Perspectives for gems exploration
Tracing the mother rock with RSS-NMR


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Michel L Friedman (DESTOM Chartered 67/11)	2020/03/06	CREATION Rev. 00

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1. <u>The effective method of geological exploration</u>

The proposed highly effective method of searching for minerals is based on the use of nuclear magnetic resonance (NMR) effect - measuring the spectra of the nuclear spins of substance atoms in the magnetic field of the Earth. This effect was used to create a search equipment set and related methods and technologies, which have the general name "Geo-holographic Equipment set". The set of equipment itself, methods and technologies were developed by specialists of our enterprise in cooperation with scientists from the Sevastopol State University. The equipment and technology are protected by patents and copyright certificates. We are glad to introduce you to our joint work and look forward to fruitful cooperation in the field of geological exploration, as our method allows you to significantly reduce the cost of searching and delineating deposits, to carry out exploratory drilling in predetermined locations and to reduce the number of exploration wells to a minimum.

2. <u>Space photos</u> (stage 1 base of material)

The first stage of investigations of an area of interest on the earth's surface begins with the acquisition and processing of satellite images of the area using Earth remote sensing (ERS) methods. Satellite images are processed on a special stationary set of equipment to identify possible anomalies of the desired substances and determine promising search areas. To process satellite images, the spectral data of the samples of the target substances obtained with the help of the IR-100 nuclear research reactor are used.

3. <u>Laboratory</u> (preparation stage 1)

At this stage, a complete analysis of satellite images is carried out with the identification of promising search zones, preliminary delineation of anomalies identified by spectral analysis methods, and cartographic information is prepared to travel to the search area. Spectral matrices are also being prepared for the field part of Poisk equipment set. To obtain spectra, samples of rocks from the investigated or similar deposits are used. For this task various devices of equipment are used

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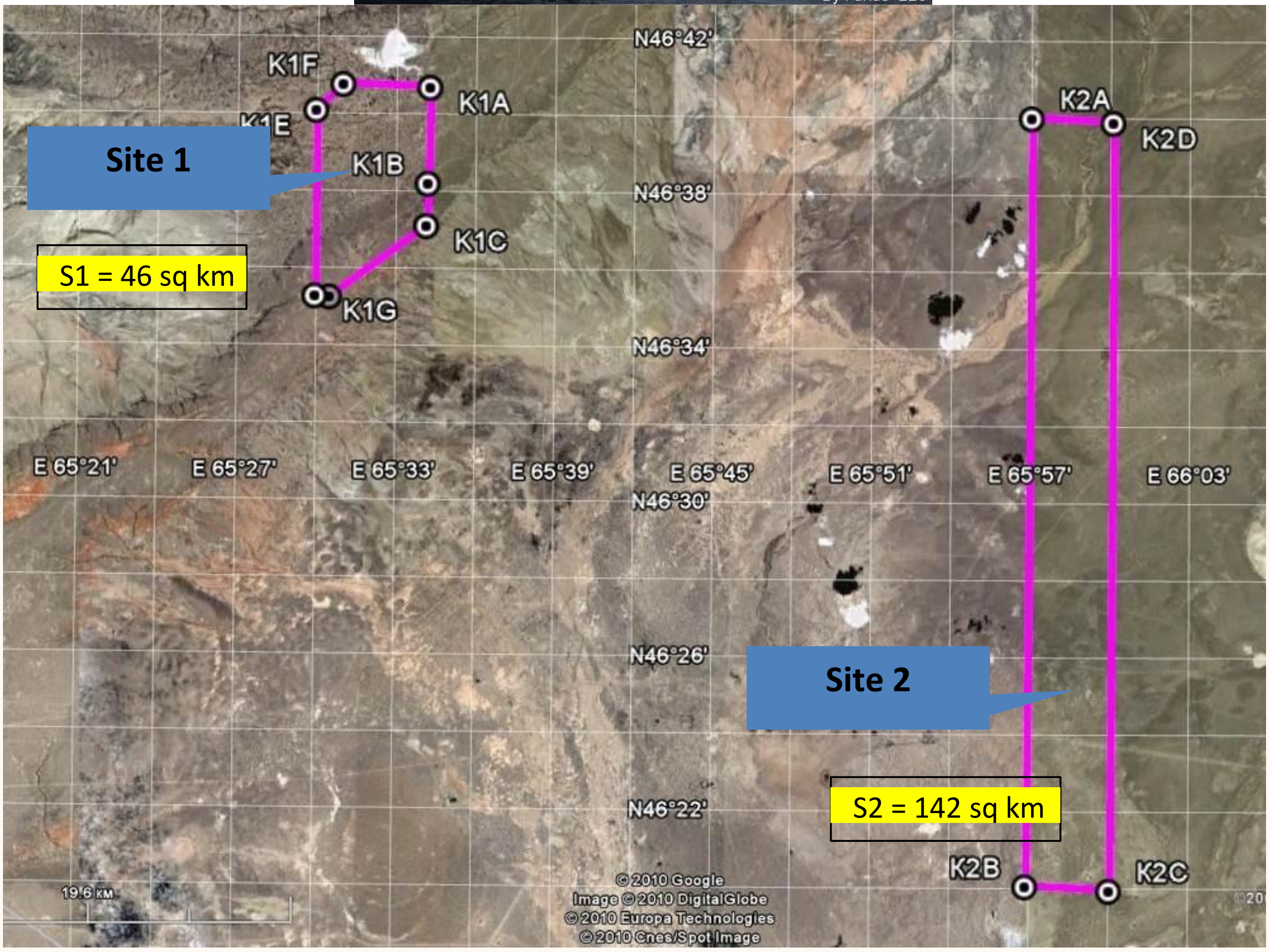

4. <u>LABORATORY WORKS</u> Stage 1

The first stage of mineral exploration consists in remotely (using satellite images or aerial photographs) studying a given search area, identifying promising areas and preparing data for field work.

For this, the following procedures are sequentially performed:

Study of samples of samples of oil, gas, ores with different concentrations of metals or groundwater (drinking, low-mineralized or saline geothermal waters), recording from them information-energy spectra (atomic spectra of metals and non-metals in a wide spectral range) or atomic spectra of reference (typical) metals included in their composition.

The transfer of information and energy spectra of search agents (oil, gas, GC, ores of various metals, groundwater etc.) on special "test" and "working" media (matrix), made with nanomaterials and organometallic with subsequent radiation

- chemical treatment ("stitching") and measurement of the concentration of nanomaterials by the neutron activation method.

Checking and calibrating the equipment of the stationary Earth sounding complex and mobile geophysical resonance test equipment (NMR equipment) of the Poisk complex by remote identification of sample samples in laboratory conditions.

Carrying out space or aviation photographic reconnaissance of the surveyed area (or purchase of ready-made analog photographs of the surveyed area).

Processing space (analog) photographs or aerial photographs with special layers of gel solutions and phosphors, irradiation of them with doses of 5 10 ^ 4 Rem and visualization on them of areas with anomalies of specific hydrocarbons (in each photograph there is only one type of hydrocarbons) or ore anomalies of various metals (each photo shows only a specific type of ore with a specific concentration of metal). Similar processing of photographs for areas with groundwater (for each salt concentration - its own photograph).

Transfer of visualized anomalies from space images to a georeferenced satellite image (using Google mosaics, Landsat, etc. with a coordinate grid) and then to a map of the surveyed area. Determination of the areas of detected anomalies.

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, various waters (fresh, slightly mineralized, saline, geothermal).
The depths of occurrence are calculated by the magnitude of the displacement of the boundaries of one anomaly, obtained simultaneously on 2 satellite images, but made with different inclinations of the satellite orbits. The term of the first stage work is up to 3 months. The probability of detecting and delineating the anomaly based on the results of the first stage is 65-70%.

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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

"Direct" method of remote sounding of Mineral Deposits

Nuclear magnetic resonance

Use of aerospace photograph

Work on site

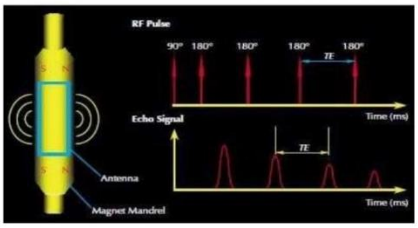
Thanks to resonance, which we arouse in sought-for substances, we "see" deposits of minerals underground and precisely define their parameters

We work with:

hydrocarbons, underwater accumulations, other minerals in large and small territories, on land, on shelf

NMR Methods in Geophysics

Method of nuclear magnetic logging

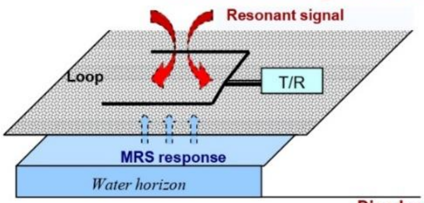


Halliburton and Schlumberger Companies

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

-- ***Small survey radius, 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 sounding (MRS)



IRIS instruments and others

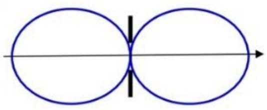
+ Direct measurement of T2 parameter for identification of water horizons, depth and reservoir porosity

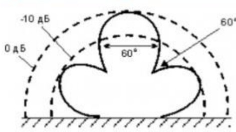
-- ***Shallow survey depth*** *(up to 150m)*,

-- ***powerful transmitter*** *(impulse 4000 V, 600 A)*

Disadvantages caused by weak directionality of antennas:

Dipole
Gain coefficient
G ≤ 4





Low-suspended horizontal frame antenna

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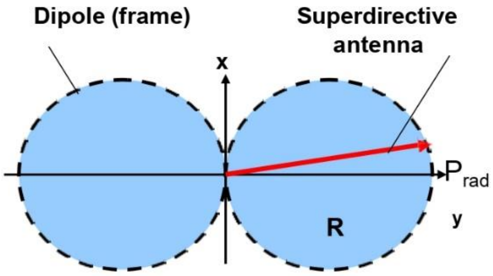
Our way - Increase of Radiating Power

Application of superdirective 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"

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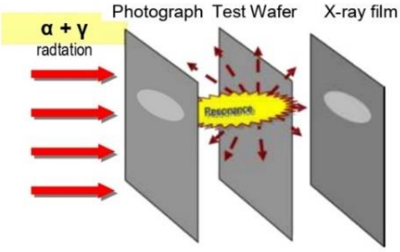
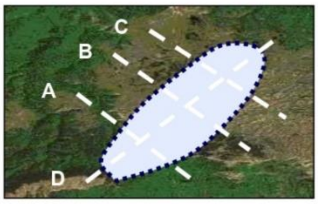
General Idea of the Technology

Preliminary the spectrum of the sought-for mineral is recorded on special test wafers



Aerospace photographs

Test wafers are used as a resonator during radiation-chemical processing of analogue aerospace photographs of the territory obtained in the infrared range.
Result is direct visualization of ground contours of basins and deposits



Ground expedition

Point-by-point resonance sounding of an area: improvement of deposit contours, obtainment of longitudinal and transverse sections. Selection of optimal drilling points, improved calculation of expected reserves.
Test wafers are used for spectral modulation of transmitter's radiation

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Capabilities of the Technology

Services of Institute are provided in the following format:

Application territory	– without limitations (on land or shelf),
Survey area	– virtually without limitations,
Survey depths	– from 0 to 7 km
Sought-for minerals	– oil, gas, water and other minerals,
Efficiency	– for hydrocarbons and water > 90%,
Stages duration	– from 1 to 3 months,
Environmental safety	– the method is completely safe for humans and the environment.

