Chapter 5 Bazina Kebira Prospect

5.1 Geology

5.1.1 Geology and Geological Structure

(1) Geology

The geology of the Bazina Kebira prospect comprises Triassic, Cretaceous and Tertiary systems overlain by Quaternary system. The stratigraphy and lithology of the prospect is summarized in Figure 46. Its geology is compiled in Figure 45.

The Triassic system distributes in the northern to western part of the prospect and is unconformably overlain by the Oligocene series in its center. The system is the northeastern part of the Jebel Ech Cheid diapir comprising rock salt in its core, gypsum, dolomite, slate, limestone and other minor rock types. Its weathered outcrops show brown to dark brown colors due to oxidation of Fe and Mn bearing minerals contained in the dolomite in minor amount. The limestone, yellowish to dark gray and massive, is generally recrystallized and seldom contains poorly preserved fossils.

The Cretaceous system is divided into Barremian-Aptian (Cba-ap), Albian-Cenomanian (Cal-Cc), Cenomanian-Turonian (Ccc-tu), Coniacian-Campanian (Cco-ca) and Upper Campanian-Maastrichtian (Cca-ma) formations in stratigraphically ascending order. Although the total thickness of the system is estimated at about 480 m in the general area, the exposed thickness in the prospect is about 100 m.

The Barremian-Aptian formation distributes in the northwestern part, from Koudiat Safra to H' zama Lassoued, and is fault-contacted with the Triassic system. Its lower member consists of alternation of gray limestone and green slate, while the upper member is essentially composed of grayish white limestone. Beddings generally strike in the NE-SW direction and dip to the northwest. The thickness is estimated at around 50 m.

The Albian-Cenomanian formation distributes in the vicinity of H'zama Lassoued in the northwestern part and is fault-contacted with the Barremian-Aptian formation. The formation comprises green marl and argillaceous limestone with the combined thickness of about 110 m.

The Cenomanian-Turonian formation, distributing in the central part to the northeast of Koudiat Safra and Koudiat Soda, is fault-contacted with the Triassic system and is conformably overlain by the Coniacian-Campanian series. The formation is divided into the lower, middle and upper members. The lower member consists of gray tabular limestone, the middle member, of alternation of bluish gray marl and limestone, and the upper member, of gray tabular limestone. Beddings generally strike

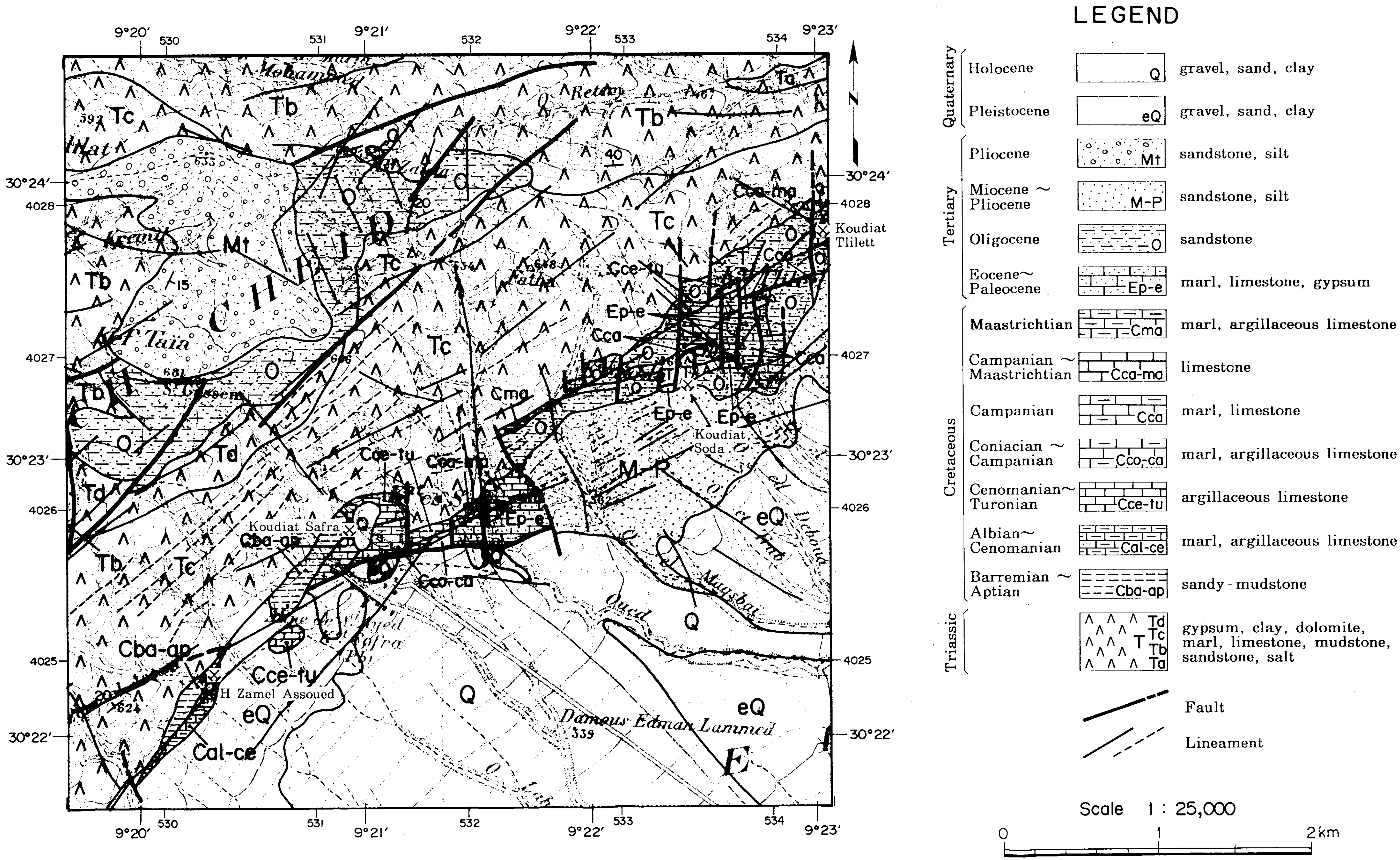


Figure 45 Geological map of Bazina Kebira prospect

in the NW-SE direction and dip to the northeast. The thickness is estimated at about 140 m.

The Coniacian-Campanian formation, conformably overlying the Cenomanian -Turonian formation, distributes in the vicinity of Koudiat Safra in the central part and mainly comprises gray marl and gray, argillaceous limestone. Beddings generally strike in the NE-SW direction and dip to the northwest. The thickness is estimated at about 160 m.

The Upper Campanian-Maastrichtian formation, mainly comprising gray limestone, distributes in the vicinity of Koudiat Tlilette and Koudiat Soda in the central part and is fault-contacted with the Triassic system. Although beddings generally strike in the NE-SW direction and dip to the northwest, they show somewhat complex attitudes in the vicinity of Koudiat Tlilette where a minor anticline is located. The thickness is estimated at about 20 m.

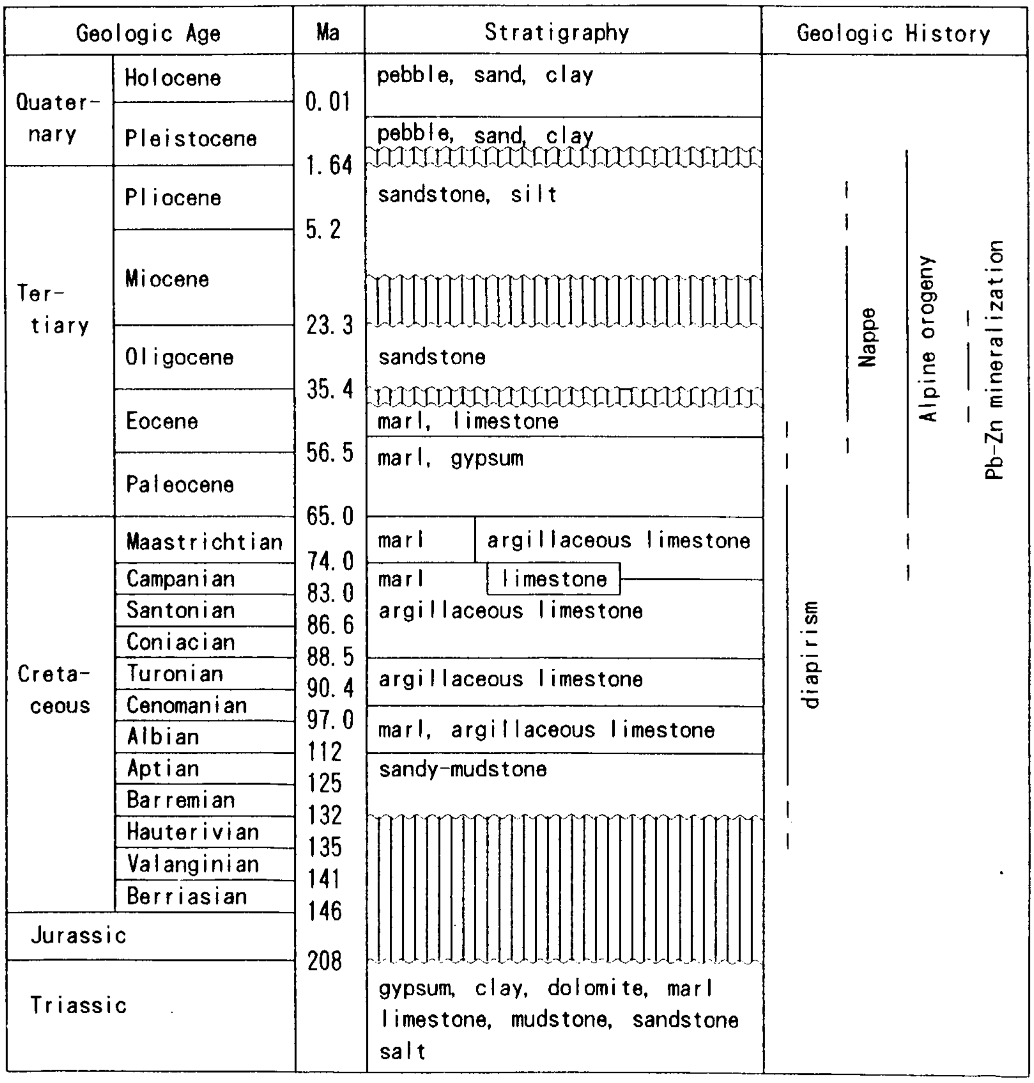


Figure 46 Schematic stratigraphic section

The Tertiary system, in the northwestern, southwestern through eastern part of the prospect, is divided into Palaeo-Eocene (Ep-lu), Oligocene (O) and Mio-Pliocene (Mc-P) series.

