Application of Frequency-Resonance Methods of Satellite Images Processing for Hydrogen and Living Water Accumulations Searching Within Local Areas in Europe

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Abstract. The results of the application of mobile direct-prospecting technology of frequency-resonance processing and interpretation of satellite images and photo images at the sites hydrogen degassing in various regions are presented. Experimental reconnaissance studies were carried out to study the features of deep structure of the hydrogen degassing areas. The materials of instrumental measurements indicate that in regions of basalt volcano’s location with roots at different depths, signals at hydrogen frequencies are almost always recorded. When scanning the cross-section, responses from hydrogen are recorded from the upper edges of basaltic volcanoes to their roots. It can be assumed that basaltic volcanoes are a kind of channels through which hydrogen migrates to the upper horizons of the cross-section and further into the atmosphere. Within many basaltic volcanoes at a depth of 68 km, deep (living) water is synthesized. Hydrogen-rich water is curative and can be used for wellness purposes. All surveyed zones of longevity on Earth are located within basalt volcanoes, in which water synthesized at a depth of 68 km migrates to the surface and is used for water supply. Hydrogen deposits can be formed by basaltic volcanoes in adjacent sealed reservoirs. Within some survey areas, responses at hydrogen frequencies from limestones, dolomites and marls were recorded at shallow depths. Direct-prospecting technology can be used to study reservoirs in crystalline rocks (basalts including). Detailed studies and wells drilling in promising areas can be planned and carried out for hydrogen and living water at the same time. The result of investigation indicates the advisability of using direct-prospecting methods of frequency-resonance processing of satellite images to detect zones of hydrogen accumulation in areas of basalt volcano’s location, as well as in areas of hydrogen degassing. The use of mobile and low-cost technology will significantly speed up the exploration process for hydrogen, as well as reduce the financial costs for its implementation.

1. Introduction
In 2019-2021 in various regions of the world, a large amount of experimental research has been carried out with the aim of testing frequency-resonance methods of satellite images and photo images processing and decoding, as well as improving methodological techniques for their practical application during solving geological exploration problems of different nature. In the course of the work, the possibility of purposeful application of mobile direct-prospecting technology was additionally studied for hydrogen
accumulations detecting in areas of hydrogen degassing and determining the depths (intervals) of their occurrence. Considering that hydrogen can become an environmentally friendly fuel of the future, and also taking into account the materials of numerous studies in the framework of deep hydrogen degassing of the Earth [1, 3-4], it can be stated that the problem of accumulations of natural hydrogen searching and organizing it production is becoming quite relevant. Some results of the experimental investigation in order to study the possibility of direct-prospecting methods using for localizing hydrogen accumulations in the cross-section are given in [8-11]. This article presents the materials of additional experimental work on the hydrogen problem.

2. **Research method**

Experimental reconnaissance studies are purposefully carried out using the methods of frequency-resonance processing and decoding of satellite images and photo images, vertical scanning (sounding) of the cross-section in order to determine (estimate) the depths and thicknesses of various complexes of rocks and minerals, as well as methods of integral assessment of prospects oil and gas content (ore content) of local areas and large blocks [6-7]. Separate methods of the technology used are based on the principles of the “substance” paradigm of geophysical research, the essence of which is the search for a specific (required in each case) substance - oil, gas, gas condensate, gold, iron, water, etc. Mobile technology as a whole, as well as some of its methods are actively used in the approbation mode to search for hydrocarbon accumulations at the initial stages of the exploration process, including for an integral assessment of the oil and gas potential of large and hard-to-reach blocks and areas, as well as local drilling areas for prospecting and exploratory wells.

In modified versions of the methods of frequency-resonance processing of satellite images and photo images, as well as vertical sounding (scanning) of the cross-section, bases (sets, collections) of chemical elements, minerals, rocks and minerals (specific samples) are used [6]. Thus, the collection of oil samples used for instrumental measurements includes 117 samples, gas condensate - 15 samples. The set of photographs of sedimentary rocks consists of 11 groups and the base of photographs of igneous and metamorphic rocks includes 18 groups (http://rockref.vsegei.ru/petro/). Materials of previously performed experimental studies obtained with the used set of mobile direct-prospecting methods are presented in publications [6-12]. The same articles describe the methodological features of measurements when processing satellite images and photographs using the developed technical means.

