SAMPLE OF REPORT

«Evaluation of Gold potential of area-2 in Sudan by Resonant Frequency Remote Sensing (RFRS) data processing»

ABSTRACT

Report on R&D: 42 pages, 15 figures, 7 tables.
Object of study – **Gold** deposits within **Area-2** in Sudan.

Purpose

The purpose of this study was the processing and interpretation (decoding) of remote sensing (RS) data within Area-2 in order to detect and map zones of potential gold mineralization within the research area.

Summary of Results

This report presents the results of remote sensing investigations conducted within Area-2. Anomalies of the "Gold" type were identified and mapped using the frequency-resonance method of remote sensing data processing. The investigation results are presented graphically in the form of maps.

Research Method

The study was carried out using the express technology of "direct" exploration based on remote sensing and geoelectric methods. The technology includes:

- Frequency-resonance processing and interpretation of remote sensing data;
- Ground-based geoelectric methods, including the Formation of Short-Pulsed Electromagnetic Field (FSPEF);
- Vertical Electric-Resonance Sounding (VERS).

The frequency-resonance method of remote sensing data processing is, in essence, a direct method for mineral prospecting and exploration. Anomalies mapped by this method can (and should) be considered as surface projections of potential mineral deposits within the geological cross-section.

Key Findings

As a result of frequency-resonance processing and interpretation of remote sensing data at a scale of 1:5,000, thirty (30) anomalies of the "Gold" type were discovered and mapped within the study area.

Vertical scanning was performed at 30 points to estimate the depth intervals of possible gold mineralization, and three geological cross-sections were constructed.

The conducted investigations demonstrate that areas of potential gold mineralization can be effectively detected and mapped using the frequency-resonance method of remote sensing data processing and interpretation.

REMOTE SENSING SOUNDING OF EARTH, SATELLITE IMAGE, PROCESSING, INTERPRETATION, ANOMALY OF DEPOSIT TYPE, GOLD, VEINS.

Content

INTRODUCTION

This report presents the results of frequency-resonance processing and interpretation (decoding) of remote sensing (RS) data within Area-2. The primary objective of the study was the detection and mapping of sites with potential gold mineralization within the survey area using remote sensing data processing and interpretation methods.

The specific objectives of the survey were to determine the location and spatial extent of frequency-resonance (FRRS) anomalies associated with gold resonant frequencies, including:

- Detection and mapping of anomalous zones of the "Gold" type based on remote sensing data processing and interpretation results;
- Identification of the most promising areas for detailed investigations and/or field exploration.

The mobile express technology of "direct" exploration is based on the frequency-resonance method of remote sensing data processing and interpretation , as well as ground-based geoelectric methods, including the Formation of Short-Pulsed Electromagnetic Field (FSPEF) and Vertical Electric-Resonance Sounding (VERS) .

The frequency-resonance method of remote sensing data processing enables the detection and mapping of anomalous zones of the "oil reservoir," "gas accumulation," "hydrate reservoir," "aquifer," and similar types. The application of this method in combination with the FSPEF and VERS geoelectric techniques significantly reduces both the time required for ground fieldwork in remote and hard-to-access areas (deserts, tundra, taiga, mountainous regions, shallow offshore zones, etc.) and the overall cost of exploration.

The mobile geoelectric methods FSPEF and VERS, together with the frequency-resonance remote sensing data processing method, can be effectively applied in the prospecting and exploration of hydrocarbon deposits, ore minerals, and aquifers in regions with diverse climatic, tectonic, and geological conditions.

1. INITIAL DATA FOR WORK

At the initial stage, only minimal information about the study area was provided. Due to the specific characteristics of the region and the limited level of previous investigation, no publicly available information exists regarding the geological study of the work area (Fig. 1).

To accomplish the assigned task, the following information was requested:

- Boundaries of the study area;
- Calibration points (coordinates of locations with confirmed gold occurrence or known deposits);
- Well data for depth calibration;
- Samples of the target mineral or host rocks containing the target substance;
- Historical geological data for the study region.

Unfortunately, no detailed geological or exploration data for the region were provided, except for indirect confirmation of gold occurrence at a specific location.

Based on the available information, methodological work was carried out to identify anomalous zones corresponding to frequencies typical of gold-bearing rocks.

As a result of preliminary processing at a scale of 1:100,000, six anomalous zones were identified. One of these zones, located outside the original license area, was distinguished by its significant size and high intensity (Fig. 2).

Subsequently, the client acquired an additional license for this area (coordinates provided in Table 1). Within this newly licensed territory, we were tasked with selecting the most promising part of the site for detailed processing at a scale of 1:5,000.

Express analysis conducted at a scale of 1:30,000 showed that the anomalous zone was subdivided into five fragments. The most significant fragment in terms of intensity and area is located in the southern part of the zone. This southern fragment was recommended for detailed investigation using the frequency-resonance remote sensing (FRRS) method at a scale of 1:5,000 (Fig. 3).

Figure 4 presents the 1:5,000 scale plate of the identified anomalous zone. The coordinates of the plate are provided in Table 2.

Map of gold anomalies by frequency -resonant processing of satellite imagery, Sudan

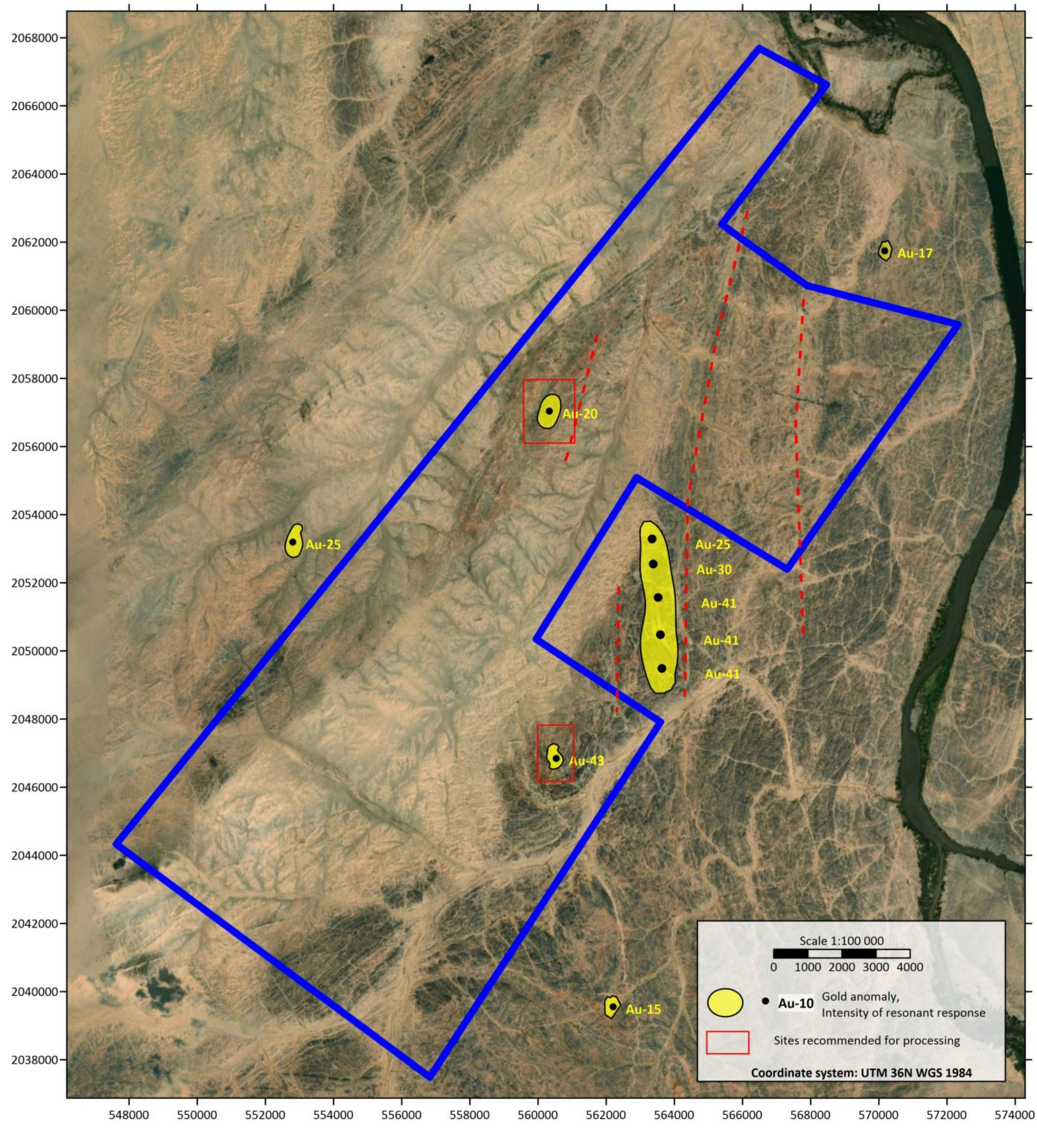

Table 1

N	Long	Lat
A	33°38'16.341"E	18°33'40.397"N
B	33°35'45.849"E	18°35'08.432"N
C	33°34'04.793"E	18°32'34.501"N
D	33°36'09.073"E	18°31'14.911"N

Table 2

Point	X	Y	Long DD.DDD	Lat DD.DDD	Long DMS	Lat DMS
A	562263	2050956	33,59000	18,54835	33° 35' 24.00"	18° 32' 54.07"
B	564164	2050956	33,60801	18,54829	33° 36' 28.83"	18° 32' 53.85"
C	564164	2049632	33,60797	18,53633	33° 36' 28.68"	18° 32' 10.78"
D	562264	2049632	33,58997	18,53639	33° 35' 23.88"	18° 32' 10.99"

Proposal for gold evaluation in Sudan
Map of gold anomalies by frequency -resonant processing of satellite imagery, Sudan

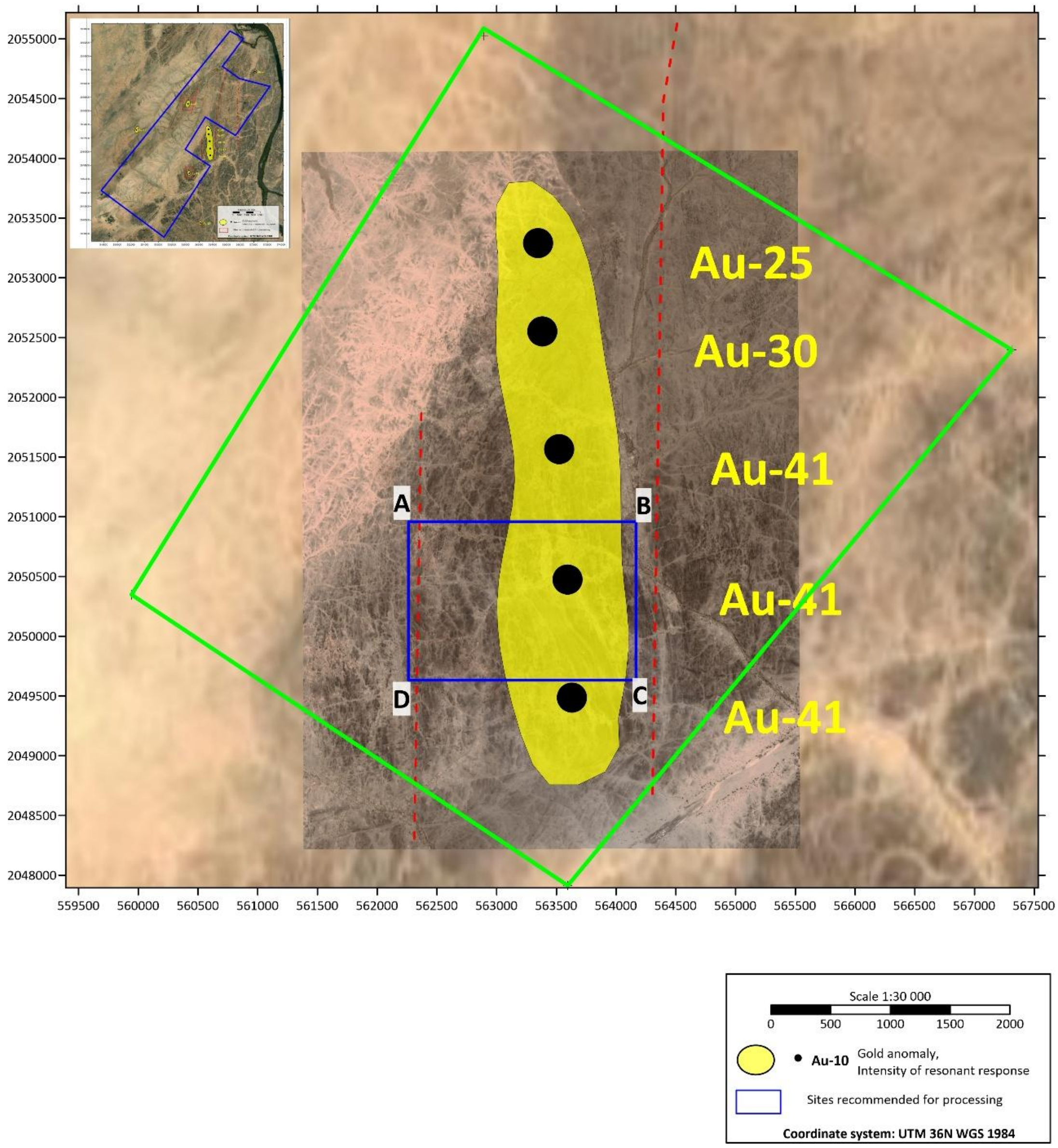

Figure 2.

