

Mineral Resources Exploration

Innovative and Effective Solutions



Introduction

We offer a timely solution to remodel the ways and means of natural resources exploration. By ingenious remote sensing expertise plus corroborating field works derived from the Nuclear Magnetic Resonance (NMR) theory, commercially relevant anomalies are identified, delineated and geologically substantiated.

Beneficial pre-knowledge on economic feasibility of acreage is provided; further, recommendation on best area for targeted seismic (if so pursued); the identification and geological validation of best spot for appraisal act.

The application of three integrated disciplines of patented remote sensing acumen, scientifically vindicated NMR field works and the ultimate G & G authentication of the findings, wields a potent and innovative toolkit that is as disruptive as it is efficient.



Paraguay. Brief overview



Two major sedimentary basins with prospective organic-rich and marine-deposited black shales are present in Paraguay

Paraná Basin: The Basin contains black shale within the Devonian Ponta Grossa Formation. The structural setting is simple but the basin is partly obscured at surface by flood basalts, although this igneous cap is less prevalent here than in the Brazil portion of the basin.

Chaco Basin: Black shale in the Devonian Los Monos Formation is present within a relatively simple structural setting in northwest Paraguay.

Exploration concept

Paraguay does not produce oil and gas, although extensions of its sedimentary basins are productive in both Argentina and Bolivia.. But due to the presence of all components of petroleum system. i.e. mature source rock, migration pathways, reservoir rock, cap rock, there are high chances of discoveries in commercial values, both conventional and non conventional. The proposed exploration concept is aimed to

- Identify anomalies associated with hydrocarbon accumulations by means of NMR technology in the most perspective areas of two basins. The areas include those already drilled but without discoveries and the the ones perspective from geological point of view.
- Perform potential resources evaluation and grading and prioritization of leads.
- Outline targeted seismic program and participate in its fulfilment
- Participate in exploration drilling program

The NMR theory

Nuclear magnetic resonance (NMR) is the phenomenon where nuclei in a static magnetic field are perturbed by weak oscillating magnetic field; they respond by producing electromagnetic signal in a frequency particular of the magnetic field of their nucleus.

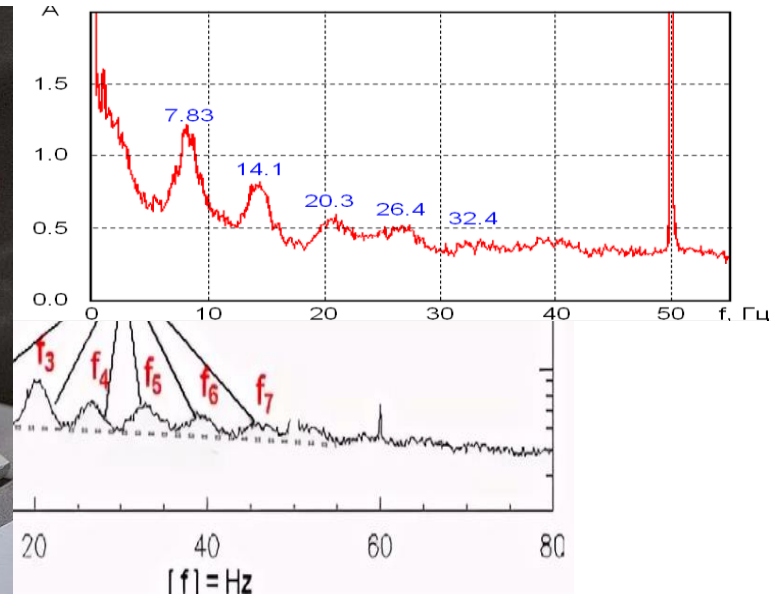
A key feature of NMR is that the resonance frequency of a particular simple substance is directly proportional to the strength of the applied magnetic field. It is this feature that is exploited in imaging techniques; if a sample is placed in a magnetic field then the resonance frequencies of the sample's nuclei depend on where in the field they are located.

Radio-frequency magnetic fields penetrate both soft and hard rock allowing higher resolution anomalies mapping and can easily be used with a boat, plane, helicopter or truck for exploration.