3. **Results of instrumental measurements on sites in different region**

Experimental reconnaissance studies were carried out to study the features of the deep structure of the hydrogen degassing areas in various regions of the world.

3.1. **Latvia**

An image of site in Latvia, on which the drilled well for hydrogen is located, is shown in figure 1. A visual analysis of this image showed that there are local zones of hydrogen degassing. One such area (green rectangle) together with the well location area (blue rectangle) were accepted for survey. On the area with the well, no signals at the frequencies of oil, condensate, gas and hydrogen were recorded.

On the second site, signals were recorded at the frequencies of hydrogen and the 6th (basalt) group of igneous rocks. By fixing the responses from basalts at different depths, the root of a deep channel (volcano), filled with basalts, was established at a depth of 470 km. By scanning the cross-section with a step of 10 cm, the upper edge of the basalts was determined at a depth of 26 m. Hydrogen responses began to be recorded from a depth of 28 m when scanning the cross-section with a step of 10 cm.
3.2. Area in Lithuania
When processing a fragment of the image in a rectangular contour (figure 2), responses from hydrogen, phosphorus (white), deep (living) water, sedimentary rocks of the 9th group (marls) and igneous rocks of the 6th group (basalts) were recorded from the surface. The root of the basalt volcano was identified at a depth of 470 km, and the upper edge of the basalts was recorded at an elevation of 254 m. On the surface of 254 m, responses from marls were obtained from the upper part of cross-section. By scanning cross-section from the surface to a depth of 254 m, step 10 cm, responses from hydrogen were recorded in the depth interval 140-235. By scanning cross-section from 240 m, step 10 m, responses of water from basalts began to be recorded from 317 m. Signals from water were recorded on the surface of its synthesis 68 km.

3.3. Region of Lake Chervone location (Republic of Belarus)
When processing a fragment of the image with Lake Chervone (figure 3, lower rectangular contour on the right), signals on the surface were recorded from phosphorus, hydrogen, deep water and igneous rocks of the 6th group (basalts). The lower edge of basalts was determined at a depth of 98 km, and the upper edge was established by scanning at a depth of 100 m. Signals from the 10th group of sedimentary (siliceous) rocks were recorded on the surface of 99 km. By fixing responses at different depths (99, 450, 550, 650, 723 km), the root of the volcano of these rocks was determined at a depth of 723 km. On the 0 m surface from the upper part of the cross-section (atmosphere), weak responses from hydrogen were recorded, which indicates its migration into the atmosphere. By scanning the cross-section from 80 m, step 10 cm, signals from hydrogen began to be recorded from 100 m, and of deep water - from 112 m. The responses from deep water were recorded at the surface of 68 km. Signals from dead water were received at a depth of 71 km.
During image processing in the upper left rectangular contour (figure 3) signals from phosphorus (white), hydrogen, deep water were recorded from the surface. Signals from 1-6 groups of sedimentary rocks and 6th group of igneous rocks (basalts) were received also. There was no response from the salt. By scanning the cross-section from the surface, step 1 m, the responses from the basalts were recorded from 1010 m and traced to 99 km. On the surface of 99 km, signals from the 10th group of sedimentary (siliceous) rocks were obtained from the lower part of cross-section. By fixing the responses at different depths (150, 250, 450, 550, 650, 750, 723 km), the root of the volcano with siliceous rocks was identified at a depth of 723 km. On the surface of 1010 m, responses from 1-6 groups of sedimentary rocks, oil, condensate, amber, carbon dioxide, phosphorus were obtained from the upper part of cross-section. By scanning the section from 1000 m, step 50 cm, responses from hydrogen were recorded from 1165 m and traced to 2 km (no further scanning was performed). On the surface of 0 m, only signals from carbon dioxide were recorded, responses from hydrogen and phosphorus were absent. By scanning the cross-section from 1000 m, step 1 m, the responses from deep (living) water began to be recorded from 1320 m. Additional examination of the interval 1320-1600 m showed that hydrogen-rich water is curative and can be used to treat various complications (ailments) in the human body, caused by colonies of numerous viruses and parasites.