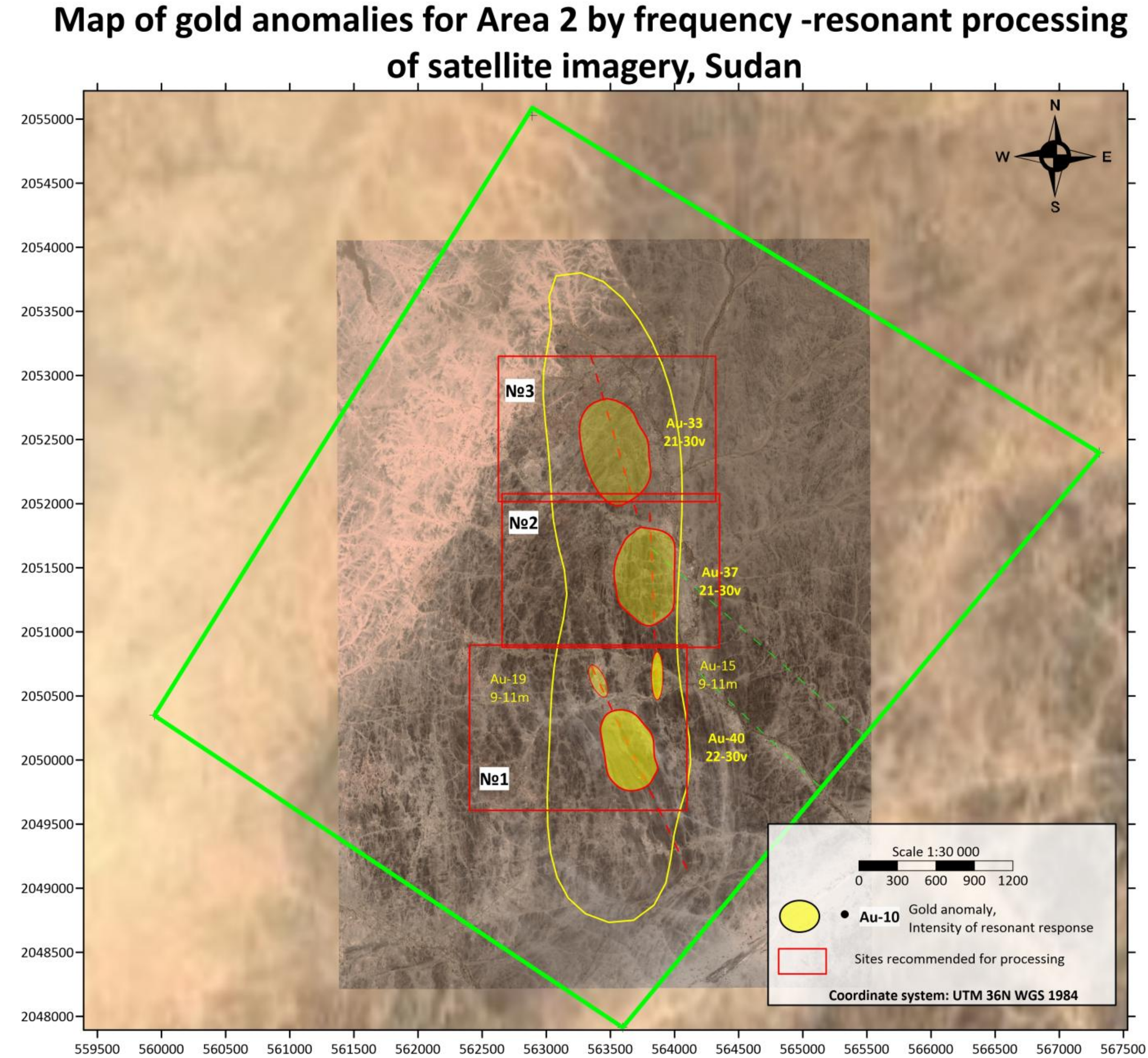
Map of gold anomalies for Area 2 by frequency -resonant processing of satellite imagery, Sudan
N
W
E
S
№3
№2
№1
Au-33
21-30v
Au-37
21-30v
Au-19
9-11m
Au-15
9-11m
Au-40
22-30v
Scale 1:30 000
0 300 600 900 1200
Au-10
Gold anomaly,
Intensity of resonant response
Sites recommended for processing
Coordinate system: UTM 36N WGS 1984
2055000
2054500
2054000
2053500
2053000
2052500
2052000
2051500
2051000
2050500
2050000
2049500
2049000
2048500
2048000
559500 560000 560500 561000 561500 562000 562500 563000 563500 564000 564500 565000 565500 566000 566500 567000 567500

Figure 3.

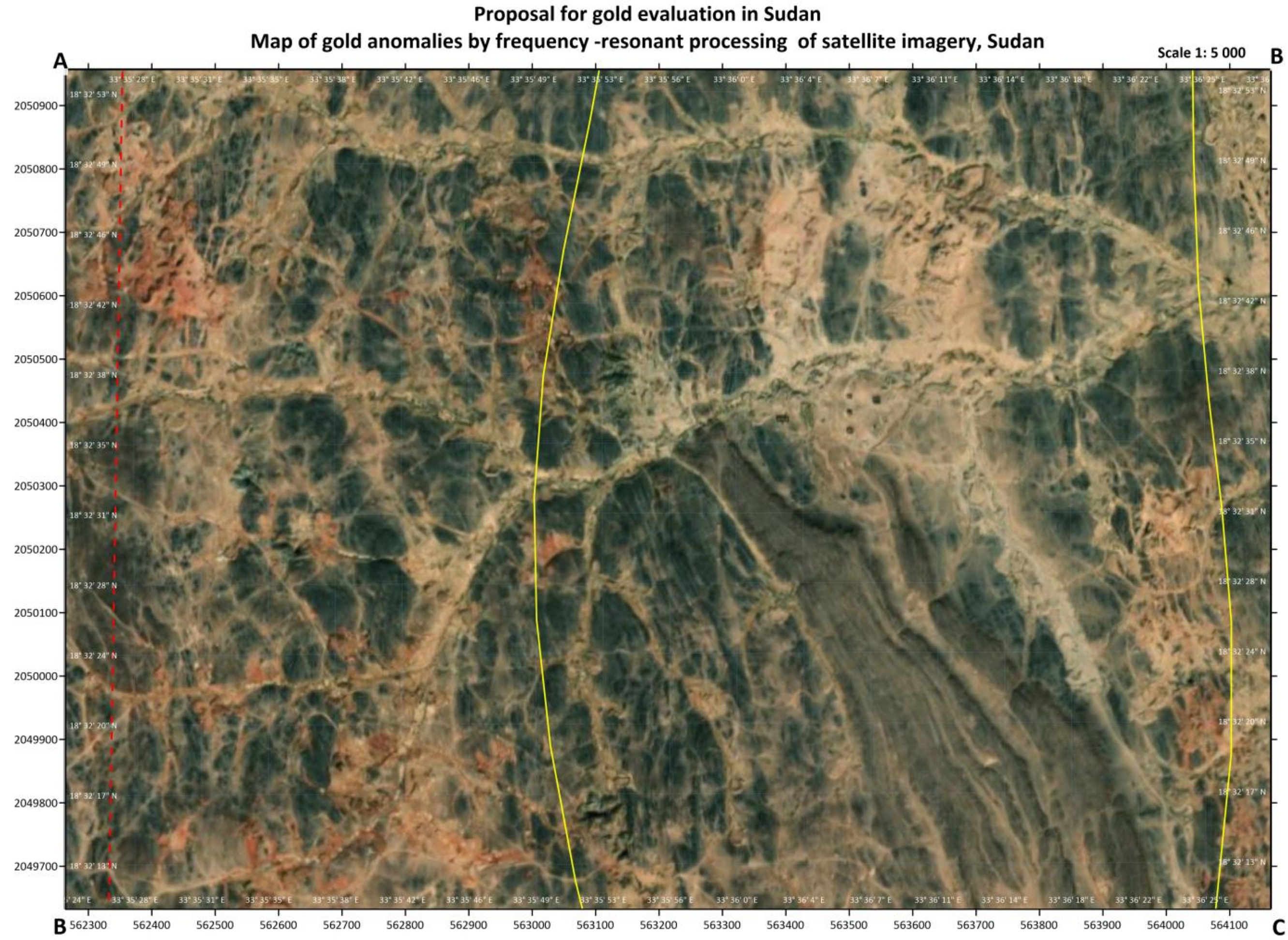
Proposal for gold evaluation in Sudan
Map of gold anomalies by frequency -resonant processing of satellite imagery, Sudan
Scale 1: 5 000
A
B
B
C
2050900
2050800
2050700
2050600
2050500
2050400
2050300
2050200
2050100
2050000
2049900
2049800
2049700
562300
562400
562500
562600
562700
562800
562900
563000
563100
563200
563300
563400
563500
563600
563700
563800
563900
564000
564100

Figure 4.

2. MOBILE EXPRESS TECHNOLOGY FOR "DIRECT" PROSPECTING AND EXPLORATION OF PETROLEUM AND MINERAL DEPOSITS USING GEOELECTRIC AND REMOTE SENSING METHODS

Principal Features of the Technology

The application of this technology in prospecting for oil and gas reservoirs, ore minerals, and aquifers significantly accelerates the exploration process and substantially improves its efficiency.

Technology Components and Equipment

The technology includes the following components:

- A specialized method for satellite data processing and interpretation;
- Areal mapping using the Formation of Short-Pulsed Electromagnetic Field (FSPEF) method;
- The Vertical Electric-Resonance Sounding (VERS) method;
- Computer-assisted measurement instrumentation for field observations;
- Software for data acquisition, processing, and interpretation;
- Established procedures for conducting field observations.

The original FSPEF and VERS methods are based on studying the geoelectric parameters of the subsurface in pulsed transient geoelectric fields, as well as in the quasi-stationary electric field of the Earth and its spectral characteristics over hydrocarbon (HC) reservoirs.

The possibility of conducting FSPEF surveys from vehicles or aircraft enables rapid examination of large territories within compressed timeframes.

The features and techniques of the technology are described in numerous publications.

Operational Capabilities

The technology allows for rapid:

- Assessment of the prospectivity of investigated areas using specialized satellite data processing;
- Detection and mapping of "deposit-type anomalies" (DTA) that may correspond to hydrocarbon accumulations in the geological cross-section;
- Determination of bedding depths and thicknesses of anomalous polarized layers (APL) of "oil," "gas," "water," and similar types;
- Reconnaissance surveys of large and hard-to-access oil- and gas-bearing territories within short time periods;
- Detailed investigations within selected anomalous zones to determine optimal borehole locations, estimate potential HC reserves, and support decisions regarding further geological and geophysical work and drilling;

- Identification and mapping of gas-saturated zones within coal seams and surrounding rocks;
- Mapping of salt domes and salt layers;
- Investigation of both supra-salt and sub-salt (sub-cornice) hydrocarbon reservoirs;
- Mapping of fractured zones and hydrocarbon accumulations within fractured crystalline basement rocks;
- Offshore oil and gas prospecting from vessels;
- Detection and mapping of geoelectric anomalous zones of the “mineralization zone” type, and determination of the depth and thickness of anomalous polarized layers of the “mineral deposit” type using VERS sounding;
- Identification and tracing of underground water flows of natural and anthropogenic origin, and mapping of water-saturated reservoirs.

Features of Frequency-Resonance Processing of Remote Sensing Data

1. Substantial Paradigm of Direct Prospecting

Currently, several remote sensing data processing and interpretation methods have been developed within the framework of the "substantial" paradigm of geological and geophysical studies. The essence of this paradigm lies in the *direct* search and prospecting for specific materials such as oil, gas, gold, platinum, zinc, iron, water, etc.

Examples of such technologies include CCSC exclusive research partners: "Tomko," and "Poisk." The effectiveness of geophysical methods based on this paradigm is reported to be significantly higher than that of traditional approaches.

2. Phenomenological Basis of the "Tomko" Technology

According to published descriptions, the "Tomko" technology is based on advances in astrophysics, mathematics, electromagnetic radiation theory, laser systems, and modern computer hardware and software.