Step I – Sampling + Data base

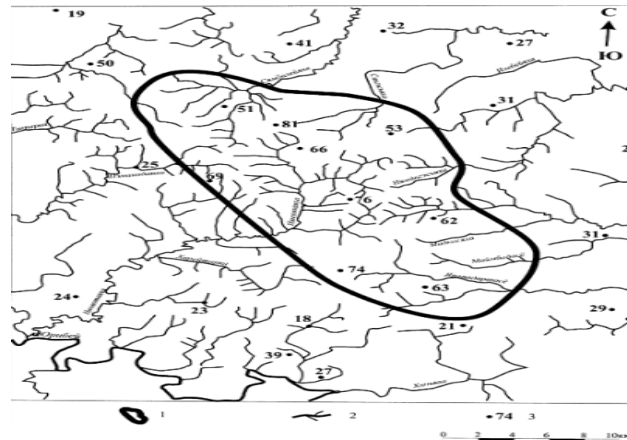
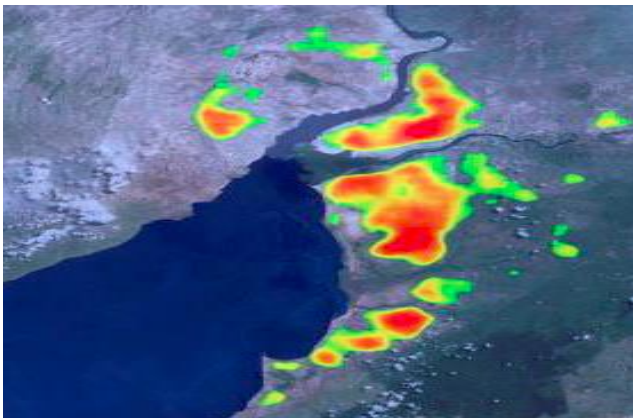
1. Collect and analyze samples of sought substance,
2. Identify reference elements in the samples,
3. Record frequency spectrum of the reference elements,
4. Set up the reference element's data base





Step II – RS + Data processing

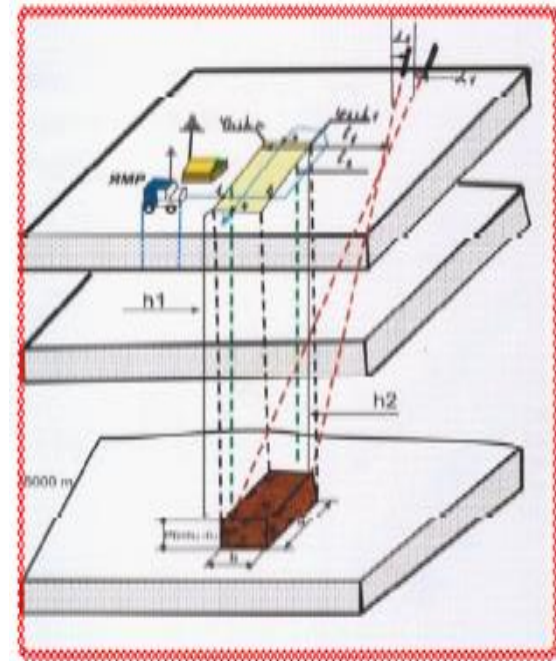
1. Perform satellite survey and imaging of the Area of Interest (AOI),
2. Process the image material with ingenious nanogels and solutions to amplify and highlight spectral anomalies associated with petroleum accumulations,
3. Enhance processing of the image in a small scale nuclear reactor,
4. Plot preliminary boundaries of hydrocarbon accumulation on the AOI map.





Step III – RS + Data processing

The resonant frequencies of the reference molecule's atoms are imposed/modulated on the carrier frequency by a high-frequency generator. High-frequency electromagnetic fields, characteristic of the reference sample's elements, are induced above the sample's accumulation by its resonating frequencies. Each characteristic electromagnetic field is sequentially recorded by a sensitive receiving device tuned to register resonant frequencies of the reference sample's atoms, ensuring a plausible identification of petroleum accumulations.