3.4. Survey areas in Poland

When processing a fragment of image in figure 4a, only responses from 8th (dolomites), 9th (marls), and 10th (siliceous) groups of sedimentary rocks were recorded. The root of the volcano of marls was determined at a depth of 98 km, dolomites - 470 km, siliceous rocks - 723 km. Signals from the 7th group of sedimentary rocks (limestones) were recorded from the depth interval of 99-217 km.

During frequency-resonance processing of a image fragment in figure 14b, signals from the surface are recorded of hydrogen, phosphorus (white), living water, potassium-magnesium salt, stishovite, lonsdaleite, sedimentary rocks of the 10th group (siliceous) and igneous rocks of the 6th (basalts) and 7th (ultramafic) groups. The root of the volcano of siliceous rocks was determined at a depth of 217 km, ultramafic rocks - 470 km, basalts - 723 km. Signals from the 9th (marl) group of sedimentary rocks were recorded in the depth interval 218-470 km. By scanning cross-section from the surface, step 10 cm, the upper edge of the basalts was fixed at a depth of 107 m. Signals from hydrogen and dolomites were recorded on the 107 m surface from the upper part of cross-section. By scanning the cross-section from the surface to a depth of 107 m, step 5 cm, responses of hydrogen from dolomites were recorded in the depth interval 63-83 m. When scanning the cross-section from a depth of 107 m, a step of 10 cm, hydrogen responses from basalts began to be recorded from 139 m, and of living water - from 220 m. Signals from living water were recorded on the surface of its synthesis 68 km. At the 0 m surface, no responses from hydrogen and phosphorus from the upper part of cross-section were recorded, which indicates the absence of their migration into the atmosphere.

Figure 4. Satellite images of survey sites in Poland.
3.5. Ikaria Island (Aegean Sea)
Ikaria Island is the island of centenarians. Earlier studies in the regions where the sites of longevity are located (Ikaria Island, including) [7, part 2] showed that they are all located above basalt volcanoes, in which water synthesis occurs at a depth of 68. The basalts volcanoes also contain hydrogen. And hydrogen-rich water has healing properties and promotes longevity.

![Figure 5. Satellite image of the Ikaria island (Aegean Sea, Greece).](image)

When processing the satellite image of the island (figure 5) from the surface, responses (signals) were recorded only from hydrogen, deep water, the 8th group of sedimentary rocks (dolomites) and the 6th group of igneous rocks (basalts). By fixing the responses from basalts at different depths (50, 150, 450, 550, 750, 723 km), the root of basalt volcano was determined at a depth of 723 km, and the upper edge of the basalts - in the depth interval 3-4 km. From the interval of cross-section above the basalts, responses from marls were obtained. By scanning cross-section from the surface, step 10 cm, responses at hydrogen frequencies were obtained from the intervals: 1) 89-880 m; 2) 2812-3182 m; 3) 3507- (responses traced up to 15 km). From the surface, responses were also obtained from the 14th group of igneous rocks, in which there are samples with the properties of marls. By scanning cross-section with a step of 50 cm, signals from these rocks were recorded in the interval of 160-260 m.

By scanning cross-section from the surface, step 10 cm, responses from water were recorded in the intervals: 1) 40-93 m; 2) 110-400 m (traced only up to 400 m). When scanning the cross-section from 70 m, step 10 cm, responses at hydrogen frequencies from the 8th group of sedimentary rocks (dolomites) were recorded in the following intervals: 1) 89-218 m; 2) 244-356 m; 3) 418-580 m; 4) 650-664 m; 5) 765-812 m; 6) 836-848 m; 7) 871-880 m; 8) 887-893 m. From the interval 89-893 m, responses were obtained from only one sample of the 8th group of sedimentary rocks - oncolytic dolomite. Signals from salt and sedimentary rocks of 1-3 groups were also recorded in this interval.