The theoretical justification refers to the concept that atoms in molecules possess specific spatial positions and electromagnetic fields with characteristic spatial-frequency intensity distributions.

The spatial-frequency structure of electromagnetic fields of any substance is determined by its chemical composition and molecular or crystalline lattice structure. Large quantities of homogeneous material may generate a collective electromagnetic field whose radiation power is proportional to the concentration of the substance.

It is hypothesized that a linearly polarized wave with a specific frequency response, carrying structural information about a substance, is not significantly absorbed by the surrounding medium and does not decrease in intensity with distance. Under this assumption, a homogeneous substance at depth could create a detectable field as if it were located at the surface.

Characteristic electromagnetic responses of large hydrocarbon accumulations are reported to be identifiable in satellite imagery and used for detecting previously unknown fields.

3. "Poisk" Technology

The "Poisk" technology is also described in specialized publications and electronic documents. These sources provide a detailed description of the fundamental physical principles and emphasize the possibility of mineral prospecting based on resonance phenomena.

4. Frequency-Resonance Method Used in This Study

In the "Tomko" technology, useful signal extraction is achieved through quantum-optical filtering of satellite imagery.

In contrast, the method used in this study applies frequency-resonance processing for separating useful signals from satellite imagery. Characteristic resonance frequencies have been experimentally identified for various materials (oil, natural gas, uranium, gold, water, zinc, etc.) based on mineral samples. These frequencies are then applied during remote sensing data processing and interpretation.

For example, specific resonance frequencies have been determined for water with different levels of mineralization. For other minerals, resonance frequencies are identified within broader ranges.

5. Satellite Data Used

Frequency-resonance processing is performed using multispectral imagery from various satellites, primarily those available in the public domain.

- For reconnaissance surveys of large areas (scales 1:50,000 and smaller), Landsat-5 and Landsat-7 imagery with 30 m/pixel resolution may be used.
- For detecting small objects at scales of 1:1,000 and smaller, higher-resolution imagery (10–1 m/pixel) is required.

For the BC project, Sentinel-2A satellite data were used, providing a spatial resolution of 10 m/pixel (equivalent to 10 pixels per cm at a 1:10,000 scale).

Table 2.1

Resonance frequencies of water of different salinity

Number	Mineralized water	Mineralization (g/dm^3)	Resonance frequencies, kHz
1	Structured (Alpine sources)	< 0.1	**717.6**
2	Weakly mineralized (Morshynskiye sources)	0.1 -0.4	**643.8**
3	Average mineralization	0.5 - 1.0	**615.7**
4	**Strong mineralization**	**5.0 – 15.0**	**551.5**

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3. RESULTS OF REMOTE SENSING DATA PROCESSING AND INTERPRETATION OF THE SURVEY AREA

As a result of frequency-resonance processing and interpretation of remote sensing data at a scale of 1:5,000, thirty (30) anomalies of the "Gold" type were identified and mapped within the study area. In addition, seven zones were delineated that likely correspond to iron sulfidization zones ("FeS").

Vertical scanning (VSS) was performed at 30 points, and depth intervals to possible gold mineralization were determined.

Stages of Satellite Image Processing

Satellite image processing was carried out in several stages.

Stage 1 – Structural Analysis

The first stage included the identification and mapping of fault and fracture zones. At this scale of investigation, only a limited number of fault zones were identified that may control mineralization. The predominant orientation of the mapped fault zones is north–northwest.

The results of this stage are presented in Figure 3.1.

Stage 2 – Mapping of "Gold" Type Anomalies

During the second stage, anomalous zones of the "Gold" type were identified and mapped. A total of 30 such anomalous zones were delineated within the investigated territory.

For each anomalous zone, the intensity value (I = XX, as shown on the maps) was determined. This parameter is relative and reflects the comparative potential of anomalous zones within the study area.

The intensity of an anomaly depends on several factors, including:

- Depth of the anomalous formation;
- Width (thickness) of the mineralized body;
- Concentration of gold.

Accordingly, the recorded anomalies may reflect the presence of multiple gold-bearing layers or veins, potentially extending to depths greater than those identified through vertical scanning or surface-level investigation.

Simultaneously, zones of sulfidization and pyritization were investigated. As a result, seven "FeS" zones were identified, several of which spatially coincide with "Gold" anomalies. The presence of these sulfidization zones indicates an increased probability of significant gold mineralization.

The results are presented as follows:

- Figure 3.1 – Anomalies shown as isolines of response intensity;
- Figure 3.2 – Anomaly map overlaid on satellite imagery;
- Figure 3.3 – Anomalies displayed on a relief map.

Table 3.1 summarizes the characteristics of the discovered "Gold" anomalies, including:

- Maximum anomaly intensity (in relative units);

- Presence of a “Gold” response;
- Area of each anomaly.

All maps were constructed at a scale of 1:5,000 using the UTM Zone 36N coordinate system, Datum WGS 1984.

The results indicate that anomalous gold zones spatially coincide with fault zones and generally follow their predominant north–northeast orientation.

The highest anomaly intensities (40–45 relative units) are associated with anomalies Au-1, Au-2, Au-3, Au-4, Au-5, and Au-9. These anomalies are located within a single sulfidization zone. The adjacent Au-8 anomaly, separated by a fault zone, also demonstrates elevated intensity.

The remaining anomalies generally exhibit intensities in the range of 10–20 relative units.

Stage 3 – Vertical Scanning (VSS)

In accordance with the technical assignment, the third stage involved vertical scanning within the detected anomalous zones.

A total of 30 vertical scans were carried out within anomalous zones to depths of up to 100 meters. The locations of VSS points are shown in Figure 3.4.

Final Mapping Results

After completion of all processing stages, final result maps were compiled.

- Figure 3.4 presents anomaly intensity (in relative units) and VSS points at a scale of 1:5,000. The map also shows the depth intervals of anomaly responses.
- Figure 3.5 shows anomalies and their properties overlaid on satellite imagery.

Table 3.2 presents the numerical results of VSS.

Graphical representations of VSS results are provided in Figures 3.6–3.9.

Map of "Gold anomalies" by frequency - resonant processing of satellite imagery, Area-2, Sudan, Scale 1:5 000

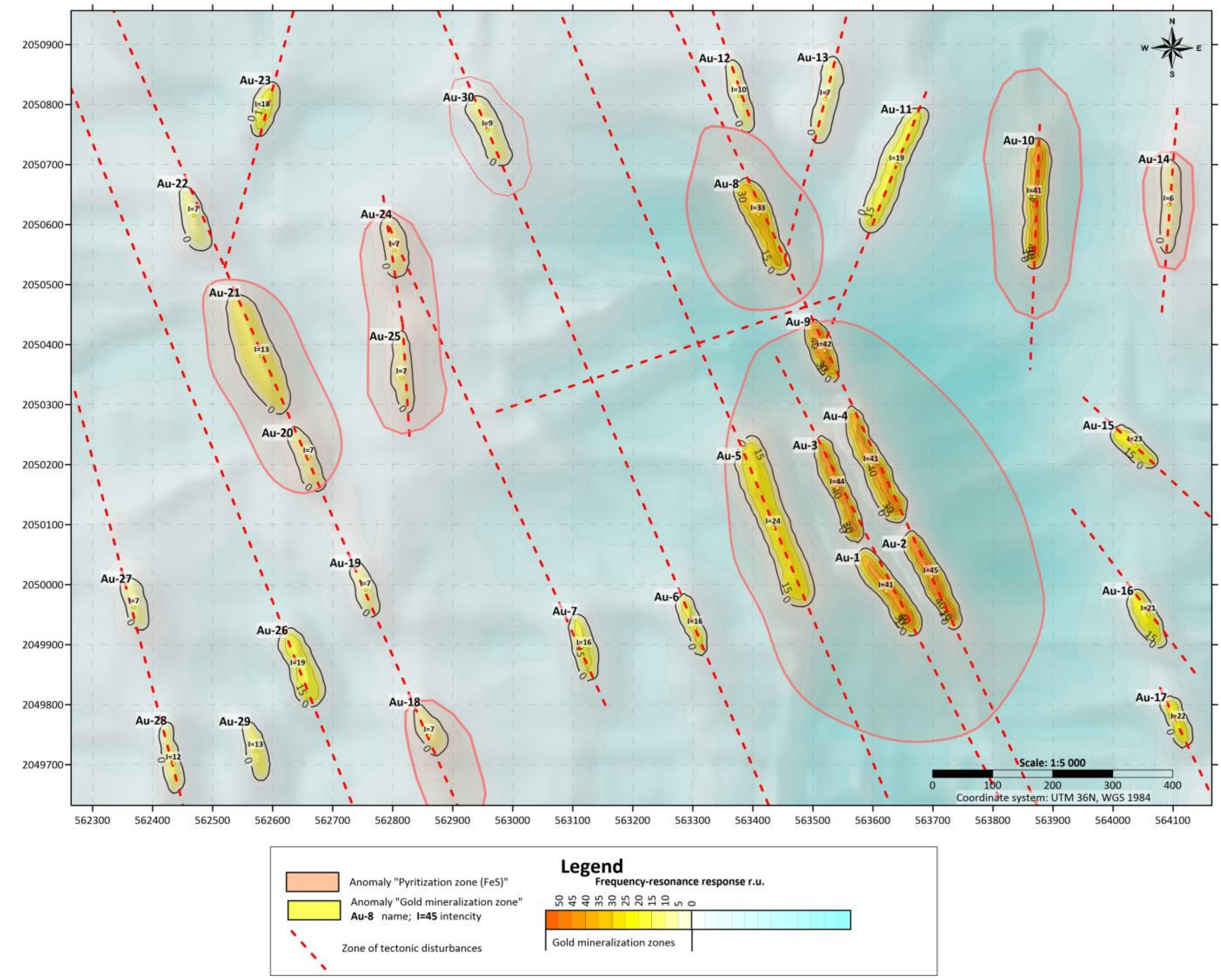


Figure 3.1.

Map of "Gold anomalies" by frequency - resonant processing of satellite imagery on sattelite, Area-2, Sudan, Scale 1:5 000

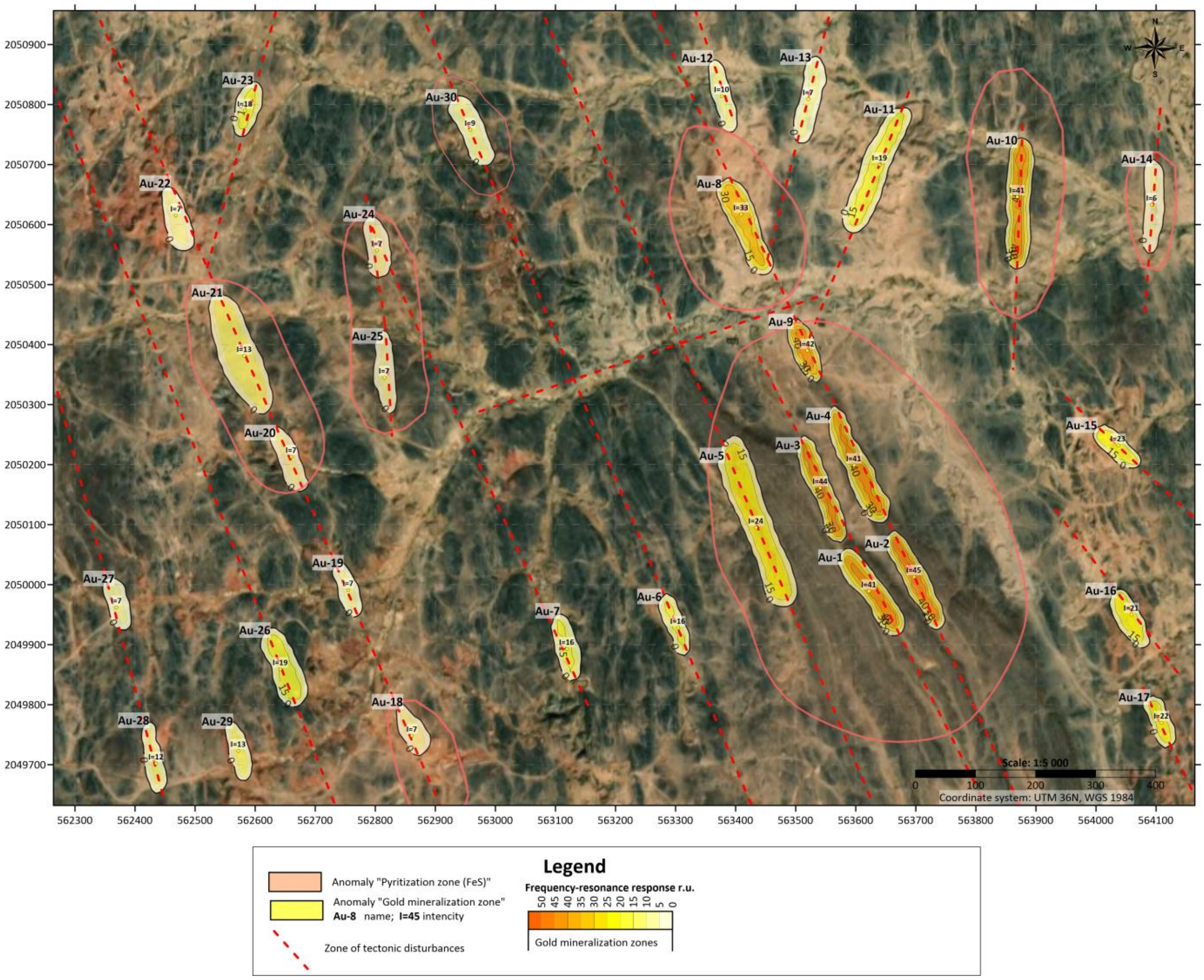


Figure 3.2.