Precise boundaries of the accumulations / ore deposits are plotted on the area-of-interest.

G & G Substantiation

G&G substantiation includes (but not limited to)

- Play analysis,
- Basin modeling,
- Geological history (tectonics, sedimentation analysis etc.),
- Petroleum system analysis,
- Petroleum perspectivity factors determination,
- Geotechnical estimation (FSD, natural envelopes, creaming curves etc.).

Using advanced software like Petromod, Rose & Associates, Decision Space Geoscience, Hampson Russell, Depth Team Express, Interactive Petrophysics, Petrel, Eclipse etc. we investigate and validate the findings of RS and NMR field survey before reporting.

Benefits

1. Substantial increase of chance of success,
2. Reducing risks and uncertainties,
3. Highly cost efficient,
4. Zero in just on the area of exploration acreages, for prospect delineation and drilling/trenching, with targeted seismic, if needed

By ingenious remote sensing expertise plus corroborating field works derived from the NMR theory, commercially relevant anomalies are identified, delineated and geologically substantiated. Beneficial pre-knowledge on economic feasibility of acreage is provided; further, recommendation on best area for targeted seismic (if so pursued) or drilling. The application of three integrated disciplines of patented remote sensing acumen, scientifically vindicated NMR field works and the ultimate G & G authentication of the findings, wields a potent and innovative toolkit that is as disruptive as it is efficient.



Lead's Area Estimation.

In the areas with **established production**:

1. Anomalies are delineated on surface maps.
2. FSD (Field Size Distribution) is constructed for reality checks. Size distribution of reserves in the fields in a given trend, play, or basin show a pronounced tendency to follow the lognormal pattern. FSD is truncated at the lower end to eliminate fields that are noncommercial.
3. Lead's area estimation. The "low end" (reasonable minimum P90%) is approximately the area of the economically marginal producing fields. The "high end" (absolute maximum P1%) is the maximum area possible. Normally, Pmean value derived from the area distribution (P1-P99) is taken as the predicted lead area.



Lead's Area Estimation

In the areas with **no discoveries / no production** :

1. Anomalies are delineated on surface maps.
2. Predicted field size distribution (PFSD) is constructed for reality checks. In order to construct a PFSD for analog area, the FSD of the reference area is adopted as proxy. Then the proxy is assessed for plausibility from geological perspective. Corrections to the PFSD can be made to reflect the real geological setting.
3. Lead's area estimation. The "low end" is approximately the area of the economically marginal producing field in the analog area. The "high end" is the area of anomaly plotted on the surface map. Pmean value derived from the area distribution is taken as the predicted lead area.