The Palaeo-Eocene series, distributing around Koudiat Soda in the central part, conformably overlies the Upper Campanian-Maastrichtian formation at around Koudiat Soda, while it covers directly the Campanian formation with unconformity to the northeast of Koudiat Soda. The series mainly consists of black marl, containing gypsum and fragments of organic remains. Index fossils yielded from the upper part of this series indicate the Lutetian stage of Eocene. Beddings strike in the E-W direction and dip to the north in general. The thickness is estimated at 50 m in the vicinity of Koudiat Soda.

The Oligocene series, unconformably overlying the stratigraphically lower formations, distributes from Koudiat Tlilette to Koudiat Soda in the northwestern to eastern part. This series consists of reddish brown sandstone containing fragments of organic remains, and is seldom interbedded with layers of marl and conglomerate. Beddings strike in the NE-SW to E-W direction and dip to the north or northwest. Fault development in the series is considerable, which makes it extremely difficult to estimate its thickness.

The Mio-Pliocene series distributes in the eastern part and mainly comprises sandstone, interbedded with lenses of green marl and red slate. Its thickness is undetermined because the upper limit is not exposed. The Quaternary system comprises talus, colluvial and alluvial deposits. Talus and colluvial deposits distribute in hills and foot-hills and consist of gravel, sand and clay. Alluvial deposits are developed in plains along rivers and water courses and consist of gravel, sand and clay.

(2) Geological Structure

The major structural elements that are observed in the Triassic to Tertiary systems in the prospect are diapirs and fault systems trending in the N-S, NE-SW and ENE-WSW directions.

A topographic high, elongated in the NE-SW direction, is located in the northwestern part of the general area including the prospect. This characteristic morphology is an expression of an anticline or dome formed by intrusion of a diapir consisting of the Triassic system. The topographic high has its peak in the vicinity of Jebel Ech Cheid, thus called 'Jebel Ech Cheid diapir', and slopes away towards northwest and southeast.

The Triassic system is in contact with the Cretaceous and Tertiary systems to the southeast bounded by a fault or unconformity. A number of north-south running faults can be assumed to the northeast of Koudiat Safra, where alignments of dolomite and limestone strata are laterally offset step-by-step in the north-south direction. Strata of the Cretaceous and Tertiary systems indicate a homoclinal structure, striking in the

NE-SW direction and dipping 25 to 70° to the northwest in general. To the southeastern side of the diapir, however, overturn folds are extensively developed due to diapirism. A particularly complex structural zone runs from Koudiat Safra to Koudiat Tlilett with its width of about 250 m, and continues to an area where a number of north-south trending faults make the structure further complex.

Faults are categorized into the N-S trending and the NE-SW or ENE-WSW trending systems, with the former crosscutting the latter. The fault systems break up the Cretaceous and the Palaeogene systems into a number of blocks, each of which indicates its own geologic characteristics. In addition, a number of small scale folds are commonly formed by intrusion of the diapir.

5.1.2 Mineral Occurrences

There is no operating mine in the Bazina Kebira prospect. Sidi Ayed, located about 7.5 km northeast of Gaafour, is the only mine that has ever been exploited. The mine produced 2571 tons of lead concentrates with an average grade of 50 % Pb from about 28,000 tons of ores containing around 5.5 % Pb. The production was made from two ore deposits, namely Koudiat Safra and Koudiat Soda. However, no production record remains for either of these deposits. The ore deposits were reportedly discovered in 1904 and exploited in the two separate periods, from 1905 to 1914 and from 1924 to 1931. In 1954, ASARCO evaluated its resources attempting re-exploitation and reported the ore reserves of possible category at 230,000 tons containing 10,000 tons of lead metals. Further, a new mineralization zone, H' zama Lassoued, was located about 1 km southwest to the Sidi Ayed mine by the exploration in the period between 1956 and 1957. ONM carried out an exploration consisting of trenching and drilling (5 holes with the total length of 1,006.75 m) in the period between 1971 and 1972, which, however, failed to locate a high grade ore deposit as expected.

The Triassic, Cretaceous and Tertiary systems distribute in the mine area. The ore deposits, as well as other indications of mineralization, occur in association with either the Barremian-Aptian formation of Cretaceous or the Lutetian formation of Eocene. The Barremian-Aptian formation consists mainly of light yellow-gray to gray, fine to medium grained and partly cross-bedded sandstone which is often interbedded with dolomitic limestone and pyritic argillite. The dolomitic limestone contains fossils which suggest a lacustrine sedimentary environment The formation ranges from 10 to 15 m in its thickness and laterally continues for some 450 m. The Lutetian formation also comprises sandstone which is quite similar in its lithology to that of the Barremian-Aptian sandstone. The formation ranges from 10 to 15 m in its thickness and laterally continues for 600 m. Both formations generally strike in the NE-SW to ENE- WSW direction and incline 40 to 50° to the northwest or north. However, they are fragmented into blocks by faults trending in the N-S, NW-SE and ENE-WSW directions.

The Koudiat Safra deposit is located at the coordination of 36° 22' 38" N and 9° 20' 35" E. The ore deposit occurs in the Barremian-Aptian sandstone, presenting a stratiform mode of mineralization along the side of diapir (Figure 133). Its lateral continuation can be traced for some 450 m westwards from its east end where the ore deposit is terminated by a crosscutting fault. Major ore minerals are mostly galena and subordinate sphalerite, accompanying calcite as a gangue.

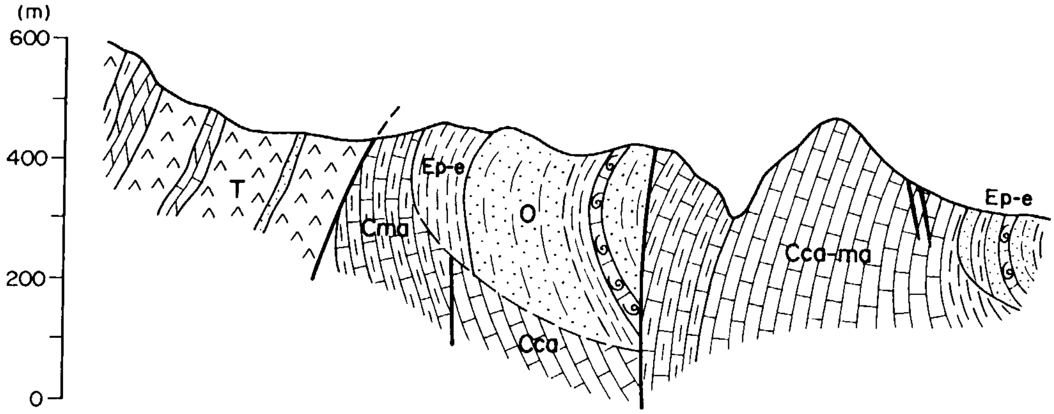


Figure 47 Geological section in Koudiat Safra

The Koudiat Soda deposit is located approximately 1.5 km to the northeast of the Koudiat Safra. The ore deposit occurs in the Lutetian sandstone in contact with the Triassic system (Figure 134). The mineralization forms discontinuous veins or tabular bodies filling fractures in the host sandstone. Ore minerals are mainly galena and subordinate sphalerite, accompanying calcite as a gangue. Minor lea mineralization is also observed in association with limestone of the Cenomanian-Turonian and the Campanian-Maastrichtian of Cretaceous.

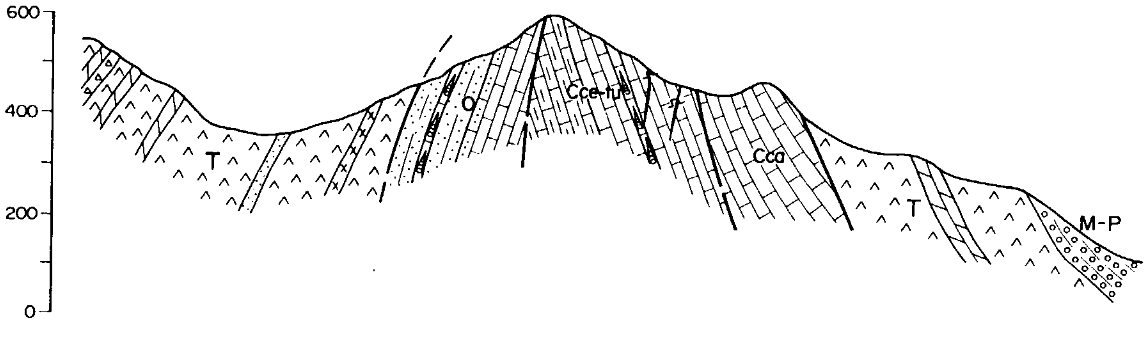


Figure 48 Geological section in Koudiat Soda

Besides these major ore deposits, occurrences of lead mineralization are identified at H' zama Lassoued, about 1.2 km to the southwest of the Koudiat Safra deposit, and at Koudiat Tlilett, about to the northeast of Koudiat Soda. Both mineral occurrences are hosted by the Barremian-Aptian sandstone, though too small in their sizes for exploitation.

5.2 Geophysical Prospecting

In the Bazina Kebira prospect, geophysical surveys using a gravity and IP methods are carried out along 21 measuring lines with a total line length of 30.5 km covering an area of 10 km^2.

5.2.1 Methodology

(1) Layout of Measuring Lines

The base line C0 of 10 km long is laid out along the contact zone between the Triassic systems and the Cretaceous systems. The 20 measuring lines, the line numbers from C1 through C20, are set perpendicular to the base line. Length of these measuring lines is 1 km in principal.