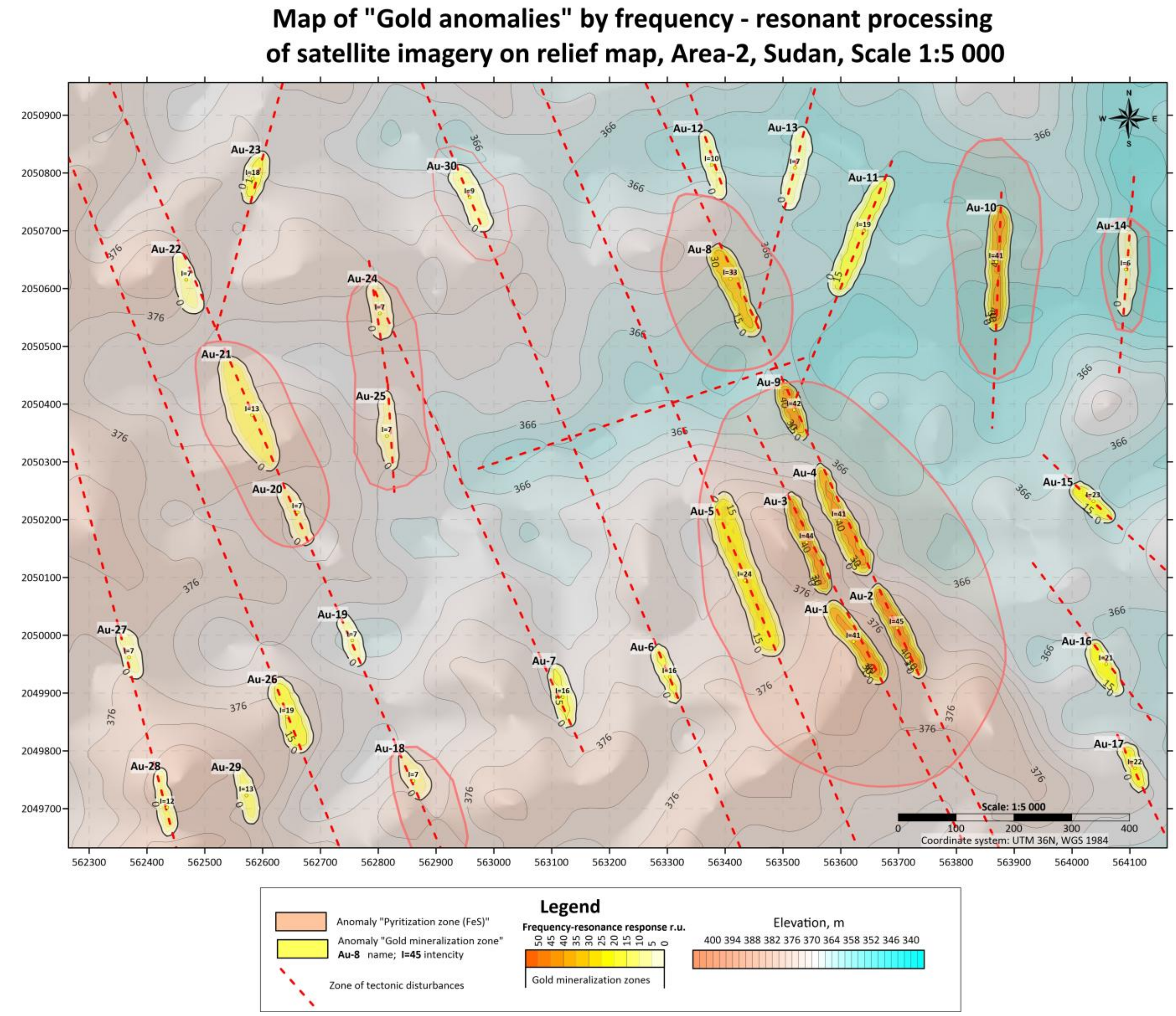

Map of "Gold anomalies" by frequency - resonant processing
of satellite imagery on relief map, Area-2, Sudan, Scale 1:5 000
Legend
Anomaly "Pyritization zone (FeS)"
Anomaly "Gold mineralization zone"
Au-8 name; I=45 intencity
Zone of tectonic disturbances
Frequency-resonance response r.u.
50 45 40 35 30 25 20 15 10 5 0
Gold mineralization zones
Elevation, m
400 394 388 382 376 370 364 358 352 346 340
Scale: 1:5 000
Coordinate system: UTM 36N, WGS 1984

Figure 3.3.

Table.3.1.

Anomaly	Intensity (ru)	Area (m^2)
Au-1	**41**	**6 282**
Au-2	**45**	**5 287**
Au-3	**44**	**5 566**
Au-4	**41**	**7 746**
Au-5	**24**	**13 706**
Au-6	16	2 351
Au-7	16	2 977
Au-8	**33**	**5 617**
Au-9	**42**	**3 041**
Au-10	**41**	**6 513**
Au-11	19	8 031
Au-12	10	2 521
Au-13	7	3 758
Au-14	6	3 855
Au-15	**23**	**2 573**
Au-16	**21**	**2 870**
Au-17	**22**	**2 115**
Au-18	7	2 257
Au-19	7	1 886
Au-20	7	2 841
Au-21	13	10 532
Au-22	7	3 005
Au-23	18	2 426
Au-24	7	2 756
Au-25	7	2 844
Au-26	**19**	**4 749**
Au-27	7	2 161
Au-28	12	2 330
Au-29	13	2 139
Au-30	9	3 848

Tables 3.2.

VSS	Top (m)	Bottom (m)	Response depth interval, m	Intensity (ru)	X	Y	Altitude (m)	Comments
V-1	13	22	9	41	563622	2049989	377	Depth
V-2	22	31	9	45	563697	2050013	374	Depth
V-3	13	22	9	44	563541	2050161	376	Depth
V-4	22	31	9	41	563597	2050199.	371	Depth
V-5	12	16	4	24	563434	2050095	373	Depth
V-6	5	9	4	16	563304	2049928	373	Near-surface
V-7	1	22	21	16	563119	2049893	371	Near-surface
V-8	1	35	34	33	563409	2050617	365	Near-surface
V-9	22	29	7	42	563519	2050390	364	Depth
V-10	12	33	21	41	563869	2050646	361	Depth
V-11	5	14	9	19	563640	2050700	362	Near-surface
V-12	1	22	21	10	563377	2050814	363	Near-surface
V-13	5	17	12	7	563521	2050809	363	Near-surface
V-14	11	26	15	6	564093	2050633	356	
V-15	1	13	12	23	564037	2050232	365	Near-surface
V-16	5	13	8	21	564059	2049950	367	Near-surface
V-17	6	11	5	22	564109	2049770	370	Near-surface
V-18	8	15	7	7	562861	2049748	373	Near-surface
V-19	1	21	20	7	562755	2049991	367	Near-surface
V-20	6	9	3	7	562660	2050213	371	Near-surface
V-21	5	21	16	13	562582	2050381	373	Near-surface
V-22	1	7	6	7	562468	2050615	376	Near-surface
V-23	6	12	6	18	562583	2050790	372	Near-surface
V-24	4	32	28	7	562803	2050557	372	Near-surface
V-25	6	12	6	7	562815	2050345	370	Near-surface
V-26	5	20	12	19	562642	2049859	376	Near-surface
V-27	21	27	6	7	562369	2049962	375	Depth
V-28	22	25	3	12	562435	2049702	380	Depth
V-29	13	16	3	13	562572	2049723	378	Depth
V-30	1	18	17	9	562958	2050758	369	Near-surface

Map of VSS points of "Gold anomalies" by frequency - resonant processing of satellite imagery, Area-2, Sudan, Scale 1:5 000

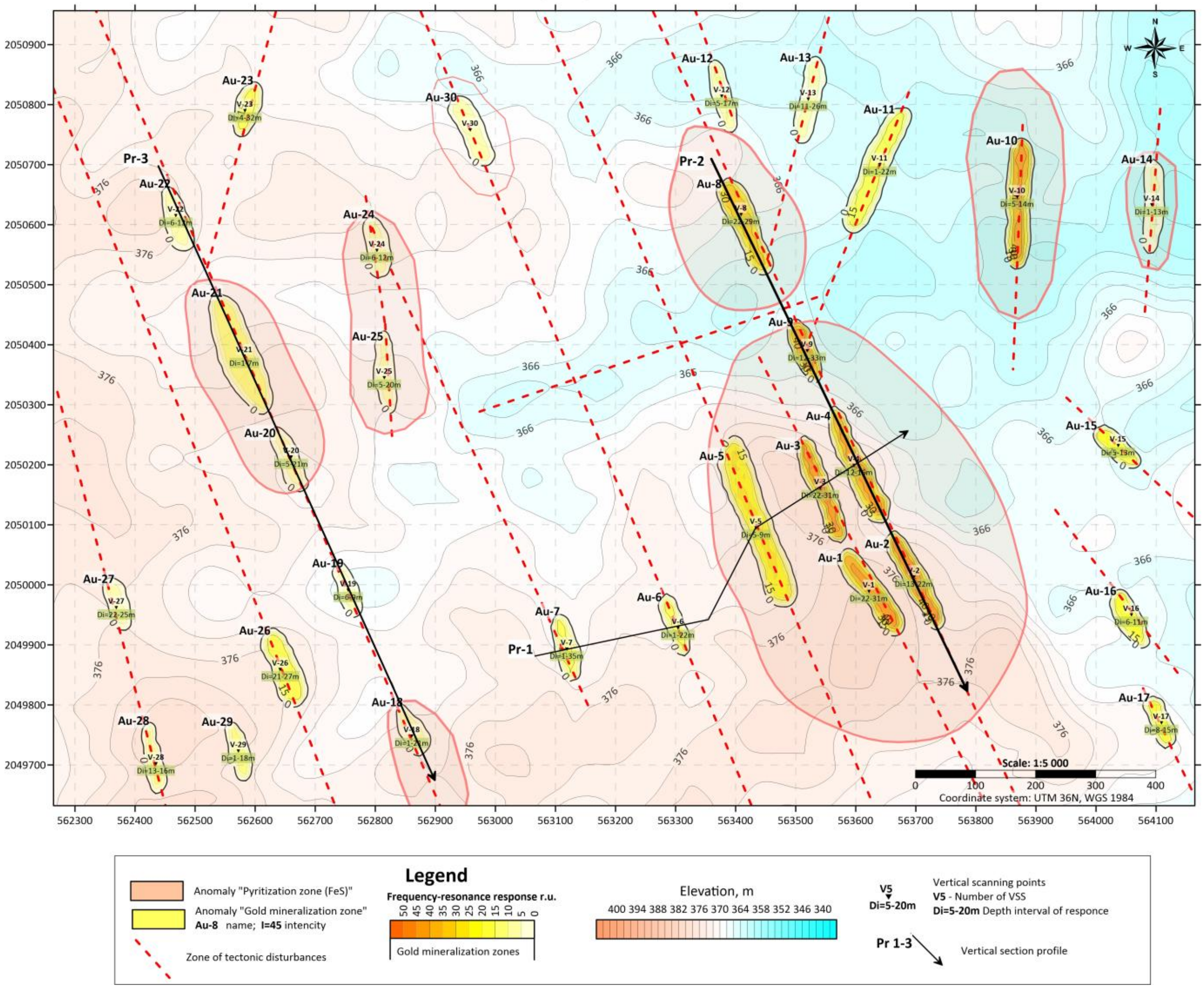


Figure 3.4.