Services are provided in the following format:

Services are provided in the following format:

Remotely
with application of the patented technology of radio-chemical processing of analogue aerospace photographs of a territory
4 Options

On site
with application of the patented technology of pointwise sounding with the help of mobile field equipment
2 Options

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Options of Remote Survey

- ① *Prompt diagnostics of territories*
- ② *Remote survey of plots*
- ③ *Obtainment of map of minerals*
- ④ *Remote Survey of wells*

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.

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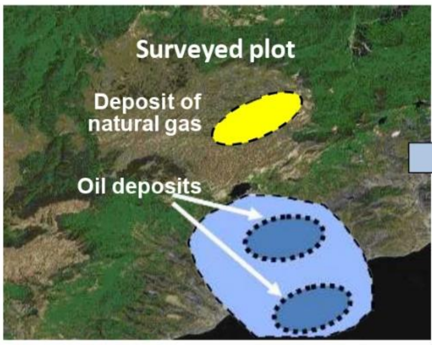
2 Remote Survey of Plots



Solved tasks:

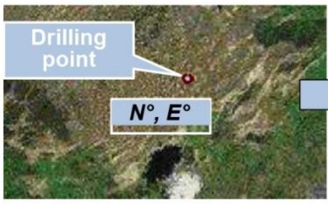
1. Detection, localization and obtainment of ground contours of deposits,
2. Definition of number of horizons of deposit,
3. Definition of occurrence depths of horizons,
4. Definition of thickness of each horizon,
5. Evaluation of reservoir rock,
6. Calculation of forecast volume of deposit reserves.

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

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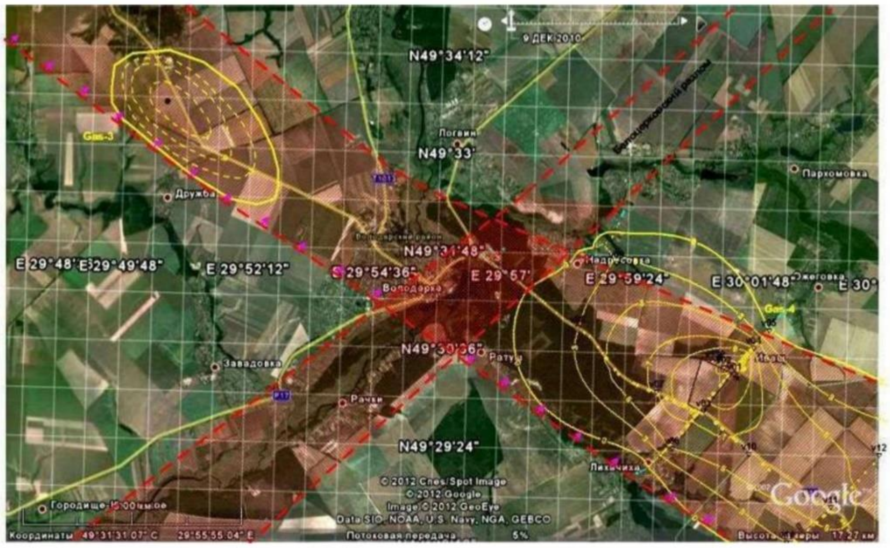
Example of remote plot survey
(total area of the plots is 500 sq.km)

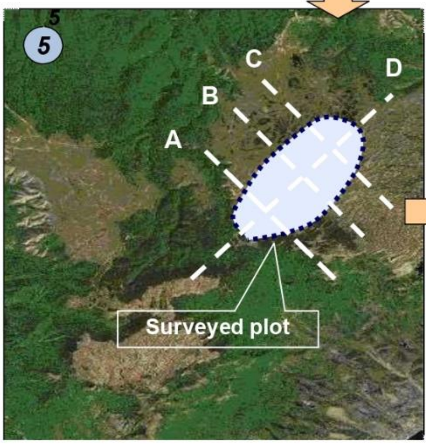


The map shows two deposits of natural gas discovered in complex rocks and two crack zones (shown in red). Prospective drilling sites were selected 10

Conduction of Works on site (expedition)

(5) Survey of deposits

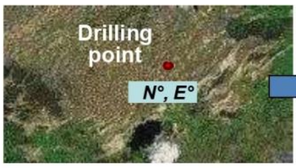
(6) Survey of wells on site



Solved tasks:

1. Specification of ground contours of deposits and occurrence depths of horizons and their thickness, evaluation of reservoir rocks and cap rocks.
2. Definition of number of horizons of deposit. occurrence depths and thickness of each horizon,
3. Construction of geological sections of deposit.
4. Definition of optimal drilling points.
5. Detection of gas caps in horizons, definition of thickness and pressure in them, evaluation of reservoir rocks.
6. Calculation of predicted volumes of deposit reserves.

The result is achieved within 2 months.



(6) Survey of wells on site

-Detection the sought-for mineral in the drilling point,
-Determining the number of horizons, occurrence depths and their thickness, gas pressure, type of reservoir and cap rock.

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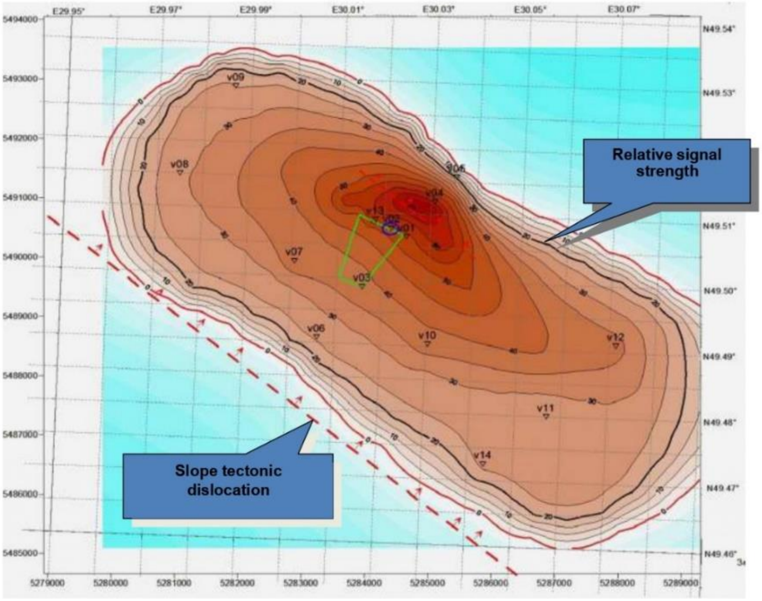
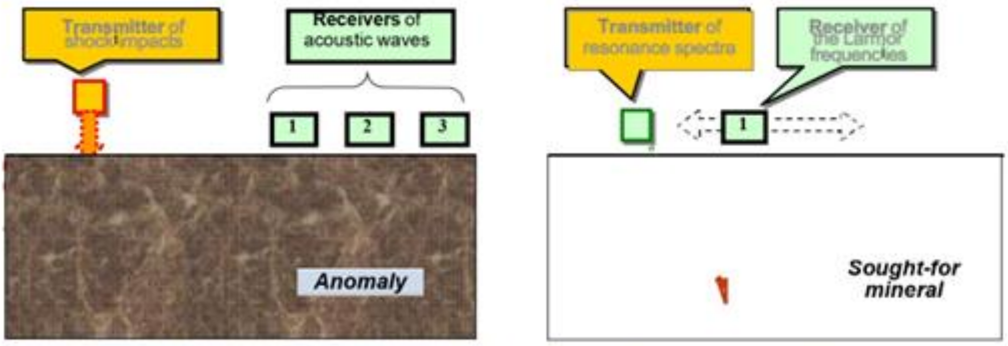
Survey Example: Natural Gas (ground contours of deposit)



Comparative analysis of terrestrial technologies

Seismography	*Innovative method*



Study of the Earth's crust on the basis of artificially excited acoustic waves

Study of mineral deposits on the basis of nuclear-magnetic resonance

Using shock impacts on the ground surface

Effectiveness - about 30%
There are restrictions on the type of terrain,
Long duration of work and data processing,
Unfavorable to the environment and humans.

Using signals that excite resonance in sought-for substances

Effectiveness - 90%
There are no restrictions on the type of terrain,
Short duration of work and data processing,
It has no harm to humans and the environment.

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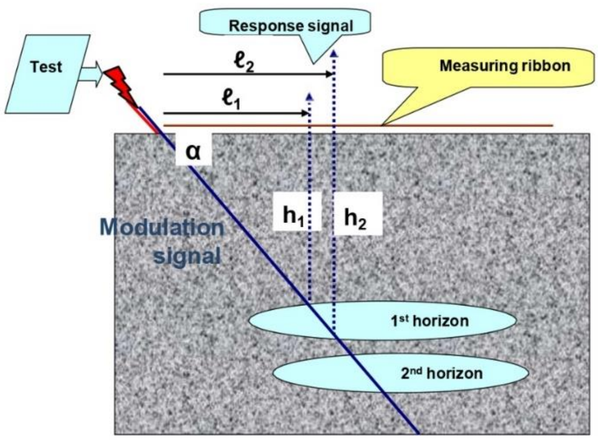
Diagram of Measurement of Deposit Parameters



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

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

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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Comparative Efficiency for large territories

Methods	Executable works	Results (for an area ~1000 sq. km)		
		Effectiveness	*Duration*	*Average number of mining holes*
Traditional methods	*Space survey* *Geological survey* *Geophysical survey* *Searching boring*	**30- 40 %**	**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*	**➢ 80%** **➢ 90 %**	**1- 2 months** **1- 2 months**	**1**

Comparative Characteristics with 3D Seismography

#	Parameters	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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Testing of the Technology


"CARPATHIA", LLC
Limited Liability Company

"КАРПАТІЯ", ТОВ

FINAL REPORT
On Presentation-Demonstration of "Deep Vision" Model

"CARPATHIA", LLC, represented by Vasyl Lyubarets, as a party representing "Deep Vision" Model of discovering natural resources that being tested, and Kelly Alvey, as a party participating in the test, have executed this Final Report concerning final results of testing unique Model "Deep Vision".