(2) Gravity Survey

The gravity measurement is conducted on the base line and all measuring lines in the prospect. The same methodrogy of the measurements and analyses in the Bou K'hil prospect, which is described on the 3.2.1, is applied to this prospect.

(3) IP Survey

The IP survey is carried out on the 11 lines, the base line C0 and the measuring lines C4, C7, C9, C10, C11, C14, C15, C16 and C17. The following measurement equipments were used in the prospect.

Generator: Honda (Japan), Model ET4500

Transmitter: Phoenix (Canada), Model IPT-3

Receiver: Scintrex (Canada), Model PR-12

The same methodrogy of the measurements and analyses in the Bou K'hil prospect, which is described on the 3.2.1, is applied to this prospect.

(4) Laboratory Test

Density, resistivity and chargeability are measured in laboratory for 49 samples collected from outcrops within and around this prospect and the Siliana prospect.

Two ore samples, collected from a waste dump of the old Bou K'hil mine, are added for the chargeability measurement. Water , immersing the samples, indicated conductivity of 2,031 μ S/cm, equivalent to around 5 Ωm, at a temperature of 20.7° C at the time of measurement.

5.2.2 Gravity survey

(1) Regional Gravity Distribution (Figure 20)

The NE-SW and crosscutting NW-SW gravity trends are predominated in the region including the Bazina Kebira prospect, reflecting the regional geological structure, according to the regional gravity distribution as the result of the project carried out by the ONM. The known ore deposits of The Bou K'hil and the El Akhouat prospects investigated in the previous program and the Fejera Doume working mine are located in and around gravity high. Though diapirs tend to be related to gravity high, a diapir is generated by rise of a low density rock mass upwards. The fact suggests that diapirs don't indicate high gravity, but other geological structures related to diapirs such as anticline increase gravity.

The Bazina Kebira prospect is located in the southeastern side of the narrow area of gravity high, which is outlined by the 0 meal contour and stretches northeastward along the Djebel Ech Chied hills. Three high gravity anomalies lies within the narrow gravity high, the prospect is located around the center and northeastern anomalies of them. Two extensive gravity low areas which trend in the NW-SE direction lie in the El Aroussa plain and the Teboursouk plain, which spread in the both sides of the Djebel Ech Chied hills. The prospect is laid in the marginal zone of steep gravity gradient from the narrow gravity high southeastward the gravity low in the El Aroussa plain.

(2) Gravity Distribution of the Prospect (Figure 51)

The gravity distribution of the prospect is divided into the southwestern and northeastern parts from the Koudiat Safra ore deposit of the old Sidi Ayed mine.

In the northeastern part, the zone of steep gravity gradient from the narrow gravity high runs between the extensive gravity high beyond -4 mgal, centering in the vicinity of the Lambert coordination of 449500E and 345000N in the northwest side, and the extensive gravity low below -17 mgal, centering in the vicinity of the Lambert coordination of 455500E and 343000N in the southeast side. The Koudiat Soda ore deposit is located in the southeastern margin of this steep gravity gradient zone.

In the southwestern part, gravity decreases southeastwards from –5 to –10 mgal. The range in this part is not so broad as in the northeastern part, and the contour intervals are relatively long. This part is characterized by the overhung around the survey line C7. The gravity in the area between the line C5 and C8 is almost invariable. The overhung continues on a saddle of a gravity high dividing the extensive gravity low in the El Arrousa plain. The H'Zamel Assoued mineral occurrence is located on the overhung of the gravity high.

(3) Residual Gravity Anomaly (Figure 51)

Residual gravity low extends within the almost prospect except for small gravity high anomalies beyond 0 mgal in the vicinity of the Koudiat Safra ore deposit in the

