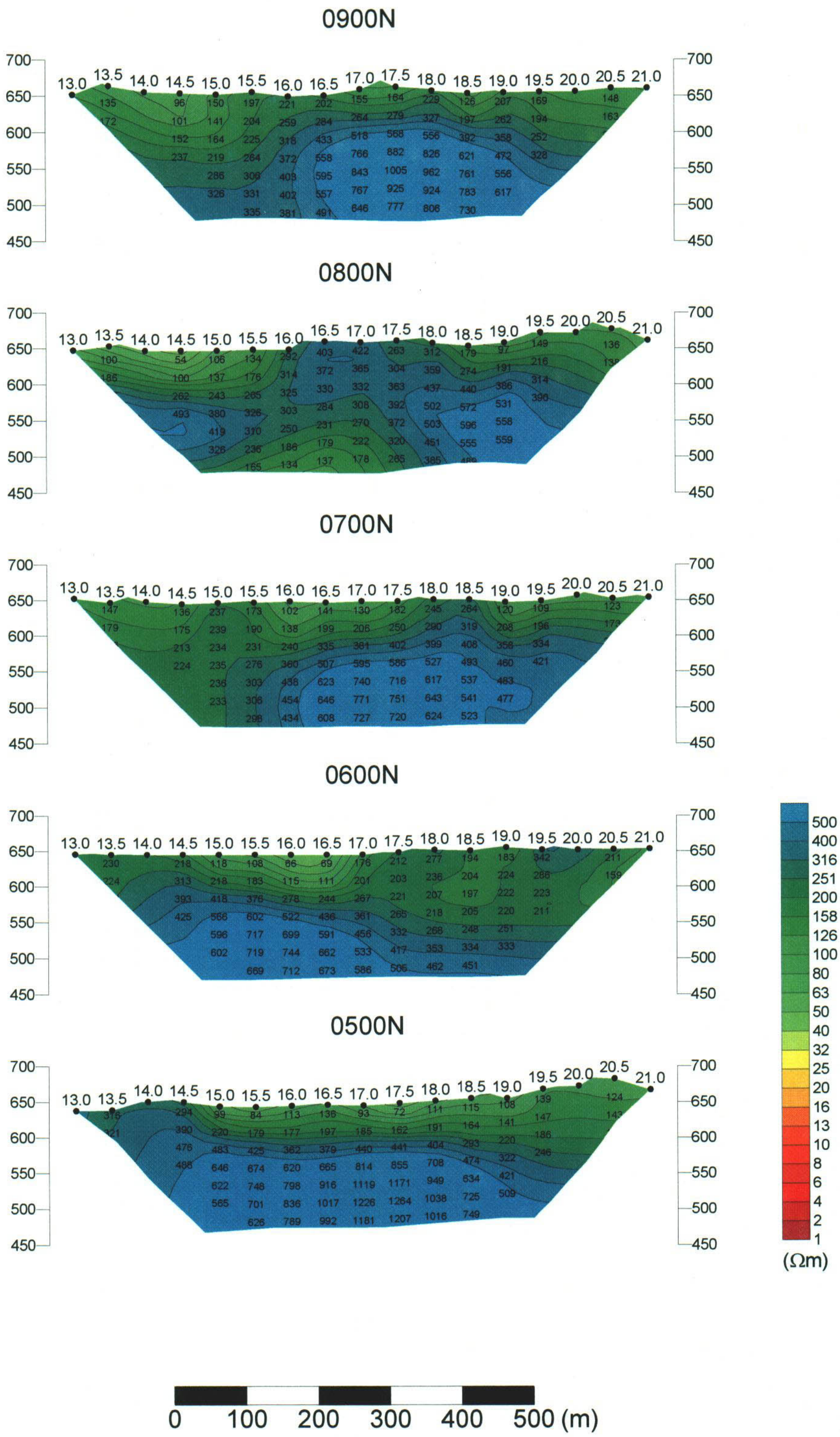

Fig. II-2-39(1) 2D analysis sections for resistivity of E-W lines in Najaid area

