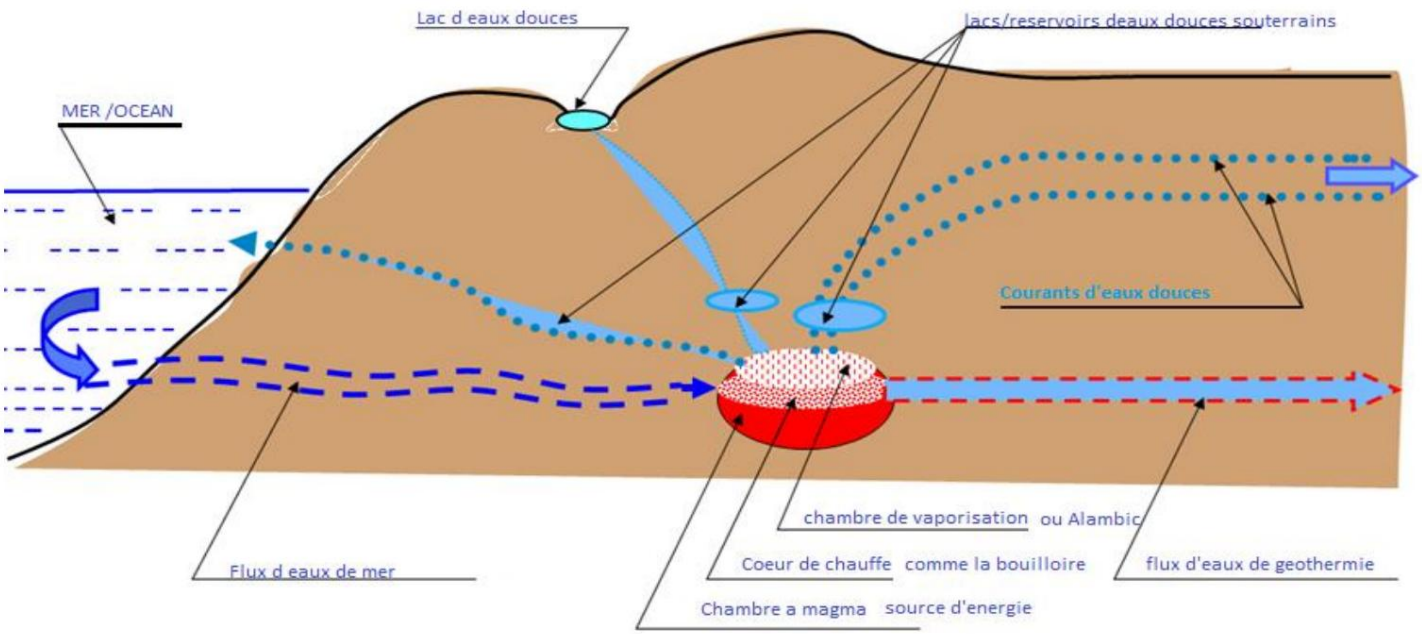
Principle of Natural Stills: We are also working on the mechanisms of formation of fresh underground water near the magma chambers of extinct volcanoes using the equipment of the remote resonance testing complex "Poisk"

Simple geophysical principle: The mechanism of formation of fresh groundwater is that seawater sliding along tectonic fractures arrives in the magma chamber (2000 ÷ 3000 m depth), where the water boils and then vaporizes. (Alembic principle).

The resulting steam flows under pressure into the upper water-permeable rocks by tectonic phenomena.
In the fractures (at a depth of 400 ÷ 1000m) a condensation of water vapor forms, which forms a underground freshwater lake. From these lakes along the faults underground freshwater rivers are formed

From the boiling zone, following another circuit of faults, the very salty water called geothermal (at a depth of 2000 ÷ 2500 m) flows either deeper or towards the surface after boiling.

In any case, the flow of groundwater from lakes and reservoirs is directed towards the seas and oceans. This phenomenon occurs over hundreds of kilometers at several depths. Along the way, the freshwater flow branches into small streams, which cover large areas but are not accessible without RSS-NMR techniques.

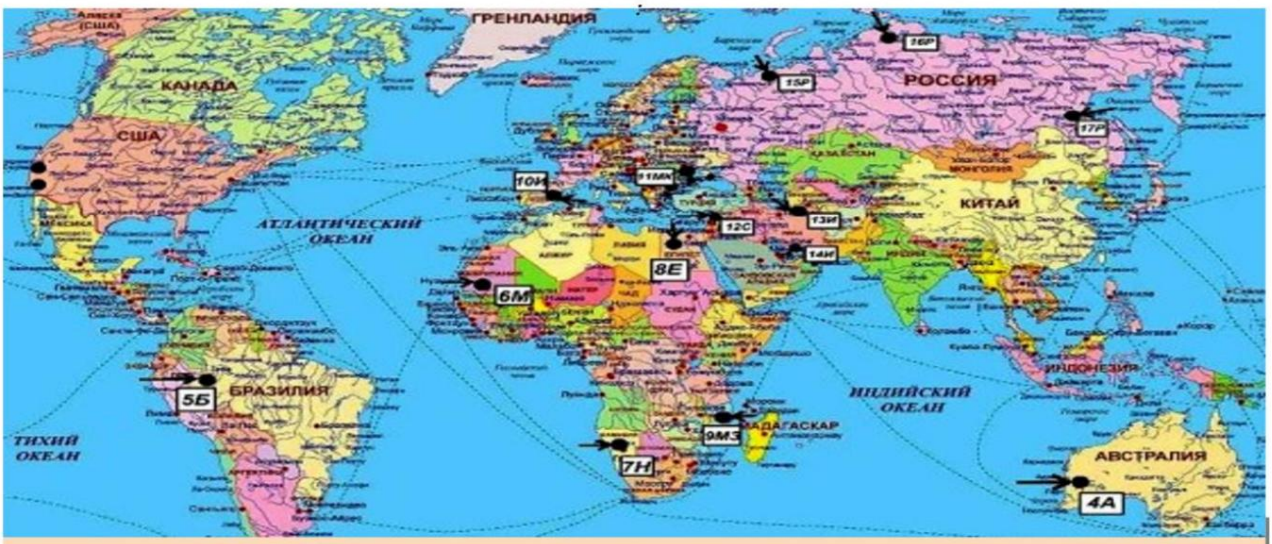


When the desert could be a garden of Eden

We have highlighted a specific example: In magma chamber number 14 in southern Iran, seawater comes from the Persian Gulf. This results in the formation of two geothermal water flows at depths of 2 and 3 km. Consequences This has created a large flow of fresh water that flows across the Arabian Peninsula and Saudi Arabia. This powerful freshwater current flows through the United Arab Emirates at a depth of 280 to 350 meters. Other underground watercourses flow into the Red Sea near the city of Jeddah.

4. Les sources naturelles d'eau douce les plus importantes dans le monde

Nous avons identifié un certain nombre de sources majeures d'eau souterraines dans différents pays



Dans tous les cas, le flux des eaux souterraines des lacs et réservoirs se dirige vers les mers et les océans. Ce phénomène se produit sur des centaines de kilomètres à plusieurs niveaux de profondeur. En cours de route, le flux d'eau douce se ramifie en petits ruisseaux, qui couvrent de grandes surfaces mais qui ne sont pas accessibles sans les techniques RMN

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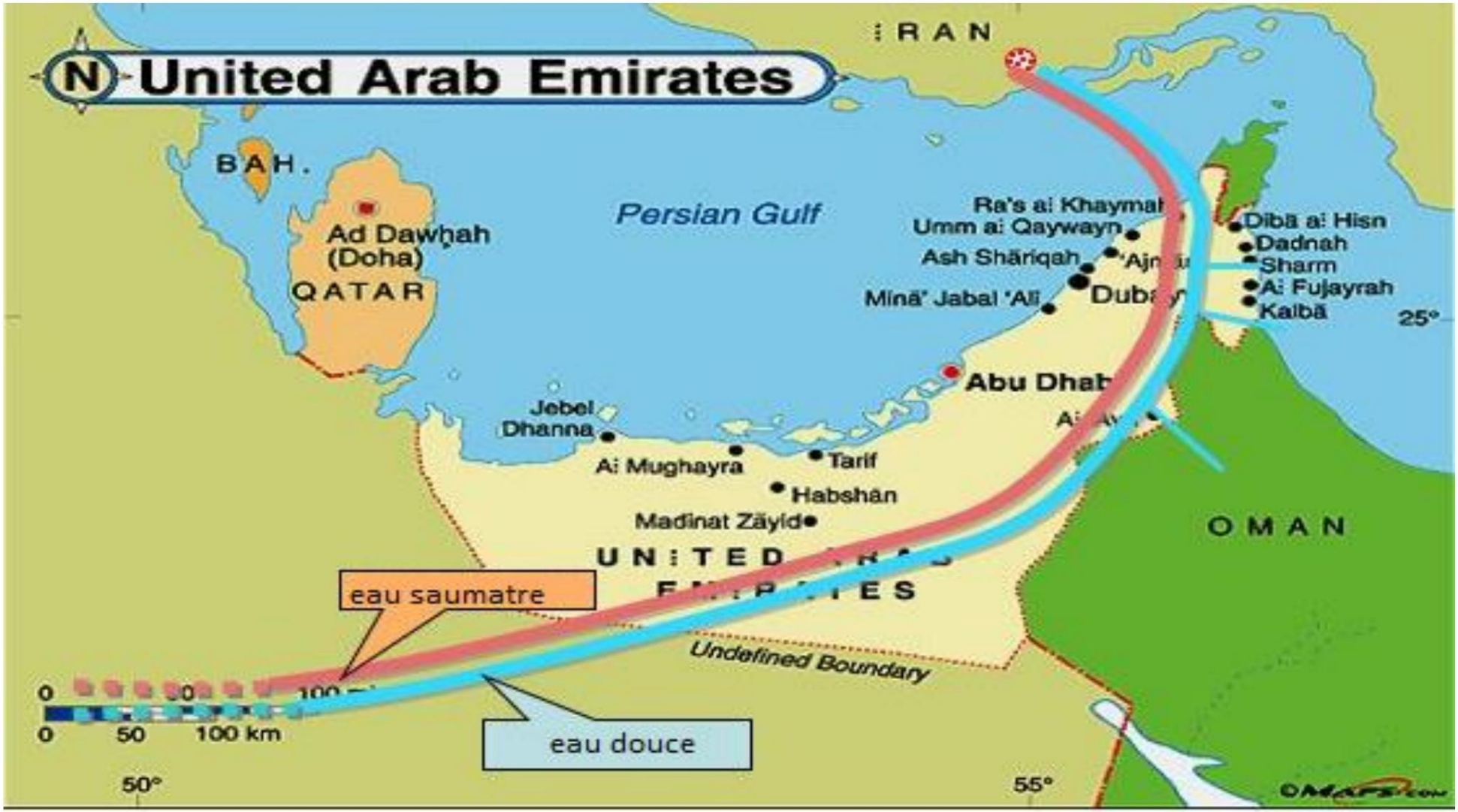


Quelques exemples de sources naturelles d'eau douce

On peut non seulement trouver des "chaudières" naturelles, mais aussi déterminer leur structure:

Parametres	Point 6 **Mauritanie**	Point 8 **Egypte**	Point 9 **Mozambique**	Point 13 **Iran**
Provenance des eaux de mers	Atlantique 3 km de large	Mediterranee 8km de large	Ocean Indien. 10 km de large	Caspienne 10 km de large
Eaux de type géothermique	Courant de type Geothermique Rivières d'eaux Salées souterraines. Profondeur ~2000 m	Courant de type Geothermique Rivières d'eaux Salées souterraines. Profondeur ~ 2500 m	Courant de type Geothermique Rivières d'eaux Salées souterraines. Profondeur ~ 2300 m	Courant de type Geothermique Rivières d'eaux Salées souterraines. Profondeur ~ 2000 m
Eaux douces disponible	3 flux eaux douces. Profondeur 70m -128m	Multiple flux d'eau douces. Profondeur ≥ 200m	Multiple flux d'eau douces. Profondeur ≥ 150m	3 flux d'eau douces. Profondeur ≥ 180 - 240m

Publications by our scientists on this subject

1. G.A. Bielawski, NI Kovalev.New technologies in remote environmental monitoring of underground and underwater objects // "Environment and Resources", vol. Number 9, Kiev, 2004., P.7.
2. N.I.Kovalev, etc. Investigation of the mechanism of formation of underground fresh water near the magma chambers extinguished volcanoes. International Conference «Space technologies in geophysics» //C.P.Russia, 2013.
3. N.I. Kovalev, etc . On the mechanism of formation of underground fresh water near magma chambers. - The book Scientific works of СНУЯЭиП, vol. 2(46), 2013.

V. Estimation of burial depth

The author's software allows to calculate the depth of hydrocarbon deposits and mineralization zones based on the results of space exploration. To calculate the depths of identified anomalies (at 2-3 points) using only space reconnaissance, the values of "displacements" of the boundaries of anomalies are determined, determined from two analog satellite images taken by 2 satellites with different orbital inclination angles (Fig. 1).