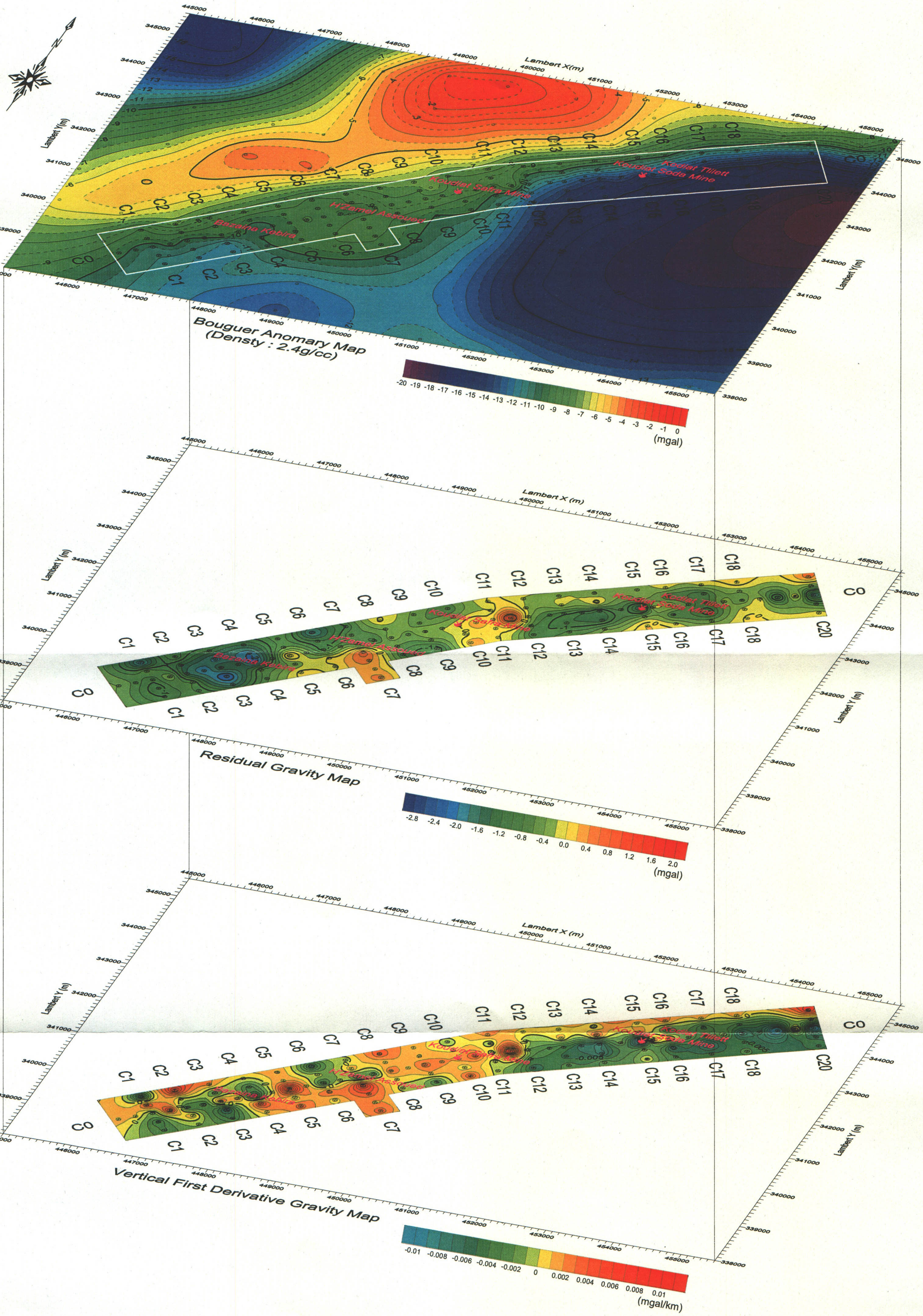


Figure 49 Panel diagram of gravity survey plan map in Bazina Kebira prospect

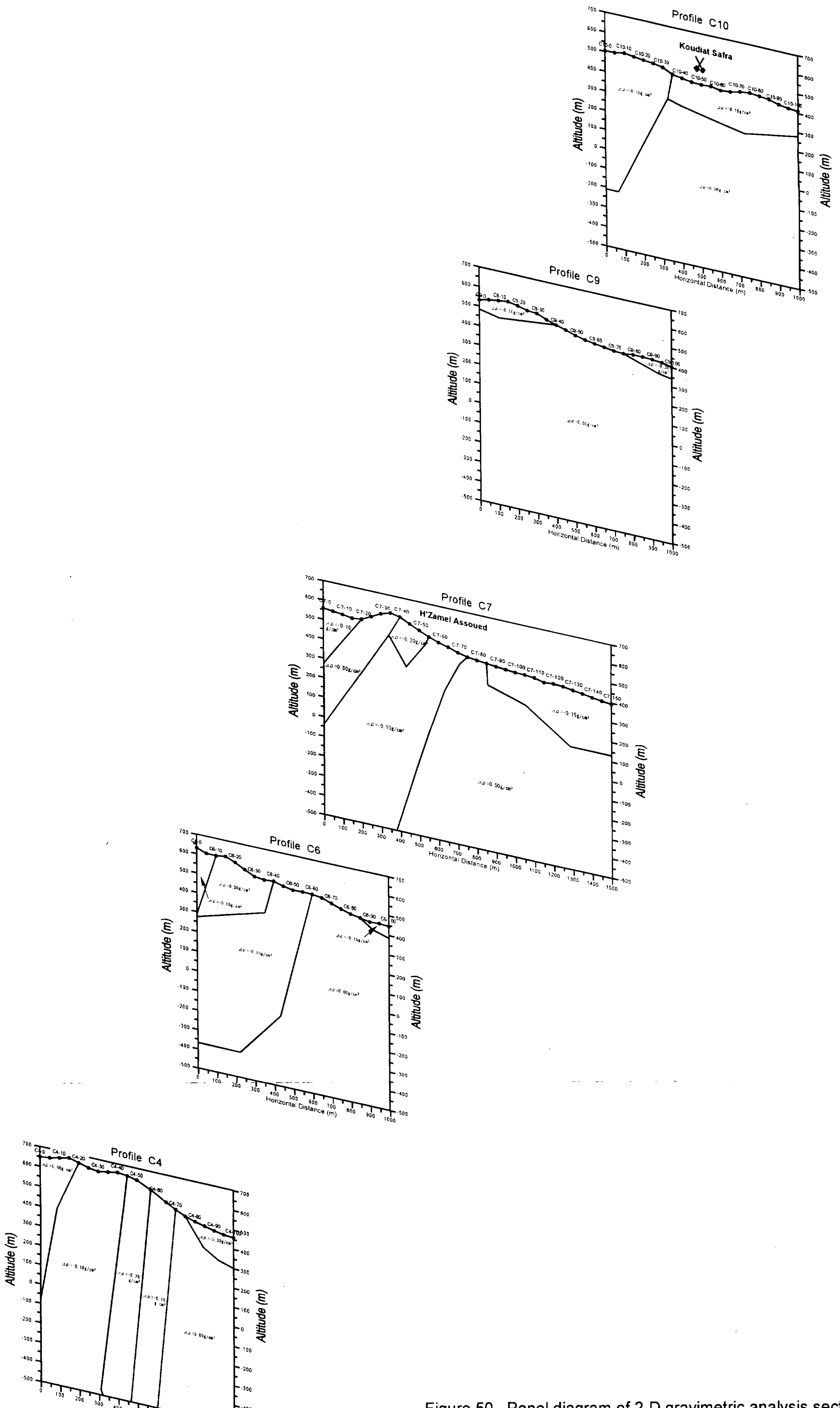
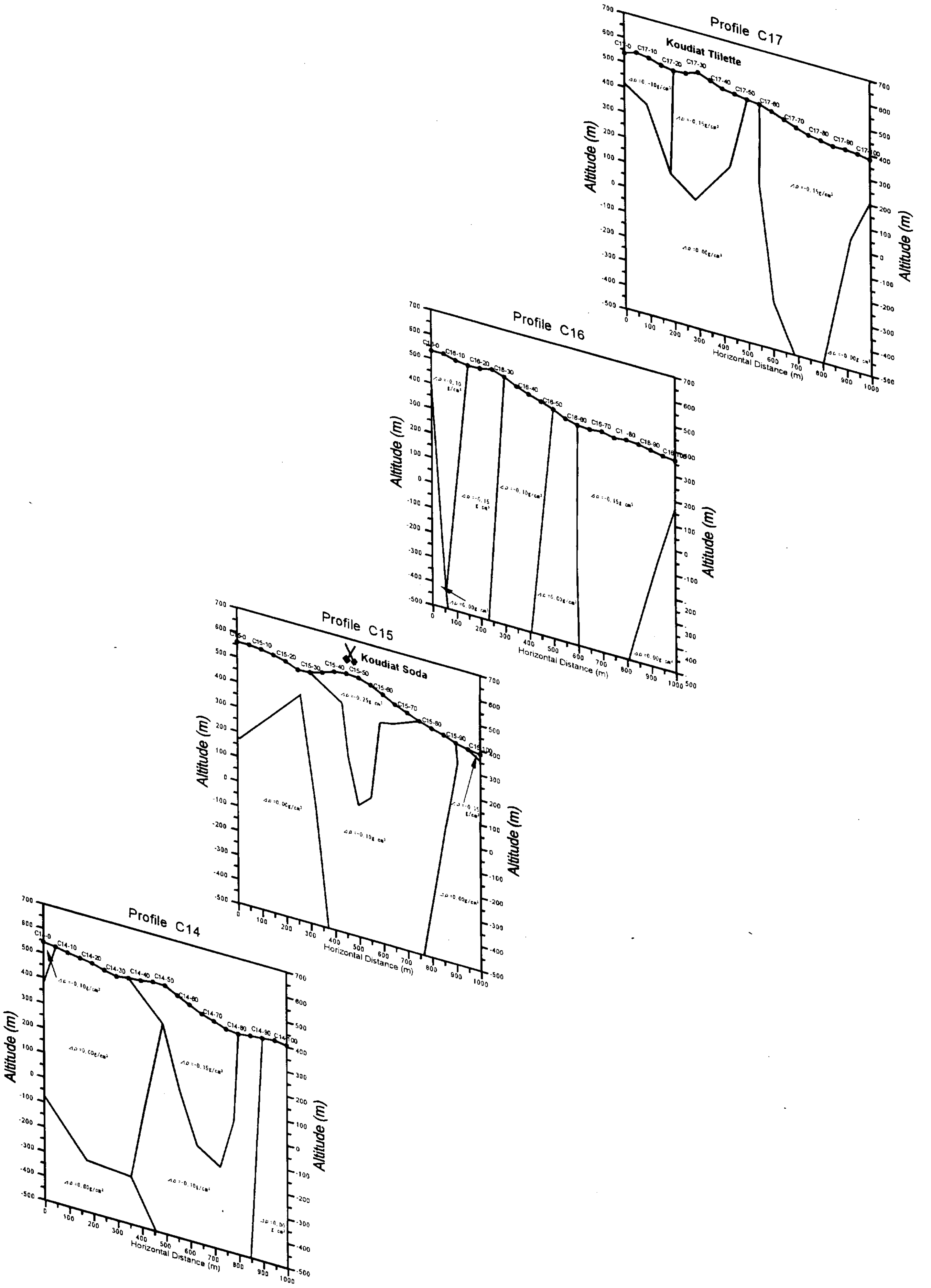


Figure 50 Panel diagram of 2-D gravimetric analysis section in Bazina Kebira prospect (No.1)



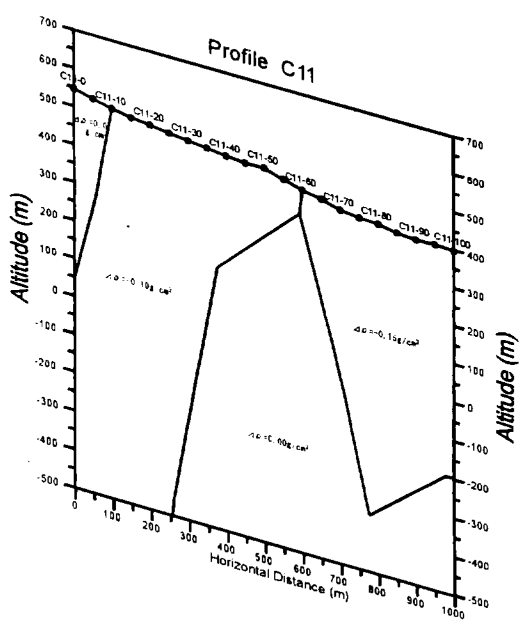


Figure 51 Panel diagram of 2-D gravimetric analysis section in Bazina Kebira prospect (No.2)

central part and in the southeastern side of the line C7 in the southwestern part.

In the southeastern part of the prospect a residual gravity low anomaly below −1 mgal extends broadly from the line C1 to the line C4. Residual gravity low anomalies are laid in the northwestern part of the line C6 and in the southeastern edge of the line C9.

In the northeastern part small residual gravity low anomalies line up along the base line C0 between the line C13 near the central part and the line C20 in the northeast margin of the prospect. These residual gravity low anomalies correspond to ridges stretching from the Djebel Ech Chied hills to the El Aroussa plain. Though Triassic dolomites with high density are frequently exposed in the ground surface of the ridge areas, the residual gravity low anomalies suggest underlying rock masses of low density related to diapers.

The Bazina Kebira mineral occurrence in the vicinity of the line C4, the Koudiat Soda ore deposit and the Koudiat Tlilette mineral occurrence in the vicinity of the line C17 are located within and in the vicinity of residual gravity low anomalies. The H'Zamel Assoued mineral occurrence in the vicinity of the line C7 and the Koudiat Safra ore deposit lie within and around residual gravity high anomaly.

(4) First Vertical Derivative Gravity (Figure 51)

The first vertical derivative gravity distribution of the prospect is divided into the southwestern and northeastern parts from the Koudiat Safra ore deposit of the old Sidi Ayed mine such as the gravity distribution. In the northeastern part, the contour of 0 mgal/km runs along the line from the station C12-25 to C20-15 in the direction of ENE-WNW. In the southeastern side of the contour first vertical derivative become low. The contour runs in the northwestern hill side of the contact zone between the Triassic and the Cretaceous systems observed on the ground surface. In the southwestern part, the contour of 0 mgal/km runs complicatedly. Anomalies of first vertical derivative gravity approximately correspond to those of residual gravity.

(5) Cross Section Analysis

In the cross section analysis of the Bazina Kebira prospect, the Cretaceous system is suppose a gravity basement with density difference of 0.00 g/cm^3. It is assumed that above the gravity basement the Triassic systems with low density difference of -0.10 g/cm^3 overlies in the northwestern Djebel Ech Chied hills side, the Tertiary systems with low density difference of -0.15 g/cm^3 and the Quaternary systems with low density difference of -0.30 g/cm^3 in the southeastern El Arrousa plain side.

In the section C7 running in the southeast part of the prospect through the H'Zamel Assoued mineral occurrence, the low density layer with density difference of −0.20 to 0.0 that is corresponded the Triassic systems overthrust in the vicinity of the C7-70 in the central part to the gravity basement in the southeastern plain side. The low density layer includes the relatively lower zone of –0.20 g/cm^3 and the higher zone of 0.0 g/cm^3. The low density overburden with density difference of –0.15 g/cm^3, which may reflect the Tertiary systems, is overlying the gravity basement.

In the section C10 crosscutting the Koudiat Safra working in the central part of the prospect from the northwest to the southeast, the low density layer with density difference of -0.10 g/cm^3, which is corresponded to the Triassic systems, lies in the northwestern hill side from the C-35 in the central part of the line. The gravity structure in the southeastern side of the low density layer is principally two-layered, composed of a low density layer with density difference of -0.15 g/cm^3, which is thick ranging from 100 to 150m and can reflect the Tertiary systems, and the underlying gravity basement. The fact that Cretaceous sandstone and mudstone distribute on the ground surface around the Koudiat Safra working in the vicinity of the boundary with the Triassic system suggest the difficulty of discrimination between the Cretaceous rock less density than limestone and the Tertiary system.

In the section C15 running through the Koudiat Soda working, the boundary of the gravity basement and the low density layer with density difference of -0.10 g/cm^3, which reflect the Triassic systems. The gravity basement is also recognized in the deep zone of the northwestern part. The density difference of the low density surface layer between the C15-30 and 80 including Koudiat Soda working in the central part is -0.25g/cm^3 .