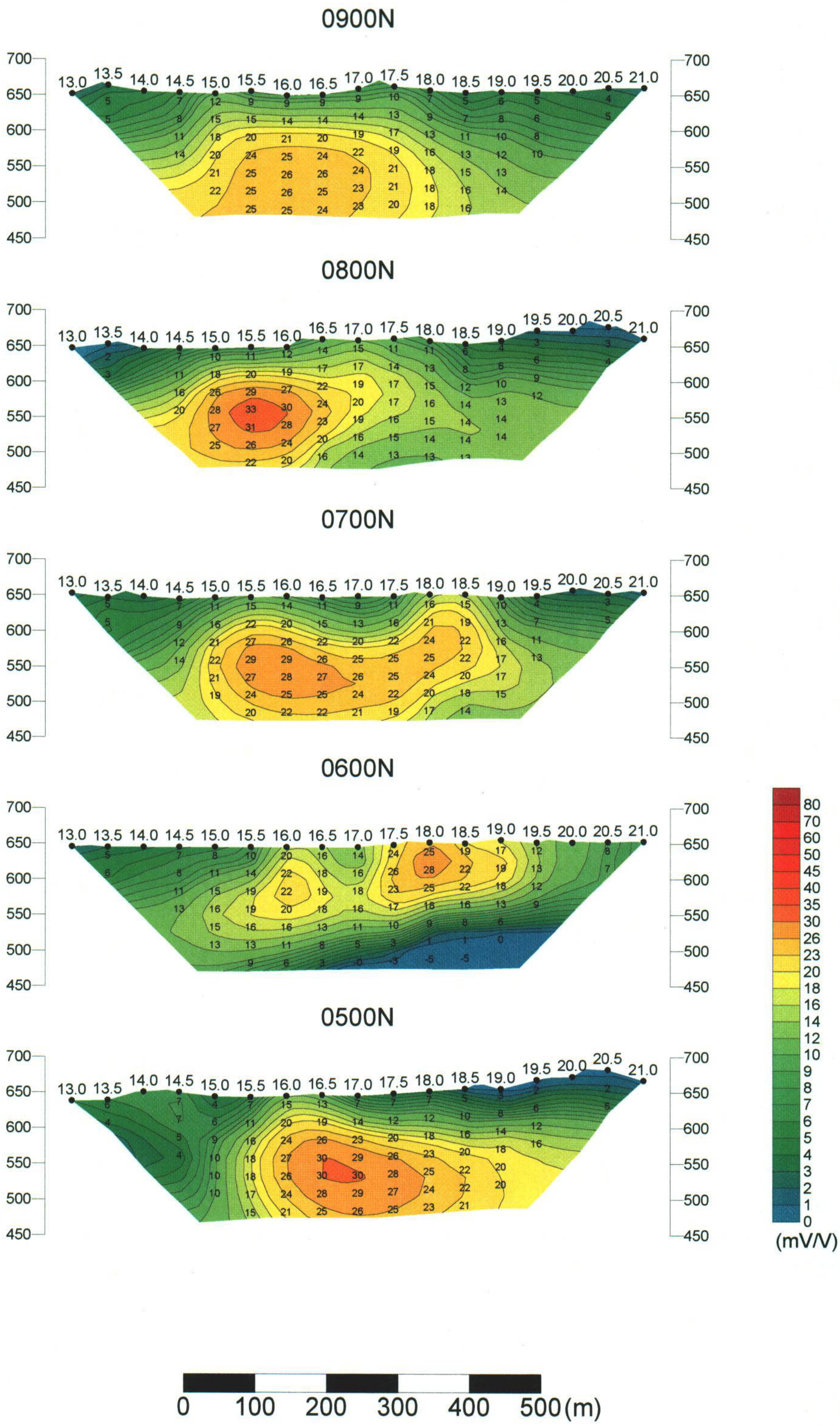

Fig. II-2-39(2) 2D analysis sections for chargeability of E-W lines in Najaid area