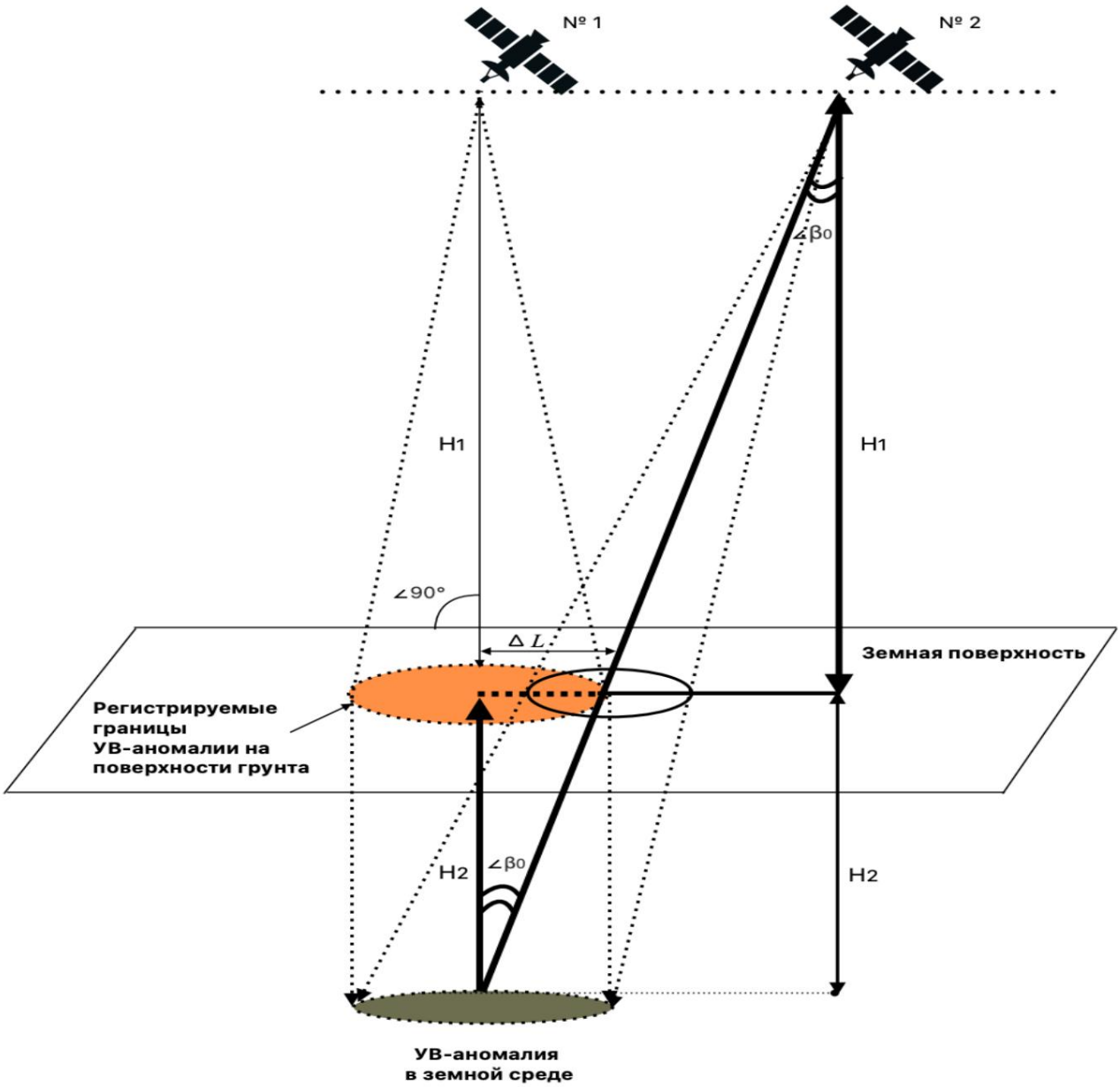


Figure 1 – Method for calculating anomaly depths

To calculate the depth of the deposit (H2), special software is used, which takes into account the angle of inclination of the orbital axes ÿÿ0 and the flight altitude of the satellites (No. 1 and No. 2). At the depth measurement points, sections with the average effective thickness of horizons or ore bodies saturated with oil and gas are constructed and a preliminary assessment of the resources is carried out.

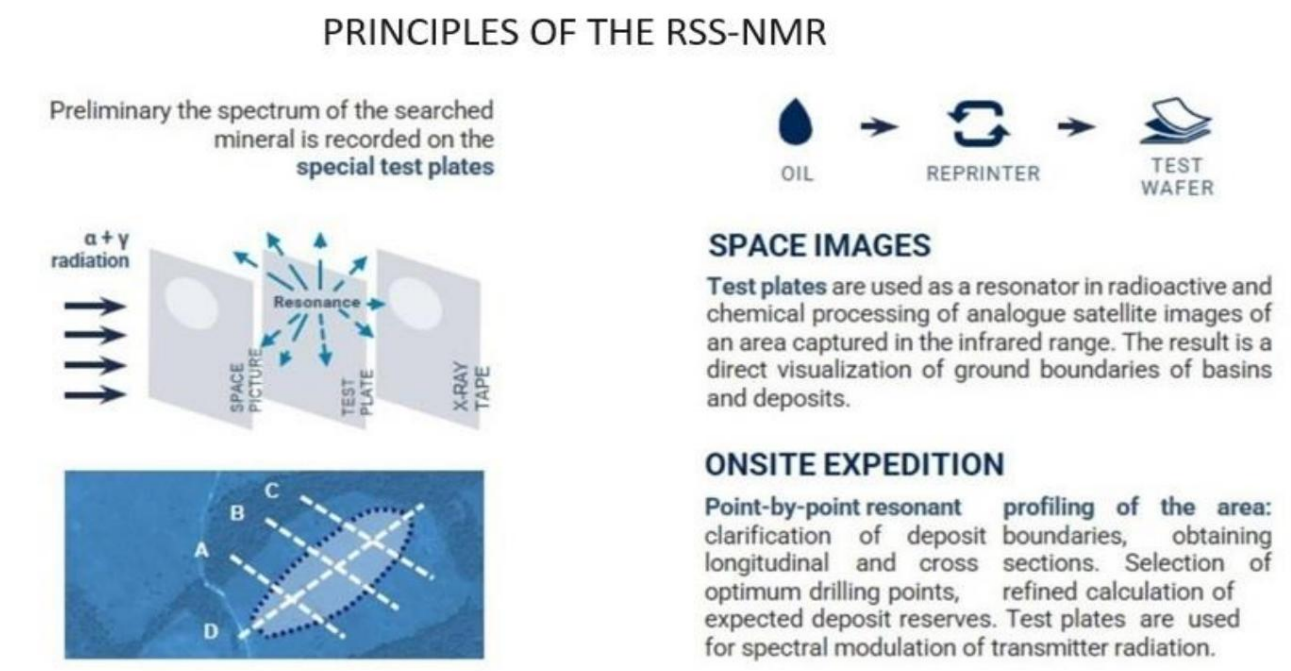
VI. The main advantages of Group Poisk LLC technology developed by Fands-llc

1. Versatility, ability to remotely search for all types of minerals (oil, gas, various metals, diamonds, coal, etc.), as well as mineralized groundwater, weakly mineralized thermal water and fresh water;
2. High success rate (statistical accuracy) in identifying (>70%) mineral deposits, ability to determine depths of occurrences and preliminary resource assessment prior to exploration drilling;
3. Significant reduction of geological risks and uncertainties associated with the discovery of mineral deposits;
4. The ability to remotely determine anomalies in any territory and their delimitation on a digital satellite photograph, which ensures the scale of research work by covering large research areas of a large area, and also significantly reduces the time required for searching for deposits;
5. Reduce the cost of detection and identification work of industrial anomalies (deposits) and, consequently, eliminate large volumes of seismic exploration and exploratory drilling, which is particularly important for deep deposits and for objects that are difficult to access;
6. High economic efficiency with low time investment (2-4 months)
7. The ability to determine the depth of deposits and calculate expected resources,
8. Possibility of making a decision on the prospects of the study area without carrying out costly geological exploration work
9. Possibility of classifying the identified anomalies according to their degree of possible perspectives in view of further geological exploration work targeted on these
10. The ability to survey difficult-to-access land areas (marshy, wooded, mountainous), as well as on the maritime plateau;
11. The ability to map tectonic faults and determine the direction of migration hydrocarbon fluids and geothermal waters;
12. The ability to determine the quality of minerals before drilling, which eliminates financial risks associated with unpromising objects.

The technology has been successfully used to search for various minerals in many countries (Australia, DR Congo, Indonesia, Kazakhstan, Mongolia, USA, Sierra Leone, Russia, Peru, etc.).
Between 2008 and 2024. More than 350 works were carried out.

Patents have been filed for the technology and equipment used in the Russian Federation, Ukraine, Switzerland and Germany. The technology can complement other geophysical methods of searching for minerals and be used in conjunction with them, which will make the process of geological exploration as efficient as possible.

VII. Explanation of the Scientific process applied in the field



RSS NMR
the simple way of exploration

CAPABILITIES OF THE TECHNOLOGY

TERRITORIAL APPLICABILITY	no limitations (any in-land or shelf area)
TOTAL SIZE OF THE TERRITORY	practically without limitations
SOUNDING DEPTH	0-5 km underground
DETECTABLE MINERALS	water, oil, gas, different metals in ore beds
SUCCESS RATIO	for hydrocarbons and water reserves > 90%
DURATION	typically 2 months
SAFETY	the method is environment-friendly and completely safe for people

«DIRECT» IDENTIFICATION OF MINERALS PROVIDES HIGH EXPLORATION RESULTS OVER A SHORT PERIOD WITH LOW COSTS OF WORK

SERVICES OF INSTITUTE ARE PROVIDED IN THE FOLLOWING FORMAT:

REMOTELY [4 OPTIONS]

ON SITE [2 OPTIONS]

The set of services allows solving a variety of tasks

GENERAL IDEA OF THE TECHNOLOGY

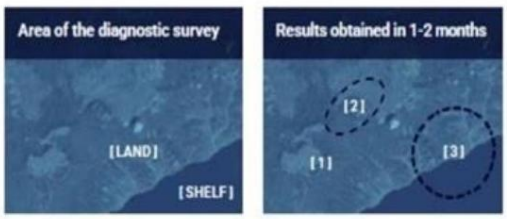
1 **PROMPT AREA SCANNING**

2 **REMOTE SURVEY OF SITES**

3 **MAPPING OF MINERAL DEPOSITS**

4 **SURVEY OF WELLS**

DIAGNOSTICS



1 Aquifer
2 Gas deposit
3 Oil field

DIAGNOSIS OF AREAS AND BLOCS IS PERFORMED ON THE AREA UP TO 10,000 SQ. KM AND MORE

TASKS TO BE SOLVED:

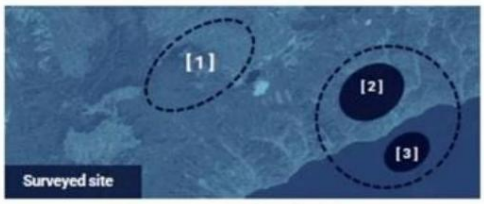
1.Rapid identification of deposits and basins of hydrocarbons on large areas, aquifers and other minerals upon request.

2.Determination of ground boundaries of deposits, estimation of the number of horizons and their possible depths.

DIAGNOSIS ALLOWS QUICK ASSESSING OF THE DEPOSIT RESERVES PROSPECTS ON LARGE AREAS

RSS NMR
the simple way of exploration

REMOTE SURVEY OF SITES



1 Natural gas deposit
2 ,[3] Oil deposits

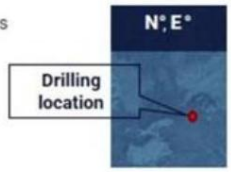
TASKS TO BE SOLVED:

1. Identification, localization and getting ground boundaries of deposits.
2. Determination of the number of deposit horizons.
3. Determination of the horizon depths.
4. Determination of horizon capacities.
5. Assessment of reservoir formations.
6. Calculation of estimated deposit reserves.

RESULTS ARE OBTAINED IN 2 MONTHS

MAP OF MINERALS

Mapping of deposits of various minerals on large land and offshore areas.