In the section C17 running through the Koudiat Tlilette mineral occurrence. The gravity basement lies deeply in the northwestern part, and it is exposed on the ground surface between C17-55 and 60 in the central part. A low density layer with density difference of -0.15 to -0.10 g/cm^3, which is corresponded to the Tertiary systems, is underlain the gravity basement in the northwestern part and the other low density layer lies in the southeastern part. The vertical boundaries of rock masses in the both sides of the Koudiat Tlilette fall down in the vicinity of the C17-20 and the 60, and suggest fault structures.

5.2.3 IP survey

(1) Modeled Resistivity and Chargeability

The panel diagram of all modeled resistivity sections in this prospect is shown Figure , the panel diagram of all modeled chargeability sections Figure . The panel diagram of modeled resistivity plan maps sliced at the altitudes of 400m, 300m and 200m is presented Figure , the panel diagram of modeled chargeability plan maps sliced at the same altitudes Figure

Modeled resistivity in this prospect indicates ranges between 0.1 and 1,127 Ωm, averaging at approximately 80 Ωm.

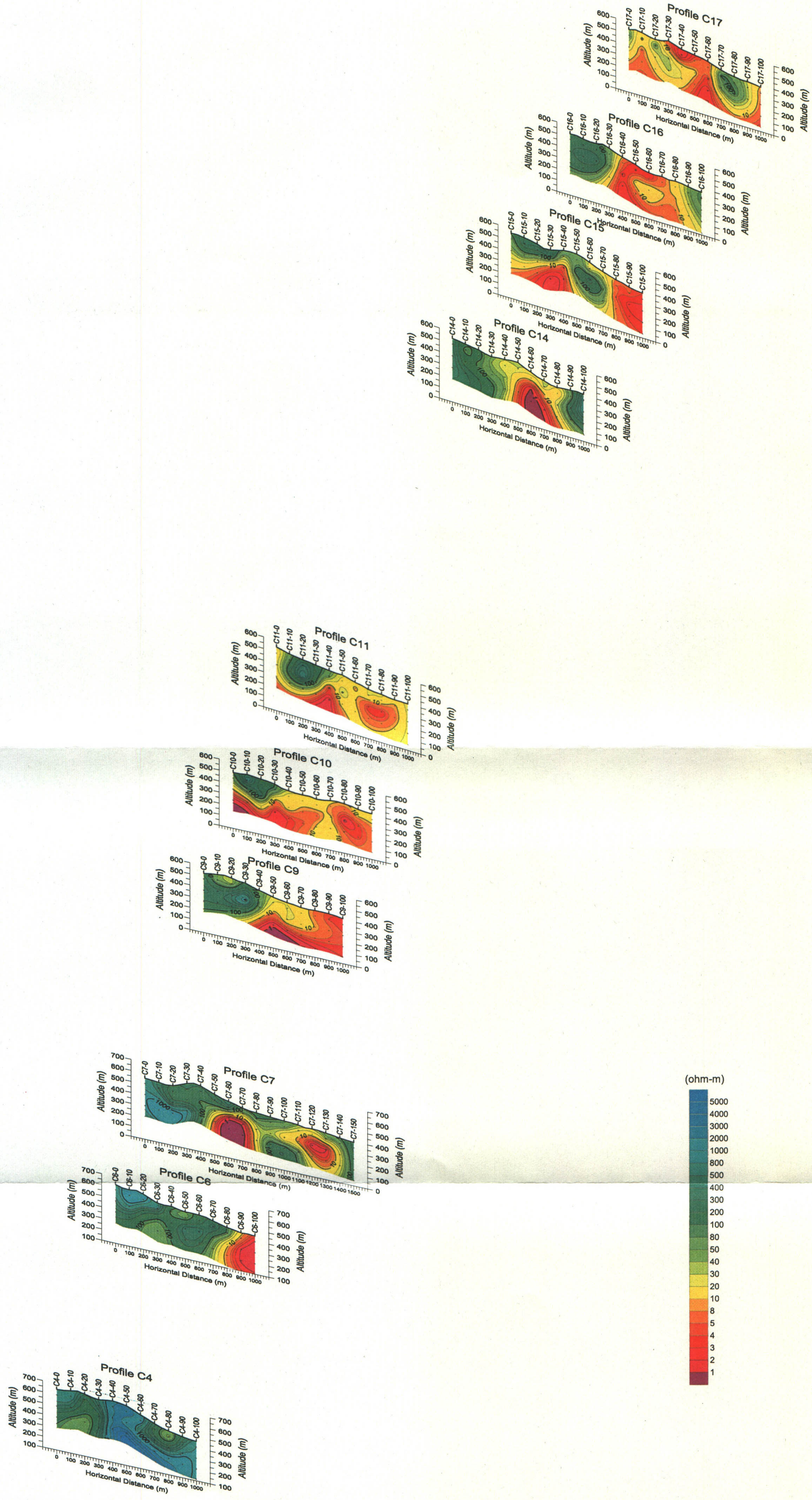


Figure 52 Panel diagram of modeled resistivity section in Bazina Kebira prospect

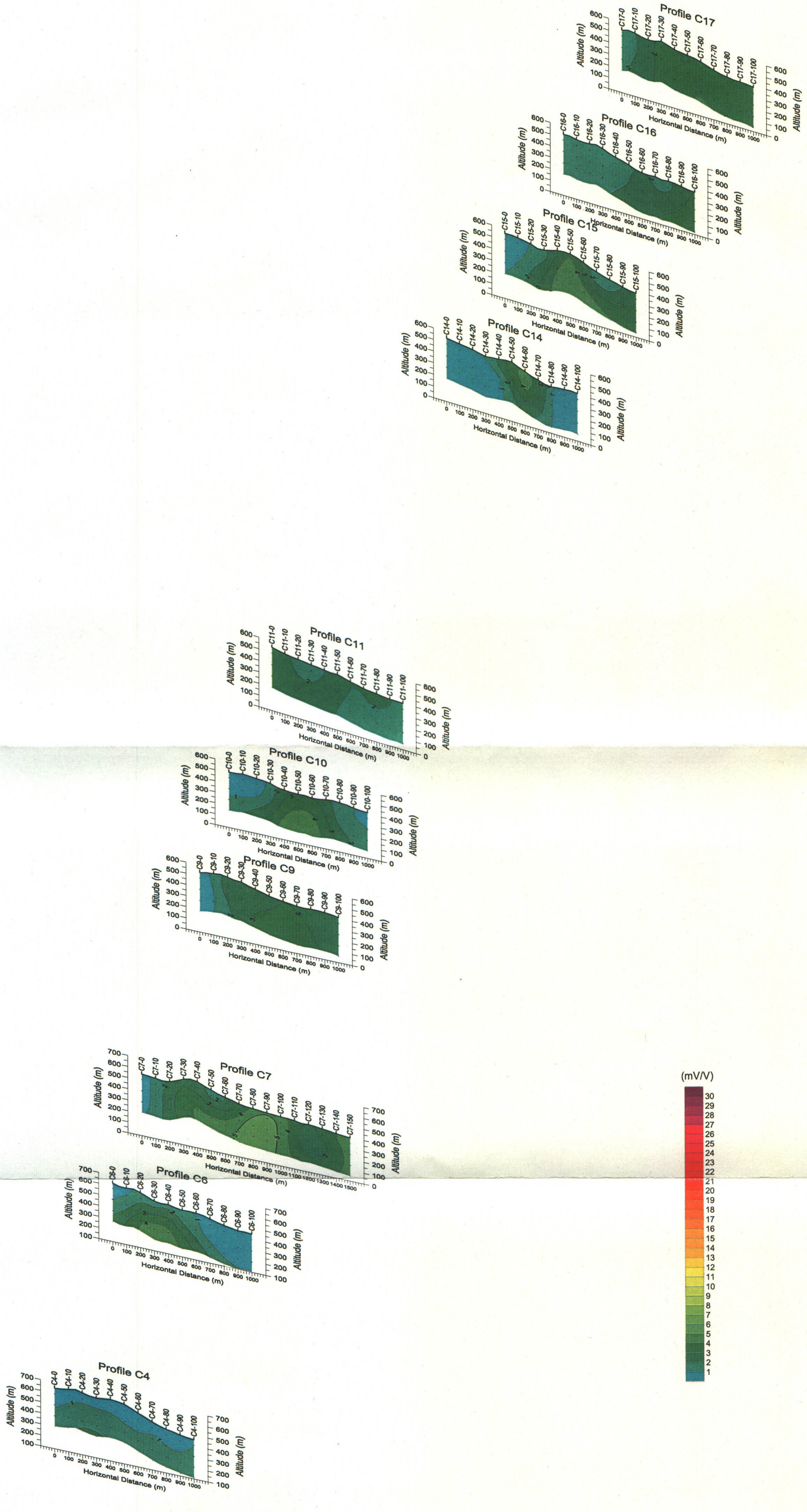


Figure 53 Panel diagram of modeled chargeability section in Bazina Kebira prospect