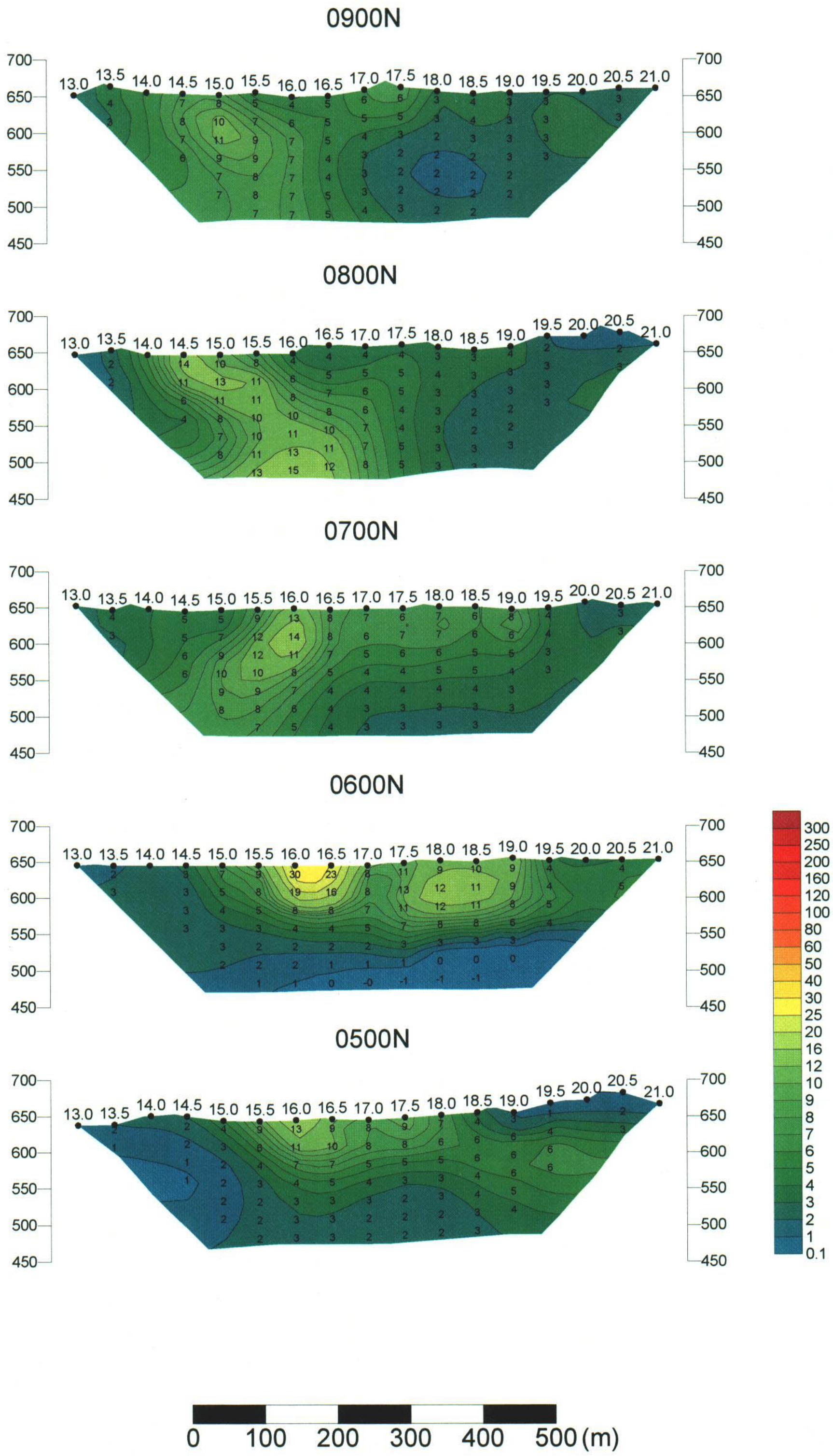

Fig. II-2-39(3) 2D analysis sections for metal factor of E-W lines in Najaid area