REMOTE SURVEY OF DRILLS

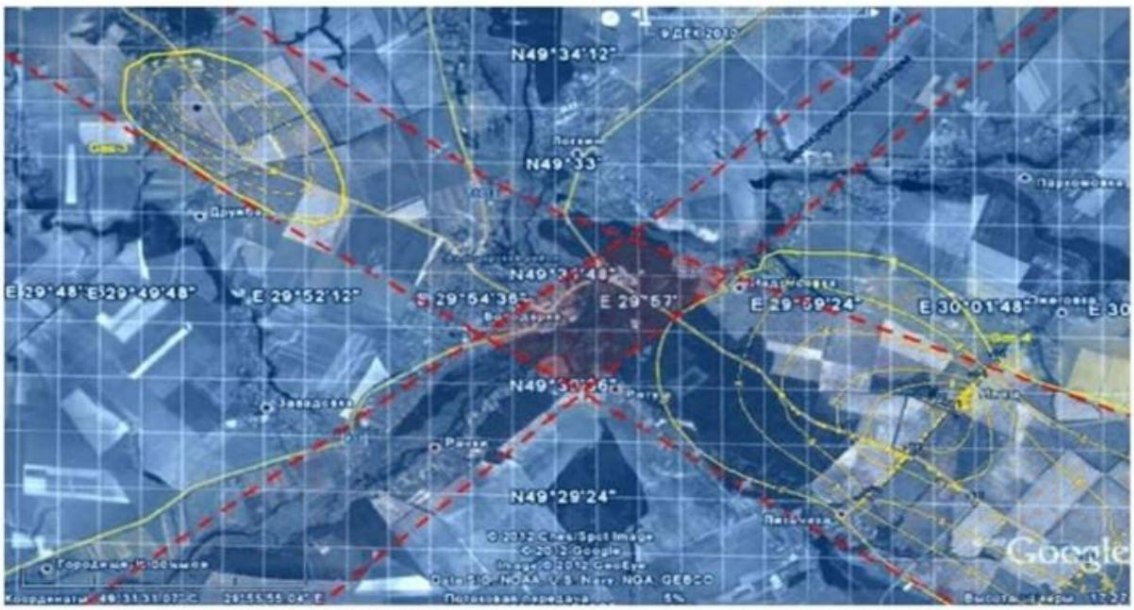
SURVEY RESULTS:

—presence or absence of the desired mineral in a drilling point (or nearby), if «yes», we define:
— ground boundaries of a deposit, the number of horizons, the depth and the expected capacity.

THE RESULT IS ACHIEVED IN 1 MONTH

EXAMPLE OF REMOTE SENSING AREA

[TOTAL SITE AREA IS 500 SQ. KM]



TWO DEPOSITS WERE FOUND IN COMPLEX NATURAL GAS FORMATIONS. SEEN AS TWO FAULT ZONES (RED) AND PROSPECTIVE SITES FOR DRILLING.

RSS NMR
the simple way of exploration

HOW WE WORK ON SITE

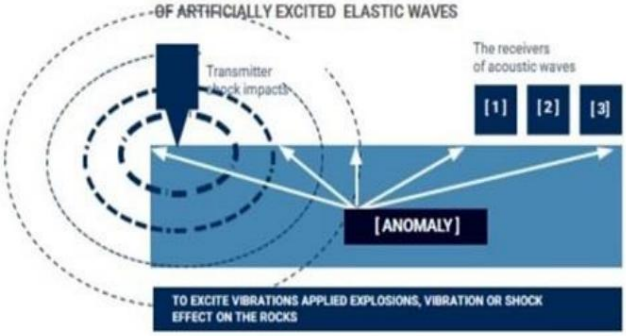
DURING THE EXPEDITION SPECIFIED PARAMETERS DEPOSITS, DETERMINED BY THE EFFECTIVE POWER HORIZONS. SELECTS THE OPTIMUM DRILLING LOCATION. FOR THESE POINTS, WE ARE BUILDING A DEEP COLUMN. THE DATA OBTAINED
ARE SPECIFYING RECOVERABLE RESERVES

WORK ON THE GROUND IS ABSOLUTELY HARMLESS TO HUMANS AND THE ENVIRONMENT

COMPARATIVE ANALYSIS OF TECHNOLOGIES

[SEISMOGRAPHY]

INVESTIGATION OF THE EARTH'S CRUST, BASEDON THE STUDY
OF ARTIFICIALLY EXCITED ELASTIC WAVES

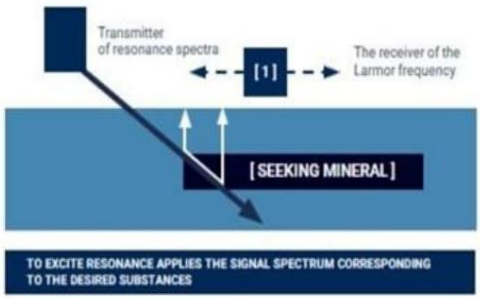


TO EXCITE VIBRATIONS APPLIED EXPLOSIONS, VIBRATION OR SHOCK EFFECT ON THE ROCKS

EFFECTIVENESS	about 30%
RESTRICTIONS	on the character terrain
COST OF THE WORK	the relatively high cost of the work
DURATION	the long duration of work and data processing
ENVIRONMENT	unfavorable to the environment

[RESONANCE METHOD]

STUDIES OF MINERAL DEPOSITS BASEDON THE EXCITATION OF THE DESIRED MATERIALOF NUCLEAR MAGNETIC RESONANCE



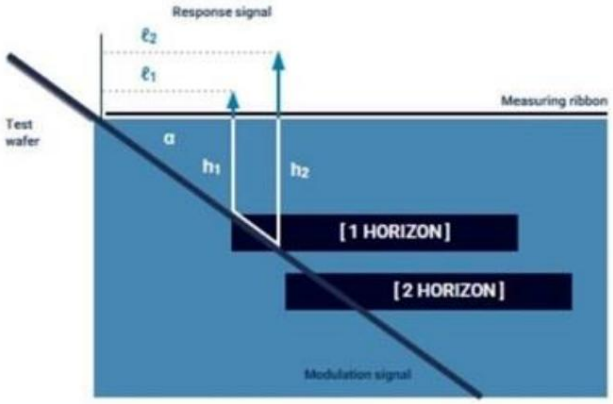
TO EXCITE RESONANCE APPLIES THE SIGNAL SPECTRUM CORRESPONDING TO THE DESIRED SUBSTANCES

EFFECTIVENESS	90%
RESTRICTIONS	no restrictions on the character terrain
COST OF THE WORK	the relatively low cost of the work
DURATION	the short duration of work and data processing
ENVIRONMENT	It has no effect on humans and the environment

RSS NMR
the simple way of exploration

FEATURES OF POINT-BY-POINT RESONANT PROFILING OF THE AREA

[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 ℓ_1 to ℓ_2.

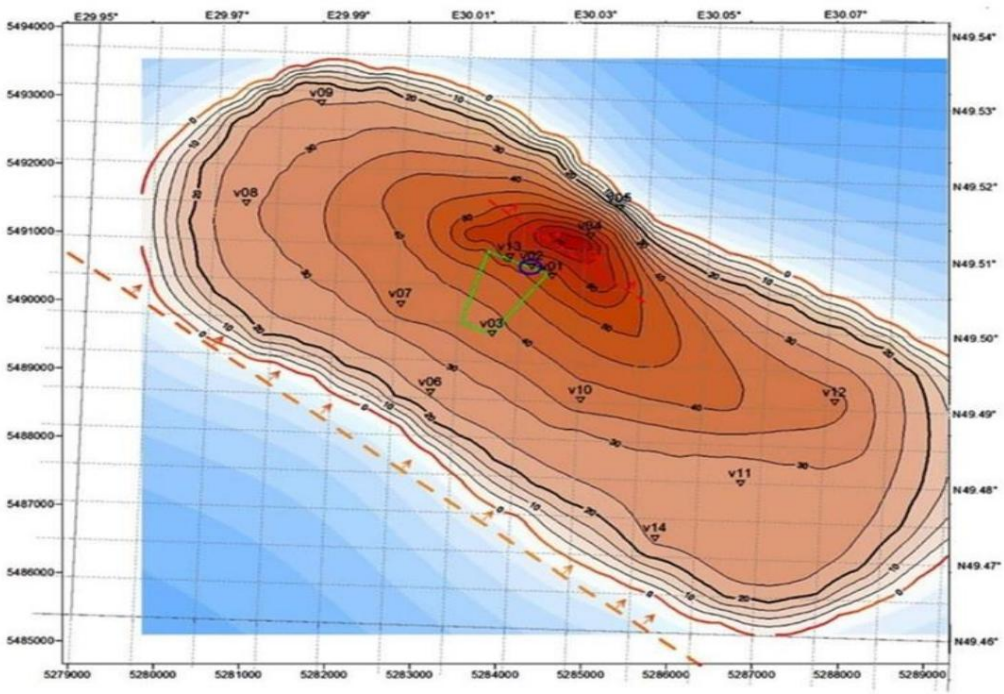
Occurrence depths of a horizon are calculated with the help of the following formulae:

$h_1 = \ell_1 \times tg\ \alpha \qquad h_2 = \ell_2 \times tg\ \alpha.$

Horizon thickness: $\Delta h = h_2 - h_1 = (\ell_2 - \ell_1) \times tg\ \alpha$

SURVEY EXAMPLE: NATURAL GAS

[GROUND BOUNDARIES OF A DEPOSIT]



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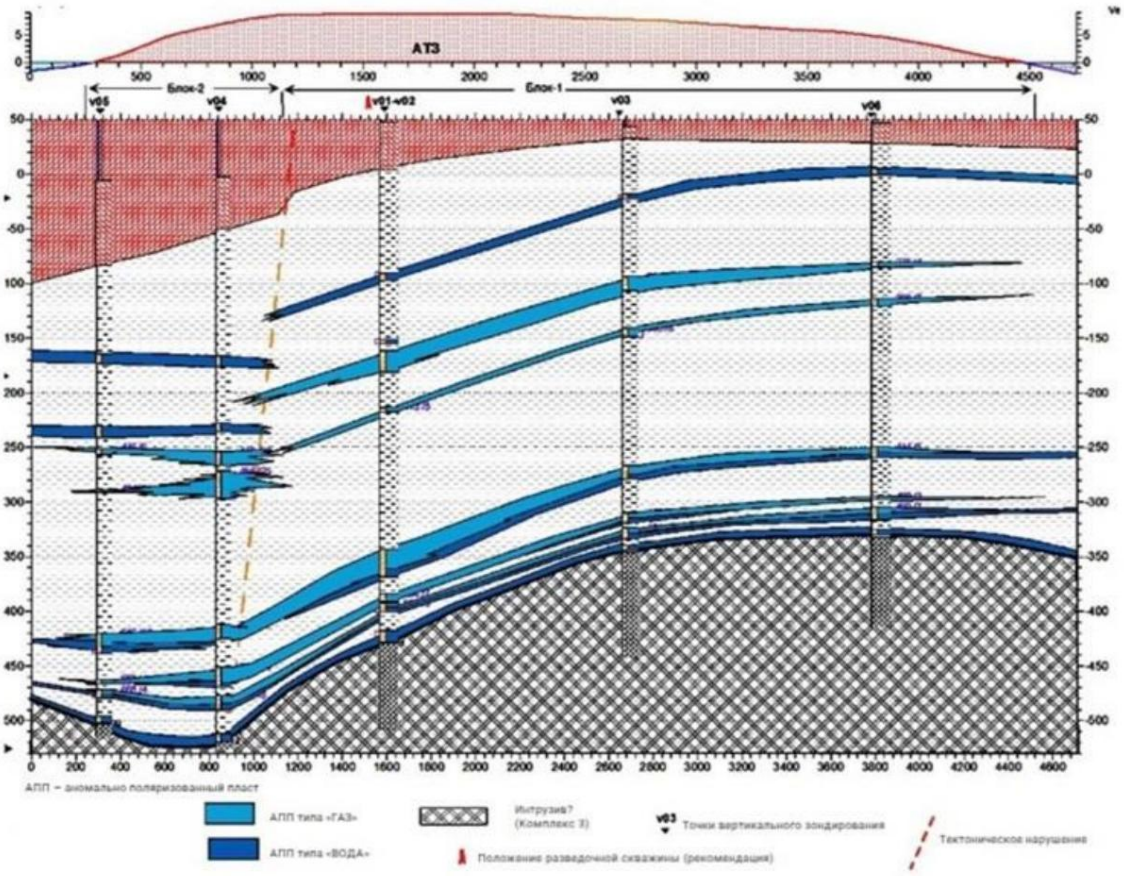
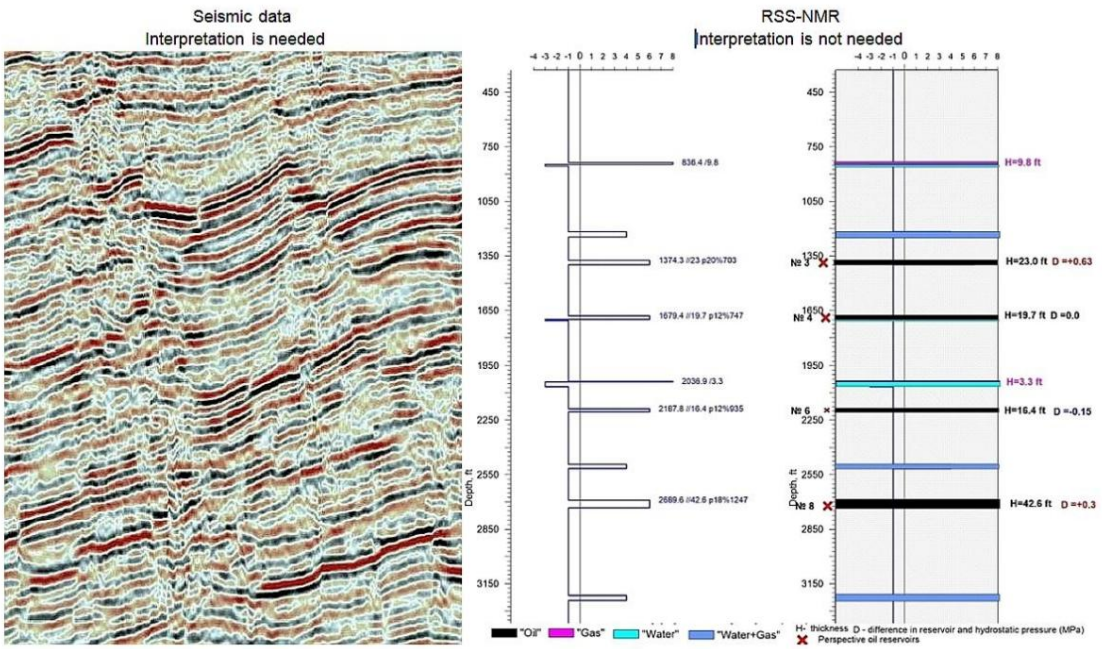
LONGITUDINAL SECTION OF A DEPOSIT