General procedure

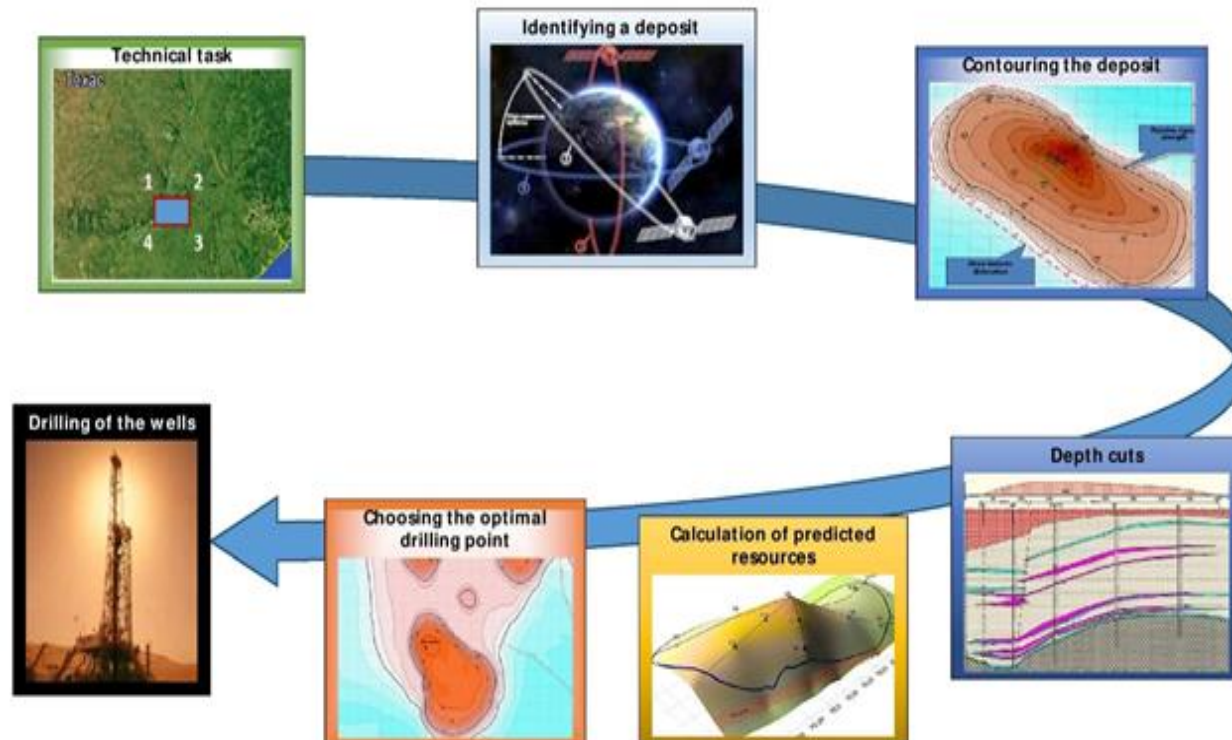
- Collect and analyse available G&G data.
- Remote survey (NMR) of the selected areas
- Provide geological substantiation and prioritize anomalies by means of geotechnical evaluation
- Develop detailed work program
- Prepare and fulfil targeted seismic program jointly with local seismic company.
- Generate preliminary geological models.
- Outline exploratory well drilling program and participate in drilling supervision
- Perform post-drill analysis

The integrated exploration process is girded on reliable geotechnical work, the investigation of geological setting, as well as risk and uncertainties estimation.