Results of inspection of objects, located on the territory of the state of Utah, USA — Dated 26 of February 2009

Object #	Kelly Alvey's data	"Deep Vision" data	Comparison %	CONCLUSION
1	Nothing	Nothing	100 %	Matching results
2	Nothing	Nothing	100 %	Matching results
3	6380	6150-6450	100 %	Matching results
4	6380	6150-6430	100 %	Matching results
5	[illegible]	[illegible]	96 %	Matching results

Director of "Institute of Geophysics and Problems of the Earth", Technical Director of "Benf International" Corporation, Fyodor N. Ivashchenko

Inventor of "Deep Vision" Model, Professor — Vitaly A. Gokh

Signatures of Witnesses

Vasyl O. Lyubarets, Leader-President of "CARPATHIA", LLC

Kelly Alvey

Roy Moore, Wolverine Gas and Oil Company of Utah, LLC Landman

Kay Beckham, BYU Professor

Jeffrey F. Chivers, "ENDEAVOR" Capital Group, LLC

Brad Whittaker, CEDO Executive Director

Edward W. Fall, P.G.UT Government Department of Natural Resources

Arbitrator — Elizabeth Goryunova, Director of International Relations, Salt Lake Chamber of Commerce

Technology is tested in the USA

Testing and practical demonstration of innovative technology was conducted in 2009 on territory of state of Utah. Total area is **3600sq. km.**

Directly on locality were inspected **5 beforehand unknown for us underground objects**, being drillholes and oil-extracting settings.

As a result of inspection the following control indexes were defined by us: presence of deposits of oil and gas, amount of horizons in them, depths of bedding of horizons and their thickness. Information obtained by us during the survey was fixed and presented to the members of commission and officially confronted with information of Arbiter.

The results: Effectiveness = 100%, Accuracy of depth ≥ 98%

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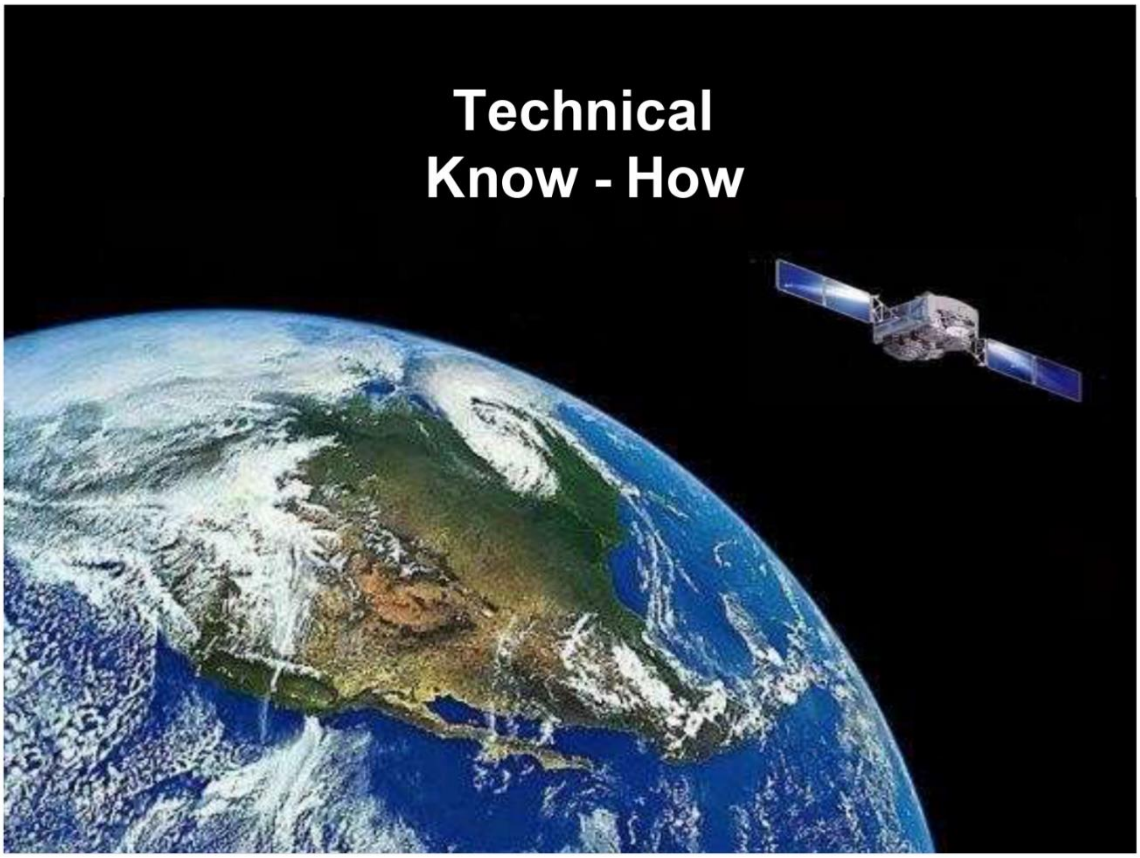

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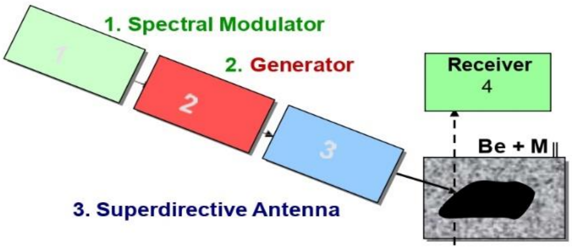
Implementation

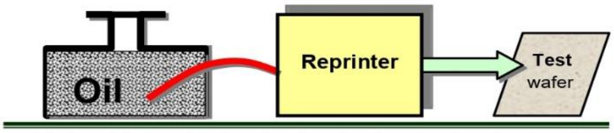
Diagram of reception of resonance signal from deposit



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)



As integrated with antenna high frequency generator we use red gallium-arsenide laser: **P_{rad} = 0,2 W**, beam diameter = 1,1mm, **G_A = 13·10^6** relative to point-light isotrope emitter

(laser aiming device)

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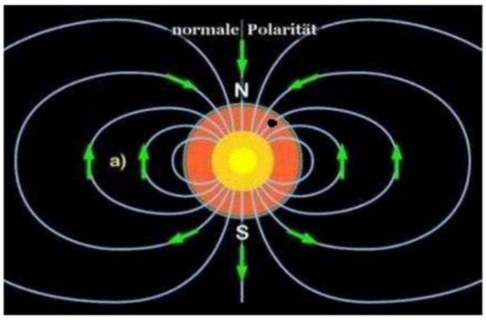
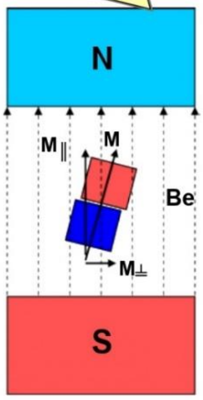
Reception of Response Signal on the Surface of the Earth



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_{II} 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 **$M_\parallel$**, i.e. the magnetic field of the Earth ' extract's resonance response of molecules to the surface.

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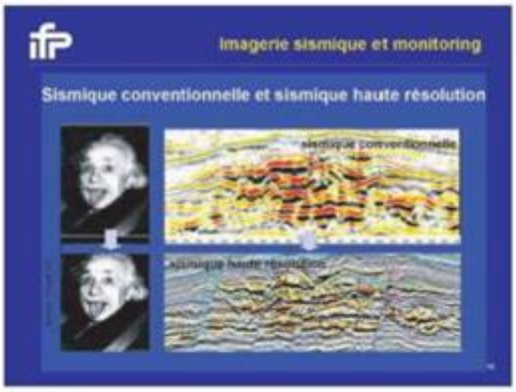

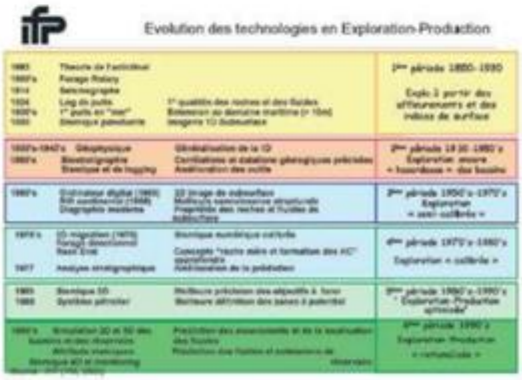

5. Field work (stage 2)

Then the work continues on the ground, with a departure to the search area of the research group, armed with a field set of equipment. On-site measurements are made, the anomalies found are outlined in detail, equipment readings are taken to build a three-dimensional model of ore bodies and areas of occurrence of the required minerals, and the depths are determined. The field set of the "Poisk" complex makes it possible to determine the occurrence of the required substances up to 6000 m, both on land and under water.

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The second stage of work consists in sequential measurements with field mobile resonance-test equipment on each anomaly with the following measures:
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 resonant test excitation of atoms of the desired substances in the anomaly and recording of resonant electromagnetic fields arising above the anomalies.

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

Determination of the types of reservoir rocks and their porosity at the points of measurement, metal concentrations in ores and gas pressures in gas-bearing horizons using resonance test equipment.

Recording over the deposit of recognition resonance-frequency spectra of electromagnetic fields arising from NMR excitation of atoms of reference elements that make up a mineral (NMR excitation of elements is performed in the natural magnetic field of the Earth using microwave generators with a rotational electromagnetic field).

Field work is carried out on site using a mobile set of equipment of the "Poisk" complex with the records of the spectra of the required substances (ores, water, hydrocarbons, etc.) prepared at the first stage. The mobile kit can be placed on a car or boat.

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

Such measurements make it possible to select points of control drilling 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 search area from the transport infrastructure, the size of the area under study and the complexity of the search task (the number of simultaneously studied minerals, etc.) Usually the term of field work is 1-3 months.

6. <u>Work results report to client</u> (stage 3)

The third stage of work is carried out on the stationary equipment of the "Poisk" complex and is included in the processing of the full amount of data obtained at the first stage and field measurements of the second stage. The tasks of the third stage include the following:

Processing the results of field measurements on stationary equipment, calculating the thickness of oil and gas horizons, underground water horizons and the thickness of minerals of various metals with a specific (average) concentration of metals in them. Determination of gas pressures in gas reservoirs and in the caps of oil horizons.
Visualization of geological sections based on the results of measurements of the depths and thicknesses of oil and gas reservoirs (water horizons) or measurements of the depths of occurrence of mineralization at the points of measurements.
Determination of the type of hydrocarbons (oil, gas, gas condensate) and minerals (copper, uranium, molybdenum, silver, gold, etc.).