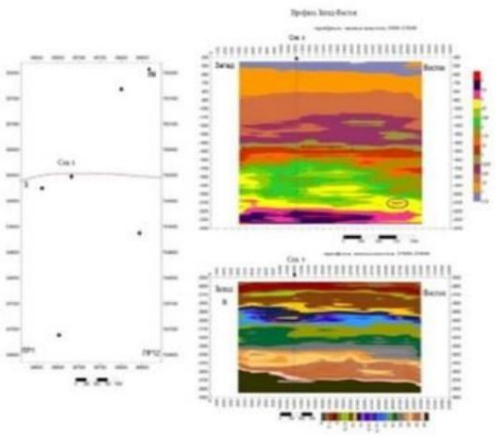


How 3D seismic and RSS-NMR are showing underground deposits:

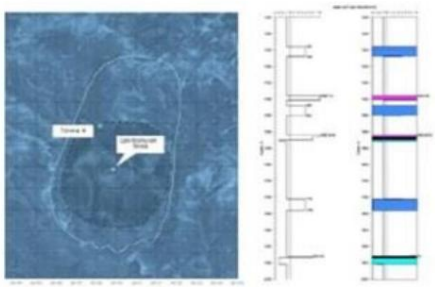


EXAMPLE OF WORK PERFORMED

[KOMI REPUBLIC OF THE RUSSIAN FEDERATION]



VERTICAL SECTION OF THE ELECTROMAGNETIC FIELD
BY THE WEST-EAST PROFILE



DETAILED REMOTE SPACE GEOLOGICAL AND FIELD GEOPHYSICAL SURVEYS USING THE NMR EQUIPMENT IN KOMI REPUBLIC OF THE RUSSIAN FEDERATION IN 2015

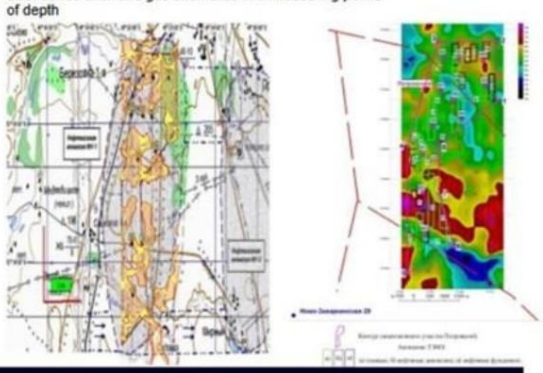
Coincidence — 97.3% based on results of drilling of an exploration well №1

Well №2 — drilling is scheduled for 2016

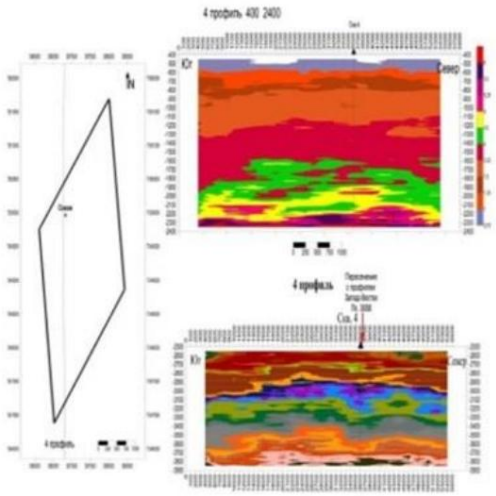
EXAMPLE OF WORK PERFORMED

[SARATOV REGION OF THE RUSSIAN FEDERATION]

Boundaries of oil and gas anomalies with measuring points of depth



DETAILED REMOTE SPACE GEOLOGICAL AND FIELD GEOPHYSICAL SURVEYS USING THE NMR EQUIPMENT IN SARATOV REGION OF THE RUSSIAN FEDERATION IN 2016



VERTICAL SECTION OF ELECTROMAGNETIC FIELD BY PROFILE 4

EXAMPLE OF WORK PERFORMED

[PROJECT FOR SHALE GAS IN TEXAS, UNITED STATES]

The figure shows the contours of the ground 25 identified shale gas drilling points on the largest sites, migration routes of gas along faults, as well as the contours of the west identified two oil deposits.

The data on the number of horizons (6), power and depth of their occurrence, as well as gas pressure levels (30–50 amt).

UNDERGROUND WATER PROJECTS

Country	Area remote	Coordinate survey that drilling	The depth, m	Type of water
			Our data / drilling results	Our data / drilling results
Mauritania, city of Atar	2500 sq. km.	N 20032' E 13002'30"	130÷150 / 125÷150	Fresh / fresh
Mongolia, Gobi Desert	1600 sq. km.	N 44001'40" E 108029'00"	270÷320 / 275÷320	Fresh / fresh
Cyprus, cityof Limassol	400 sq. km.	N 34042'00" E 33001'20"	180÷200 / 195÷205	Fresh / fresh
Ukraine, Sevastopol, Simferopol	1600 sq. km.	more than 100	From 50 to 950 / Error 1÷10%	Fresh / fresh (two errors)

PUBLICATIONS BY OUR SCIENTISTS ON THIS SUBJECT

1.G.A. Bielawski, NI Kovalev. New technologies in remote environmental monitoring of underground and underwater objects // «Environment and Resources», vol. Number 9, Kiev, 2004., P.7.

2.N.I. Kovalev, etc. Remote defining the contours of underground fresh water in the Gobi Desert in Mongolia / Scientific report «Gobi» SNUNEI, Sevastopol, 2008., P.65.

3. N.I. Kovalev, etc. Investigation of the mechanism of formation of underground fresh water near the magma chambers extinguished volcanoes. International Conference «Space technologies in geophysics» // C-P, Russia, 2013.

4. Kudric I.D, Kovalev N.I., Bielawski S.G. Environmental monitoring. / / Cherkassky CSTEI, 2013. P.258.

COMPARATIVE EFFICIENCY FOR LARGE TERRITORIES

Traditional methods	Space survey Geological survey Geophysical survey Searching boring	~ 30 %	3–5 years	6 (From data of Russian State Institute of Oil and Gas)
Innovation technology	Radiation-chemical treatment of spaces pictures Nuclear-magnetic resonance sounding of a deposit on-site	more than 90 % 2 months	2 months	1

[COMPARATIVE CHARACTERISTICS WITH 3D SEISMOGRAPHY]

			"IT"
			+
1	Topographical binding	+ (anomalies)	+
2	Construction of 3D models of objects	+ (anomalies)	+
3	Search of unstructured traps of oil and gas	–	+
4	Detection of gas 'caps' in oil horizons	–	+
5	Definition of gas pressure in gas 'caps'	–	+
6	Definition of presence of oil mobility	–	
7	Detection of water horizons over oil and gas deposits	–	+

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7	Detection of water horizons over oil and gas deposits	–	+

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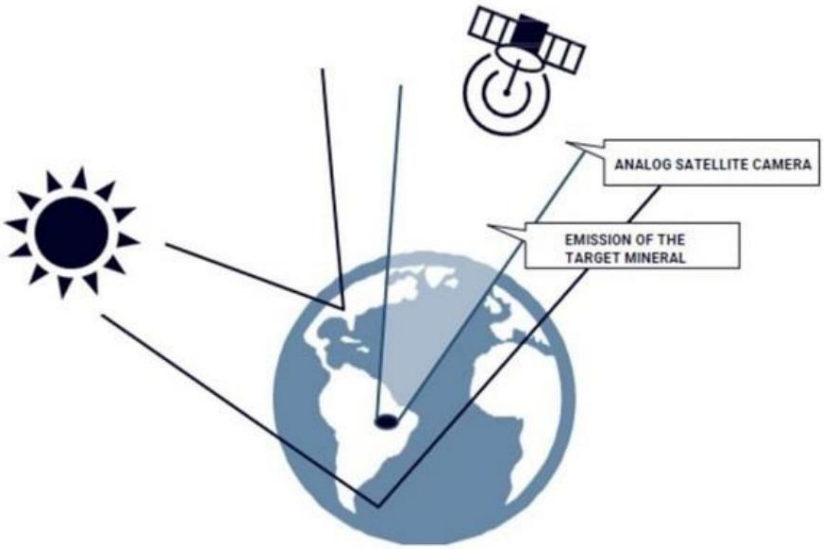
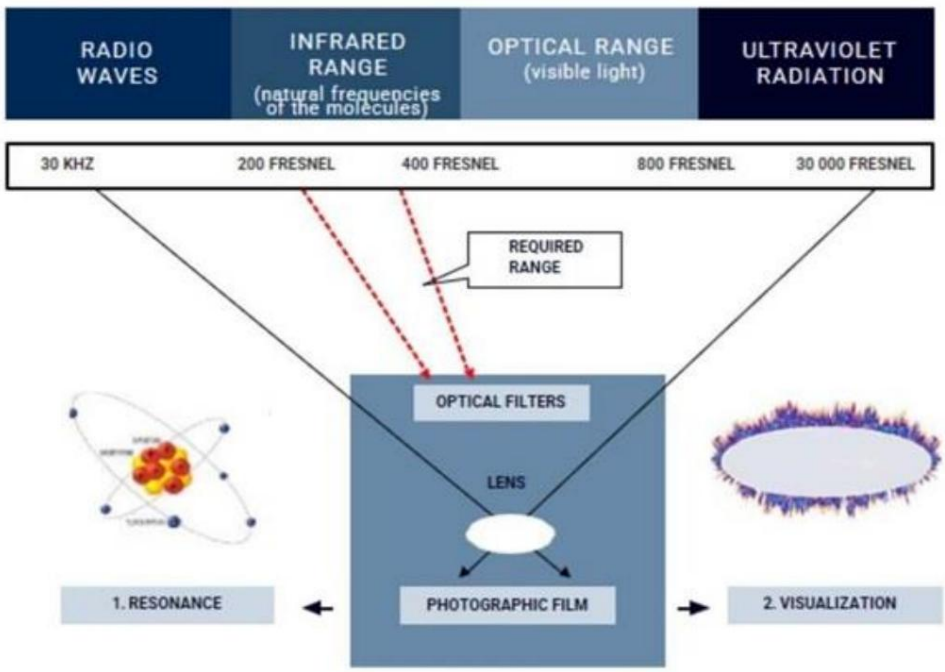
REMOTE EXPLORATION OF AREAS USING SATELLITE IMAGERY

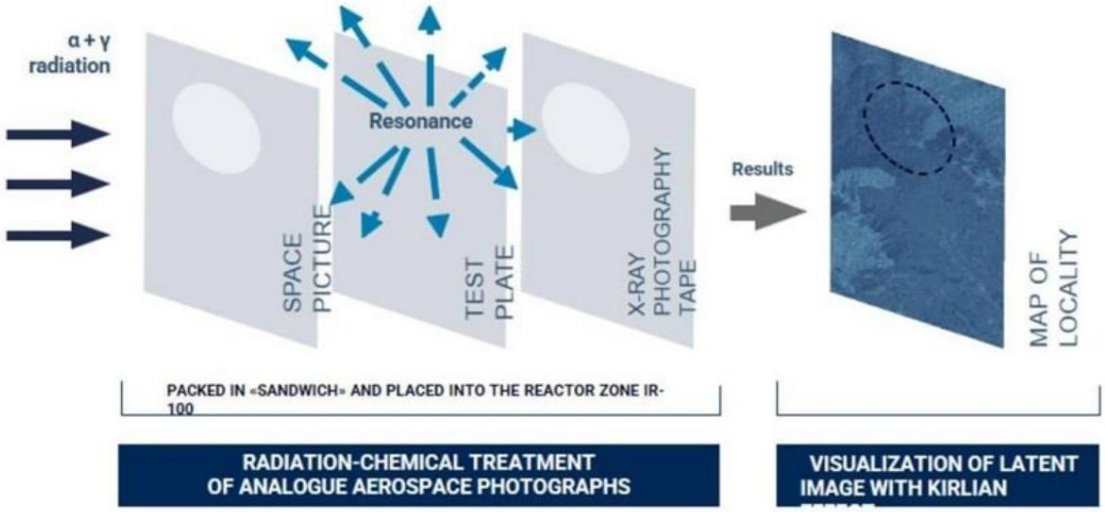
[RADIATION-CHEMICAL TREATMENT OF ANALOGUE AEROSPACE PHOTOGRAPHS]



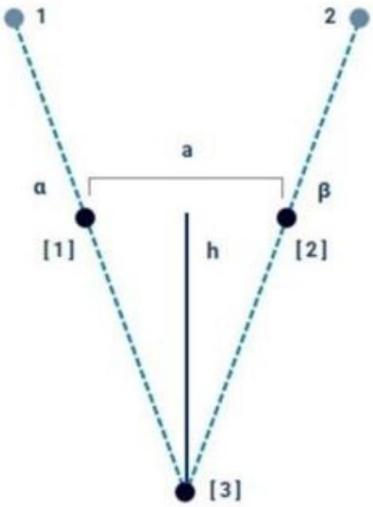
RADIATION-CHEMICAL TREATMENT OF ANALOGUE AEROSPACE PHOTOGRAPHS



HOW IT IS DONE



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.** Obtain ground mapping point **3** in two differ- ent positions, «**1**» for the first satellite and «**2**» for the second.