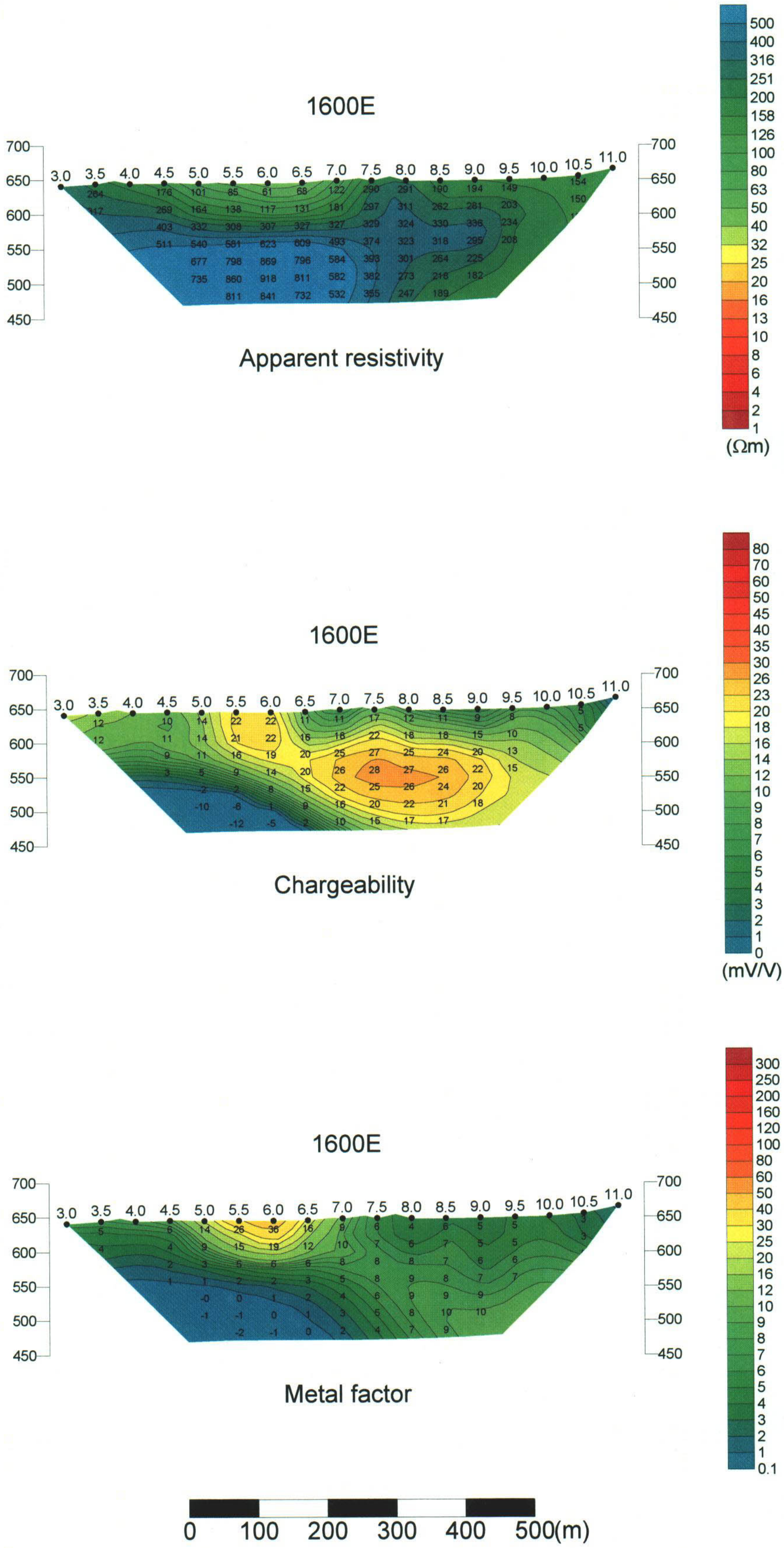

Fig. II-2-39(4) 2D analysis sections of N-S lines in Najaid area