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Determination and mapping of the boundaries and areas of the contours of the areas of deposits, the depths of occurrence of hydrocarbon horizons and mineralization, the number of horizons and their useful capacity.

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

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 areas and deep columns at points for drilling wells (up to depths of 6000 m).

Identification and mapping of tectonic anomalies (tectonic faults and shifts).

Drawing geological profiles of the identified mineralization, deep columns at selected points for drilling wells (to depths of 1000 m) or areas of groundwater accumulations (to depths of 6000 m).

Calculation of the approximate predicted volumes of groundwater resources in the identified anomalous areas or the volumes of ore anomalies, calculated according to the constructed geological profiles of areas with a step between measurement points from 150m to 250m (for ore anomalies - from 15 m to 25 m).
Selection of points for opening deposits in the identified areas. If necessary, the

Customer performs control drilling at the recommended point. A final report with cartographic material is presented.

Submission of reporting documentation on the research work done with the provision to the Customer of the complete revealed characteristics of the detected anomalies, cartographic and geological information (maps of anomalies, graphical representations of sections, deep columns of selected drilling points, etc.)

The term of the third stage work depends on the amount of data obtained at the first two stages. Typically, the reporting period by itself is no more than 1-2 months.

RSS-NMR SEISMIC FANDS-LLC
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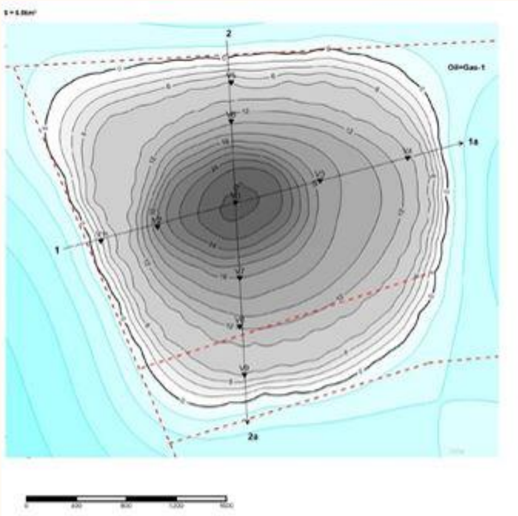
Based on the data obtained from preliminary studies and field measurements, a report is drawn up on the results of studies of a given area with the provision of cartographic information, profiles and contours of ore bodies, etc. to the customer.

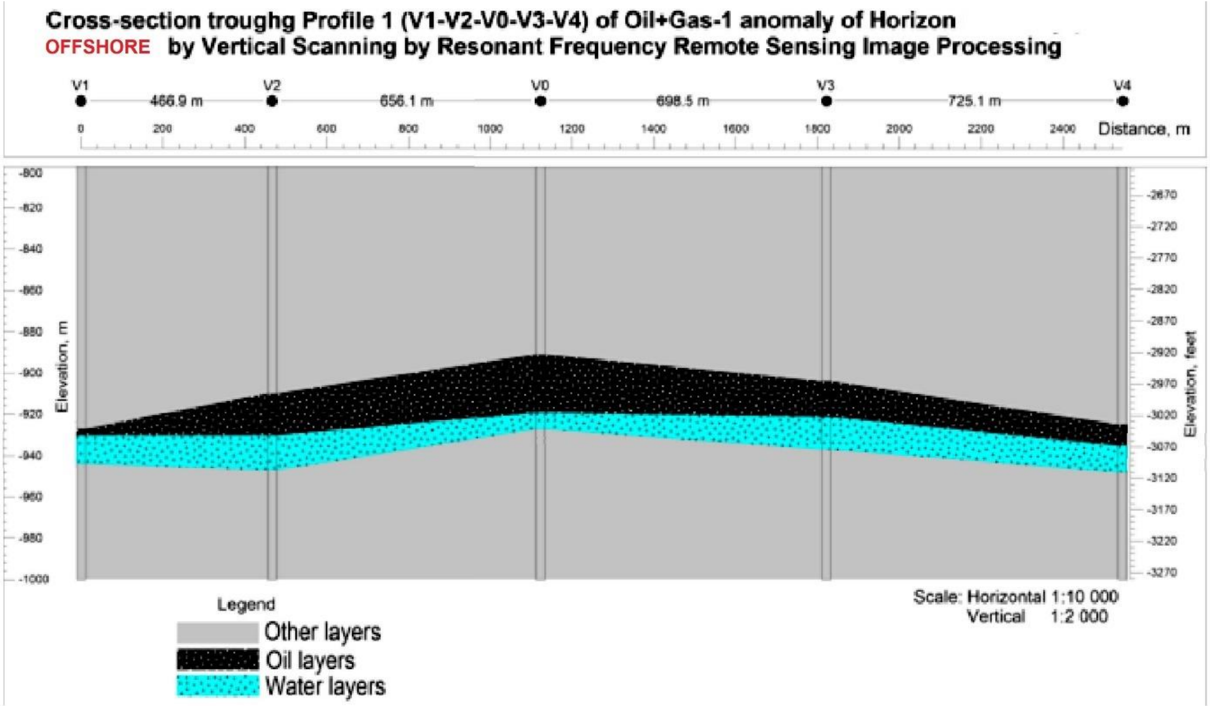
Recommendations are given for drilling test wells with approximate depth columns for them. Fossil resources are assessed for the identified deposits. Depending on the tasks set by the customer, certain calculations and construction of three-dimensional models of deposits are made. Prospects for using existing wells in hydrocarbon, water, etc. fields are assessed.



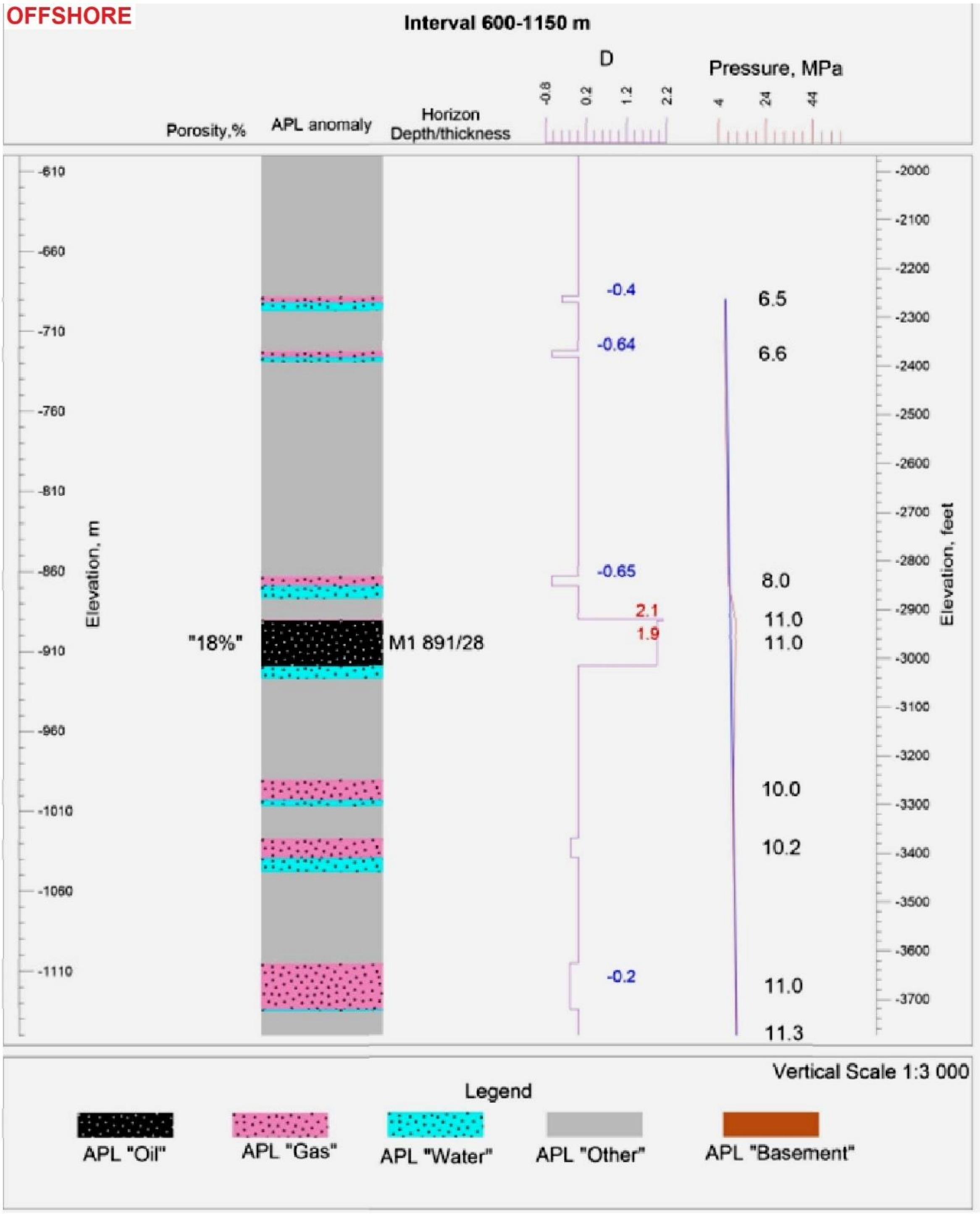
Fault zones are shown in red. Black lines indicate relative signal response levels.

An in-depth scan was made over two sections of the deposit 1 - 1a and 2 - 2a at points V0 - V4 and V5 - V9, respectively.

The following figure shows an example of a deep section of the oil horizon at points V0 - V4.


Cross-section troughg Profile 1 (V1-V2-V0-V3-V4) of Oil+Gas-1 anomaly of Horizon
OFFSHORE by Vertical Scanning by Resonant Frequency Remote Sensing Image Processing
V1
466.9 m
V2
656.1 m
V0
698.5 m
V3
725.1 m
V4
0
200
400
600
800
1000
1200
1400
1600
1800
2000
2200
2400
Distance, m
-800
-820
-840
-860
-880
-900
-920
-940
-960
-980
-1000
Elevation, m
-2670
-2720
-2770
-2820
-2870
-2920
-2970
-3020
-3070
-3120
-3170
-3220
-3270
Elevation, feet
Legend
Other layers
Oil layers
Water layers
Scale: Horizontal 1:10 000
Vertical 1:2 000

At the point of maximum response of the V0 signals of this deposit, a deep scan was performed and a vertical deep column was obtained:



We see the presence of several horizons of natural gas at various depths, as well as a powerful oil horizon with good reservoir porosity (18%) and with excessive reservoir pressure.

