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Technology of Frequency Resonance Processing of Satellite Images: Results of Testing on gold deposits and areas of gold ore occurrences

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SUMMARY

The results of testing mobile and direct prospecting technology of frequency-resonance processing of satellite images and photo images at large gold deposits Boddington (Australia) and Muruntau (Uzbekistan), as well as at areas of gold ore occurrences in Australia and Ukraine, are presented. At a large Boddington deposit, responses from gold were recorded up to 2600 m, and at the largest Muruntau, up to 2000 m. Within the Ilkurlka ring structure (Australia), gold ore mineralization intervals were recorded from the surface up to 2000 m. Within a prospecting site in Ukraine, responses from gold were obtained from intervals of 49-99 m and 590-650 m. All examined objects are located in the contours of deep channels (volcanoes) with roots at 470 and 996 km, filled with granites. In the contours of the Yarrabubba crater, responses at gold frequencies have not been recorded. Responses from gold were recorded only in granite volcanoes with roots at a depth of 470 km. The research materials, presented in the report, as well as those conducted earlier, will allow us to formulate statistically substantiated recommendations of a methodological nature for the search for fuels and ore minerals.

Introduction. Studies at the Ukrainian marine Antarctic Expedition in 2018 (Yakymchuk et al., 2019a) demonstrated the operability of mobile and low-cost methods of frequency resonance processing of satellite images and photo images, as well as the appropriateness of their application to study the deep structure of the Earth and mineral exploration. In 2019-2020 testing of these methods was deliberately continued while solving various geological and geophysical problems. This report presents the results of testing mobile methods at known gold deposits, as well as local areas of prospecting for gold accumulations.

Research Methods. Experimental studies in the survey areas were carried out using methods of frequency resonance processing and decoding of satellite images and photo images, vertical scanning (sounding) of a cross-section in order to determine (estimate) the depths and thicknesses of various rock complexes and minerals sought, as well as methods for the integrated assessment of the oil and gas potential of local sites and large blocks (Yakymchuk et al., 2019a; 2019b; Yakymchuk and Korchagin, 2019a). These methods are based on the frequency resonance principle of recording useful signals. The important components in the modifications of the direct-prospecting methods used are the bases (sets, collections) of chemical elements, minerals, oil and condensate samples, as well as sedimentary, magmatic and metamorphic rocks, the resonant frequencies of which are used during the satellite images and photo images processing. The collection of oil samples in the database includes 117 copies, gas condensate – 15 samples. The base of sedimentary rocks consists of 12 groups, and the collection of photographs of igneous and metamorphic rocks includes 18 groups (Yakymchuk et al., 2019a). Photos of the used sets of samples of sedimentary, metamorphic and igneous rocks are taken from an electronic document on the website http://rockref.vsegei.ru/petro/. Figure 1 shows the sets of granite samples from the used sedimentary and igneous rock collections.
The document on the site (Ten ...) provides information on the 10 largest gold deposits in the world (including photos of quarries). Reconnaissance studies were carried out at two deposits: Boddington (Australia) and Muruntau (Uzbekistan). At the initial stage of the experiments, responses were obtained indicating the presence of similar elements (features) in the structure of these deposits. In the subsequent stages of the work, a small amount of measurements was performed at each deposit.

Boddington gold deposit. During frequency-resonance processing of a quarry photograph at the deposit (Figure 2), responses from 1 (granites), 2 and 4 groups of igneous rocks were recorded from the surface, signals from sedimentary rocks were absent.