Exploration Cycle

How RSS technology works
for remote deposits survey directly

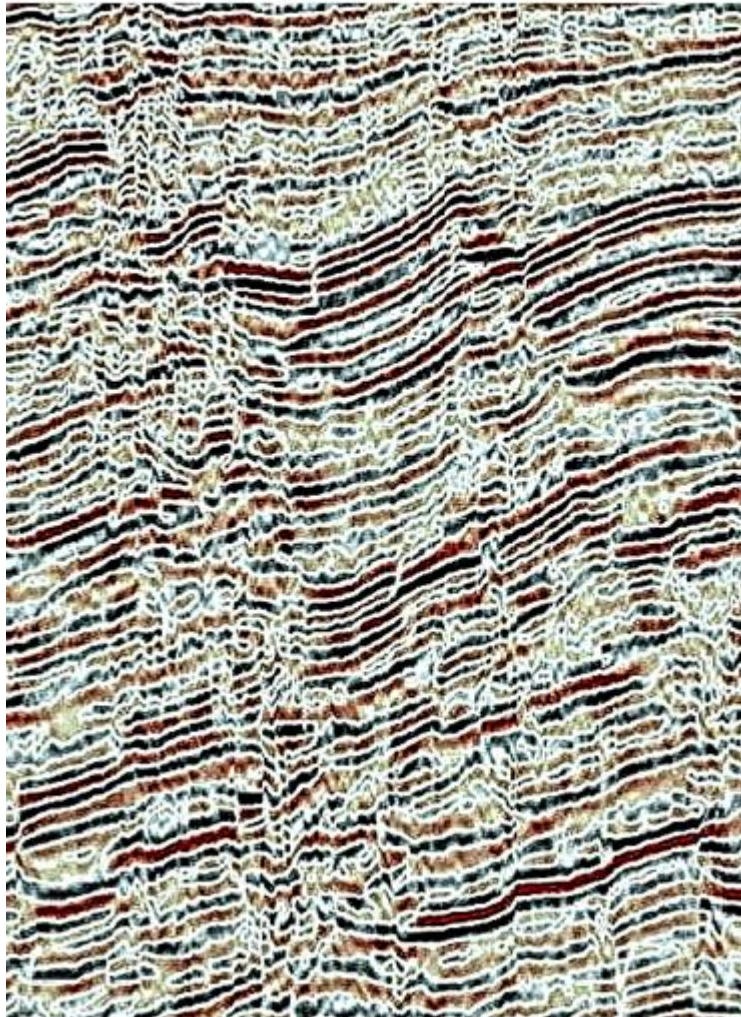




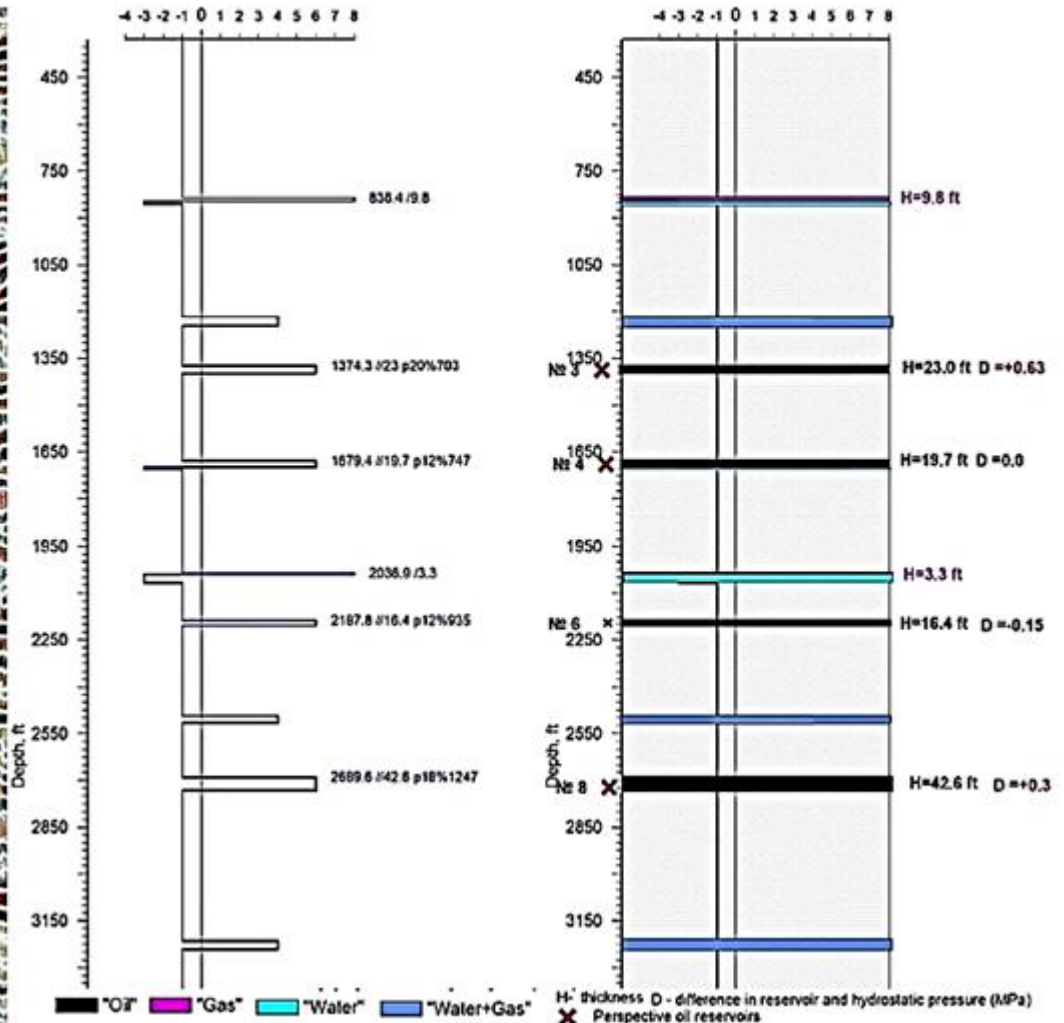
RSS-NMR versus Sísmica clásica