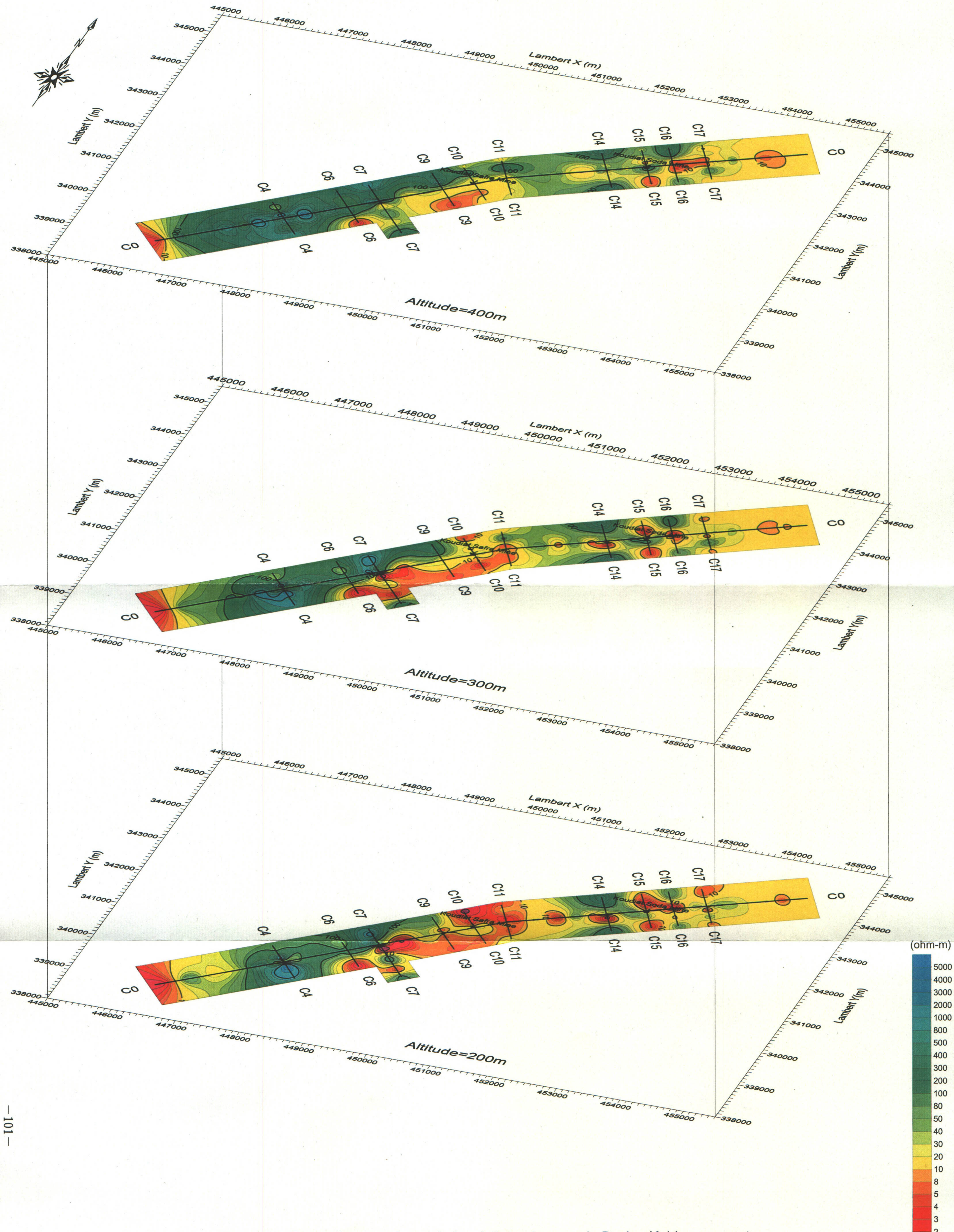


Figure 54 Panel diagram of modeled resistivity plan map in Bazina Kebira prospect

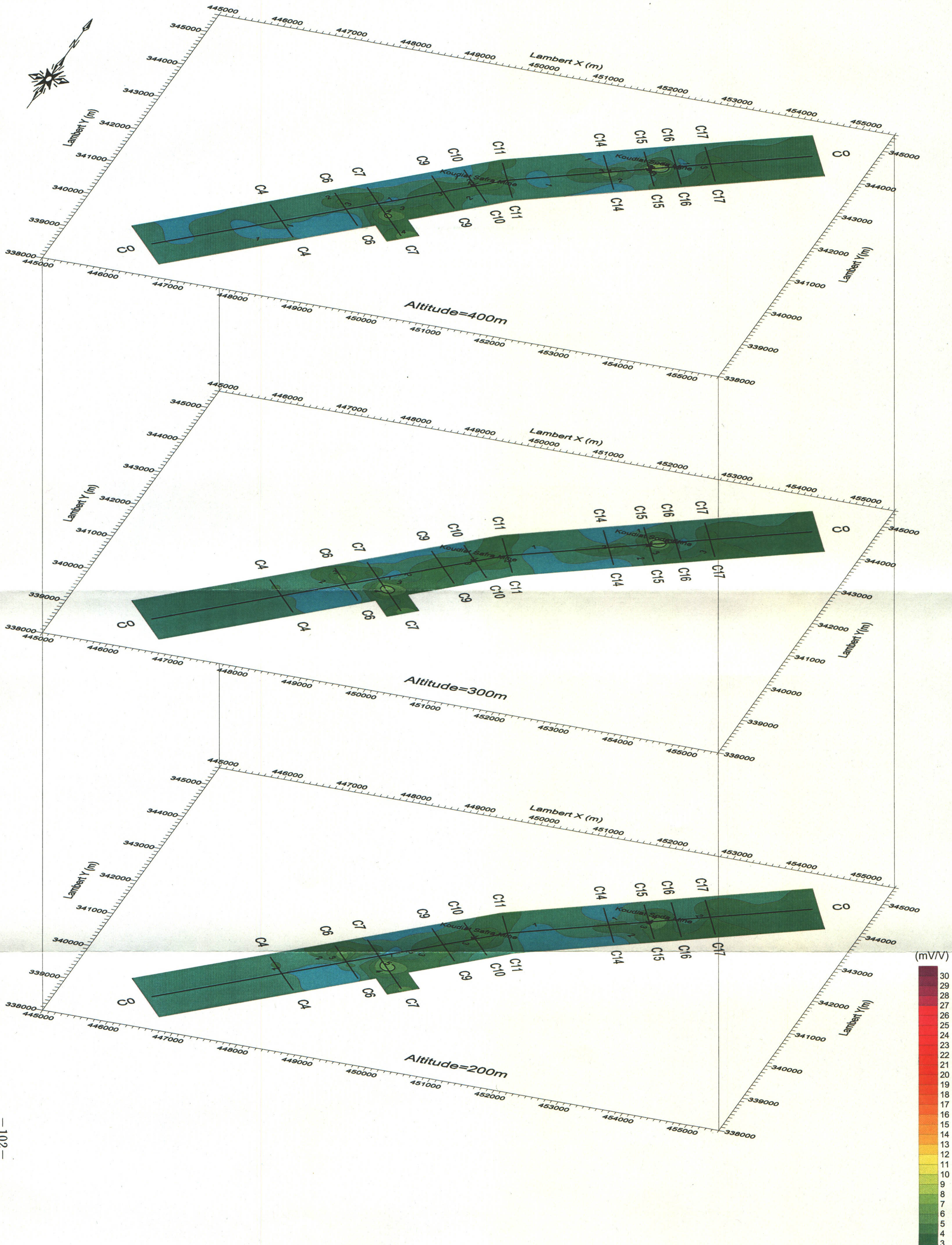


Figure 55 Panel diagram of modeled chargeability plan map in Bazina Kebira prospect

Resistivity distribution in the prospect is divided 3 areas; the southwest area except for the southwestern end, the central area and the northeast area except for the northeastern end. In the southwest area high resistivity exceeding 100 Ωm is distributed from shallow to deep, extending southeastward as the southwest. High resistivity is corresponded to the Triassic dolomite. In the central area low resistivity extends in the deep part, high resistivity stretches from the southwest area in the shallow part. The low resistivity is corresponded to sandstones and conglomerates of the Cretaceous, the Tertiary and the Quaternary systems. In the northeast area high and low resistivity is distributed complicatedly.

The small resistive anomalies in the tops of stretching high resistivity eastward in the northwest side is located around the station C7-90 in the vicinity of the H'Zamel Assoued mineral occurrence in the southwest area, around the Koudiat Safra working in the central area and around the Koudiat Soda working in the northeast area.

The chargeability obtained by the modeling based on the field measurement is low as a whole, indicating the maximum of 8 mV/V and averaging at approximately 2 mV/V. Negative chargeability is estimated in part where it is virtually impossible to measure valid chargeability. The weak small anomalies exceeding 5mV/V is located around the station C7-90 in the vicinity of the H'Zamel Assoued mineral occurrence in the southwest area and around the Koudiat Soda working in the northeast area. The weaker small anomalies between 4 and 5 mV/V are recognized around the station C6-30 in the southwest area, around the Koudiat Safra working in the central area and around the C14-60 in the northeast area.

(2) Interpretation

The interpreted IP map composed of the valid anomalies of residual gravity, chargeability and resistivity on the geological map is shown in Figure 56.

The distribution of resistivity high corresponded to the Triassic systems agreed with that of low residual gravity. The feature stands in contradiction to the characteristics of the Triassic dolomite indicating high density and high resistivity in the laboratory test. In consideration that The Triassic systems lie on relative steep slopes, it is supposed that porous sands and mud lie between dolomites and unsaturated zone extends in the Triassic systems. This resistivity high overthrusts on the low zone in the plain area. This feature of the resistivity distribution corresponded to the geological structure such as the Triassic systems extend over the Cretaceous and the Tertiary systems.