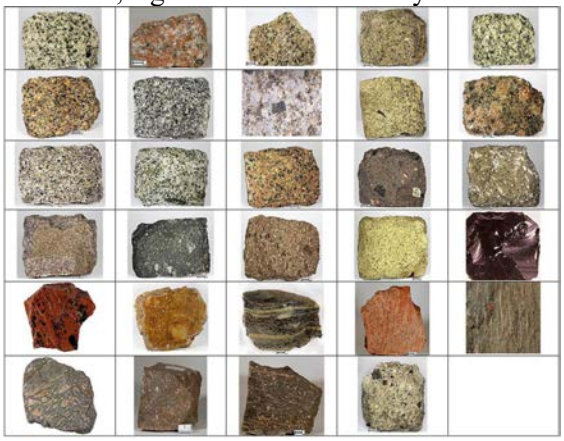

Figure 2 *Photos of the quarry of the Boddington gold ore deposit (Australia) (Ten…).*

Figure 1 *Photographs of group 1 of granite rocks samples whose resonant frequencies are used during images processing.*

By fixing responses from granites at various depths (50, 450, 550, 520, 500, 470 km), the root of the granite channel (volcano) was established at a depth of 470 km.
When processing the image, responses were received from samples of “young” granites (1-10 in Figure 1), no signals were received from “old” (11-19 in Figure 1). By scanning a cross-section from the surface, a step of 10 cm, responses from gold were obtained from the following intervals: 1) 50-86 m, 2) 93-134 m; 3) 187- (strong) -258 m, at a step of 50 cm, 4) 450-765 m, further scanning was not carried out. Signals from gold from the lower part of the cross-section were also obtained on surfaces

of 1000, 2000 and 2500 m, and responses were already absent on surfaces of 2600 and 3000 m. It can be assumed that the lower boundary of gold mineralization is located in the interval of 2500-2600 m.

Muruntau gold deposit. During frequency-resonance processing of a quarry photograph in the field (Figure 3), responses from 1 (granites) and 2 groups of igneous rocks were recorded from the surface, signals from sedimentary rocks were absent.
By fixing responses from granites at various depths (50, 450, 550, 650, 950, 995, 996 km), the root of the granite channel (volcano) was established at a depth of 996 km. On a surface of 450 km, responses from “young” (1-10 in Figure 1) and “old” (11-19 in Figure 1) granite samples were recorded.
By scanning a cross-section from the surface, a step of 50 cm, responses from gold were obtained from the interval: 1) 210-(good) (400 – strong) (strong 650) –780 m (no further scanning was performed). When scanning from 100 m, a step of 10 cm, signals from gold began to be recorded from an interval of 205-207 m.
Signals from gold from the lower part of the cross-section were also obtained on surfaces of 1000, 1800 and 1900 m, and responses on the surface of 2000 m were already absent. At this deposit, the lower boundary of gold mineralization is located in the range of 1900-2000 m.

Figure 3 *Photo of the quarry of the Muruntau gold ore deposit (Uzbekistan) (Ten…).*