Como la RSS-NMR y las sísmicas clásicas muestran los resultados de terrenos

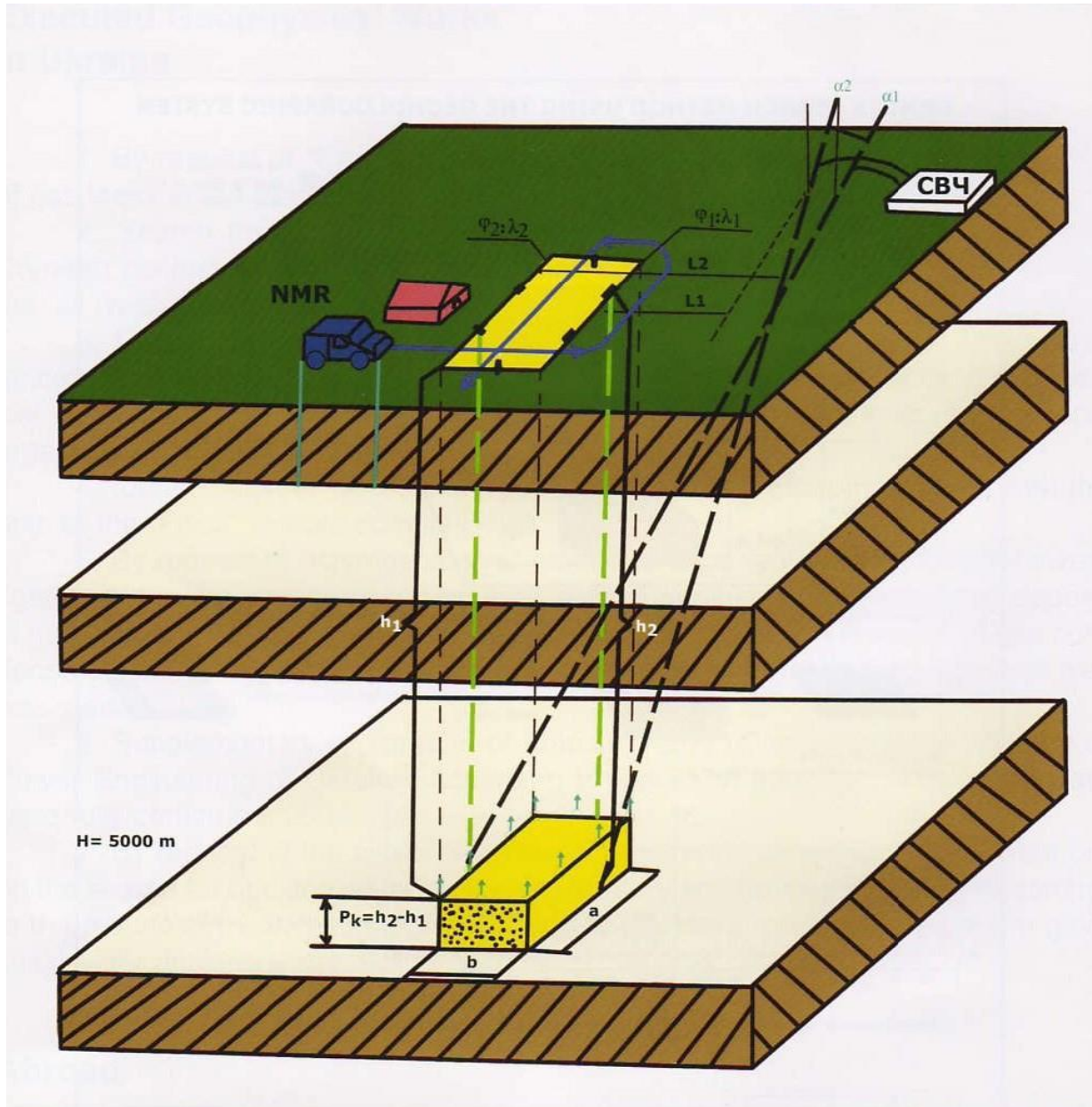
Sísmica, una larga interpretación es necesaria