Map of VSS points of "Gold anomalies" by frequency - resonant processing of satellite imagery, Area-2, Sudan, Scale 1:5 000

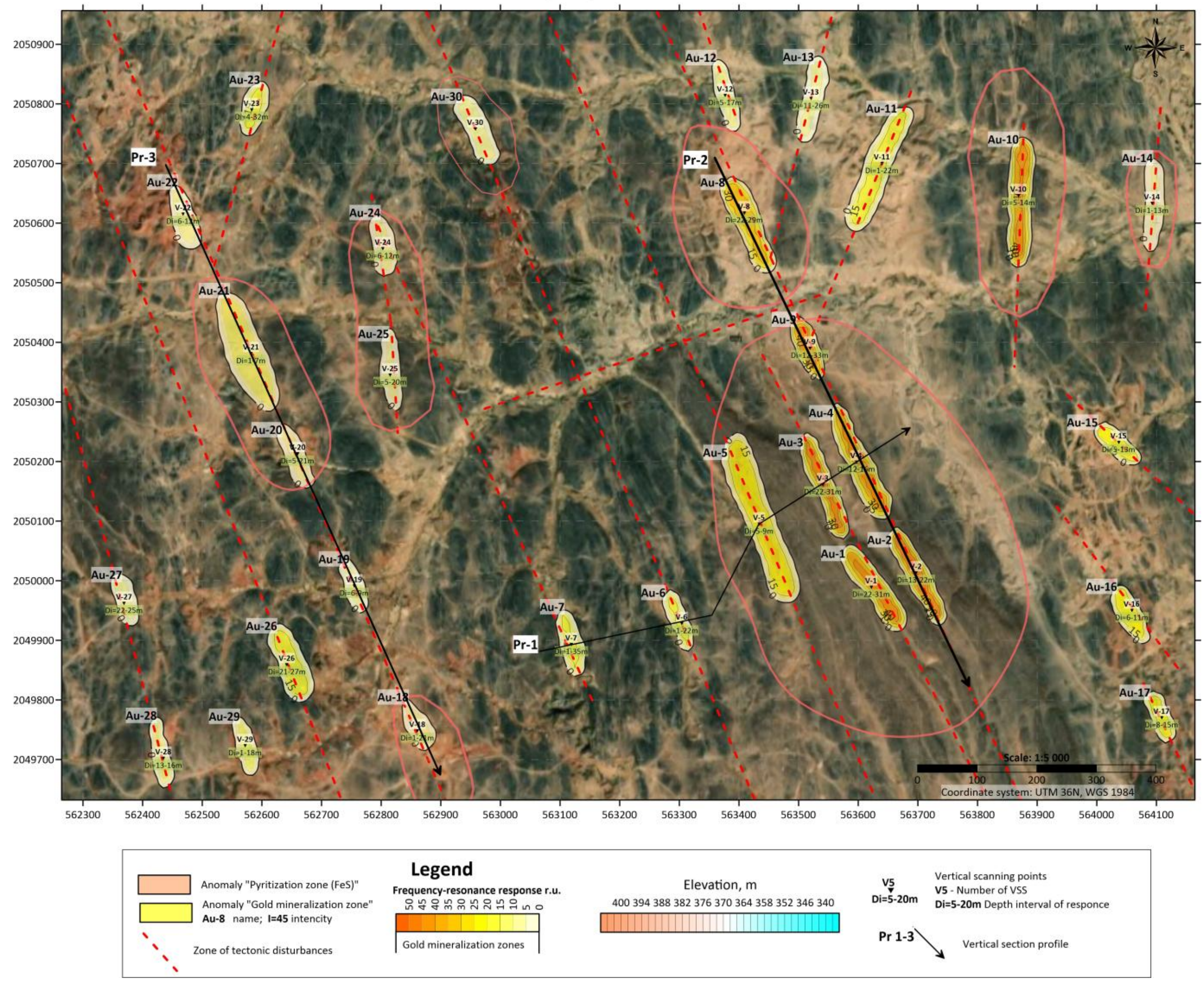


Figure 3.5.

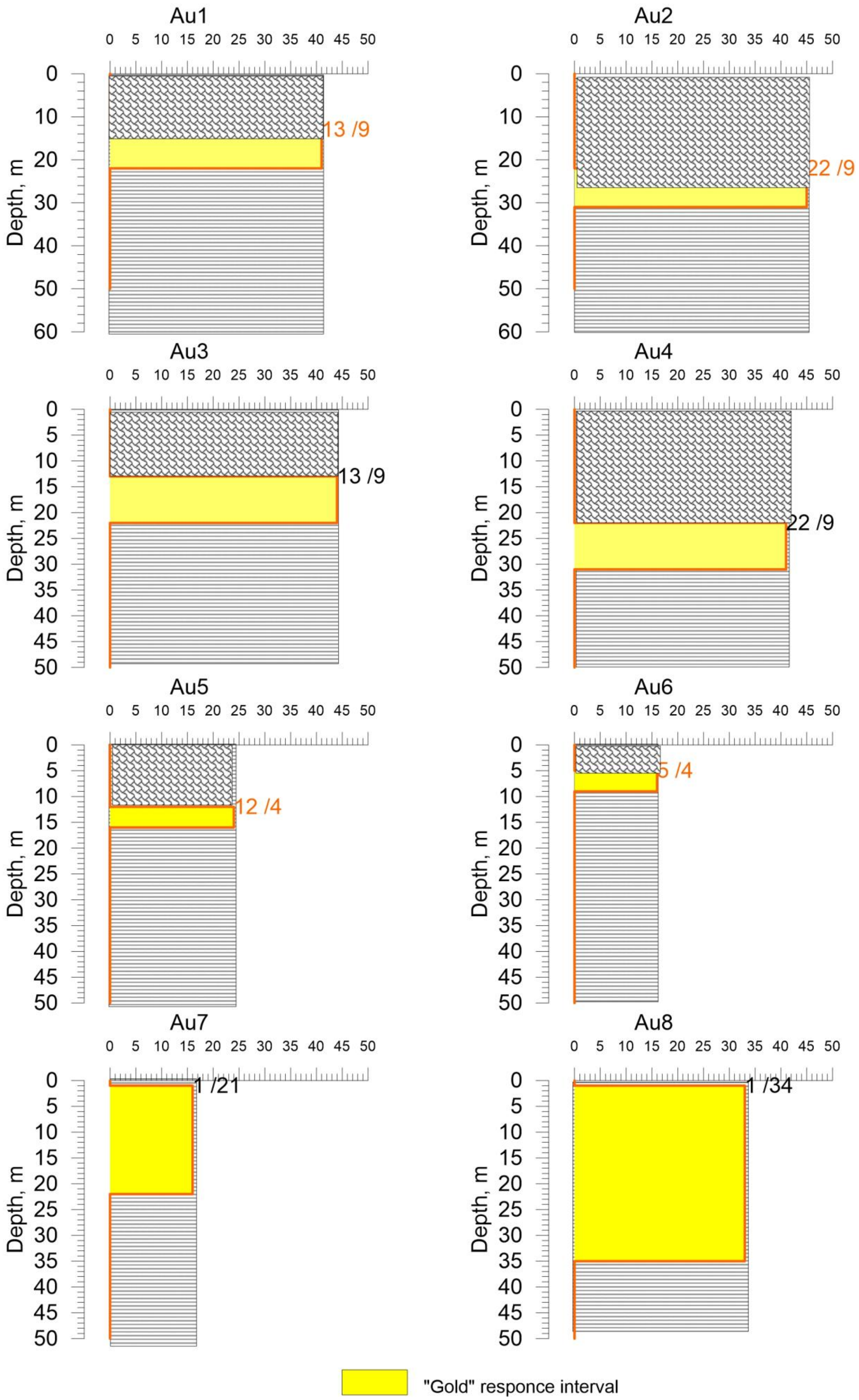

Au1
13 /9
Au2
22 /9
Au3
13 /9
Au4
22 /9
Au5
12 /4
Au6
5 /4
Au7
1 /21
Au8
1 /34
Depth, m
"Gold" responce interval

Figure 3.6.

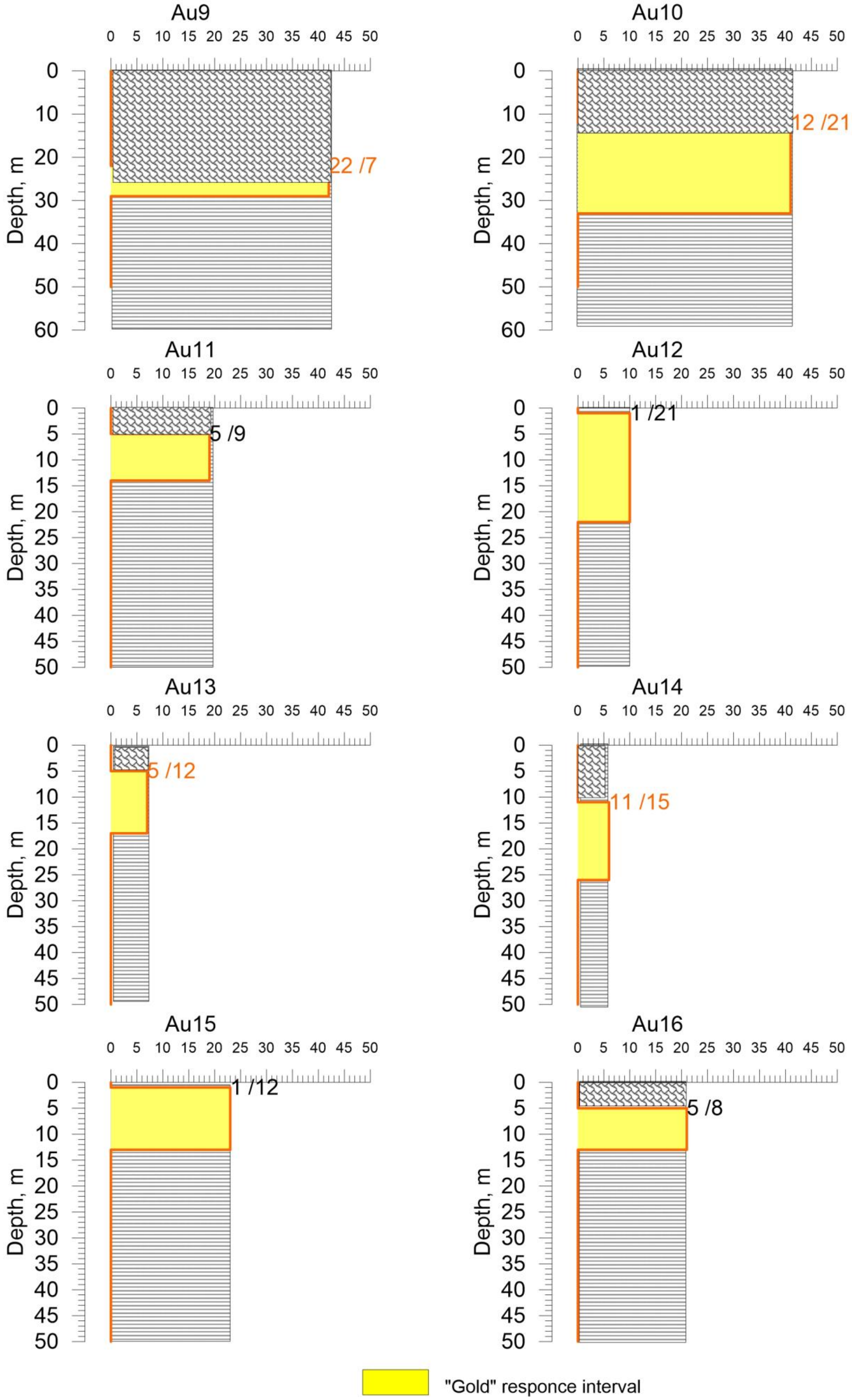
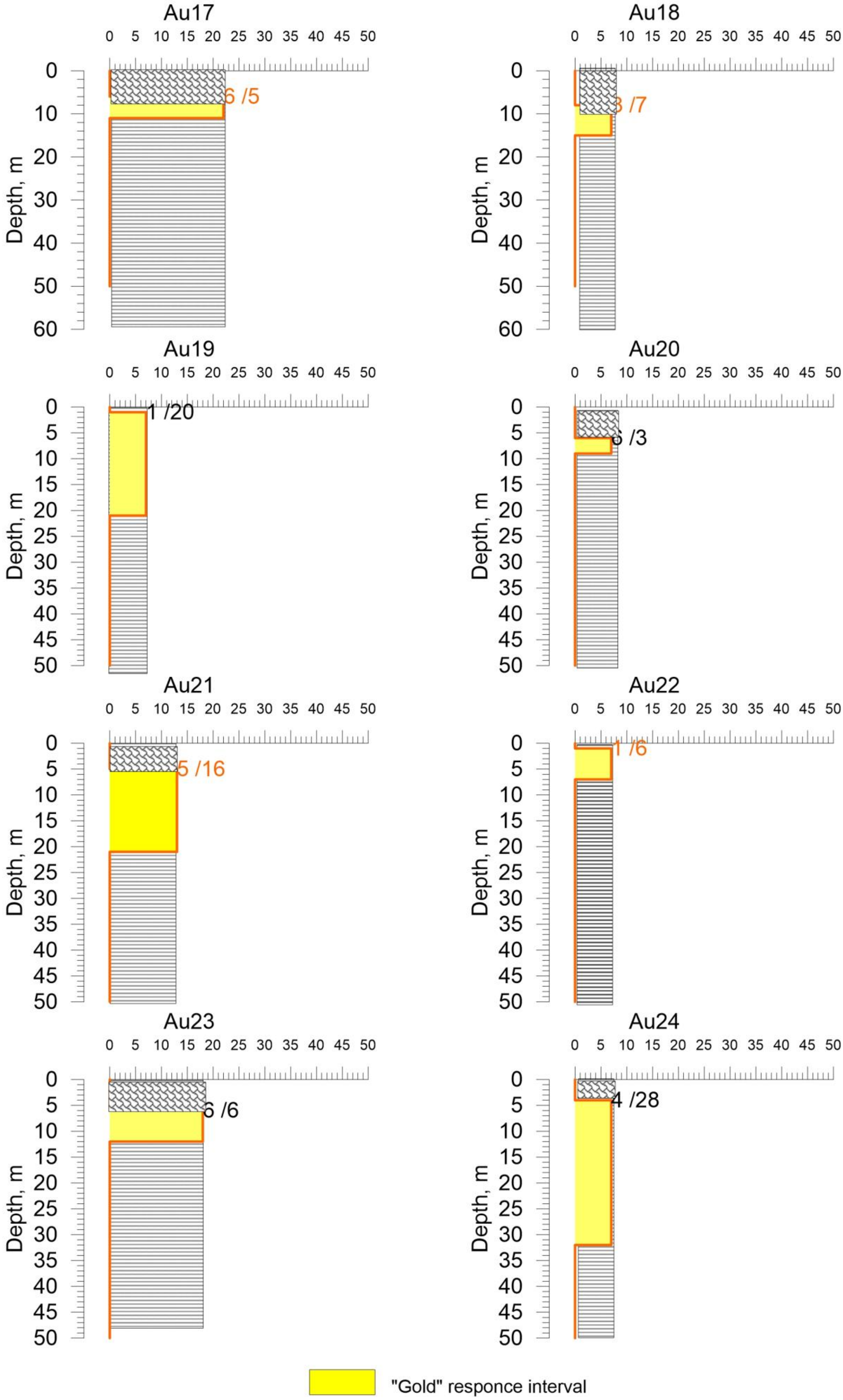