3.6. Areas of hydrogen degassing in Italy
In Italy, a limited number of instrumental measurements was made within three local areas, the position of which is indicated on the satellite image in figure 6 by rectangular contours. Signals from basalts, hydrogen and living water were recorded at the area 1 (figure 6, rectangle 1). The lower boundary of the basalts is determined at a depth of 99 km. From the 99-470 km interval, responses were obtained from the 9th group of sedimentary rocks (marls). Within area 2 (figure 6, rectangle 2) signals from basalts, hydrogen and living water were recorded also. The lower boundary of the basalts is determined at a depth of 99 km. From the interval 99-218 km, responses were obtained from the 8th group of sedimentary rocks (dolomites), and from the interval 218-723 km - from the 10th group of sedimentary rocks (siliceous rocks). Signals from basalts, hydrogen and living water were recorded in the contours.
of the area 3 (figure 6, rectangle 3). The lower boundary of the basalts is determined at a depth of 99 km. From the interval 99-218 km, responses were obtained from the 9th group of sedimentary rocks (marls), and within the interval 218-723 km - from the 10th group of sedimentary rocks (siliceous rocks). During frequency-resonance processing of the entire image in figure 7 signals from basalts, hydrogen and living (healing) water were also recorded.

Figure 6. Satellite images of local areas of hydrogen degassing in Italy.

3.7. Areas of investigation in UK
3.7.1. Area near Heathrow Airport. During the frequency-resonance processing of a satellite image of a relatively large area in the region of Heathrow airport (figure 7a), signals from phosphorus (white), hydrogen, living water, dead water, sedimentary rocks of the 2nd, 8th (dolomites) and 10th (siliceous) groups, as well as 6th group (basalts) igneous rocks. By fixing responses at different depths, the root of the volcano of siliceous rocks was determined at a depth of 470 km, and dolomites and basalts at a depth of 723 km. By scanning cross-section from the surface, step 1 m, refinement with a step of 10 cm, the upper edge of the basalts was fixed at a depth of 388 m. At the surface (depth) of 388 m from the upper part of cross-section, responses from dolomites, as well as hydrogen from dolomites, were recorded.

By scanning cross-section from the surface to a depth of 388 m, step 10 cm, the responses of hydrogen from dolomites were obtained from the depth interval 265-378 m. At a depth of 265 m, only dolomite signals were received from the upper part of cross-section; there was no response of hydrogen from dolomites. When scanning cross-section from 388 m, a step of 10 cm, signals at hydrogen frequencies began to be recorded from basalts from 410 m and were traced to 500 m (no further scanning was carried out). During the scanning of cross-section from 388 m, step 10 cm, responses from living water were recorded in the depth interval: 425-508 m. On the surface of 508 m, responses from living water were recorded from the lower part of cross-section.

On the surface of the synthesis of living water of 68 km, signals from water were recorded, but at a depth of 71 km, there were no responses. Dead water responses were recorded at a depth of 71 km. Signals from hydrogen and phosphorus were recorded at the 0 m surface from the upper part of cross-section, which indicates their migration into the atmosphere.

3.7.2. Local survey site. During the frequency-resonance processing of a satellite image of a small area in the central part of figure. 7a, signals from hydrogen, phosphorus, living water and the 6th group
(basalts) of igneous rocks were recorded from the surface. The upper edge of the basalts was determined by scanning from 0 m, step 1 cm at a depth of 3.5 m. The root of the basalt volcano was recorded at a depth of 723 km. By scanning cross-section from the surface (0 m), 10 cm step, the responses from hydrogen began to be recorded from 9 m; intense responses were traced only up to 100 m (no further scanning was carried out). During scanning cross-section from the surface, a step of 10 cm, responses from living water began to be recorded from 25 m and were traced only up to 100 m. On the surface of 50 m, intense signals from living water were recorded. Signals from hydrogen were recorded at the 0 m surface from the upper part of cross-section, which indicates its migration into the atmosphere.