2.We calculate coordinates of points **1** and **2**, calculated by different images.

3.Determine the amount of displacement «and» between them on the ground.

4. 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. After the evaluation is determined by the depth of the deposit **h**.

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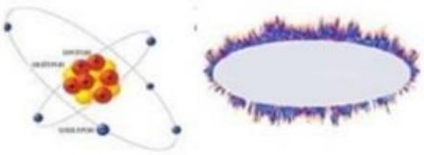
TECHNICAL IMPLEMENTATION

RADIOACTIVE AND CHEMICAL TREATMENT OF ANALOG SATELLITE IMAGES OF SURVEYED AREAS



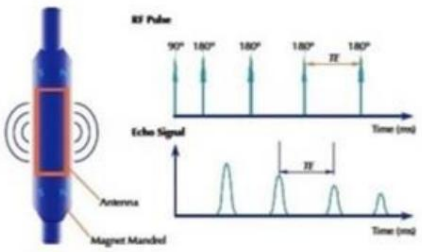
PHYSICAL EFFECTS USED

- Nuclear magnetic resonance
- Energy transfer of test minerals characteristics to test plates
- Chemical and electromagnetic (Kirlian effect) imaging of objects

EQUIPMENT AND MATERIALS

- Special chemical laboratory
- Isotropic source of α and γ radiation
- Space images of the surveyed area in the deep infrared range
- High-purity chemicals
- Highly sensitive X-ray film

NMR METHODS IN GEOPHYSICS



[MAGNETIC LOGGING METHOD]

Companies HALLIBURTON and SCHLUMBERGER

\+ Direct measurement of T1 parameter for identification of fluids, porosity and permeability, regardless of lithology

– Small radius of the survey, powerful magnets, powerful transmitter

r =0,05–0,2m; f =0,6–1,2 MHz; B_0=0,1–3T; P =50–300W

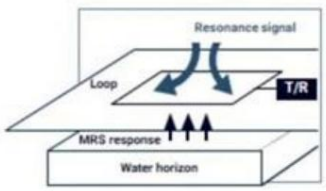
[METHOD OF MAGNETIC RESONANCE SENSING, MRS]

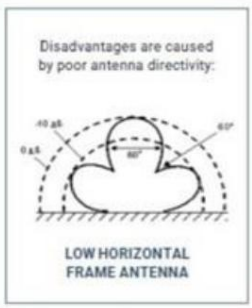
IRIS INSTRUMENTS and others

\+ Direct measurement of T2 parameter for identification of water horizons, depth and porosity of collectors

– Shallow depth of survey (up to 150 m), a powerful transmitter (4000 V, 600 A pulse)

Dipole
Gain ratio G≤4





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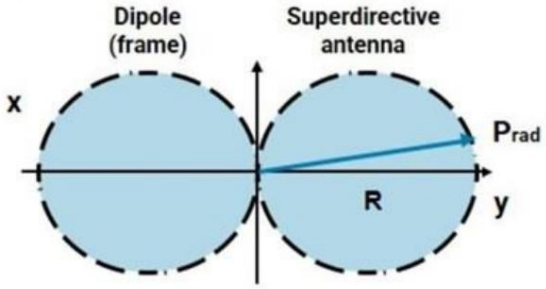
INCREASE OF THE EMISSION POWER

[USE OF THE SUPERDIRECTIVE ANTENNA]



ANTENNA EMISSION POWER:

$P_{rad} = \eta_A \times G_A \times R_{trans}$
(where **x Rtrans** -transmitter power,
η_A — efficiency of the antenna,
G_A — antenna gain).
For Dipole GA ~ 4,
for a directive antenna:
$G_A = S_1/S_A = 4\pi \times R^2 / S_A$
(where S_A — the effective area of antenna).
When **R = 1m** и $S_A = 10^{-6}$ m², we get the superdirectivity antenna gain by power
$G_A = 4\pi \times 10^6 \sim 12 \times 10^6$

[IMPROVED SURVEY RELIABILITY]

The above systems use a sinusoidal signal of resonance. However, oil comprises 1,000 elements, so in order to maximize identification of the target mineral, it is necessary to cause a resonance in all molecules of the target substance.

THE MAIN IDEA OF THE INNOVATIVE METHOD IS TO PERFORM THE POINT-BY-POINT PROBING OF AN AREA WITH A FREQUENCY SPECTRUM, CAUSING A RESONANCE IN THE TARGET MATERIAL

REDUCTION OF RADIO-WAVE ABSORPTION IN THE GROUND

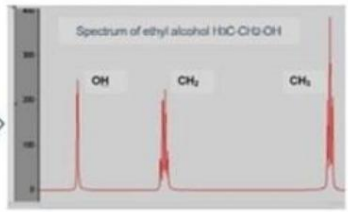
In order to reach this goal we use the effect of 'chemical shift' in NMR.

If it were possible to form spectrum of oil frequencies and use this signal for its actuation, we would be able to considerably reduce absorption of signal energy in other substances.

Since oil is a mixture of molecules of complex hydrocarbons (in any oil sample there are more than thousand of various compoundings) it is almost impossible to generate such complex vibrations with the help of traditional methods.

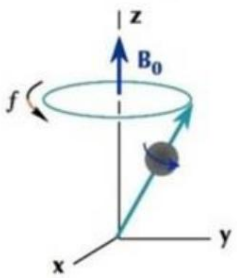
WE DECIDED TO SOLVE THIS TASK BY RECORDING SPECTRA OF SAMPLE SIGNALS ONTO SPECIAL TEST WAFERS AND USE THEM FOR MODULATION OF FREQUENCY OF THE MASTER GENERATOR

Proton in constant magnetic field has a fixed absorption frequency $F = \gamma B0 / 2\pi$



Grouping of atoms into molecules causes complex absorption spectrum, which is an 'individual address' of each molecule

Single Spin



$$f = \frac{\gamma}{2\pi} B_0$$

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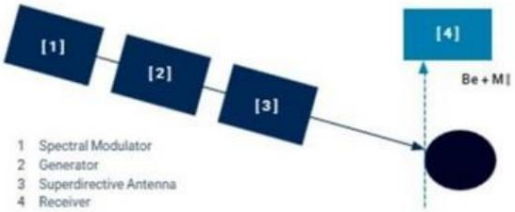
IMPLEMENTATION

[DIAGRAM OF RECEPTION OF RESONANCE SIGNAL FROM DEPOSIT]



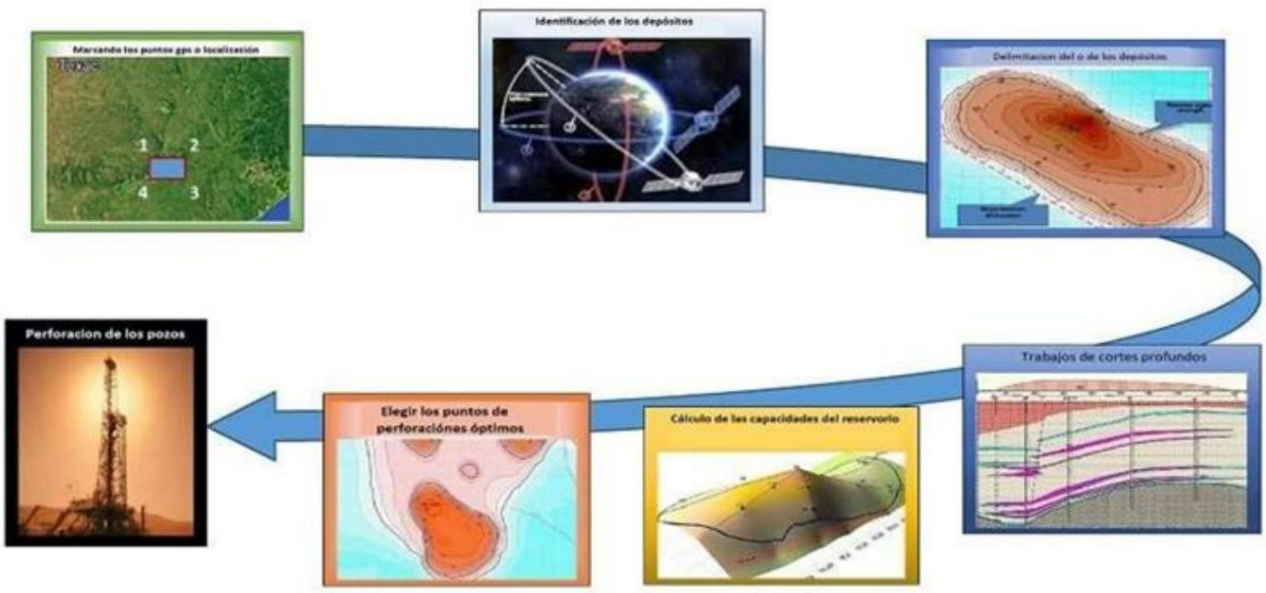
For resonance actuation of oil molecules in a deposit and registration of response signal we use a transmitter containing:
– spectral modulator 1,
– master generator 2,
– superdirective antenna 3, as well as
– superregenerative receiver 4.

Characteristics of various oil types are recorded from samples onto test wafers. Test wafers as spectrum carriers are used for modulation of semiconductive laser (positive decision on international application PCT/UA2011/000033).

Laser aiming device

AS INTEGRATED WITH ANTENNA HIGH FREQUENCY GENERATOR WE USE RED GALLIUM-ARSENIDE LASER:
PRAD = 0,2 W,
BEAM DIAMETER = 1,1MM,
GA = 12 X 10^6
RELATIVE TO POINT-LIGHT ISOTROPE EMITTER

Cómo funciona la RSS para descubrir los reservorios (petroleo, gas o agua) de forma directa



VIII. Patents and patents

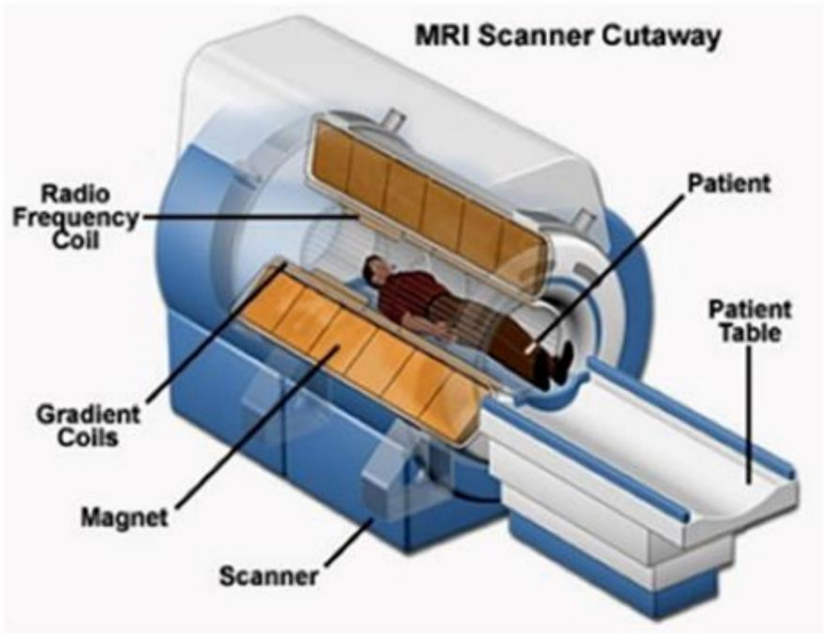
THE GENERAL IDEA

Technology is based on the effect of nuclear magnetic resonance.
Nuclear magnetic resonance (NMR) - a physical phenomenon is used to study the properties of molecules under irradiation of atoms' nuclei by radio waves in magnetic field.

The essence of the nuclear magnetic resonance phenomenon is that during exposure of object placed in constant magnetic field to radio frequency impulses electromagnetic energy is consumed and further released in the form of response impulses that can be registered and analyzed.

For the discovery of the effect of nuclear magnetic resonance in 1952 the American scientist Felix Bloch and Edward Mills Purcell were awarded the Nobel Prize in Physics.
Nuclear magnetic resonance is widely used in science and engineering.

In medicine, it is called a magnetic resonance imaging (MRI).