Au9
22 /7
Au10
12 /21
Au11
5 /9
Au12
1 /21
Au13
5 /12
Au14
11 /15
Au15
1 /12
Au16
5 /8
Depth, m
"Gold" responce interval

Figure 3.7.



Au17
Au18
Au19
Au20
Au21
Au22
Au23
Au24
0 5 10 15 20 25 30 35 40 45 50
Depth, m
6 /5
1 /20
5 /16
1 /6
6 /6
4 /28
"Gold" responce interval

Figure 3.8.

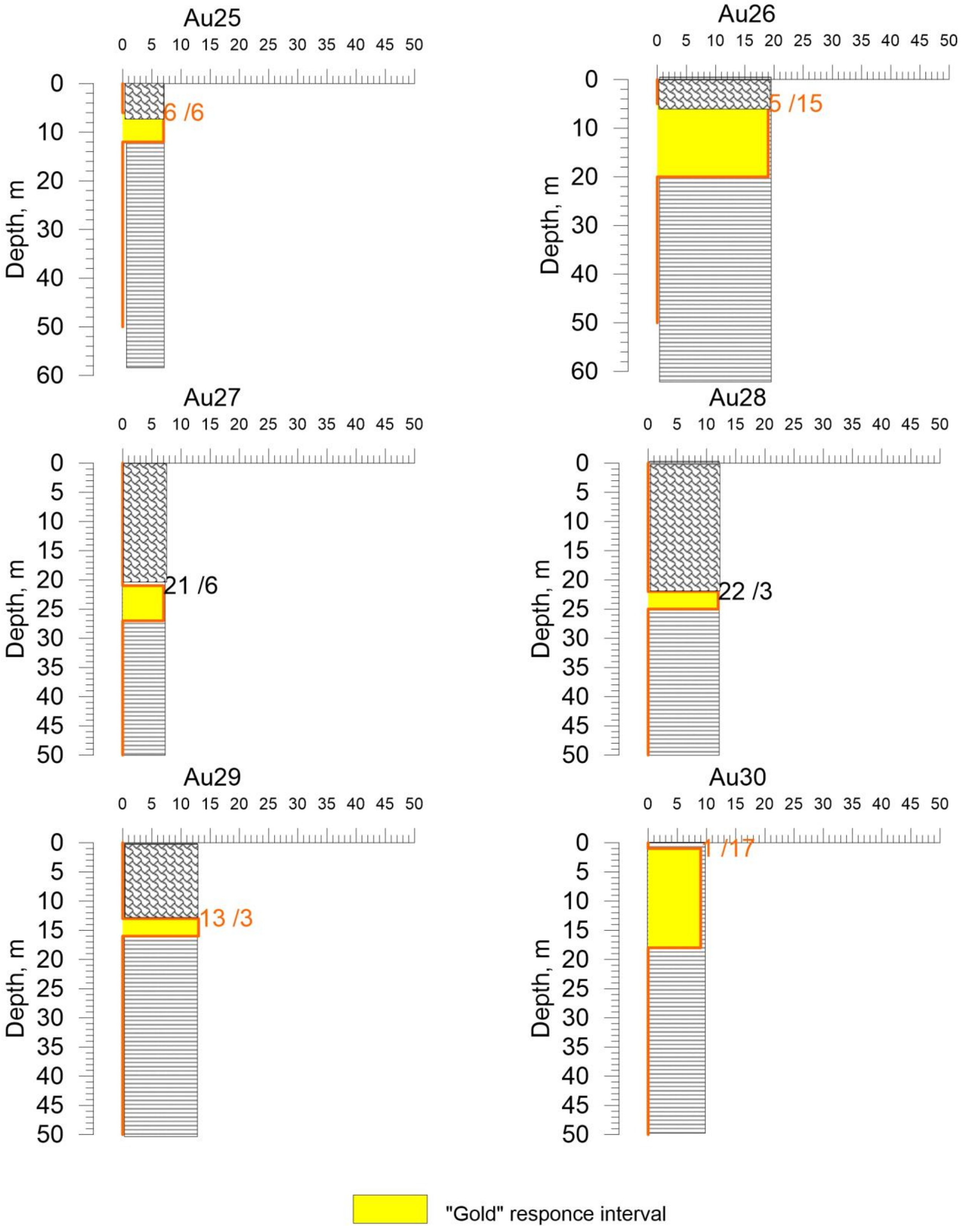


Figure 3.9.

The identified anomalous zones can be divided into two main groups by depth.

Near-surface anomalies are predominantly concentrated in the peripheral parts of the site. On satellite imagery, these zones are comparable in appearance to areas of artisanal gold mining.

In contrast, the central part of the site is characterized mainly by deeper anomalous zones, occurring at depths greater than 20–30 meters from the surface. These deeper zones are also distinguished by higher anomaly intensity and significant thickness. The most notable among them are Au-1, Au-2, and Au-3 (as well as adjacent high-intensity anomalies).

It should be emphasized that the reported depths represent averaged intervals of anomalous response for each mapped anomaly.

The results of vertical scanning were used to construct three vertical geological sections. The locations of the section lines are shown in Figure 3.4.

The following section profiles were constructed:

Table 3.3.

Profile #	Points VSS	Length, m	Figure
1	V7-V6-V5-V3-V4	750	Fig.3.10.
2	V8-V9-V4-V2	980	Fig.3.11.
3	V22-V21-V20-V19-V18	1120	Fig.3.12.

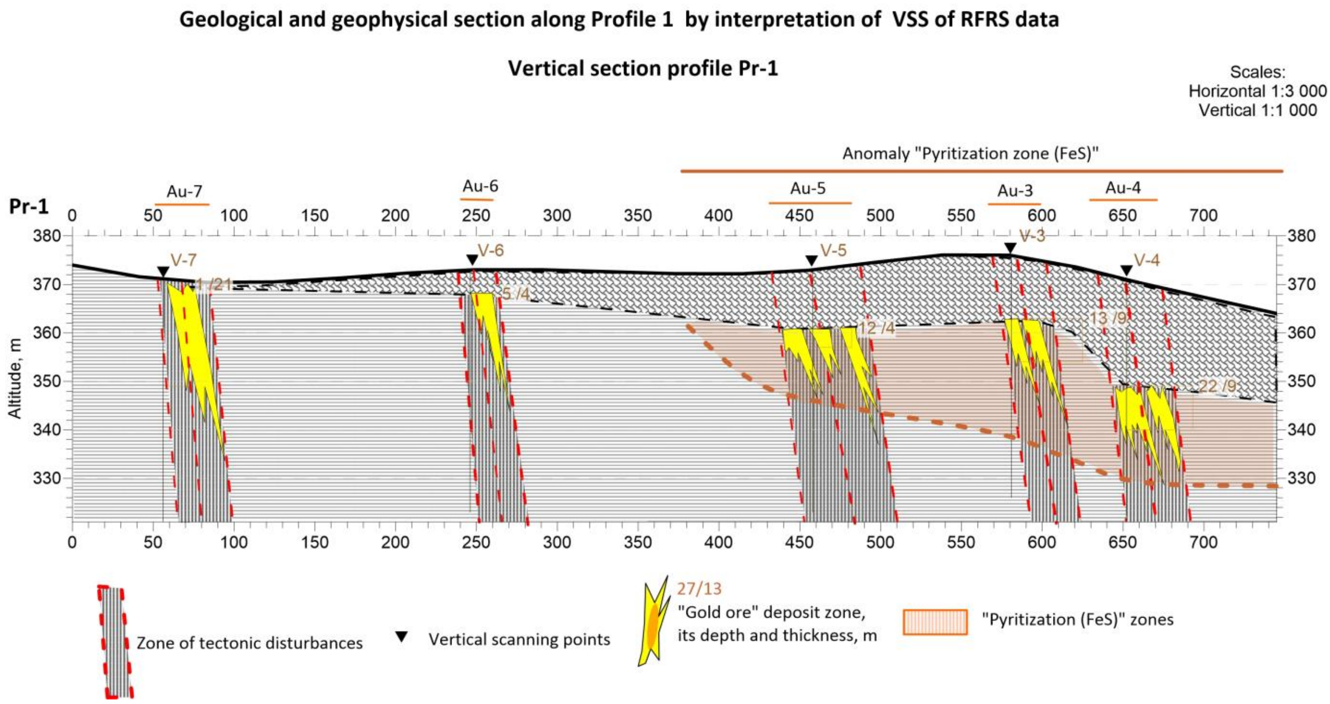


Figure 3.10.

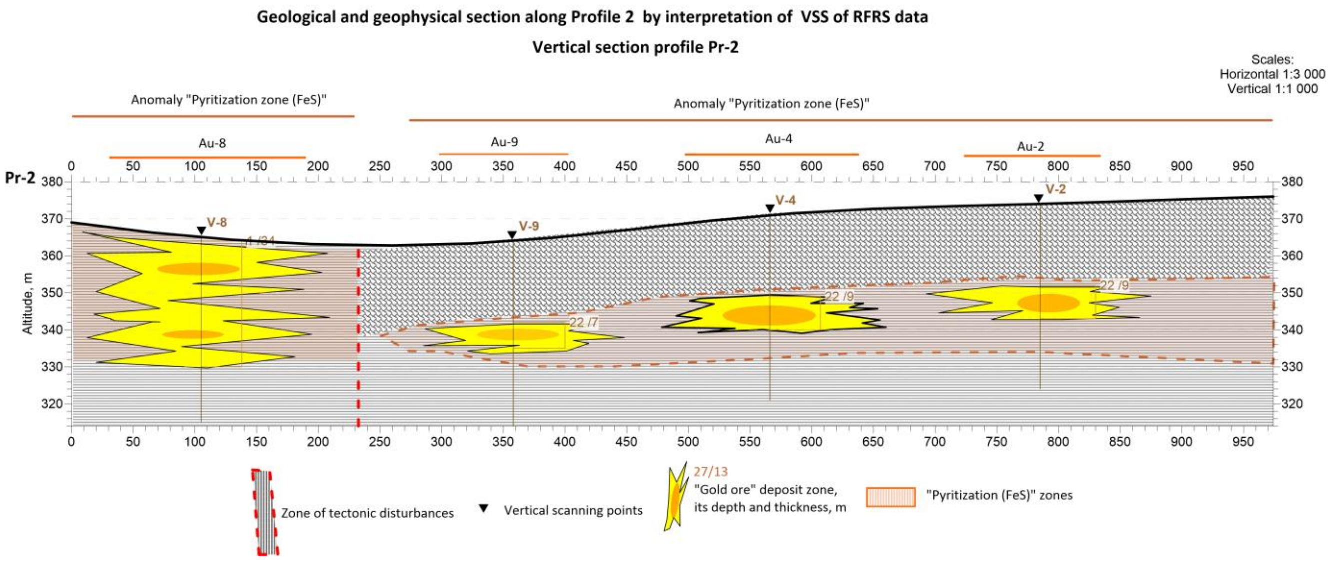


Figure 3.11.