The weak chargeability anomalies are recognized in the mineral occurrences except for the Bazina Kebira mineral occurrence. In the consideration that the mineralized specimens indicate high chargeability in the laboratory test, it is supposed that chargeability is the good parameter of mineralization in the survey area. Chargeability exceeding 5 mV/V is estimated around the H'Zamel Assoued mineral occurrence and

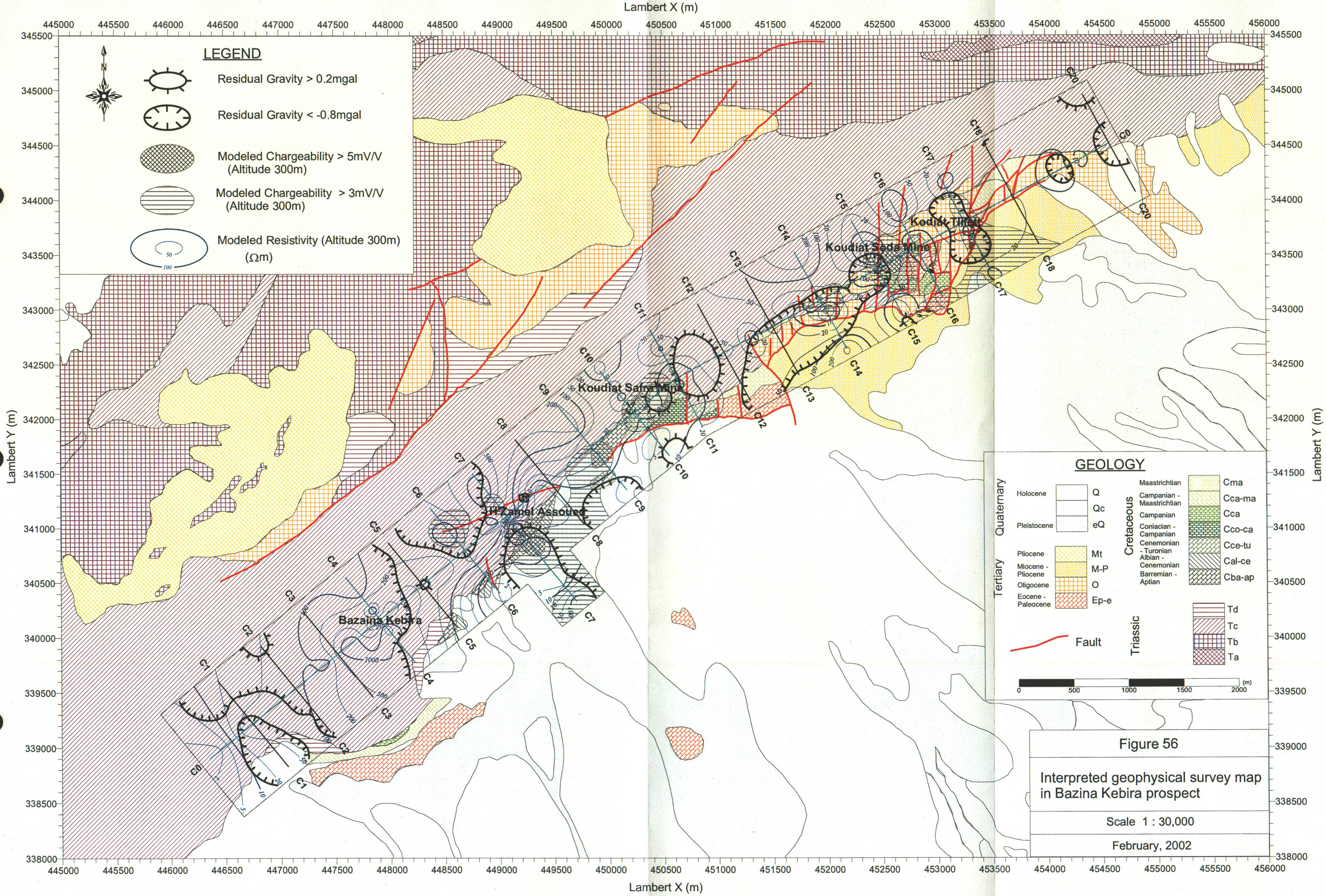


Figure 56

Interpreted geophysical survey map in Bazina Kebira prospect

Scale 1 : 30,000

February, 2002

the Koudiat Soda working. The relative high chargeability are located in the vicinity of the resistivity discontinuity running in the NE-SW direction, which corresponded to the boundary between the northwest resistivity high and the southeast resistivity low. Complicated geology such as the triple contact of the Triassic, the Cretaceous and the Tertiary around the Koudiat Soda working is reflected the complicated distribution of resistivity and residual gravity. The gravity distribution around the H'Zamel Assoued mineral occurrence same as that around Bou K'hil working and high chargeability exceeding 5mV/V within the relative high residual gravity and high resistivity.

5.2.4 Laboratory Test

Enforced wet densities of 49 rock samples collected in and around the prospects are resulted in the range between 1.81 through 3.68 g/cm^3 from density measurement in. The estimated average density of 2.60 g/cm^3 is higher than the correction density of 2.3 and 2.4 g/cm^3 adopted in the current gravity survey. Around a half of samples are collected from mineral occurences sparsly distributed within the prospects. The average desity of 2.44 g/cm^3 within the other samples are roughly same as the correction density of the current gravity survey. Average density of rock samples decreases in order of the dolomitic rock of 2.66 g/cm^3 in the Triassic system, the Cretaceous and Tertiary system of 2.57 g/cm^3, the Quaternary system 2.40 g/cm^3 and the other rocks of 2.14 g/cm^3 in the Triassic system. The highest average density of 2.81 g/cm^3 is indicated in the rocks collected around the mineral occurences.

Resistivity of 48 rock samples measured density, except for a sample disintegrated during immersion, are ranging from 19 to 17,280 Ωm and averaged around 1,500 Ωm. It is guessed that the water resistivity around 5 Ωm decided in consideration with the result of conductivity measurements in field decreases the diffrence between of results between in field survey and in laboratory test. In the Triassic system, the dolomites indicate high density and high resistivity, while the other rocks show conductive. Though many mineralized samples appear conductive, the resistivity of mineralized rock is distributed in the range between 31 througt 3,192 Ωm too widely to classify their mineralizaion.

It is difficult to estimate geological unit according to the chargeability of samples. The chargeablity of mineralized samples is distigushed clearly from that of the others. The chargeability of the non-minaralized samples is ratively low ranging between 0.6 and 9.9 mV/V, while the 13 mineralized samples indicate high chargeablity more than 10 mV/V and the average chargeability of all 23 mineralized samples is estimated around 35mV/V. There are 3 mineralized samples indicating extremely high chargeability beyond 100 mV/V. The network type and the vein type of mineralization tend to become higher chargeability than the dissimination type. It is convinced that the chargeability of samples including much galena and pylite indicates higher than that of the samples including much sphalerite.

Resistive rocks of the non-mineralized samples tend to increase density, but their correlation is weak and no valid correlation between resistivity and density of the mineralized samples. There is no valid correlation between resistivity and chargeability of the non-mineralized samples, while weak correlation is indiced within the mineralized samples. The fact leads their metal factor represented the ratio of chargeability for resistivity effective.

5.3 Drilling Investigation

5.3.1 Summary of Drilling Operation

The geological summary plan of the Bazina Kebira prospect is shown in Figure 57, incorporating the drill hole locations. As shown in the figure, the geology of the prospect comprises the Triassic diapir, the Cretaceous limestone and marl, the Tertiary system (Eocene, Oligocene and Pliocene) consisting of mainly of limestone, sandstone, argillite and conglomerate and the Quaternary system. The Cretaceous system contains the Koudiat Soda and Koudiat Safra ore deposit that was mined in the past, H'zama Lassoued mineral occurences.

Two drill holes, MJTK-C1 and MJK-C2 were put down along the geophysical survey lines, C7 and C15, of the 2st Year Campaign in this prospect, in order to locate new prospective ore deposits and to verify the IP anomaly outlined by the geophysical survey. The columnar section of each hole is shown in the appendix 8 to 9.

5.3.2 Result of Drilling Operation

(1) MJTK-C1

The objectives of this hole were to characterize the mineralization associated with the H'zama Lassoued mineral occurences and to verify the IP anomaly outlined by the geophysical prospecting in the 2st Year Campaign. The hole was drilled along the geophysical survey line C7. The columnar hole section and the geological profile along the section including the hole are shown in Figures 157 and 150 respectively.

The geology of this hole comprises the Cretaceous system and the Quaternary system.The Cretaceous system is observed in sections of the intervals from 24.00 to 311.20m and consists of limestone-marl alternation. Quaternary system comprises colluvial. Colluvial deposits consist of Triassic gravel, sand and clay.

Two mineralized zones are intersected in this hole, in the intervals from 281.50 to 286.50m and from 301.70 to 304.70m, and consist of pyrite-calcite veinlets or networks carrying minor amounts of sphalerite and galena, however, without forming any significant concentrations.