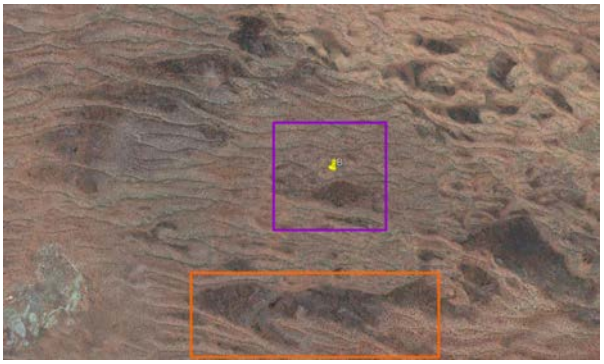

Figure 4 *Satellite image of the Ilkurlka ring structure location (Australia).*

Ilkurlka ring structure (Australia). A document on the website (Meteor ...) informs that within the Ilkurlka ring structure (the Behemoth project) in the Gibson Desert (South Australia), Strategic Elements will conduct drilling operations. The website of this company (Strategic ...) provides additional information about the ring structure, including graphic illustrations with coordinate reference. Using these materials, a satellite image of the site of the survey structure was prepared (Figure 4). At the initial stage of the work, the frequency-resonance processing of this image was carried out in order to determine the genesis of the ring structure.
In the process of frequency resonance image processing in Figure 4 from the surface, responses were recorded only from the first group of igneous rocks (granites, Figure 1); No response from sedimentary rocks. By fixing responses from granites on various surfaces (50, 150, 250, 350, 450, 550,650, 750, 850, 950, 990, 995, 996 km), the root of the channel (volcano), filled with granites, was determined at a depth of 996 km.
Responses (signals) from the following chemical elements were also obtained from the surface within the survey area: copper, zinc, gallium, erbium, gold, and mercury.
In general, the limited amount of experimental work allows us to conclude that the examined ring structure is a volcano with a root at a depth of 996 km. It can also be stated that the facts of obtaining responses at the resonant frequencies of gold are “confirmed” by the results of drilling (Strategic ...).
Additional research. It was found above that the root of the channel (volcano), filled with granites, is located at a depth of 996 km. This is the "old" volcanic complex. The following question is also interesting: is there a “young” volcano with a root at a depth of 470 km in this place? To answer this question, an additional satellite image (Figure 4) processing was performed in order to fix signals (responses) from individual granite samples (Figure 1) at different depths.
Signals from 1-11 and 12-19 samples of these granites are recorded from the surface.

Signals from 4 granite samples ("young") are recorded from the lower part of the cross-section on surfaces (depths) of 2, 20, 200, 450 and 470 km, but there are no responses on surfaces 471, 480 and 500 km. Responses from 14 granite samples ("old") were recorded from the lower part of the cross-section at depths of 570, 470 and 450 km.

These results allow us to conclude that within the Ilkurlka structure are located the "old" and "young" channel (volcano), filled with granites of different ages.

Additionally, a cross-section scanning was performed in two site shown in Figure 4 by rectangular contours, in order to determine the intervals of fixing responses at the resonant frequencies of gold.

By scanning the cross-section within the upper fragment of the image (upper rectangle in Fig. 4) from the surface, with a step of 10 cm, the responses at the frequencies of gold were obtained from the following intervals: 1) 11.50-49 m; 2) 125-164 m; 3) 206-252 m; 4) 334-398 m; 5) 456-504 m (further scanning was not performed). Deeper responses from gold were obtained from the lower part of the cross-section on the following surfaces 600 m, 1600 m, 1800 m, 1900 m; on surface 2000, signals from gold were already absent.

Within the lower fragment of the image (lower rectangle in Figure 4), responses from gold were obtained on a surface of 1900 m; on surface 2000, signals were also not received. Cross-section scanning was not performed at this local site.

It can be assumed that the zones of gold mineralization within the Ilkurlka ring structure are located in the cross-section to a depth in the range of 1900-2000 m.

Lipovenkovsky-Sukhotashlyksky area of gold halos. A satellite image of the survey site (Figure 5) was prepared for processing using graphic materials from the article (Pavlyuk et al., 2019). During frequency-resonance image processing, signals at gold frequencies are recorded (albeit of low intensity).

Responses from oil, condensate, gas, graphite, hydrogen, water, diamonds, and salt were not recorded; a signal was received from dead water.

Signals without delay from 1, 2 and 4 groups of igneous rocks were recorded; responses from sedimentary rocks were not immediately received.

By fixing the responses at various depths (50, 150, 450, 550, 995, 996 km), the root of the channel (volcano) of granite rocks was determined at a depth of 996 km.

On the surface of 400 km, responses were received from 5, 7, and 8 samples of granites ("young"), and on the surface of 600 km, only from 12-19 samples ("old"). Consequently, the survey site is located within the old and young granite volcanoes.