7. Some results

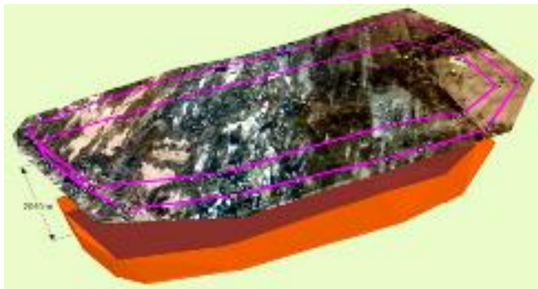
So, the geological exploration method offered to your attention, based on our author's methods of using the effect of nuclear magnetic resonance, allows you to significantly accelerate geophysical exploration of mineral deposits, reduce the cost of work by 100-1000 times and significantly increase the accuracy of searches. The dignity of the method has been confirmed by more than 280 works performed by our employees, each of which has positive feedback and gratitude.

Our employees, together with the scientists of the 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, the Poisk equipment set in geophysical exploration of minerals.

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

- hydrocarbons (oil, gas, gas condensate)
- Shale tracing for the gas (shale gas)
- water up to 5kms deep
- copper ore
- uranium ores
- gold
- silver
- molybdenum
- manganese
- diamonds and gems in general (tracing the mother rock)
- burial of hazardous substances (explosives, poisonous substances, etc.)

and much more.

№	Country	Contextof work	Results of work
1	**Ukraine** 2007	Wells 18, 21, 22, 24 of Vladislavsko e oilfield were explored	Measurement errors did not exceed 5%
2	**Ukraine** 2007	Wells 1 and 18 of Moshkarevskoye field were explored	Measurement errors did not exceed 5%
3	**USA** 2009	Testing of technology on 5 wells in the state of UTA 100% efficiency. Error of depth measurements less than 3 %	 
4	**USA** 2009	An oil reservoir in Utah has been identified and investigated in detail The parameters of occurrence and predicted resources of the deposit have been determined	
5	**Ukraine** 2010	The Vasilevskiy field was surveyed in detail	The results of the research were confirmed by drilling
6	**Ukraine** 2010	The Subbotinskoye field was examined in detail	The results of the research were confirmed by drilling on the Black Sea shelf
7	**Indonesia** 2011	Regional and detailed exploration of the Brantas block with a total area of 3050 sq. km	The data of the identified oil and gas anomalies coincided with the discovered drilling and promising geological structures
8	**Guinea** 2011	Detailed survey of two offshore platforms in the Gulf of Guinea	The data obtained coincided with the Customer's data with sufficient accuracy

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10	**Kazakhstan** 2012	Regional and detailed study of a 300 sq. km	Identified, delineated and investigated 3 oil deposits within the oil and gas basin Kumkol
11	**Ethiopia** 2012	Regional survey of the area of 3600 sq. km	2 large oil basins have been identified and delineated
12	**Russia** 2012	Regional survey of the area of 3600 sq. km	2 large oil basins have been identified and delineated
13	**Russia** 2012	Detailed remote sensing of two oil deposits. ata of occurrence, points for drilling and predicted resources of the deposit were obtained	
14	**Russia** 2013	Preliminary remote testing of 2 drilling points in the Komi Republic. Drilling has shown 100% research efficiency	
15	**Libya** 2014	Drilling Point Remote Testing for Al Wahha	Research Results Confirmed by Drilling
16	**Lithuania** 2015	Remote testing of two drilling points	Survey data and well data matched

17	**Greece** 2016	Regional survey of the 8350 sq. km Gas a d oil deposits were identified and delineated on the island and on the shelf	

18	**Mongolia** 2016	A regional survey of the license area i the east of the country with an area of 17,000 sq. km 4 oil deposits have been identified, contoured and examined in detail	
19	**Morocco** 2017	Regional survey of an area of 4200 sq. km Highlighted a site containing a promising oil reservoir	
20	**Italy** 2017	Regional survey of an area of 1,500 sq. km on the island of Sardinia Highlighted a site containing a promising oil reservoir	
21	**USA** 2017	Remote testing of two points for drilling in Iowa. Recommendations and a forecast for drilling are given	

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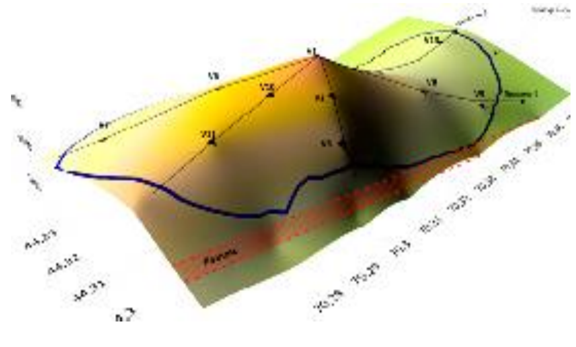
22	**Kazakhstan** 2018	Regional survey of a 315 sq. km and a detailed survey of the identified gas and oil reservoir with an area of 45 sq. km.	

Gas and condensates

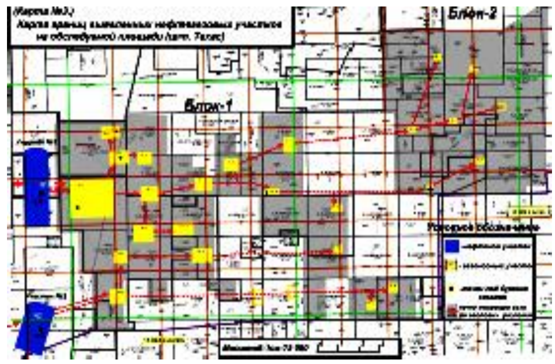
<table>
<tr><th>№</th><th>Country</th><th>Context of work</th><th>Results of project</th></tr>
<tr><td>1</td><td>Ukraine

2006</td><td>Testing of equipment at 2 wells with natural gas and 2 wells with gas condensate</td><td>The data obtained coincided with the data of wells with gas and gas condensate.

Measurement accuracy within 3-10%</td></tr>
<tr><td>2</td><td>Ukraine

2007</td><td>Drilling point survey at Novokonstantinovsky area</td><td>The data of the conducted study coincided with the data of geophysics and was confirmed by drilling</td></tr>
<tr><td>3</td><td>Ukraine

2008</td><td>Inspection of the Chernobyl exclusion zone with an area of 2,600 sq. Km.</td><td>Identified and delineated 2 gas deposits within the exclusion zone and an oil deposit at the border of the zone</td></tr>
<tr><td>4</td><td>USA

2010</td><td>2 licensed blocks in the state of Texas were examined. Areas of shale and natural gas have been identified. The drilling point was recommended instead of the one previously selected by the Customer. The field was discovered from the first well, without seismic</td><td></td></tr>
<tr><td>5</td><td>Ukraine

2010</td><td>The mine «Zasyadko» was examined.

Revealed 5 horizons of gas under the coal horizons.

Drilling showed high data agreement</td><td>
<table>
<tr><th>Horizon, m</th><th>Occurrence depth, m data: our/drilling</th><th>Gas pressure, atmospheres data: our/drilling</th></tr>
<tr><td>h_1</td><td>544 – 584/ 535 - 595</td><td>10 – 20 / 16</td></tr>
<tr><td>h_2</td><td>974 - 1043/ 906 - 1020</td><td>15 – 20 / 92</td></tr>
<tr><td>h_3</td><td>1272 - 1317/ 1266 - 1324</td><td>18 – 20 / -</td></tr>
<tr><td>h_4</td><td>1753 - 1857/ 1794 - 1808</td><td>150 – 160 / 164</td></tr>
</table>
</td></tr>
</table>

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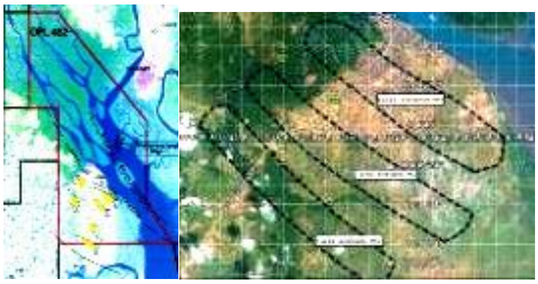
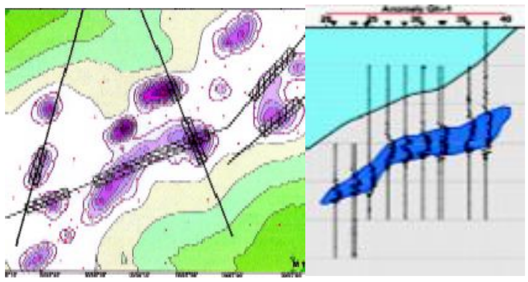
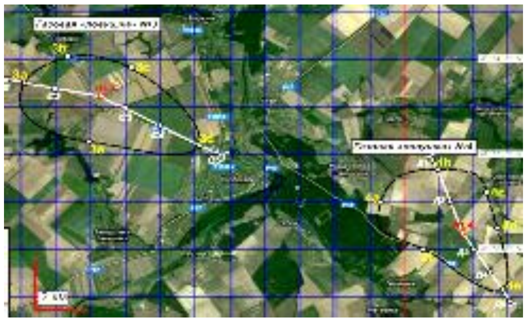
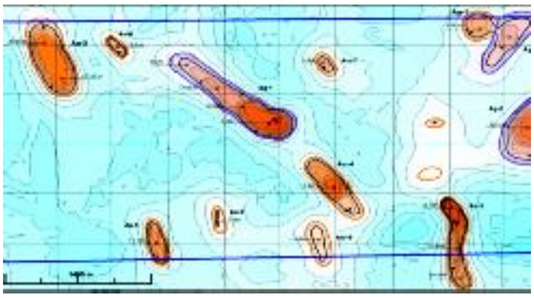
6	**Nigeria** 2011	Block OPL-452 with an area of 200 sq. km Revealed 3 gas deposits in two horizons with a total area of 21 km2. Estimated forecast resources	

7	**Ukraine** 2012	A survey of the Shetland Islands (Antarctica region) was carried out. A group of gas hydrate deposits has been identified. Deep section of a large deposit	
8	**Ukraine** 2013	The territory f the Kiev region was examined. Revealed 5 promising natural gas deposits located in the decompacted zones of the granite basement	
9	**Russia** 2013	The northern part of the territory of the Saratov region with an area of 12 thousand square kilometers was examined	Identified, delineated and explored in detail natural gas deposits