RSS-NMR lectura directa de los resultados, sin interpretación



La Geo holografía principio científico

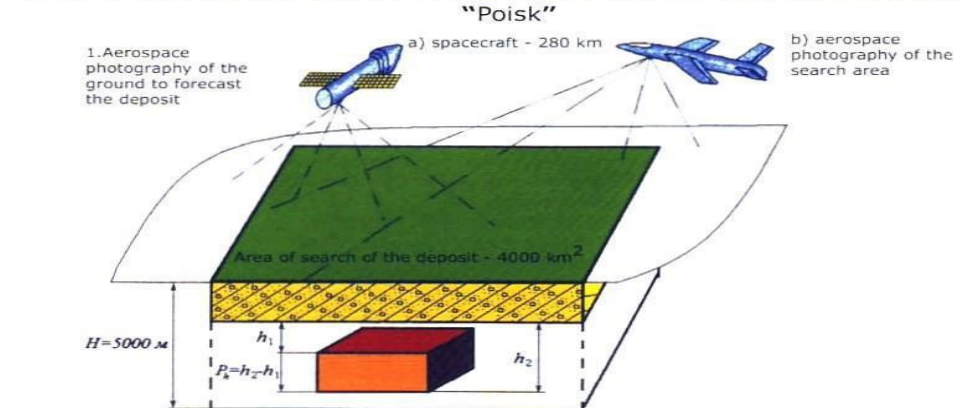


Ciclo de Geo Holografía

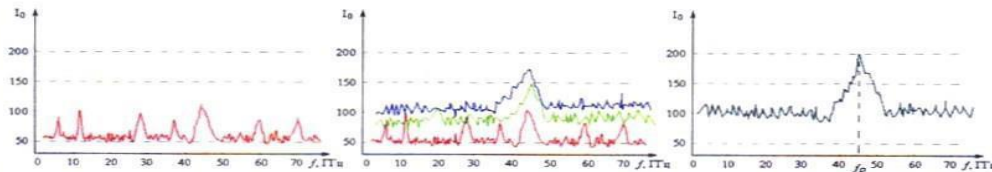
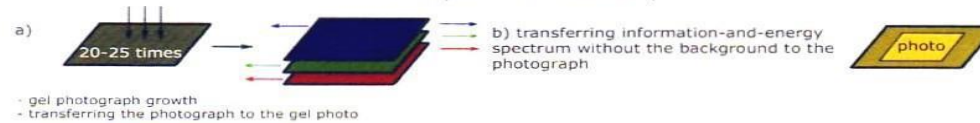


RSS NMR
the simple way of exploration

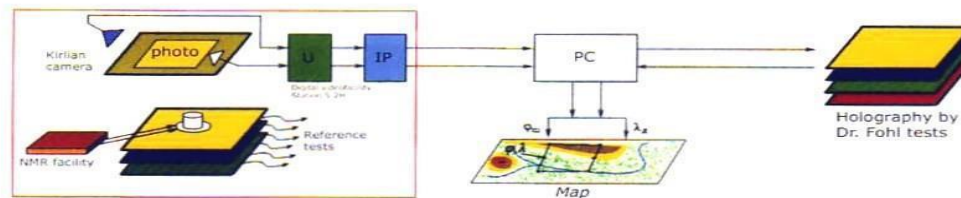
REMOTE SEARCH METHOD USING THE GEOHOLOGRAPHIC SYSTEM "Poisk"