![Satellite images of survey sites in the vicinity of London: Heathrow airport area (a); area of St. Mary Cray, Orpington (b).](image)

**Figure 7.** Satellite images of survey sites in the vicinity of London: Heathrow airport area (a); area of St. Mary Cray, Orpington (b).

Using a satellite image of the local survey area, additional instrumental measurements were made in cross-section interval of 25-100 m. From this interval, responses from living water were recorded, and its healing properties were assessed. The results of additional experiments showed that living water is characterized by negative values of the oxidation-reduction potential (ORP) and can be used to protect the human body from the effects of many viruses and parasites.

3.7.3. **The survey area in the St. Mary Cray, Orpington region.** During frequency-resonance processing of a satellite image of the site in the St. Mary Cray, Orpington region (figure 7b), signals from dead water and the 7th group of sedimentary rocks (limestones) were recorded from the surface. The root of the volcano, filled with limestone, was identified at a depth of 723 km. On the surface of 71 km, intense responses from dead water were recorded; there were no signals at a depth of 59 km. On the surface of 68 km, responses from living water were recorded, signals from dead water were not received at this depth.

3.7.4. **Peatland site in Scotland.** The results of frequency-resonance processing of satellite images and photographs of areas of peat bogs in Rivne and Chernigov regions in Ukraine showed that they are all located above basalt volcanoes, in the contours of which hydrogen migrates into the atmosphere. For confirming such "features" of peatlands, additional experiments were carried out on Doune Hill in Scotland (figure 8a) [2]. The presence of a volcano filled with sedimentary rocks of the 9th group (marls) was established when processing the image in top rectangle. The root of the volcano was identified at a depth of 723 km. By scanning cross-section, the upper edge of the marls was established at a depth of 2.25 m. Signals from hydrogen, living and dead water were not registered. During processing the image in bottom rectangle, the presence of a basalt volcano has been established. Signals from basalts were recorded in the depth interval 4.8-98000 m. From the interval of cross-section 98-723 km, responses from the 9th group of sedimentary rocks (marls) were obtained. Signals of hydrogen from basalts began...
to be recorded from 6 m, and of living water - from 7.5 m. Instrumental measurements also established the facts of hydrogen migration into the atmosphere and the synthesis of water (living) at a depth of 68 km. The results indicate the participation of hydrogen in the formation of peat bogs.

Figure 8. Areas of investigation in England: photograph of Doune Hill and Moorland in Scotland [2] (a); satellite image of a well at Preston New Road (Lancashire) (b); photographs of crop circles in England [5] (c).

3.7.5. Drilling site in England. During processing a satellite image of a well for shale gas location in England (figure 8b), responses from hydrogen and basalts were also recorded. Signals from basalts were recorded up to 95 km. This indicates that the darkened areas in the image (figure 8b) are in fact local zones of hydrogen degassing. Taking this into account, the images of eight such local zones, indicated in figure 8b by rectangular contours, were processed separately. As a result, responses from hydrogen and basalts were recorded up to 95 km within each of these zones.

3.7.6. Crop circles in England. The reasons of crop circles appearance are of interest to many researchers. In this regard, it became expedient to process photographs of such circles (figure 8c), found on the fields in England in 2019 [5], in order to get an idea of the deep structure of the local zones of their location. The results of the experiments performed were somewhat unexpected. So, from the surface within all surveyed circles on figure 8c signals from basalts and hydrogen are recorded. By fixing the responses at different depths (70, 97, 94, 95), the roots of all volcanoes of basaltic rocks were established in the depth interval up to 99 km. The upper edge of basalts in all volcanoes is located in the depth interval of 5-6 m. By scanning cross-section from the surface, with a step of 5 mm, the signals at basalt frequencies began to be recorded from 5.55 m. On the 5.56 m surface from the upper part of cross-section basalt signals were not recorded (for all circles), and on the 5.60 m surface, they were recorded (also for all circles). On the surface of 0 m from the upper part of cross-section, responses from hydrogen
and phosphorus were recorded for all circles, which indicate of these elements’ migration into the atmosphere within areas of circles location.