MRI is based on the principle of re-emission of radio waves by hydrogen nuclei (protons) contained in the tissues of the body, immediately after receiving the energy from the radio wave signal, which the patient is irradiated.
The patient is placed in a powerful magnetic field. At him affects the RF signal, causing nuclear magnetic resonance in the desired tissues or organs. The scanner receives response signals, which are then processed in the computer and creates an internal image (visualization).

RSS NMR
the simple way of exploration

Method's Description

For your consideration an effective geophysical method of mineral search and prospecting "Poisk" is offered, which was created by Russia- an scientists. The method has passed practical tests since 1998 and showed high effectiveness dur-ing investigation of land and shelf of the Earth.
The method of geoholographic mineral search was developed on the basis of up-to-date achievements of science and technology, and allows to remotely carry out search and prospect-ing of different kinds of minerals on land and sea shelf, assess the availability of industrial develop-ment of deposits.
This unique geophysical method of mineral search and prospecting provides high effective-ness of work with small time and money expens- es because of physical principles and innovation- al technologies it is based on.
The complex of works on mineral search and prospecting with the help of "Poisk" geoholo-graphic method is carried out in 2 stages.

1st, search stage of works includes obtaining of aerospace photographs of a territory under investigation in different spectra, their geoholo-graphic processing on special equipment and obtaining of preliminary search results (contouring of kindly regions).

2nd, prospecting stage includes carrying out of geoholographic works directly on-site where deposit boundaries, occurrence depths, quality and bed thick-ness are specified and optimal points of exploratory and industrial wells are defined.

Method's Capabilities

•**Territory of action** is unlimited (any region on land or shelf on the territory of the Earth);
•**Minimum area under investigation** of the Cus-tomer's territory is defined by the size of aero-space photographs used during the first stage of works. At present such "single" area under inves-tigation is 60 x 60km (3600 sq. km);
•**Maximum square** of the investigated territory is virtually unlimited;
•**Sounding depth** - from 0 to 5 km;
•**Detectable minerals** - water, oil, gas, different metals in ore beddings;
•**Method's delicacy** - 1-1.5 grams of substance per ton of the ore body;
•**Detection success of deposits** - on first stage of sounding - not less than 80%, on second stage -97 % for water source and hydrocarbons, for all other min-erals - not less than 90%;
• **Work execution terms** are usually 1 -3 calen-dar months at first stage of work and 2-6 months at second stage depending on total square of in-vestigation and scope or works;

Описание метода

Вашему вниманию предлагается геофизический метод поиска и разведки полезных ископае- мых «Поиск», разработанный Российскими уче- ными. Метод прошел практическое тестирование с 1998 года и показал высокую эффективность при исследовании как суши, так и шельфа Зем- ли.
Метод геоголографического поиска ископае- мых был разработан на безе современных до-стижений науки и технологии. Он позволяет уда-ленно выполнять поиск и разведку различных видов полезных ископаемых на суше и морском шельфе, оценивать возможность промышленной разработки месторождений.
Этот уникальный геофизический метод поиска и разведки полезных ископаемых предусматри-вает высокую эффективность работ в короткое время и с малыми затратами благодаря своим физическим принципам и инновационным техно-логиям, на которых о основан.
Комплекс работ по поиску и разведке минера- лов с помощью геоголографического метода «Поиск» выполняется в 2 этапа:

1-й этап, поисковый, вклю чает аэрокосми-ческое фотографирование исследуемой терри-тории в различных спектрах, геоголографиче-скую обработку снимков на специальном обору-довании и получение предварительных резуль-татов поиска (оконтуривание искомых регионов)

2-й этап, разведочный, вклю чает в ы полне- ние геоголографических работ непосредственно на месте, где определяются границы месторож-дения, глубины залегания, качество и мощность пласта, а также намечаются оптимальные точки исследовательских и промышленных стволов.

Возможности метода

•**Территория обследования** — не ограниче- на (любая территория суши или шельфа на по-верхности Земли);
•**Минимальная площадь для исследова- ния** — определяется размерами аэрокосмиче- ских снимков во время первого этапа работ. В настоящее время такая «одиночная» площадь составляет 60х60 км (3600 кв.км);
•**Максимальная площадь** исследуемой территории — практически не ограничена;
•**Глубина зондирования** — от 0 до 7 км;
•**Определяемые минералы** — вода, нефть, газ, различные металлы в рудном залегании;
•**Чувствительность метода** — 1-1,5 г веще-ства на 1 тонну руды;
•**Точность определения месторождений** — на первой стадии зондирования — не менее 80%, на второй стадии —97% для воды и гидро-карбонатов, для всех остальных ископаемых — не менее 90%;
•**Сроки исполнения работ** — обычно 1-3 календарных месяца на первом этапе, и 2-6 ме-сяцев на втором этапе в зависимости от общей площади обследования и масштабов работ;

• **Method safety** - the method is environmental- ly appropriate and completely safe for people.

(The success of deposit detection is defined by results of exploratory works carried out in 1998-2007 in Ukraine, Russia and abroad).

In comparison with other geophysical methods of mineral search and prospecting, the "Poisk" method provides an efficient shortening of work duration and a higher success in detection of minerals.

The cost of works is quite important too. For instance, in comparison with tra-ditional geophysical methods the gross work cost (per 1 sq. km) of the "Poisk" method is decreased by tens of times.

Method's Concept

Traditional satellite and ground geophysical methods of mineral search are based on reception and further processing of reflected from the surface of the earth or underground aperiodicities of various natural (solar radiation) or artificial sound-ing signals.

In the basis of the "Poisk" method lies an original concept of resonance remote mineral search and prospecting when sound of the earth is executed with the help of particular signals only inherent to chosen minerals producing the effect of resonance in their deposits.

Physical Principles In the Basis of the Method

To basic physical principles which allow to realize the method of resonance mineral search in practice belong Kirlian effect and also the effect of energoinformational transfer of particular substance radiation onto other carriers.

We have used the abovementioned physical principles and effects at following stages of prospect works with the help of the "Poisk" method:

1. Obtaining of aerospace photographs of the required territories with addi-tional highlighting by particular resonance signals;
2. Narrow hypogene sounding of mineral de-posits with particular signals with the help of field equipment directly on-site;
3. Holographic processing of resonance sig- nals coming to satellite and field equipment from the whole bulk of sought-for mineral deposits.

• **Безопасность метода** — метод экологиче- ски чист и полностью безопасен для людей.

(Успех определения месторождений определен по результатам выполненных в 1998-2007 гг. работ в Украине, России и за рубежом).

В сравнении с другими геофизическими методами поиска и разведки полезных ископаемых, метод «Поиск» предоставляет значительное уменьшение сроков работ и значительное увеличение успешности определения минералов.

Стоимость работ также имеет значение. Например, в сравнении с традиционными геофизическими методами, общая стоимость работ (на 1 кв.км) методом «Поиск» меньше в десятки раз.

Концепция метода

Традиционные спутниковые и наземные геофизические методы поиска минералов основаны на получении и дальнейшей обработке отраженных от поверхности Земли или от подземных неоднородностей различных природных (солнечная радиация) или искусственных зондирующих сигналов.

В основе метода «Поиск» лежит оригинальная концепция удаленного поиска и разведки минералов по их резонансу с помощью определенных сигналов, на которые только выбранные минералы дают резонансный эффект в местах их залегания.

Физические принципы в основе метода

Базовые физические принципы, позволяющие реализовать эффект резонансного поиска минералов на практике, относятся к эффекту Кирлиан, а также к эффекту энергоинформационного переноса излучения конкретного вещества с помощью несущей частоты.

Мы используем вышеупомянутые физические принципы и эффекты на следующих этапах разведочных работ с помощью метода «Поиск»:

Получение аэрофотоснимков требуемых территорий с дополнительной подсветкой конкретными резонансными сигналами;

Узконаправленное гипогенное облучение ме-сторождения ископаемых определенными сигна- лами с помощью полевого оборудования непо- средственно на месте;

Голографическая обработка резонансных сиг-налов приходящих с спутника и полевого оборудования для всего объема искомого вещества по месторождению.

Scientific Preconditions

It is well known in the physics of the atomic nucleus the data about magnetic and electrical moments are of special importance.
According to the works of the academician E.Zavadsky (1946), all nuclei with spins that are not equal to zero have the magnetic moment μ_1, which is connected with the spin of this nucleus **J**, nuclear magneton - μ_{nucl} and proportional to gyro-magnetic relation — g_1 :

$$\mu_1 = g_1 \bullet J \bullet \mu_{nucl};$$

The gyromagnetic relation g_1 is a constant magnitude and is equal to ratio of nuclear mag- netic moment to the nuclear angular moment.
If we bring the atomic nucleus with spin **J** and moment μ_1 to the magnetic field with intensity **I**, then we can see magnetic interaction, and the energy of interaction of magnetic moment of the nucleus with the field W_m will be proportional to **H**:

$$W_m = \mu_1 \bullet H \bullet (m/J);$$

where **m** is the projection of the vector **J** to the direction of intensity of the magnetic field. I.e., the energy of interaction is proportional to the intensi- ty of the magnetic field.
According to the quantum mechanics, several energetic (quantum) levels of nucleus energy are possible, and the difference of values of 2 adja-cent energetic levels will be equal to:

$$\Delta W_m = g_1 \bullet I_{nucl} \bullet H;$$

Then the frequency corresponding to this ener- gy will be called Larmor's frequency:

$$f_L = \Delta W_m / h;$$

where **h** is Planck's constant.
If we place the sample body to the constant orienting magnetic field I (the spins will be orient-ed along the magnetic field) and simultaneously apply variable rotating magnetic field I_{var}, but per-pendicular to the orienting nucleus of the field — **I**, then at the frequency of the variable field equal to Larmor's frequency f_L, we can observe resonant absorption and resonance scattering of the energy by the sample body.
Thus, having recorded resonance frequencies for each substance in nuclear magnetic reso- nance facility and then influence the examined substance by the generator with such a frequen- cy, then by presence of resonance phenomena it is pos-sible to judge about presence of the searched body in the depths of the earth. Only in case when the modulated signal of the generator hits the searched substance, a perturbation ac-tion to the receiving device of the vector magnetic field of this sub-stance occurs.
As a rule, the value of Larmor's frequencies for different substances present in the magnetic field of the Earth, lies within terahertz range (100 GHz - 100 THz).

Научные предпосылки

В физике атомного ядра уделяется особенное внимание магнитным и электрическим момен-там.
В соответствии с работами академика Е.Завадского (1946), все ядра с ненулевыми спи-нами имеют магнитный момент μ_1, связанный со спином этого ядра **J**, ядерным магнетоном — μ_{nucl} и пропорционален гиромагнитному отноше-нию — g_1:

$$\mu_1 = g_1 \bullet J \bullet \mu_{nucl};$$

Гиромагнитное отношение g_1 есть постоянная магнитуда и равна отношению ядерного магнит-ного момента к ядерному угловому моменту.
Если внести атомное ядро со спином **J** и мо-ментом μ_1 в магнитное поле интенсивностью **I**, то мы можем видеть магнитное взаимодействие, и энергия взаимодействия магнитного момента ядра с полем W_m будет пропорциональна **H**:

$$W_m = \mu_1 \bullet H \bullet (m/J);$$

где **m** есть проекция вектора **J** на направле-ние интенсивности магнитного поля. То есть, энергия взаимодействия пропорциональна ин-тенсивности магнитного поля.
В соответствии с квантовым механизмом, не-которые энергетические (квантовые) уровни ядерной энергии возможны, и разность в значе-ниях 2 соседних энергетических уровней будет равна:

$$\Delta W_m = g_1 \bullet I_{nucl} \bullet H;$$

Тогда частота соответствующая этой энергии (называемая Ларморовой частотой) будет:

$$f_L = \Delta W_m / h;$$

где **h** — постоянная Планка.
Если мы поместим образец вещества в посто-янно ориентированное магнитное поле **I** (спины будут ориентированы вдоль магнитного поля) и одновременно подадим изменяющееся вращаю-щееся магнитное поле I_{var}, но перпендикулярно ориентации ядер в поле **I**, тогда при частоте пе-ременного поля, равной Ларморовой частоте f_L , мы можем наблюдать резонансное поглощение и резонансное рассеивание энергии образцом вещества.
Таким образом, имея записанные резонанс- ные частоты для каждого вещества в условиях ядерного магнитного резонанса и затем воздей-ствуя на исследуемое вещество с помощью ге-нератора таких частот, по наличию резонансного эффекта возможно судить о наличии искомого вещества в глубинах земли. Только в случае ко-гда модулированный сигнал генератора воздей-ствует на приемное устройство по вектору маг-нитного поля, искомое вещество присутствует.
Как правило, величины Ларморовых частот для различных веществ в магнитном поле Земли лежат в терагерцовом диапазоне (100ГГц — 100ТГц).