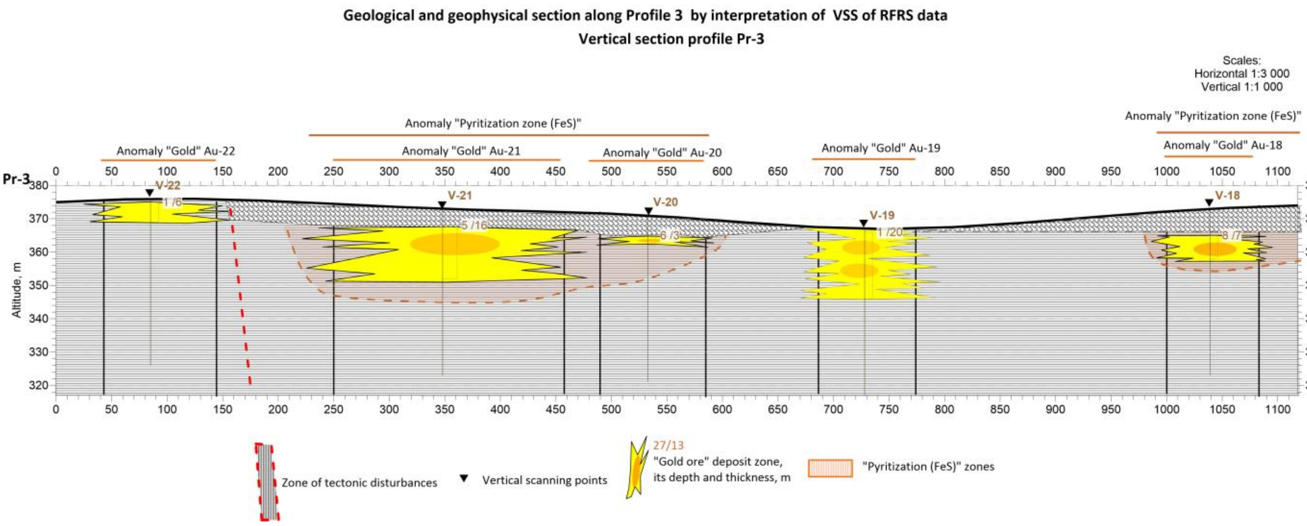


Figure 3.12.

3.1. Analyze and rank the anomalies

Below we analyzed the anomaly parameters and ranked them from the most promising to the least significant.

To analyze and rank the anomalies, we can consider several key factors:

1. **Area (square meters)** – Larger areas could indicate broader mineralization zones, potentially more gold.
2. **Intensity (relative units)** – Higher intensity generally correlates with stronger anomalous responses, which may reflect higher concentrations of the desired substance (gold).

3. **Depth Interval (meters)** – Depth is crucial as shallower deposits are easier and less expensive to explore and extract.
4. **Thickness (meters)** – Greater thickness can indicate a more substantial gold deposit in vertical extent.

As we can see on the top positions are deeply lying anomalous zones **Au-2, Au-3, Au-9, Au-10, Au-4, Au-1 and Au-5**. They are followed by near-surface anomalies **Au-8, Au-15, Au-17, Au-16, Au-11, Au-26.** The result of such analysis presented in a Table 3.3.

Table 3.3.

Rank	Anomaly	Top (m)	Bottom (m)	Response depth interval (m)	Intensity (cu)	Area (sq m)
1	**Au-2**	**22**	**31**	**9**	**45**	**5287**
2	**Au-3**	**13**	**22**	**9**	**44**	**5566**
3	**Au-9**	**22**	**29**	**7**	**42**	**3041**
4	**Au-10**	**12**	**33**	**21**	**41**	**6513**
5	**Au-4**	**22**	**31**	**9**	**41**	**7746**
6	**Au-1**	**13**	**22**	**9**	**41**	**6282**
7	**Au-8**	**1**	**35**	**34**	**33**	**5617**
8	**Au-5**	**12**	**16**	**4**	**24**	**13706**
9	**Au-15**	**1**	**13**	**12**	**23**	**2573**
10	**Au-17**	**6**	**11**	**5**	**22**	**2115**
11	**Au-16**	**5**	**13**	**8**	**21**	**2870**
12	**Au-11**	**5**	**14**	**9**	**19**	**8031**
13	Au-26	5	20	12	19	4749
14	Au-23	6	12	6	18	2426
15	Au-7	1	22	21	16	2977
16	Au-6	5	9	4	16	2351
17	Au-21	5	21	16	13	10532
18	Au-29	13	16	3	13	2139
19	Au-28	22	25	3	12	2330
20	Au-12	1	22	21	10	2521
21	Au-30	1	18	17	9	3848
22	Au-24	4	32	28	7	2756
23	Au-13	5	17	12	7	3758
24	Au-19	1	21	20	7	1886
25	Au-22	1	7	6	7	3005
26	Au-25	6	12	6	7	2844
27	Au-18	8	15	7	7	2257
28	Au-27	21	27	6	7	2161
29	Au-20	6	9	3	7	2841
30	Au-14	11	26	15	6	3855

3.1. Analysis and Ranking of Anomalies

The identified anomalies were analyzed and ranked from the most promising to the least significant based on a set of key geological and geophysical parameters.

Ranking Criteria

The evaluation considered the following main factors:

1. **Area (m^2)** – Larger areas may indicate broader mineralized zones and potentially greater gold resources.
2. **Intensity (relative units)** – Higher intensity values generally correspond to stronger anomalous responses, which may reflect higher concentrations of gold.
3. **Depth Interval (m)** – Depth is a critical economic factor, as shallower deposits are typically easier and less costly to explore and extract.
4. **Thickness (m)** – Greater thickness may indicate more substantial vertical development of gold mineralization.

Ranking Results

The highest-ranked positions are occupied by the deeper anomalous zones:

Au-2, Au-3, Au-9, Au-10, Au-4, Au-1, and Au-5.

These are followed by near-surface anomalies:

Au-8, Au-15, Au-17, Au-16, Au-11, and Au-26.

The detailed results of this ranking analysis are presented in Table 3.3.

Recommended Focus for Follow-Up Work

Based on the integrated analysis, the anomalies are grouped into three priority categories:

1. Top Priority

Au-2, Au-3, Au-1, Au-4, Au-9, and Au-10

These anomalies combine high intensity, moderate depths, and significant area and/or thickness. They represent the most promising targets for detailed exploration, including trenching, geophysical surveys, and exploratory drilling.

2. Medium Priority

Au-8, Au-5, Au-15, Au-17, and Au-16

These zones demonstrate favorable parameters and should be included in the second phase of detailed exploration.

3. Lower Priority

Au-11 and the anomalies ranked below it in Table 3.3

These anomalies are characterized by lower intensity and/or less favorable depth or thickness parameters. While currently less attractive from a commercial standpoint, they may warrant reconsideration depending on the results obtained from higher-priority targets.

3.2. Some comments on the investigation results.

Based on the frequency-resonance processing and interpretation of remote sensing (RS) data, the following recommendations and considerations regarding the accuracy of the results are provided:

1. **Accuracy of Depth Estimates**:
    - The scale of this study (1:5,000) and the remote sensing methods used, while effective for identifying anomalous zones, do not allow for highly accurate depth estimates. Therefore, the results presented here should be considered **indicative** rather than definitive.
    - To improve the accuracy of depth estimates, further **correlation with drilling data** is essential. Only through direct comparisons and cross-validation with drilling information can the depth intervals and characteristics of potential gold mineralization be refined.
2. **Factors Influencing Anomaly Intensity**:
    - The **intensity of the anomaly** depends on several factors, including the depth of the anomalous formations, their width, and the concentration of gold. This means that the observed anomalies could be influenced by multiple layers or veins of gold-bearing rock, potentially extending deeper than what has been identified through vertical scanning or surface-level exploration.
    - Anomalies could be caused by **several gold-bearing layers** or veins, including formations lying much deeper than the scanning or initial drilling efforts have revealed. As a result, further fieldwork and deeper exploration are needed to capture the full potential of these zones.
3. **Limitations in Detecting Known Gold Manifestations**:
    - It is possible that the technology used in this study did not detect **known gold manifestations** in the area, which could be due to a variety of factors:
        - The **scale of processing**: At the current scale, smaller or thinner veins of gold, especially those with low overall concentrations, may not produce detectable anomalies.
        - **Strictly vertical positioning**: Gold veins that are vertically oriented but have small thicknesses and low concentrations may escape detection at this scale.
        - Only a more **detailed scale** of satellite image processing or **on-site field studies** can detect such manifestations. However, it is

important to note that such small-scale manifestations may not be **commercially viable** for mining.

4. **Satellite Imagery Accuracy**:

    - The study utilized **open-source satellite images** (Landsat and Sentinel) for anomaly detection. The accuracy of the coordinates derived from these images is influenced by several parameters, including the availability of **ground reference points** and the quality of the imagery.
    - Based on the data sources used (e.g., Landsat and Sentinel), the expected error in coordinate precision can range from **±5 to 50 meters**, depending on the conditions. For example, from our other works, we have observed that coordinate discrepancies can range from **10 to 100 meters** in reality. This level of accuracy may be acceptable for large-scale resource exploration (such as hydrocarbons) but is **not always suitable for precise mineral exploration**.
    - For a more accurate positioning of the reported anomalies, **follow-up fieldwork** and **higher-resolution satellite imagery** will be necessary. Ground-truthing through geophysical surveys and drilling will significantly reduce the margin of error and improve the accuracy of the anomaly locations.

4. CONCLUSIONS AND RECOMMENDATIONS

All tasks предусмотренные договором have been completed.

1. Technology Calibration

The applied technology was calibrated under the geological conditions of the study area based on the data provided by the client.

2. Identification of Anomalous Zones

Within the study area, **30 anomalous zones of the "Gold" type** were identified and mapped.

For each anomalous zone, the following parameters were determined:

- Intensity of anomalous response (I = XX on the maps, in relative units);
- Areal extent of the anomaly (m^2).

The intensity values range from **45 to 6 relative units**.
The average anomaly area is approximately **4,200 m^2**, with individual anomalies varying from **1,880 m^2 to 13,700 m^2**.

3. Vertical Scanning Results

Vertical scanning (VSS) was performed at **30 points**, and depth intervals to possible gold mineralization zones were determined.

The anomalous zones are divided into two main depth categories:

- **Near-surface anomalies**, mainly concentrated in the peripheral parts of the site. On satellite imagery, these zones are comparable to areas of artisanal gold mining.
- **Deeper anomalies**, predominantly located in the central part of the site, at depths exceeding **20–30 meters** from the surface. These deeper zones are characterized by higher anomaly intensity and greater thickness.

The most significant deep anomalies include **Au-1, Au-2, and Au-3**, which demonstrate the strongest integrated parameters.

4. Mapping

Final result maps were constructed at a **scale of 1:5,000** and are presented in **Figure 4.1**.

5. Calculation of Anomaly Parameters

Quantitative calculations were carried out for all identified anomalies.

- **Table 3.1** summarizes the characteristics of all discovered anomalies, including maximum intensity (in relative units) and anomaly area (m^2).
- **Table 3.2** presents the results of vertical scanning at individual points.

6. Ranking of Anomalies

The anomaly parameters were analyzed and ranked from the most promising to the least significant based on intensity, area, depth, and thickness.

General Recommendations

Based on the results obtained, it is recommended to:

1. Prioritize detailed exploration (including geophysical surveys and exploratory drilling) within the highest-ranked anomalous zones, particularly Au-1, Au-2, and Au-3.
2. Conduct follow-up field verification in near-surface anomalous zones to confirm mineralization parameters.
3. Integrate the results with additional geological and geochemical data to refine the exploration model and reduce uncertainty before drilling operations.