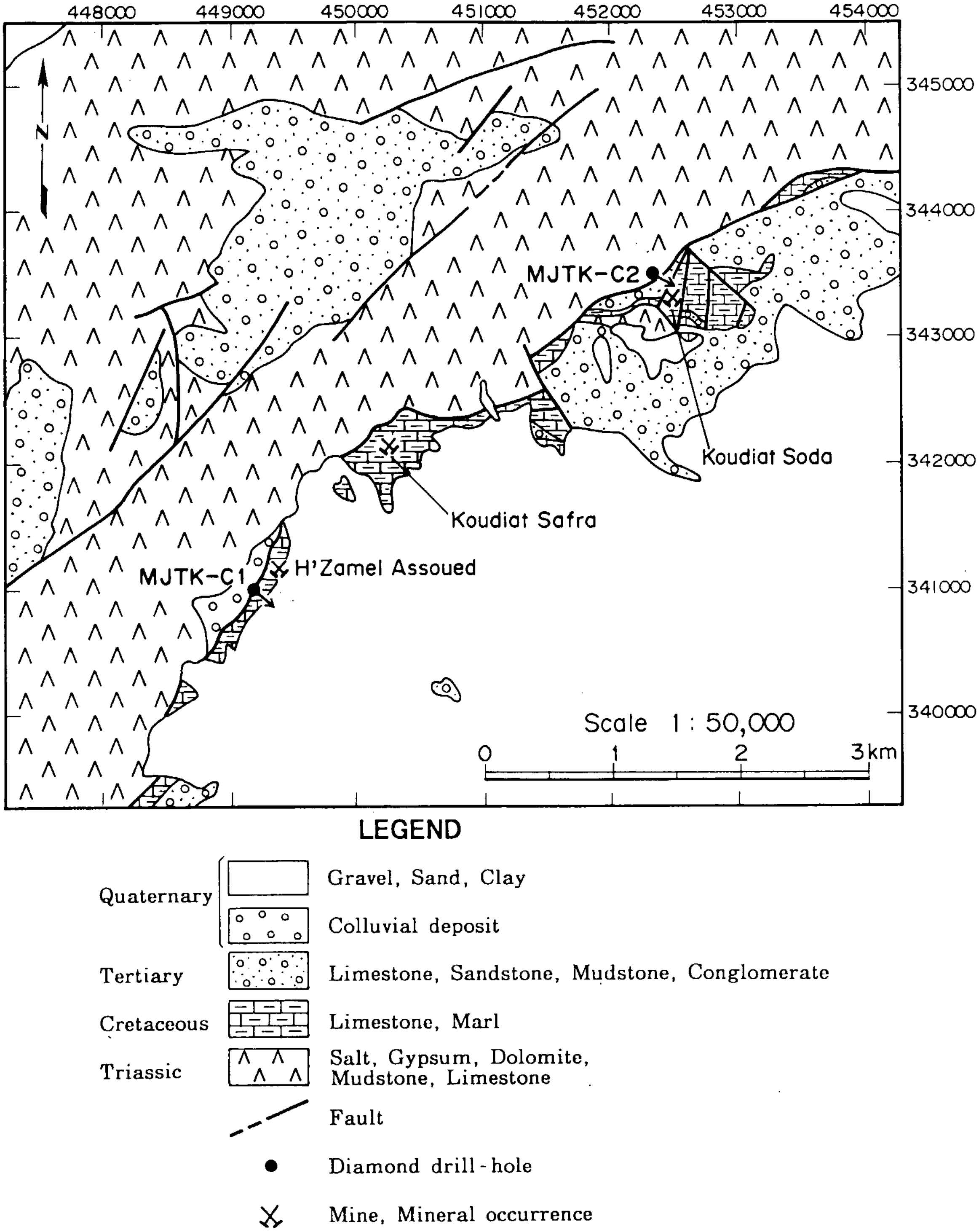


Figure 57 Geology and Drill Hole Location of the Bazina Kebira Prospect

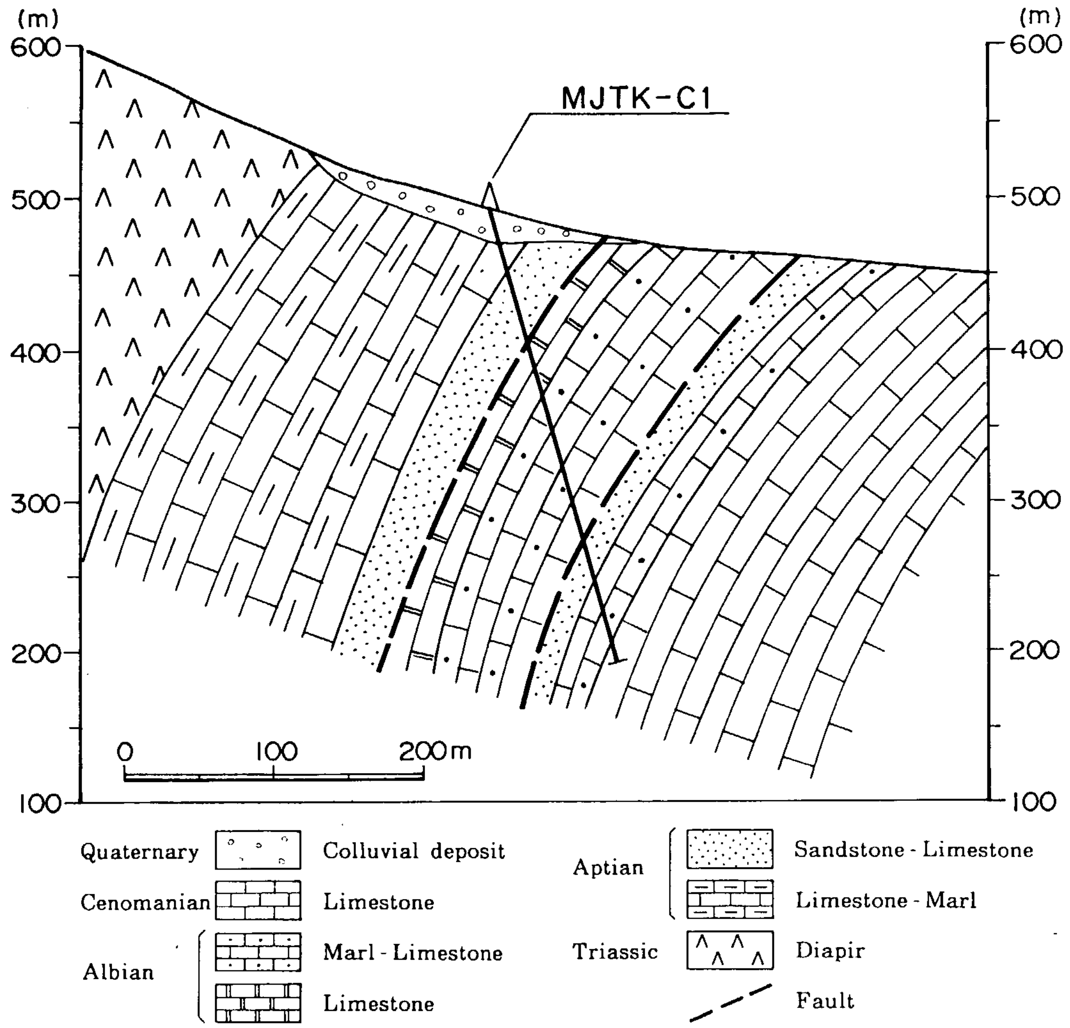


Figure 58 Geological Profile along the Hole, MJTK-C1

The H'Zamel Assoued mineralization occurs in association with Aptian carbonate rocks of the Cretaceous System. This hole, however, encountered weak Zn mineralization (averaged at 0.29% Zn for 4.0m section) in carbonate rocks of Albian instead of those of Aptian. The chargeability anomaly is proved to be caused by pyrite associated with the mineralization.

(2) MJTK-C2

The objectives of this hole were to characterize the mineralization associated with the Koudiat Soda ore deposit and to verify the IP anomaly outlined by the geophysical prospecting in the 2st Year Campaign. The hole was drilled along the geophysical survey line C15. The columnar hole section and the geological profile along the section including the hole are shown in Appendix 9 and Figures 59 respectively.

The geology of this hole comprises the Triassic diapirs, the Cretaceous system that are often brecciated and Tertiary system. The Triassic system is observed in sections of the intervals from 4.70 to 46.60m and from 126.10 to 359.30m, consisting of sedimentary complexes that include gypsum, limestone, dolomite, arenite and argillite. The Cretaceous system occurs in sections of the intervals from 360.40 to 386.10m and consists of marl. The Tertiary system occurs in sections of the intervals from 46.60 to 126.10m and consists of sandstone-marl alternation.The fault is developed in the intervals from 359.30 to 360.40m.

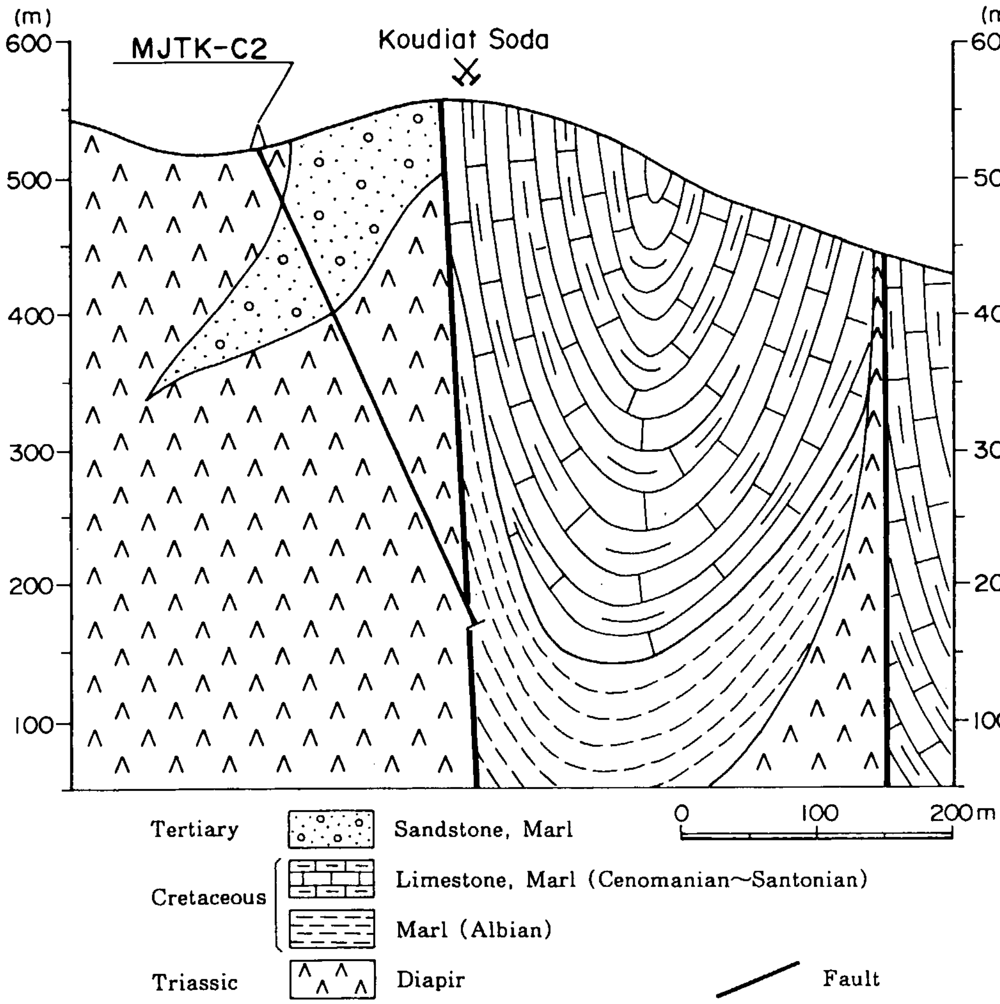


Figure 59 Geological Profile along the Hole, MJTK-C2

The geology of this hole comprises the Triassic diapirs, the Cretaceous system that are often brecciated and Tertiary system. The Triassic system is observed in sections of the intervals from 4.70 to 46.60m and from 126.10 to 359.30m, consisting of
sedimentary complexes that include gypsum, limestone, dolomite, arenite and argillite. The Cretaceous system occurs in sections of the intervals from 360.40 to 386.10m and consists of marl. The Tertiary system occurs in sections of the intervals from 46.60 to 126.10m and consists of sandstone-marl alternation.The fault is developed in the intervals from 359.30 to 360.40m.