Figure 5 *A satellite image of the Lipovenkovsko-Sukhotashlyksky area of gold halos.*

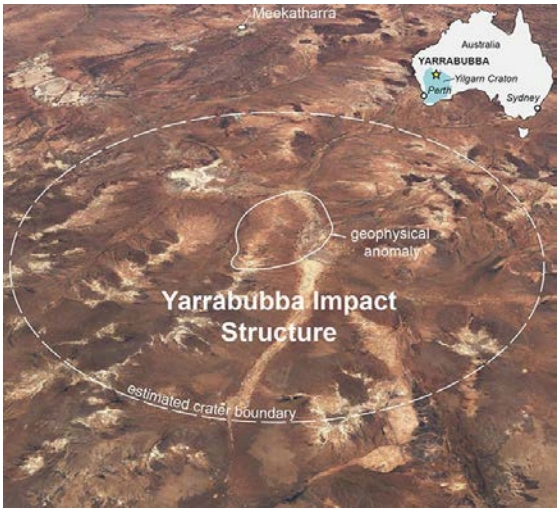

Figure 6 *Satellite image of the area of the Yarrabubba crater location (Australia) (Yarrabubba…).*

By scanning the cross-section from the surface, steps of 1 cm and 5 cm, the responses at the gold frequencies were obtained from the interval 49-(80-strong)-99 m. Deeper scanning was carried out with a step of 10 cm to 200 m and a step of 50 cm to 500 m, however, the responses from gold in this

interval are not received. Responses from gold were obtained from the lower part of the cross-section on the surfaces of 500 and 600 m, and on the surface of 700 m, signals were already absent.
By scanning the cross-section from 500 m, a step of 50 cm, the second interval of responses from gold was recorded: 590-(600-strong)-650 m.
Signals from the following chemical elements were also recorded from the surface: zinc, gallium, germanium, mercury, thallium, lead, bismuth, polonium.

The oldest Yarrabubba crater. Information on the oldest Yarrabubba Crater in Australia is given in the document (Yarrabubba ...). A satellite image of the area of this crater is shown in Figure 6.
During frequency resonance image processing in Fig. 6, only responses were received from the first group of igneous rocks (granites). Signals from all groups of sedimentary rocks are not recorded. By fixing the responses on various surfaces (50, 150, 250, 350, 450, 550, 650, 750, 850, 950, 990, 995, 996 km), the root of the granite volcano was established at a depth of 996 km.
On the surface of 50 km, responses from “young” granite samples (1-10 in Figure 1) were not received, but from “old” (samples 11-19 in Figure 1) recorded. It can be stated that there is no “young” volcano with a root at a depth of 470 km within the Yarrabubba crater!
A frequency-resonance processing of a photograph of a small fragment of the crater was also carried out in order to record responses from various chemical elements. During the photograph processing, responses were received from the following chemical elements: beryllium, scandium, calcium, titanium, chromium, manganese and copper.
And one more interesting fact should be noted. When processing three images of a crater of different scales, signals at gold frequencies were not received! It is possible that gold appears only in the "young" granite volcanoes ?!

Conclusions. The conducted experimental studies allow us to state the following.
1. The Boddington deposit is located within the “young” granite channel (volcano) with a root at a depth of 470 km. And on the area of the Muruntau deposit, the presence of “old” and “young” granite volcanoes with roots at depths of 470 and 996 km was established.
2. Information materials, including the document (Ten ...), provide information that the Muruntau deposit is the largest in the world in gold reserves. To this we add that during the frequency-resonance processing of a photograph of the quarry of this deposit, the most intense signals were recorded at the frequencies of gold!
3. It is advisable to pay attention to the fact that responses at frequencies of gold were recorded only in “young” granite volcanoes with roots at a depth of 470 km. In this regard, it is necessary to further investigate whether such a "pattern" can be traced in other gold ore deposits in granite volcanoes.
In general, the results of experimental studies at some gold deposits and ore occurrences replenish the existing base of the examined structures and mineral deposits in various regions of the world. The research materials accumulated in this database will allow us to formulate statistically substantiated recommendations of a methodological nature for the search for combustible and ore minerals.

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