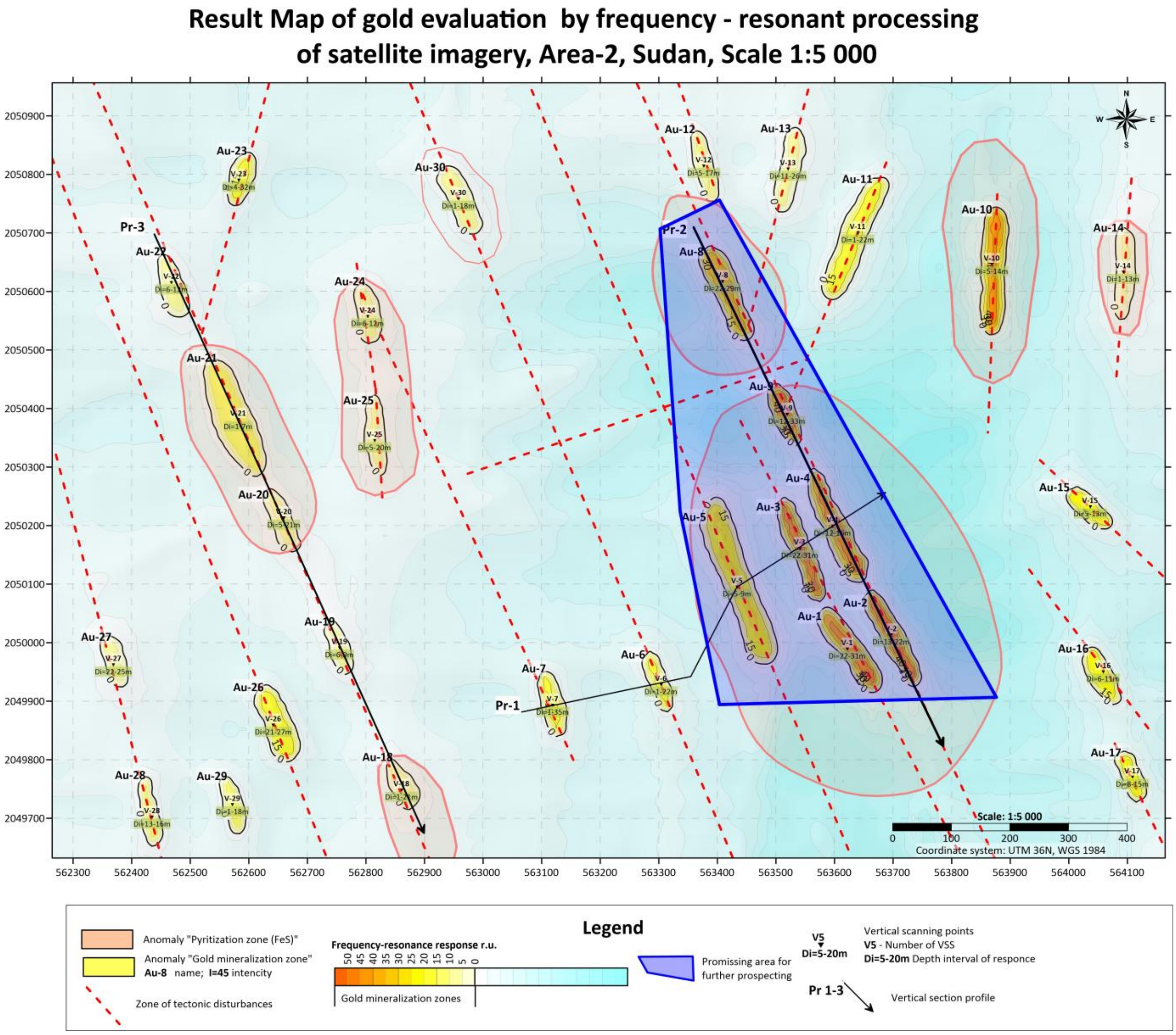

Result Map of gold evaluation by frequency - resonant processing of satellite imagery, Area-2, Sudan, Scale 1:5 000
Au-1
Au-2
Au-3
Au-4
Au-5
Au-6
Au-7
Au-8
Au-9
Au-10
Au-11
Au-12
Au-13
Au-14
Au-15
Au-16
Au-17
Au-18
Au-19
Au-20
Au-21
Au-22
Au-23
Au-24
Au-25
Au-26
Au-27
Au-28
Au-29
Au-30
Pr-1
Pr-2
Pr-3
Scale: 1:5 000
Coordinate system: UTM 36N, WGS 1984
Legend
Anomaly "Pyritization zone (FeS)"
Anomaly "Gold mineralization zone"
Au-8 name; I=45 intencity
Zone of tectonic disturbances
Frequency-resonance response r.u.
50 45 40 35 30 25 20 15 10 5 0
Gold mineralization zones
Promissing area for further prospecting
V5
Di=5-20m
Vertical scanning points
V5 - Number of VSS
Di=5-20m Depth interval of responce
Pr 1-3
Vertical section profile

Figure 4.1.

RECOMMENDATIONS FOR FURTHER EXPLORATION

Based on Remote Sensing Results

Based on the results of frequency-resonance processing and interpretation of remote sensing (RFRS) data within the investigated area, the following recommendations are proposed for further geological and geophysical exploration.

1. Prioritization of Anomalous Zones

Out of the 30 identified gold-type anomalies, prioritization is recommended according to anomaly intensity, depth, thickness, and areal extent.

Top Priority Zones

Au-2, Au-3, Au-1, Au-4, Au-9, and Au-10

These anomalies demonstrate a combination of:

- High intensity values
- Moderate depth intervals
- Significant area and/or thickness

Average intensity: 41 relative units
Total combined area: 34,400 m^2

These zones represent the most promising targets for detailed exploration, including ground geophysics and exploratory drilling.

Medium Priority Zones

Au-8, Au-5, Au-15, Au-17, and Au-16

These anomalies also demonstrate favorable parameters and should be included in the second phase of detailed exploration.

Average intensity: 25 relative units
Total combined area: 26,800 m^2

Lower Priority Zones

Au-11 and anomalies ranked below it in Table 3.3

These zones are characterized by lower intensity values and/or less favorable depth parameters.

Average intensity: 10 relative units
Total combined area: 67,000 m^2

Although currently less attractive from a commercial perspective, these zones may warrant reconsideration depending on results obtained from higher-priority targets.

2. Validation Through Ground-Based Geophysical Surveys

The most promising cluster (Au-1, Au-2, Au-3, and Au-4), as shown in Figure 4.1, should be subjected to detailed ground-based geophysical investigations.

Recommended methods include:

- Electrical Resistivity Tomography (ERT)
- Induced Polarization (IP)
- FSPEF and VERS methods

These techniques will:

- Validate gold-type anomalies
- Refine subsurface structural interpretation
- Improve targeting accuracy for drilling

3. Exploratory Drilling

Following confirmation through ground geophysics, exploratory drilling should be conducted to directly verify gold mineralization.

Based on vertical scanning (VSS) results:

- Initial drilling depth focus: **15–30 meters**
- Priority targets: highest-ranked anomalies (see Table 3.1)

A ranked drilling strategy will:

- Maximize discovery probability
- Minimize financial risk
- Optimize allocation of exploration resources

4. Further Geological and Structural Analysis

Although no strong direct correlation between anomalies and tectonic faults was observed, additional:

- Geological mapping
- Structural interpretation
- Integration of fault and fracture analysis (Figure 3.1)

is recommended to identify potential structural controls on mineralization and refine anomaly interpretation.

5. Continuous Integration of New Data

As additional geological, geophysical, geochemical, and drilling data become available, they should be systematically integrated into the exploration model.

This iterative approach will:

- Improve anomaly definition
- Refine depth estimates
- Increase targeting precision
- Reduce exploration uncertainty

6. Geochemical Sampling

A targeted geochemical sampling program is strongly recommended within top-priority anomalies.

Recommended actions:

- Soil sampling grid
- Rock sampling in structurally favorable zones
- Analysis for gold and pathfinder elements (e.g., As, Sb, Hg, Cu)

This will provide:

- Direct confirmation of mineralization
- Independent validation of remote sensing results
- Improved drill targeting

7. Detailed Exploration Phase

Upon confirmation of mineralization:

- Closer-spaced drilling
- Detailed geological mapping
- Metallurgical testing
- Preliminary resource modeling

should be conducted to assess economic viability.

CONCLUSION

The frequency-resonance method has identified **26–30 gold-type anomalies** within the investigated area, revealing a clear diagonal mineralization trend across the site.

However, due to:

- Study scale (1:5,000),
- Inherent limitations of remote sensing methods,
- Resolution constraints,

the results must be considered **preliminary**.

Further validation through:

- Ground geophysics
- Geochemical sampling
- Exploratory drilling

is essential to confirm and refine these findings.

A systematic exploration strategy based on prioritization, validation, and continuous data integration will significantly increase the probability of discovering economically viable gold deposits while reducing exploration costs and minimizing inefficient expenditure.

ANNEX

Gold Potential of the Area

Disclaimer

The gold reserve estimations presented in this report are based on interpretation of frequency-resonance remote sensing data and are preliminary.

Key Limitations

1. **Indicative Nature of Results**
   - Depth and volume estimates are indicative.
   - 1:5,000 scale limits precision.
   - Correlation with drilling data is required.
2. **Influence of Anomalous Factors**
   - Intensity depends on depth, thickness, and concentration.
   - Multiple deeper layers may exist.
   - Narrow or vertical veins may not be detected.
3. **Positional Accuracy**
   - Satellite imagery positional error: ±5–50 m
   - Expected anomaly positional uncertainty: 10–100 m
   - Field verification is required for accurate drilling layout.
4. **Gold Grade Assumptions**
   - Calculations assume hypothetical grades:
     - 1 ppm
     - 5 ppm
     - 20 ppm
   - These are scenario-based estimates only.

Methodology of Gold Resource Estimation

1. Volume Calculation

$$Volume = Area \times Thickness$$

2. Conversion to Tonnage

Assuming average rock density of 2.5 t/m³:

$$Tonnage = Volume \times 2.5$$

3. Gold Reserve Estimation

Since 1 ppm = 1 gram per tonne:

$$Gold\,(kg) = Tonnage \times Grade\,(ppm)$$

The calculated volumes, tonnage, and estimated gold reserves for each anomaly at assumed grades (1 ppm, 5 ppm, and 20 ppm) are presented in the following tables.

N	Intensity (cu)	Area (sq m)	Volume	Tonnage	Reserves 1 ppm, kg	Reserves 5 ppm, kg	Reserves 20 ppm, kg
Au-1	41	6282	56 538	141 345	141	707	2 827
Au-2	45	5287	47 579	118 949	119	595	2 379
Au-3	44	5566	50 093	125 232	125	626	2 505
Au-4	41	7746	69 714	174 284	174	871	3 486
Au-5	24	13706	54 826	137 065	137	685	2 741
Au-6	16	2351	9 403	23 506	24	118	470
Au-7	16	2977	62 524	156 309	156	782	3 126
Au-8	33	5617	190 968	477 420	477	2 387	9 548
Au-9	42	3041	21 285	53 212	53	266	1 064
Au-10	41	6513	136 768	341 921	342	1 710	6 838
Au-11	19	8031	72 279	180 697	181	903	3 614
Au-12	10	2521	52 936	132 339	132	662	2 647
Au-13	7	3758	45 102	112 754	113	564	2 255
Au-14	6	3855	57 818	144 544	145	723	2 891
Au-15	23	2573	30 873	77 183	77	386	1 544
Au-16	21	2870	22 961	57 402	57	287	1 148
Au-17	22	2115	10 575	26 437	26	132	529
Au-18	7	2257	15 801	39 503	40	198	790
Au-19	7	1886	37 724	94 309	94	472	1 886
Au-20	7	2841	8 523	21 307	21	107	426
Au-21	13	10532	168 512	421 281	421	2 106	8 426
Au-22	7	3005	18 033	45 082	45	225	902
Au-23	18	2426	14 555	36 388	36	182	728
Au-24	7	2756	77 165	192 912	193	965	3 858
Au-25	7	2844	17 066	42 665	43	213	853
Au-26	19	4749	56 988	142 471	142	712	2 849

Au-27	7	2161	12 967	32 417	32	162	648
Au-28	12	2330	6 989	17 472	17	87	349
Au-29	13	2139	6 416	16 041	16	80	321
Au-30	9	3848	65 414	163 535	164	818	3 271

Summary of Gold Potential

The analysis of the 30 identified anomalies resulted in a total estimated mineralized rock volume of **1,498,000 cubic meters**, corresponding to an estimated total tonnage of **3,746,000 tonnes** (assuming an average rock density of 2.5 t/m³).

Estimated Gold Reserves by Assumed Grade

Based on the calculated tonnage, the estimated gold content under different grade scenarios is as follows:

- **At 1 ppm (1 g/t):**
  - Estimated gold content: **3,746 kg** (≈ 3.75 tonnes)
- **At 5 ppm (5 g/t):**
  - Estimated gold content: **18,730 kg** (≈ 18.73 tonnes)
- **At 20 ppm (20 g/t):**
  - Estimated gold content: **74,920 kg** (≈ 74.92 tonnes)

Conclusion

These calculations are indicative and reflect the preliminary potential of the investigated area. Based on the current model, the gold potential of this area appears significantly higher than that of Area 1.

However, it must be clearly understood that these estimates are based on assumed grade scenarios and remote sensing interpretation. The actual gold resources may differ substantially and could be reduced following detailed geological studies, geophysical validation, sampling, and exploratory drilling.

Therefore, these figures should be considered as preliminary exploration indicators rather than confirmed mineral resources.