Metals and minerals

№	Country	Context of work	Results of work
1	**Ukraine** 2006 -2007	Survey of uranium ore sites at Inguletskoye, Smolinskoye and Lesnoye deposits.	The obtained data matched the data of 8 drilled wells
2	**Ukraine** 2006 - 2007	Detailed survey of the Smolinsky uranium ore deposit	3 new uranium ore bodies identified and delineated
3	**Russia** 2008	Regional survey of a coal basin with an area of 3 thousand sq. m	4 deposits of metallurgical coal have been identified and examined. 12 complex coal horizons have been identified.
4	**Mongolia** 2010	Regional and detailed survey of the territory with molybdenum deposits	3 areas of molybdenum ores have been identified and examined. Research results confirmed by drilling
5	**Madagascar** 2014	Regional and detailed survey of an area of 12.5 sq. km Revealed 3 gold deposits, as well as silver deposits	

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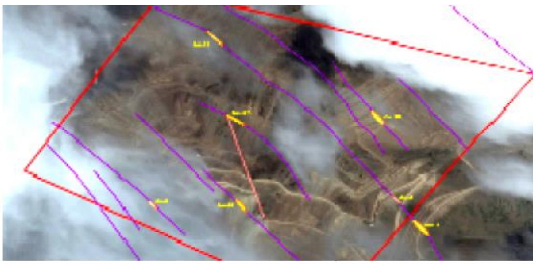
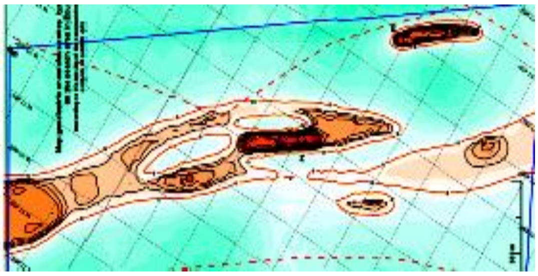
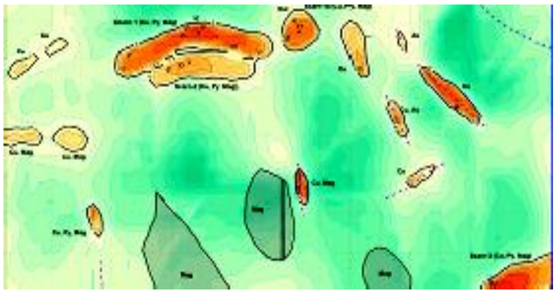
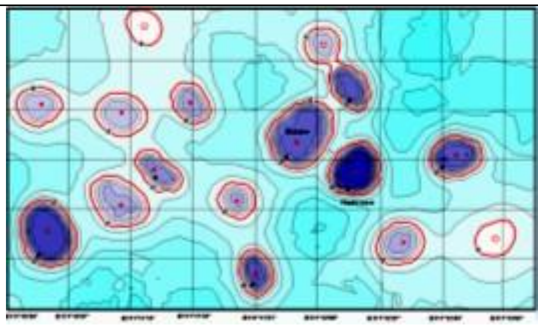
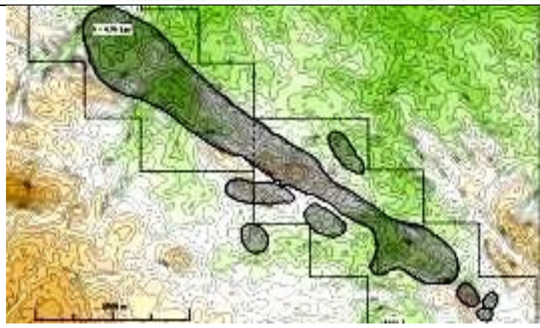
6	**Kyrgyzstan** 2016	A gold-bearing site with an area of 1 sq. km. Quartz veins with gold content identified and positioned	
7	**Ecuador** 2017	A gold-bearing site with an area of 1 sq. km. Ore and alluvial gold deposits identified	
8	**Iran** 2017	An area of 50 sq. km was examined. Revealed 5 deposits of skarn and vein copper, as well as 2 deposits of gold	
9	**Yakutia,** **South Africa** 2018	Kimberlite pipes have been identified and outlined. Determined the presence of diamonds in the identified kimberlite pipes	
10	**Congo** 2020	Regional survey of an area of 38 sq. km within the "copper belt" of southern Africa. 7 copper deposits of various mineralization were identified	

FRESH WATER

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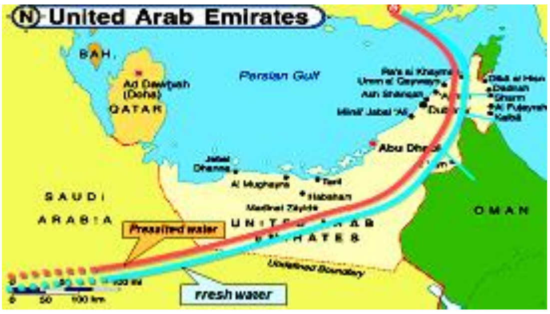
№	Country	Context of work	Results of project
1	**UAE** 2007	Explored the territory of the Emirate of Fujairah with an area of 1,166 sq. км	7 underground fresh water streams identified and delineated
2	**UAE** 2009	The territory of the UAE and adjacent countries has been investigated. The source of the formation of eep underground fresh waters of the Arabian Peninsula is identified.	
3	**Mauritania** 2010	Regional and Detailed Survey of the Western Sahara Desert	A powerful underground flow of fresh water was identified. A well was drilled with a depth of 150 m with a flow rate of 25 l / sec.
4	**Mongolia** 2013	Regional and detailed survey of the Gobi Desert area	Underground fresh water flow was revealed. Well with depth of 300m and flow rate of 7 l/sec was drilled.
5	**Mongolia** 2014	Regional and detailed survey of the site in southwest Mongolia	Drilled well in the area of Dalanzadgad city with a depth of 200m and a flow rate of 7 l/sec.
6	**Cyprus** 2015	Underground fresh water flow was detected & delineated	A 200m deep well with 7 l/sec flow rate was drilled.
7	**Ethiopia** 2016	Regional and detailed survey of a 1000 sq. km plot in the Danakil desert. A 190m deep well with 20 l/sec flow rate was drilled.	

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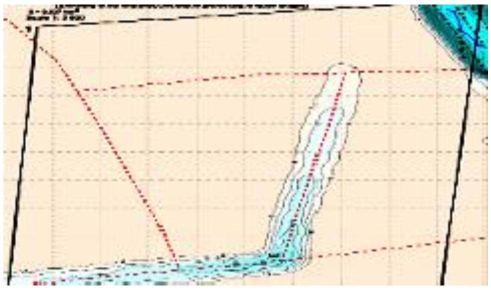
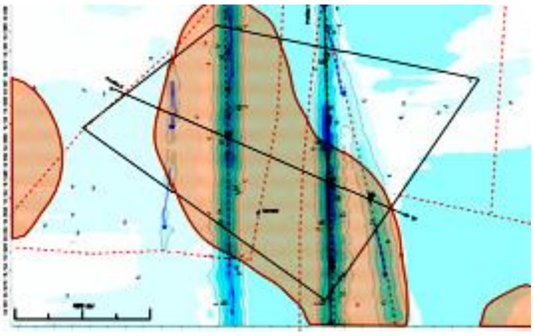
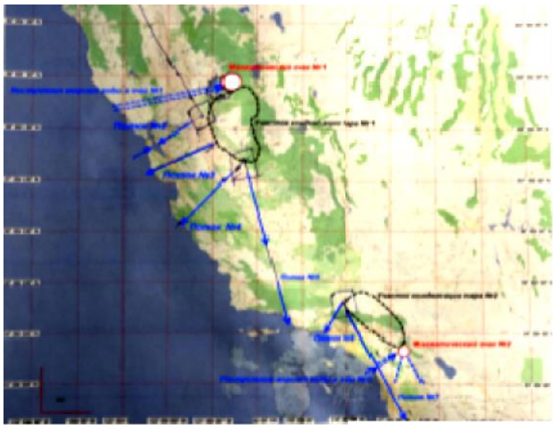
8	**Oman** 2018	Detailed survey of the site in the Wakhiba desert. Underground stream with horizons at depths from 100 to 270m was detected and applied.	
9	**Oman** 2019	Detailed survey of the site in the Wakhiba desert. Underground flow with water horizons at depths from 95 to 260m was detected and applied.	
10	**USA** 2019	Regional survey of the territory of the State of California with an area of 10,000 square kilometers. Identified 2 natural sources of underground fresh water in the area of San Francisco and Los Angeles. 7 powerful streams of underground fresh water were identified	
11	**Ukraine** 2007 - 2019	Over 1,200 sq. km of various plots were surveyed	Over 120 wells were drilled. Maximum depth of wells is 950m with 7 l/sec flow rate.

Mineral resources map of the region

№	Country	Context of work	Results of work
1	**UAE** 2006	The territory of Fujairah Emirate with the area of 3600 sq. km was explored.	Deposits of nickel, platinoids, oil, kimberlite pipes were identified and delineated.

8. Targets for the technology

The list of technologies we have already worked out allows us to explore the following minerals:
hydrocarbons (oil, gas, gas condensate)
water
copper ore
uranium ores
gold
silver
molybdenum
manganese
diamonds and gems in general (Using le mother rock like marker)
burial of hazardous substances (explosives, poisonous substances, etc.)
and much more.

For each of the listed items, we have experience in work in various parts of the world - Russia, Ukraine, Italy, Arab Emirates, 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.

9. Case of Rare earths but better call them " rare & strategic metals"

Rare earths are metals and metal compounds used in a large number of high-tech manufacturing processes, in particular recent or "future" technologies: batteries, screens, mobile phones, low-energy light bulbs, hybrid vehicles, rotors of turbines, missiles, medical imaging.

On the physico-chemical level, these are 17 elements, 15 of which belong to the lanthanide family (lanthanum, cerium, praseodymium, neodymium, promethium, samarium, europium, gadolinium, terbium, dysprosium, holmium, erbium,

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thulium, ytterbium, and lutetium), to which must be added yttrium and scandium. They are therefore not land, their rarity being relative.

Annex 1

Indirect geophysical searches for oil and gas and, above all, trap identification are a necessary but insufficient exploration stage, as only one third of the structures identified by geophysical methods and verified by exploration drilling turn out to be commercially oil and gas bearing. Therefore, the development and introduction into practice of direct methods of searching for deposits of hydrocarbons and other types of minerals to effectively assess the prospects of their development at the stage of geophysical exploration is of great importance.