4. Results and discussions

We note once again that the frequency-resonance processing of photo images and satellite images of all areas and survey site was carried out in a reconnaissance mode - an integral assessment of the values of the structural parameters of cross-section, as well as the prospects for detecting accumulations of hydrogen and hydrocarbons, was carried out. In the course of the experiments, the entire set of measurement procedures was not fully implemented. Nevertheless, the materials of instrumental measurements presented above allow us to draw conclusions of the following nature.

A) In the areas and region of the basalt volcano’s location with roots at different depths, signals at hydrogen frequencies from the surface are almost always recorded.

B) Responses from hydrogen are recorded when scanning cross-section practically from the upper edges of basaltic volcanoes to their roots. This feature makes it possible to suggest that basalt volcanoes are a kind of channels through which active migration of hydrogen occurs to the upper horizons of cross-section and further into the atmosphere.

C) In some types of basalt volcanoes at a depth of 68 km, deep (living) water is synthesized. Hydrogen-rich water is healing and can be used for wellness purposes. It is advisable to note once again that all surveyed zones and areas of longevity on Earth [7, part 2] are located within (contours) of basalt volcanoes, in which water synthesized at a depth of 68 km migrates to the surface and is used for water supply and drinking purposes.

D) Hydrogen deposits can be formed by basaltic volcanoes in sealed reservoirs adjacent to basalts. The Mali hydrogen production site is located outside the contour of the basalt volcano; Hydrogen responses were recorded at the marl well site. At other survey sites, signals from hydrogen were obtained from dolomites (Carpathians, the island of long-lived Ikaria), as well as from marls and limestones.

E) Hydrogen deposits formed near basalt volcanoes in different types of reservoirs can be operatively discovered and localized during areal exploration using direct-prospecting methods (technology of frequency-resonance processing of satellite images and photo images, including).

F) The problem of studying reservoirs in crystalline rocks (basalts including) also deserves attention. Direct-prospecting methods can also be used for this purpose.

G) The facts of hydrogen migration into the atmosphere within the discovered basalt volcanoes in different regions of the world, recorded by instrumental measurements, should be considered fundamentally important. In general, the above research results confirm the conclusions of the researchers about the large-scale migration of deep (abiogenic) gas and hydrogen into the atmosphere of Earth planet!

Basalt volcanoes with hydrogen and living water have also been identified in the course of research within local areas in Ukraine, Belarus, Russia, Australia, France, Canada, USA, Sweden, Finland, Greenland.

Signals at the frequencies of hydrogen and basalts were recorded on all surveyed planets and satellites of the Solar System, as well as on the Sun. On Mars and the Moon by scanning cross-section, the depths of the roots of basalt volcanoes are estimated at 450 km and 84 km, respectively. On the Moon, the fact of hydrogen migration into space above the satellite's surface was also confirmed.

The experiments carried out in different region of the globe have replenished the database, testifying in favor of the deep (endogenous) genesis of oil, condensate, gas in the process of hydrogen degassing of the Earth.
5. Conclusions
The materials of experimental research of a reconnaissance nature, presented in the article, clearly demonstrate the working capacity, information content and promptness of direct-prospecting methods of satellite images and photo images frequency-resonance processing during an integrated assessment of the prospects of hydrogen accumulations detecting within survey areas, as well as in the intervals of cross-section of local site. The results of experimental work in various regions indicate the advisability of using direct-prospecting methods of satellite images and photographs frequency-resonance processing and decoding to detect and localize zones of hydrogen accumulation in areas of basalt volcano’s location, as well as within sites of hydrogen degassing. The use of super-operational and low-cost direct-prospecting technology will significantly accelerate the exploration process for hydrogen, as well as reduce the financial costs for its implementation.

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