Technical Characteristics and Composition of the "Poisk" Complex Equipment

The "Poisk" resonance complex of earth sounding consists of the following units, equipment, devices and software products.
The following will be used at first stage:
-research nuclearmagnetic resonance facili- ties;
-research thermal neutron reactor IR-100 with traversing box in the active zone (neutron current 2 • 10^{12} n/cm^2 sec) and stationary gamma radia- tion facility with dosage rate up to 1000 R/hour;
-2nd class chemical and radiochemical labora- tories for work with isotopes;
-technological unit for chemical treatment of photographs with the facility for vacuum laying of prepared lactose solutions onto the photographs;
-electronic detachable devices for scanning from photographs and ore min-erals (containing ores) samples the information-and-energy spectrums and record-ing them on «testing» and «working» holograms;
-reference holographic matrices with recorded spectrums of NMR atoms of substances (metals and organic substances);
-laser facilities combined with rotary electromagnetic field facilities;
-electromagnetic camera (Kirlian camera) for visualization of boundaries of deposit contours on aerospace photographs and transferring them onto the geolog-ical map of search area using the video camera «Station-5i» connected with the PC;
-editorial and publishing complex for prepara- tion of maps, reporting docu-ments and calcula- tion materials for estimation of volumes of ore deposits with com-mercial content of metals in them.

At second stage of works different auxiliary materials are used, as well as mobile and portable equipment:
-ore samples, geological maps and color satel- lite photographs with known areas of deposits for adjustment and testing operational capability of mobile appa-ratus of the system;
-lower-power laser facilities combined with rotary electromagnetic field facilities;
-generators of radiation of different frequencies from 0,1-60 THz;
-combined units of resonance radiation;
-narrow-beam receiving aerials;
-goniometer and laser rangefinder mounted on the holder;
-geophysical devices (theodolites) with narrow-beam radiation aerials fixed on them (to define bearings and beam slope angles);
-portable devices for visual recording of spec- tral resonant lines of sub-stances (polymetals) on the boundaries of deposit areas contours;

Технические характеристики и состав оборудования комплекса «Поиск»

Резонансный комплекс для зондирования земли «Поиск» состоит из следующих модулей, оборудования, устройств и программных продуктов:
Следующее оборудование используется на первом этапе:
-исследовательское оборудование ядерного магнитного резонанса;
-исследовательский реактор на тепловых нейтронах ИР-100 с горячей камерой в активной зоне (поток нейтронов 2*1012 n/cm2/sec) и стационарное оборудование гамма-облучения с дозами до 1000 Р/час;
-химическая и радиохимическая лаборатории 2-го класса для работы с изотопами;
-технологический модуль для химической обработки фотографий с возможностью вакуумного нанесения подготовленной лактозы на фотографии;
-электронные устройства для сканирования фотографий и образцов минеральных руд (содержащих руд) для получения информационно-энергетических спектров и записи их на «тестовые» и «рабочие» голограммы;
-справочные голографические матрицы с записанными спектрами ЯМР атомов и веществ (металлы и органические вещества);
-лазерное оборудование, комбинированное с оборудованием вращающегося магнитного поля;
-электромагнитная камера (камера Кирлиана) для визуализации границ месторождений на аэрокосмических снимках и переноса их на геологические карты района поиска с использованием видеокамеры “Станция 5I”, соединенная с компьютером;
-редакционный и издательский комплекс для подготовки карт, отчетных документов и расчетных материалов для оценки объемов запасов руд с коммерческим содержанием металлов.

На втором этапе работ используются различные вспомогательные материалы, также как и мобильное и портативное оборудование:
-образцы руд, геологические карты и цветные спутниковые снимки известных районов месторождений для настройки и тестирования операционных возможностей мобильной аппаратуры системы;
-низкоэнергетическое лазерное оборудова- ние с оборудованием вращающегося магнитного поля;
-генераторы излучений с различными частотами от 0,1 до 60 ТГц;
-комбинированные устройства резонансного излучения;
-узконаправленные приемные антенны;
-гониометр и лазерный дальномер, смонтированные на держателе;
-геофизические устройства (теодолиты) с узконаправленными излучающими антеннами зафиксированными на них (для определения направления и угла отражения);

- portable devices for visual recording of spec- tral resonant lines of sub-stances (polymetals) on the boundaries of deposit areas contours;
- portable broadcasting stations, GPS receivers and auxiliary equipment for dwelling in field condi- tions;
- laptop with software for recording and pro- cessing geophysical measure-ments in field con- ditions;

At th ir d, final stage of works, a computing and editorial and publishing complexes are used for calculation materials, preparation of diagrams and final report on the carried out work..

Techniques of Work Execution

The succession of prospecting works execution with the help of the geoholo-graphic mineral search method lies in the following:

- Preparatory scanning of informational and energy spectra of the needed min-erals from pho- tographs or ores (or from samples of minerals) and their recording on "test" or "operational" holo- grams;
- Order and obtaining of the required number of aerospace photogprahs of the investigated territo- ry during simultaneous "highlighting" of the area with laser beam modulated with the rotating elec- tromagnetic field of test holograms;
- Processing of every aerospace photograph in the research reactor with thermal neutrons IR- 100 (with traversing box in the active zone and sta- tionary plant of gamma radiation with dose rate of up to 1000 R per hour);
- Countouring of the borders of the detected in the photographs mineral deposits on a nuclear- magnetic resonance plant and further visualiza- tion of the deposit borders with the help of Kirlian camera;
- Transfer of mineral deposits contours on a geographic map of the investigat-ed region with the help of computer calculating complex and obtaining preliminary data on the deposit's pa- rameters. Providing the Customer with operation- al materi-als on the detected mineral deposits;
- Further investigation of mineral deposits di- rectly on-site carried our with the help of mobile equipment of the "Poisk" geoholographic com- plex;
- Analytical processing of data array, obtaining of qualitative characteristics of deposits, mineral reserves and position data of optimal boring points;
- Preparation of the final report and providing the Customer with it.

- портативные устройства для визуальной за- писи спектральных резонансных линий веществ (полиметаллов) на границах контуров месторож- дений;
- портативные радиостанции, GPS приемники, и вспомогательное оборудование для организа- ции работ на месте.
- ноутбук с программным обеспечением для записи и обработки геофизических измерений в полевых условиях;

На тре тье м, заключительном этапе работ ис- пользуются вычислительный и издательский комплексы для обработки материалов, подготов- ки диаграмм и финального отчета по выполнен- ной работе.

Техника выполнения работы

Успешность выполнения изыскательских ра- бот с помощью геоголографического метода по- иска минералов заключается в следующем:

- Предварительное сканирование информаци- онных и энергетических спектров необходимых минералов с фотографий или руд (или с образ- цов минералов) и их запись на «тестовые» и «рабочие» голограммы;
- Заказ и получение необходимого количества аэрокосмических снимков исследуемой террито- рии во время соответствующей «подсветки» рай- она лазерным излучением, модулированным вращающимся магнитным полем тестовой голо- граммы;
- Обработка каждого аэрокосмического снимка на исследовательском реакторе на тепловых нейтронах ИР-100 (в горячей камере в активной зоне и с помощью стационарного источника гам- ма-излучения с дозой облучения до 1000 Р/час);
- Оконтуривание границ обнаруженных на снимках месторождений на установке ядерного магнитного резонанса и дальнейшая границ ме- сторождений с помощью камеры Кирлиана;
- Перенос контуров месторождений минера- лов на географические карты исследуемого рай- она с помощью компьютерного вычислительного комплекса и получение предварительных дан- ных о параметрах месторождения. Передача заказчику оперативных материалов по обнару- женным месторождениям;
- Дальнейшее исследование месторождений непосредственно на месте, выполняемое с помо- щью мобильного оборудования геоголографиче- ского комплекса «Поиск»;
- Аналитическая обработка массива данных, получение качественных характеристик место- рождений, запасов минералов и координат опти- мальных точек проходки;
- Подготовка заключительного отчета и пере- дача его заказчику.

Executed Geophysical Works In . Russia. Ukraine

1.By request of "Chernomorneftegaz" city of Simferopol', Crimea, the areas of gas leaks in the Black Sea underwater pipeline were detected. 2003-2015

2.Search for underground drinking water was carried out territory of the Crimean peninsula with indication of boring points. About 100 works were carried out, all wells gave drinking water of the required quality. 2003-2021.

3.Determination of position data of containers with battle poisonous substances drowned in coastal regions of the Black Sea. Remote identification of chem-ical substances in containers (organophosphorous, organochloric and arsenic organic substances). 2004-2009.

4.Identification of “Lenin" ship which sunk at the depth of 520m with the help of the "Poisk" remote complex. 2005 .2016

5.By request of "Krymgeologiya" works were carried out on additional inves-tigation of the earlier discovered on the Crimean peninsula "Tat'yaninskoe" deposit of gas condensate. According to the results of the investigation reserves of gas con-densate and boring point were defined, and the boring of prospecting-industrial well was started. 2005 ,2015

6.Supplementary exploration of uranium fields by request of the Ministry of Power Engineering of Ukraine. According to results of the shaft sink- ing, the data were fully confirmed. 2006—2010.

7.By request of the city of Sevastopol administration works were carried out on the search for drinking water on the city territory and its neighborhood. According to the results of the investigation 78 boring points were indicated, all of them gave suitable for drinking water. Water occur- rence depth is 20-100m. 2006-2021

8.Big gas and gas condensate field was prospected and confirmed under Ukrainian granitic sheet near Kirovograd at more than 2500 meters deep. 2009.

9.Big gas beds were prospected and confirmed in Donetsk region by request of ‘Zasyadko’ coal mine. That gas beds are the main reason of methane explosion dangerous in a mine. Confirmed by test boring. 2009.

10.In 2008-2021 we were done several prospecting works searching granite and sand beds in Ukraine. All prospected fields were confirmed by boring and several beds are in industrial exploitation now.

11.Coal-bed’s anomalies searching, water and gas fields prospecting tasks were processed by request of ‘Kuzbass Coal’ association (Russia). 2009.

Выполненные геофизические работы в России, Украине .

1.По запросу «Черноморнефтегаза» из Симферополя, Крым, места утечек газа из подводных труб были обнаружены нами в 2003-2015 году.

2.Поиск подземных источников питьевой воды на территории Крымского полуострова с указани- ем точек бурения. Около 100 работ было выпол- нено, питьевая вода — требуемого качества. 2003-2021гг.

3.Определение данных расположения контейнеров с боевыми отравляющими веществами в прибрежном районе Черного моря. Удаленная идентификация химических веществ в контейнерах (фосфорорганический, хлорорганический, мышьякорганический). Обнаружено и поднято свыше 1600 объектов. 2004-2009.

4.Определение местоположения теплохода «Ленин», затонувшего на глубине 520 метров, с помощью комплекса «Поиск». 2005 . 2016

5.По запросу «Крымгеологии» выполнены ра- боты по ранней разведке месторождения газово- го конденсата «Татьянинское» на Крымском полуострове. По результатам исследований были определены запасы газового конденсата и точки бурения, и бурение промышленных скважин бы- ло начато. 2005 , 2015

6.Дополнительная разведка урановых месторождений по запросу Министерства энергетики Украины. В соответствии с результатами шахтной проходки, данные разведки полностью подтверждены. 2006—2010.

7.По запросу Севастопольской администра- ции выполнены работы по поиску питьевой воды на территории города и окрестностей. По результатам исследований было указано 78 точек бурения, все из них дали качественную питьевую воду. 2006-2021.

8.При работах в Кировоградской области под Украинским гранитным щитом обнаружено и подтверждено крупное месторождение газа и газового конденсата на глубинах свыше 2500 м. 2009.

9.По заказу шахты им.Засядько (Донецкая обл.) обнаружены и подтверждены крупные газо- вые залегания, приводящие к просачиваниям метана и взрывам в шахте. Подтверждено бурением. 2009.

10.В 2008-2021 годах проводились работы по поиску залеганий гранитов и песков для промышленной добычи. Все найденные месторождения (около 10) подтверждены бурением, на нескольких начаты работы по добыче.

11.По заказу объединения «КузбассУголь» (Россия) произведены работы по разведке аномалий разломов угольных пластов, залеганию воды и газа в районе планируемой проходки. 2009.

Abroad

1.By request of "INKOTEK-region", Moscow, jointly with Russian Academy of Energy Sciences, Moscow, and Tyumen Institute of Oil and Gas an investigation of 7 oil fields was carried out in the Tyumen region. According to the results of the investigation an industrial boring of wells was started, the boring results on 2 fields confirmed the investigation data. On other fields the boring is not finished. 1998—2003.

2.By request of the Ministry of National Securi- ty of the Islamic Republic of Mauritania a search for underground drinking water in the region of the city of Atar was carried out, at the depths of 250m a powerful flow of drinking water was dis- covered. The initial debit of the well comprised 32,000 liters per hour. 2006.

3.Search for underground drinking water in Greece jointly with "Geomir". 2006.

4.Minerals search on the territory of the Al-Fujairah emirate at the request of the Global Development Group, UAE, 2007.

5.By request of ore-dressing and processing enterprise 'Erdenet' (Mongolia) searching and contouring work was processed on copper-ore deposits near Erdenet town (Mongolia). Data provided were confirmed by boring. 2007-2009.

6.By request of company 'MAK' (Mongolia, Ulan-Baator) underground water searching and countouring works were processed in south Gobi desert. Data provided were confirmed by 6 industrial holes. 2008-2009.

7.Large scale fields of natural gas and oil were prospected in Gobi desert region by request of ' company (Mongolia). 2008-2021

8.Prospecting works of uranic ores are processing now by request of 'MAK' company (Mongolia). 2009-2010.