2. Transferring the photograph to the gel photo and filtering the information-and-energy in the photochemical laboratory

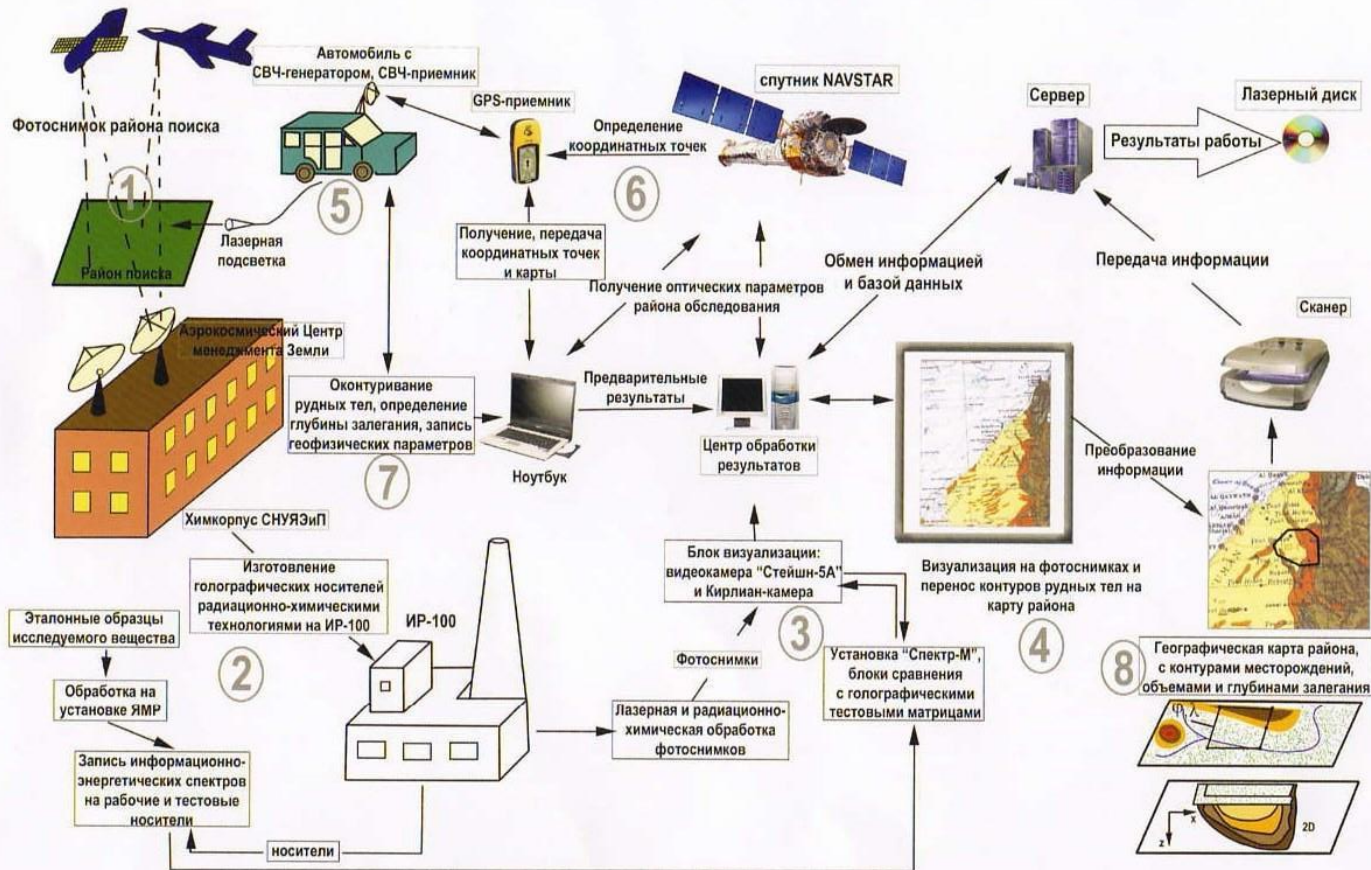


3. Identification of deposit type and contouring its area, definition of coordinates, transferring them to the map



Ciclo completo desde la muestra hasta los reportes

ФУНКЦИОНАЛЬНАЯ СХЕМА ДИСТАНЦИОННОЙ ТЕХНОЛОГИИ ОБНАРУЖЕНИЯ И ОКОНТУРИВАНИЯ МЕСТОРОЖДЕНИЙ ПОЛИМЕТАЛЛОВ И УГЛЕВОДОРОДОВ



Projects

Minerals:

- uranium
- zinc, lead
- molybdenum
- copper
- polymetallic ore
- oil, gas and condensate
- coal
- diamond Emerald
- Sunked vessel /submarine
- Gun Munition
- Chemical
- Polymetallic nodules



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