The innovative technology RSS-NMR (Resonance Spectral Sensing - Nuclear Magnetic Resonance) refers to "direct" electromagnetic methods of geophysics and is based on the application of the **resonance effect**. The idea of the technology lies in the resonant separation of the spectrum of the substance we need from a broadband mixture of spectra from other substances and many interferences of different nature. As a result, any type of minerals in areas of any complexity can be quickly and reliably explored.

The simplest analogy of this process is tuning a radio receiver to the right station among the masses of airwaves interference and signals from other stations.

The main thing in our approach to geophysical study of the earth's interior is that we do not use the interpretation of indirect data, but directly determine the presence of the desired mineral in the earth's interior and then determine the characteristics of its bedding.

Technology RSS-NMR realizes it remotely (RSS method), as well as directly on the ground (NMR method). Application of these methods makes it possible to conduct regional surveys of territories of different area and complexity at any point of the globe, their detailed survey in any climatic conditions, regardless of epidemics, warfare and so on.

Consider the effectiveness of our RSS-NMR technology compared to 3D seismic surveys, Earth Remote Sensing (ERS) and magnetic resonance systems (MRS) for finding groundwater.

Comparative characteristics of 3D seismic and RSS-NMR technology

Performance	3D	RSS	NMR
Studies Purposes	The main purpose of seismic exploration is to find structures favorable to oil and gas accumulation	Identification and survey of deposits in areas of up to tens of thousands of square kilometers, Verification and optimization of points for drilling wells. Evaluating the prospects for well rehabilitation.	Survey of the identified deposits to verify RSS results and set optimal drilling points in the field. Evaluating of well recovery prospects.
Studies results	Ground contours of anomalies, fault zones, depths and thicknesses of anomaly horizons, structural maps, expected porosity of reservoirs, 3D models, points for drilling exploration wells.	Ground contours of deposits, fault zones, depths and thicknesses of deposits horizons, gas pressure, watering horizons, structural maps, 3D models, optimal zones and points for drilling productive wells, calculation of predicted resources.	Ground contours of deposits, fault zones, depths and thicknesses of deposits horizons, gas pressure, watering horizons, structural maps, 3D models, optimal points for drilling productive wells, calculation of predicted resources.

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Duration of the studies	From 3 to 6 months and more	1 month	1 month
Limitations	Works only in sedimentary rocks. Detects mostly traditional dome traps. Does not work in shallow water and hilly terrain. Long duration of the ground phase of studies and data interpretation. Difficult to study in difficult landscape, climatic and epidemiological conditions.	Virtually no restrictions. Works in sedimentary and hard rocks. Emphasizes deposits of any structure. Used in any climatic, geological and epidemiological conditions.	Virtually no restrictions. Works in sedimentary and hard rocks. Emphasizes deposits of any structure. Used in any climatic, geological and epidemiological conditions.
Ecology	The need to cutting glades, a large vibration load.	Absolutely environmentally friendly. Safe for people and the environment.	Absolutely environmentally friendly. Safe for people and the environment.
Effectiveness	30% in new territories, up to 50% in additional field exploration.	More than 80%	More than 90%
Cost parameters	Tens of thousands of dollars per square kilometer.	Much less costly	Much less costly

Symbolically, the difference between the technologies is illustrated by the following figure:

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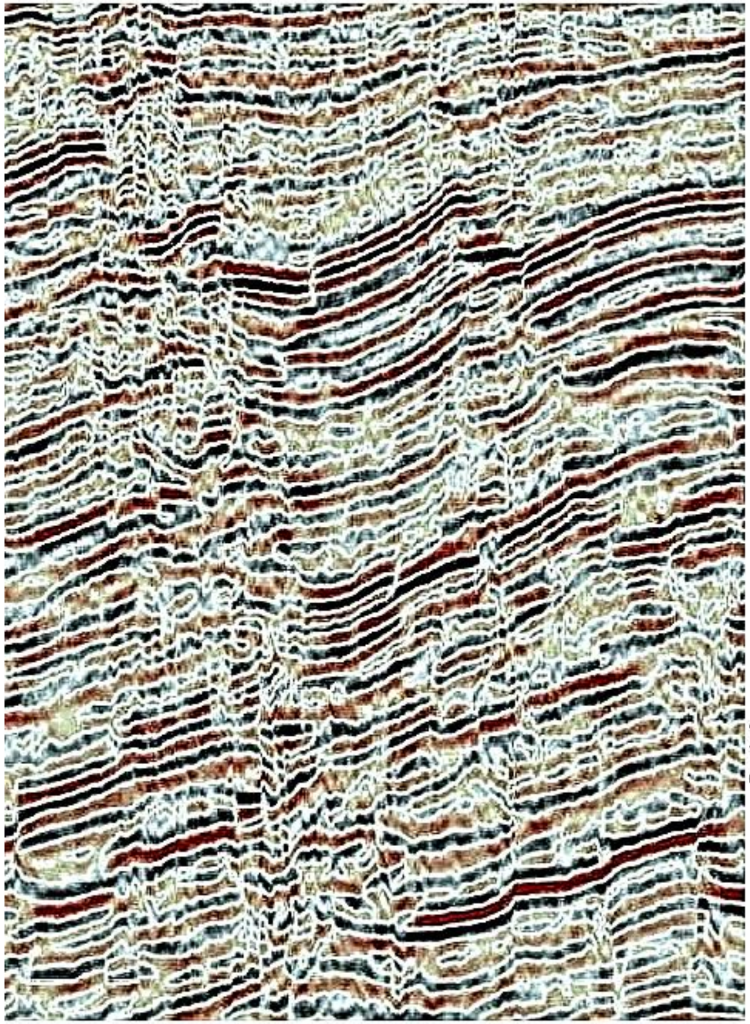
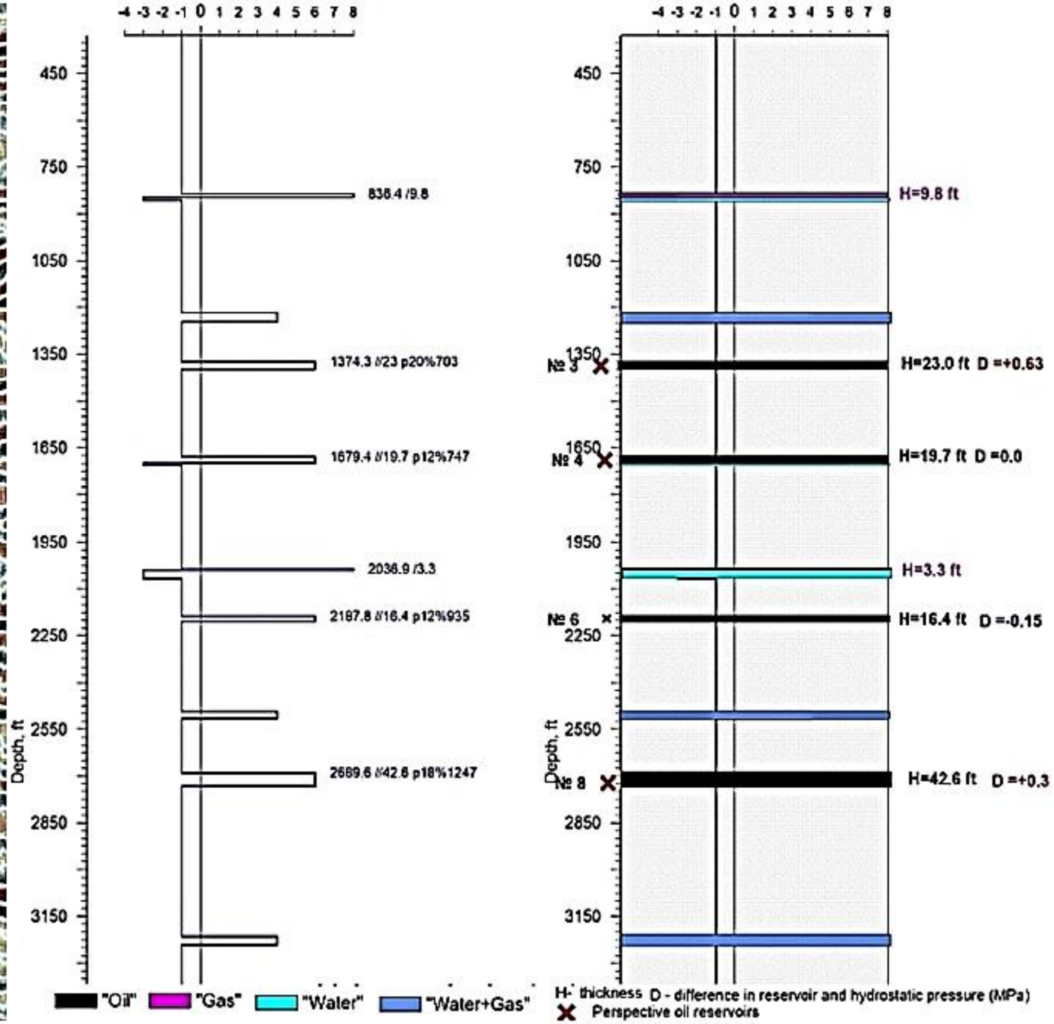
RSS NMR
THE SIMPLE WAY OF EXPLORATION
By Fands-LLC