9.Test prospecting and contouring task of searching gas and oil fields was done in Utah state (USA) by request of 'Carpathia' company. The state attestation had obtained as a result. The method precision was confirmed as 98%. 2009.

10.Underground water prospecting works were done in Australia, New South Wales state by request of farmers' association. Data provided were confirmed by boring. 2009. 2014

11.In 2010 - 2015 the works to search hydrocarbons had been carried out in Indonezia

12.In 2015 - 2020the works to search for gold had been carried out in Bahama islands and Mongolia

13.In 2021 permanent works are being carried out to search hydrocarbons for various organizations from different countries 2021

За рубежом

1.По запросу фирмы «ИНКОТЕК-регион», Москва, в сотрудничестве с Российской Академией Энергетических наук и Тюменским институтом нефти и газа, были произведены работы по исследованию 7 месторождений нефти в тюменском регионе. В соответствии с результатами разведки было начато промышленное бурение, результаты бурения подтвердили данные разведки по 2-м месторождениям. По остальным месторождениям бурение не было завершено. 1998-2003.

2.По запросу Министра национальной безопасности Исламской республики Мавритания была произведена разведка подземных источников питьевой воды в районе города Атар, на глубине 250 м был найден мощный поток питьевой воды. Начальный дебет источника оценен в 32000 литров воды в час. 2006.

3.Поиск подземной питьевой воды в Греции в сотрудничестве с «Геомиром». 2006.

4.Поиск минералов на территории эмирата Аль-Фуджейра по запросу Глобал Девелопмент Групп, ОАЕ, 2007.

5.По заказу ГОК «Эрденет» (Монголия) выполнены работы по поиску и оконтуриванию медно-рудных месторождений в районе г.Эрденет. Данные подтверждены бурением. 2007-2009.

6.По заказу фирмы МАК (Монголия, Улан-Батор) произведены работы по поиску и оконтуриванию залежей воды в южной части пустыни Гоби. Данные по залеганиям и дебету подтверждены шестью промышленными скважинами. 2008-2009.

7.По заказу фирм (Монголия) в районе пусты- ни Гоби разведаны крупные месторождения газа и нефти. 2008-2021.

8.По заказу объединения «Монатом» (Монголия) выполняются работы по поиску урановых руд на территории Монголии. 2009-2010.

9.По заказу компании «Карпатия» (США) на территории штата Юта (США) выполнена тестовая задача по поиску и оконтуриванию нефтегазовых месторождений. По результатам выполнения работ получена государственная аттестация метода и аппаратуры для подобных работ. Точность метода по результатам аттестации—98%. 2009. 2014

10.По заказу объединения фермеров штата Новый Южный Уэльс (Австралия) произведены работы по поиску залеганий воды. Полученные данные разведки подтверждены бурением. 2009.

11.Произведены работы по поиску углеводородов в Индонезии 2010-2015.

12.Произведены работы по поиску золота на Багамах ,Монголии 2015-2020г..

13. Производятся постоянные работы по поиску углеводородов по заказу различных организаций из разных стран 2021

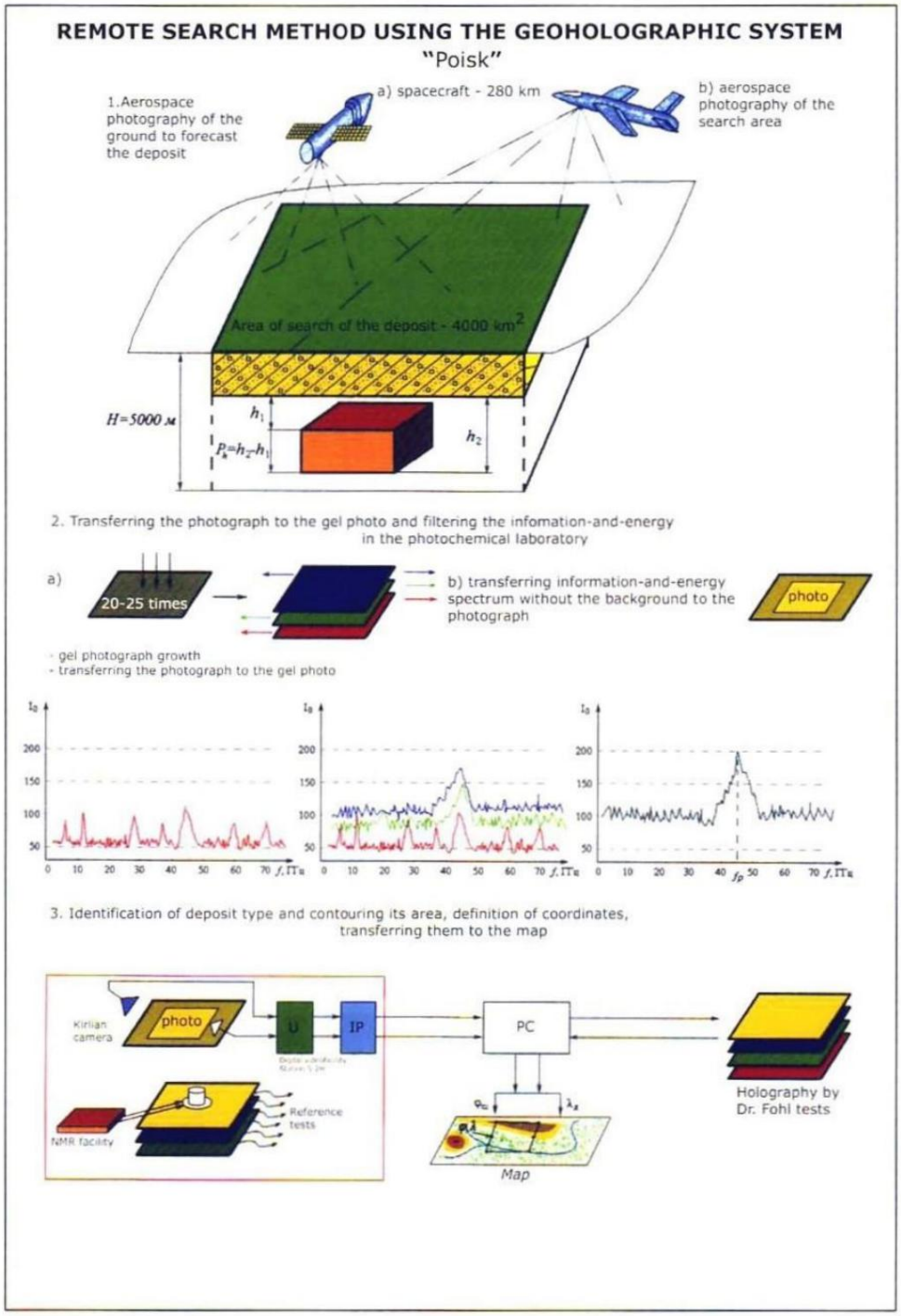


Fig.1. Geoholographic search for minerals (1st stage)
Рис.1. Геоголографический поиск минералов (1-й этап)

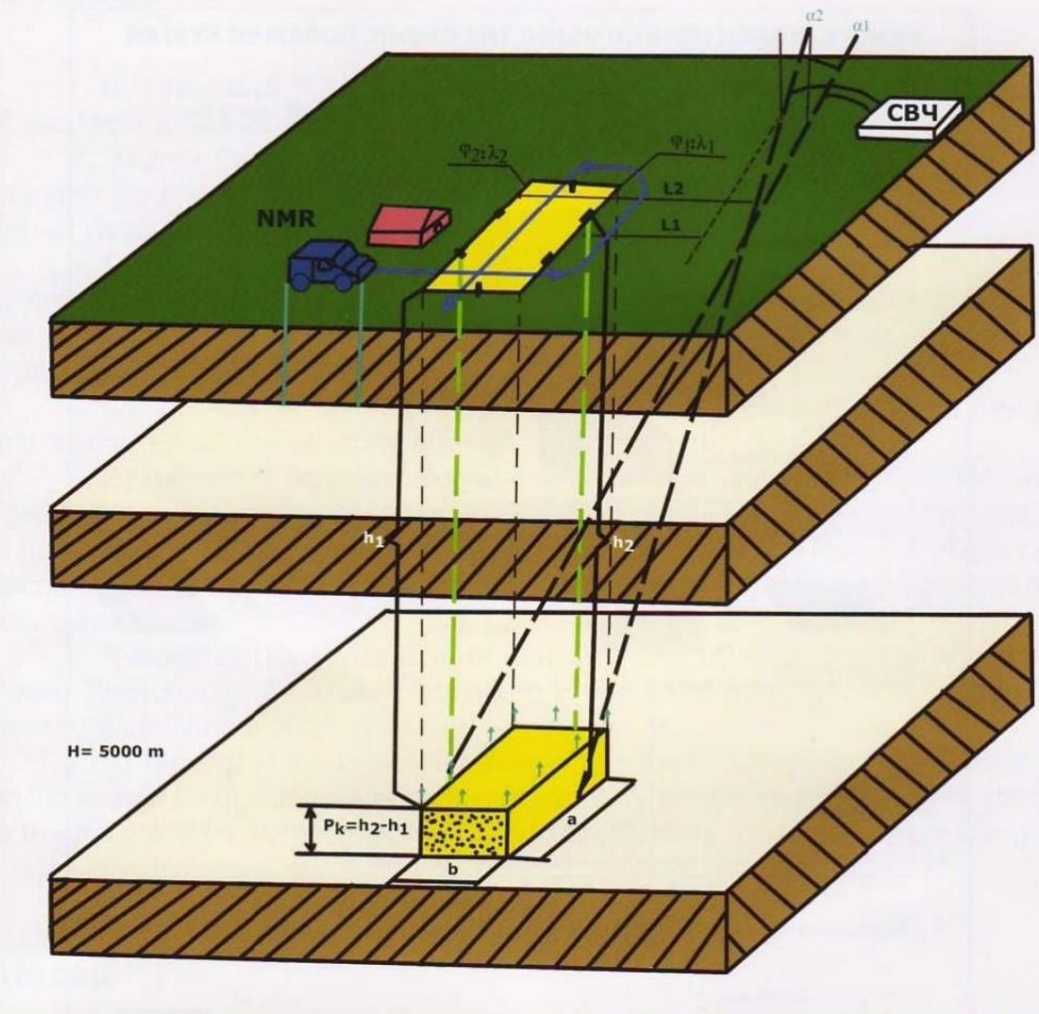


Fig.2. Geoholographic search for minerals (2nd stage)
Рис.2. Геоголографический поиск минералов (2-й этап)

RSS NMR
the simple way of exploration

Fig.3. Overall method concepts
Рис.3. Общая схема метода

BIBLIOGRAPHICAL REFERENCES

ÿ 2004-2004 - More than 350 resource exploration projects worldwide with positive results

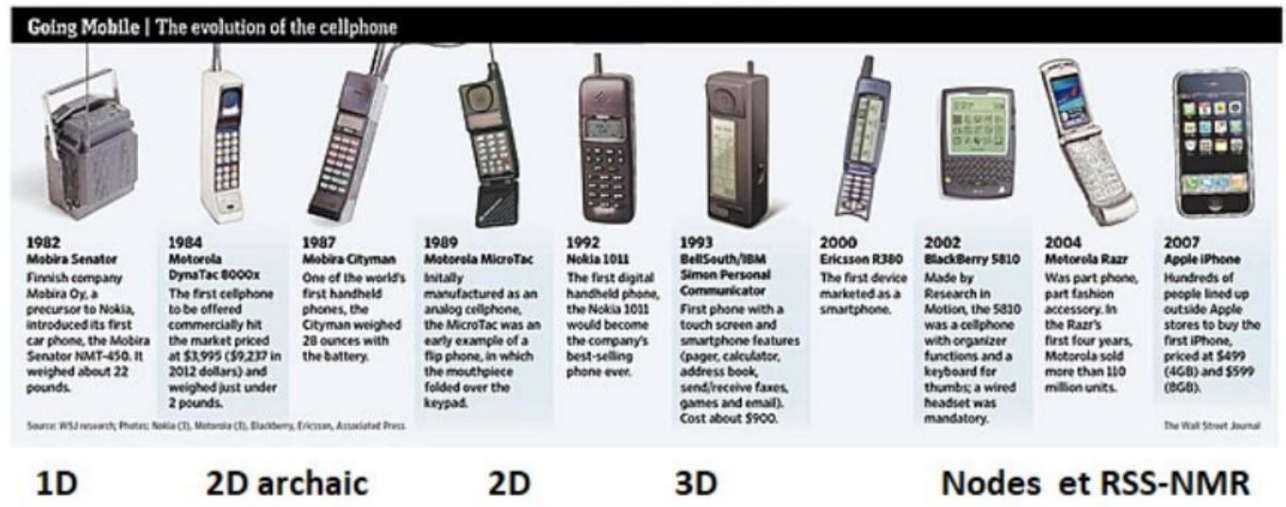
ÿ Scientific paper on geo-holography (in Russian)

ÿ Prehistory or traditional seismics

ÿ Evolution of technology in exploration

ÿ History of exploration and methods vary depending on the case ÿ A safe tool for quick and discreet exploration

ÿ The ideal tool for companies that take into consideration the maintenance of Capex and Opex



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