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

Seismic data
Interpretation is needed



RSS-NMR
Interpretation is not needed



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RSS-NMR SEISMIC
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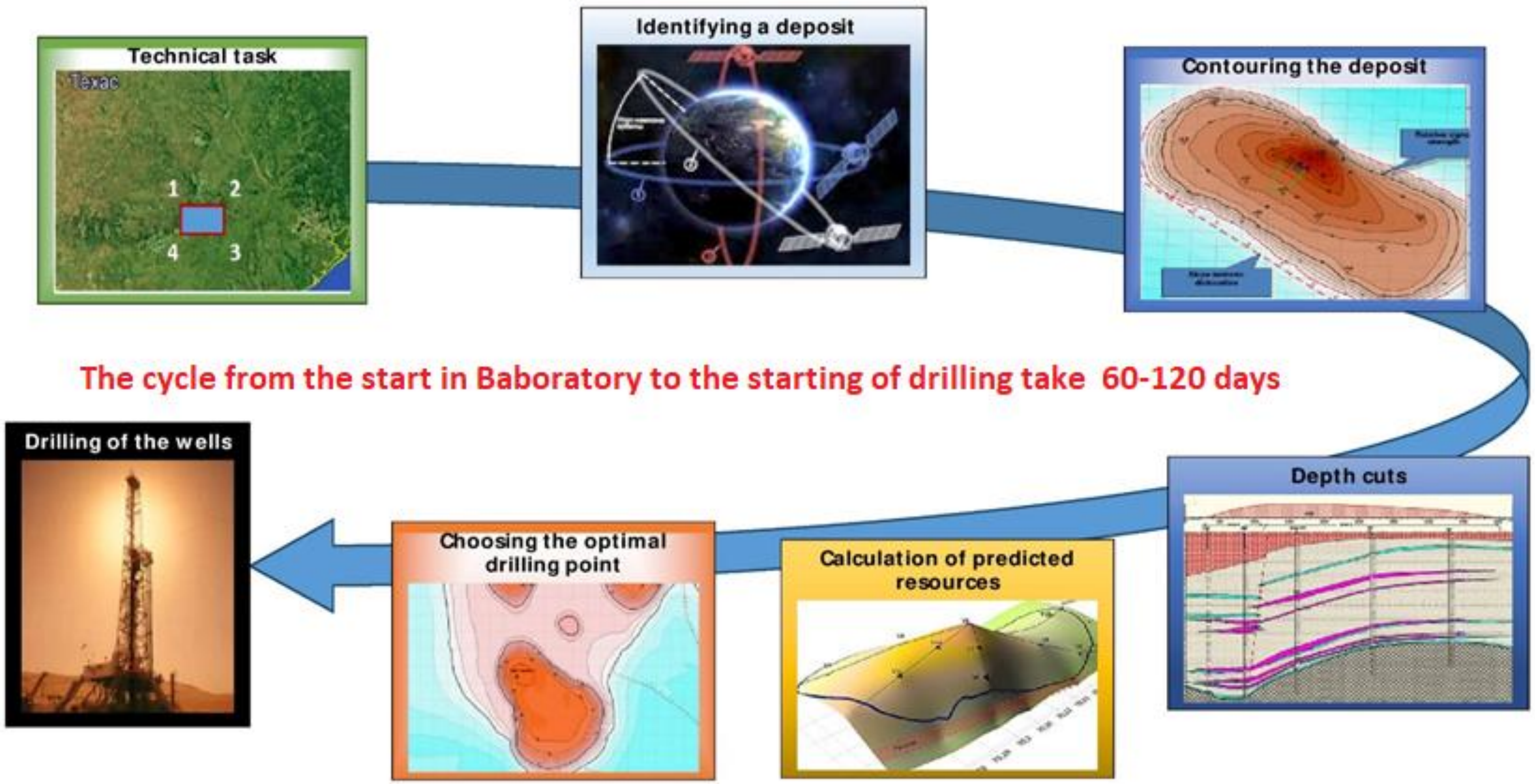
How RSS technology works for remote deposits survey directly



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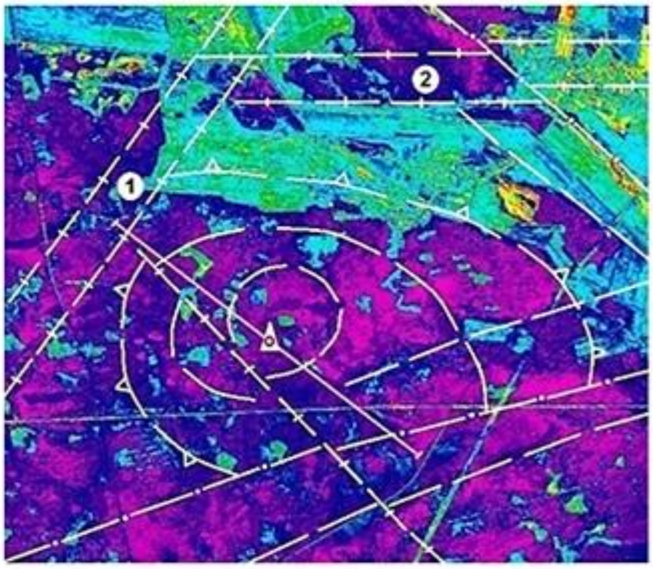
RSS-NMR SEISMIC FANDS-LLC

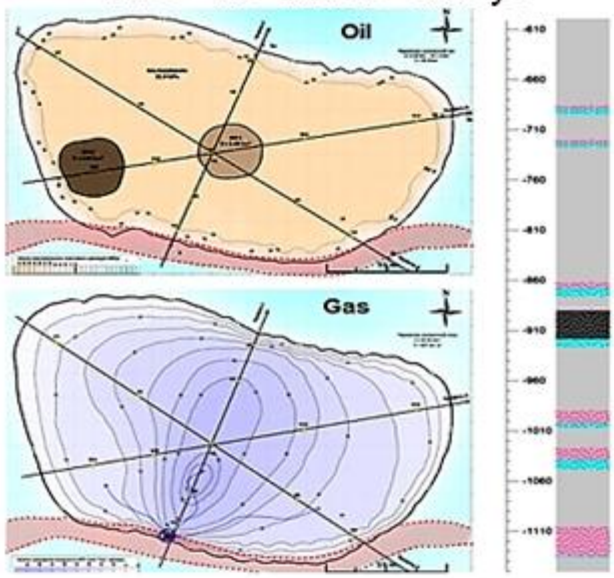
Comparison with ERS

Earth remote sensing is a non-contact study of the Earth, its surface and subsurface, individual objects and phenomena by recording and analyzing their own or reflected electromagnetic radiation. Space remote sensing systems, ERS, allow receiving data from large areas, which can then be used for forecasting territories, promising for the occurrence of various types of minerals.

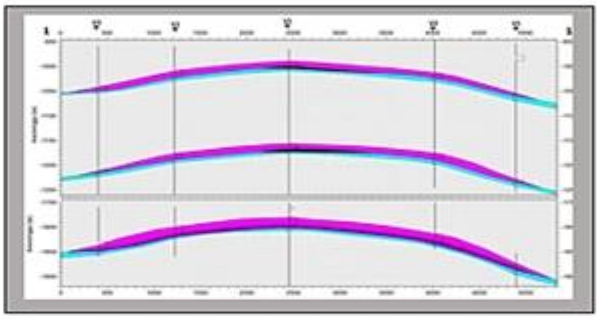
ERS - oil prospective zones

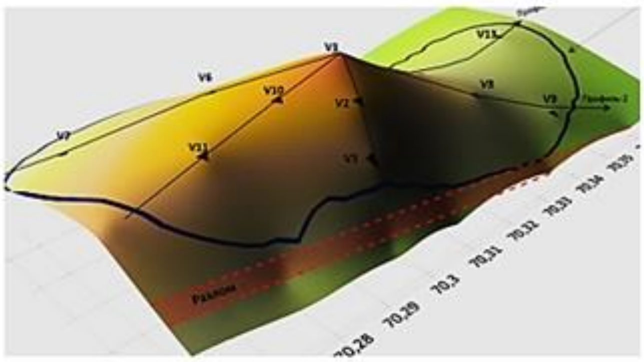


RSS - 2D and 3D surveys



ERS - terrestrial mineral displays





We can see a qualitative difference in the results of studies. ERS identifies promising areas for further studies; RSS identifies mineral deposits and gives specific characteristics of their depth occurrence.

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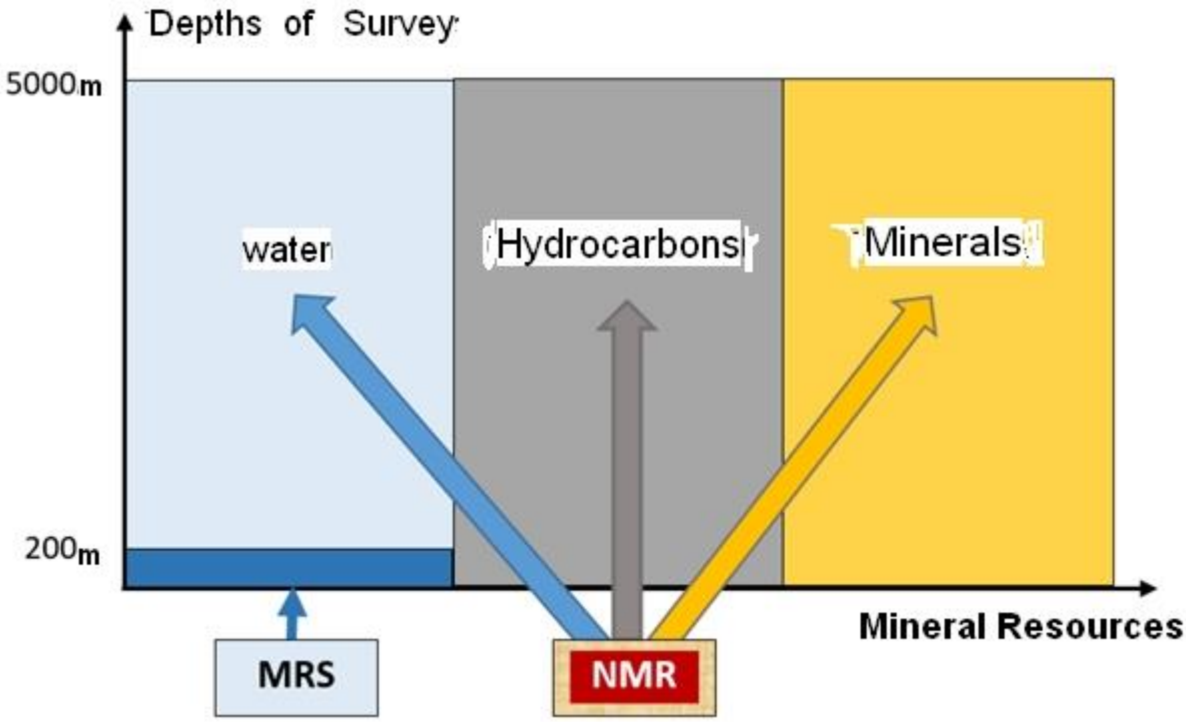
RSS-NMR vs. MRS

The MRS technology is designed to detect aquifers and measure their characteristics. The principle of operation of the compared MRS and NMR technologies is the same and is based on the phenomenon of nuclear magnetic resonance. However, MRS requires bulky antennas and huge peak power to penetrate 150 to 200 meters in depth. In this case only water horizons are detected, while NMR detects various minerals and works much deeper:



Thus, RSS technology is a remote method of surveying areas, directly identifying the minerals sought and providing in-depth exploration and assessment of development prospects.

<u>Conclusions on the results of the comparative analysis of technologies</u>

The efficiency of geophysical technologies and methods consists of the reliability of survey results, the speed of obtaining them and the cost of the work.

In all these parameters, RSS-NMR technology significantly exceeds any of the geophysical methods discussed above and, therefore, radically increases the profitability of companies exploring and producing hydrocarbons, underground fresh water and minerals.