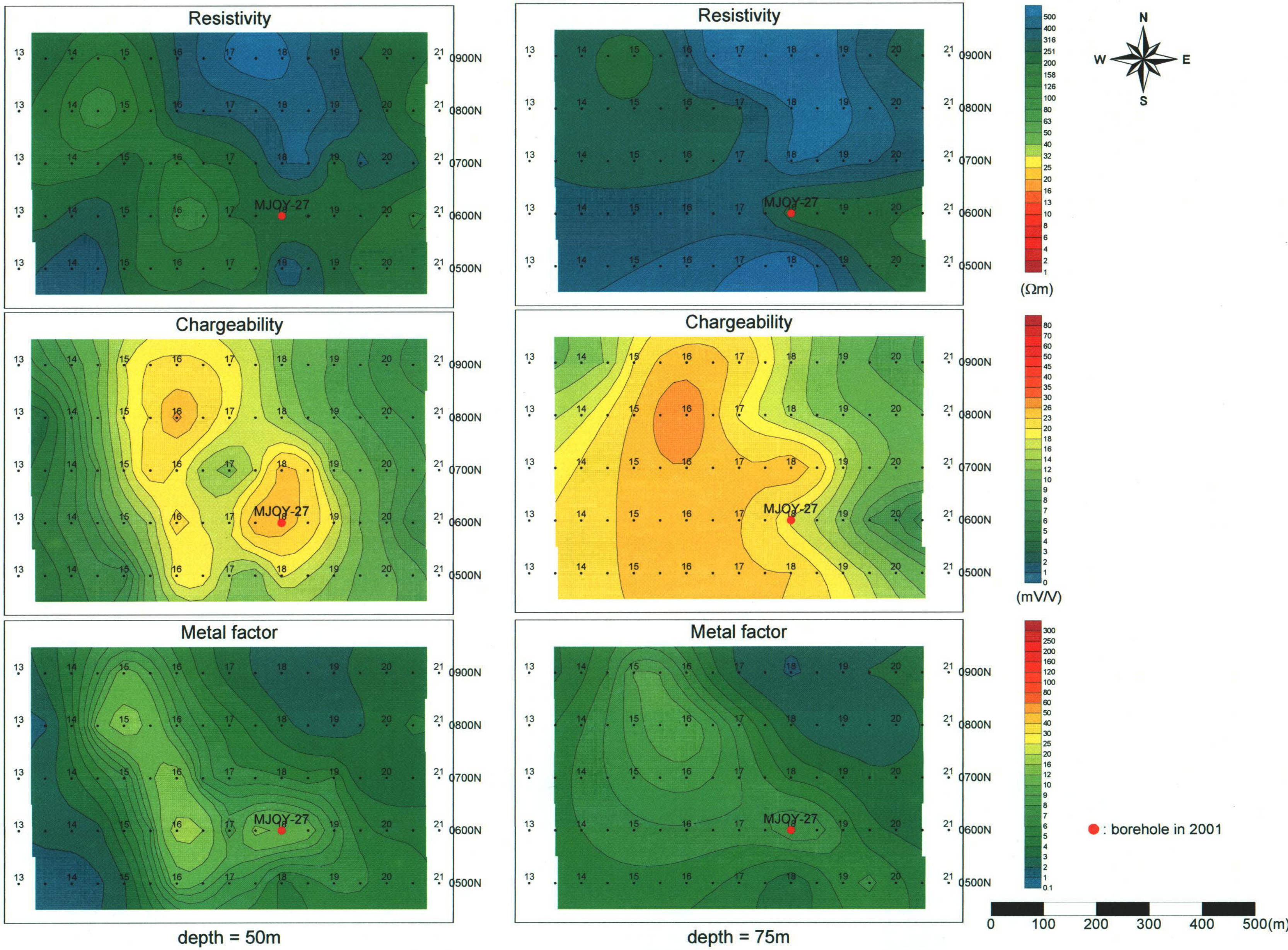

Fig. Ⅱ2-40(1) 2D analysis plane maps at the depth of 50m and 75m in Najaid area

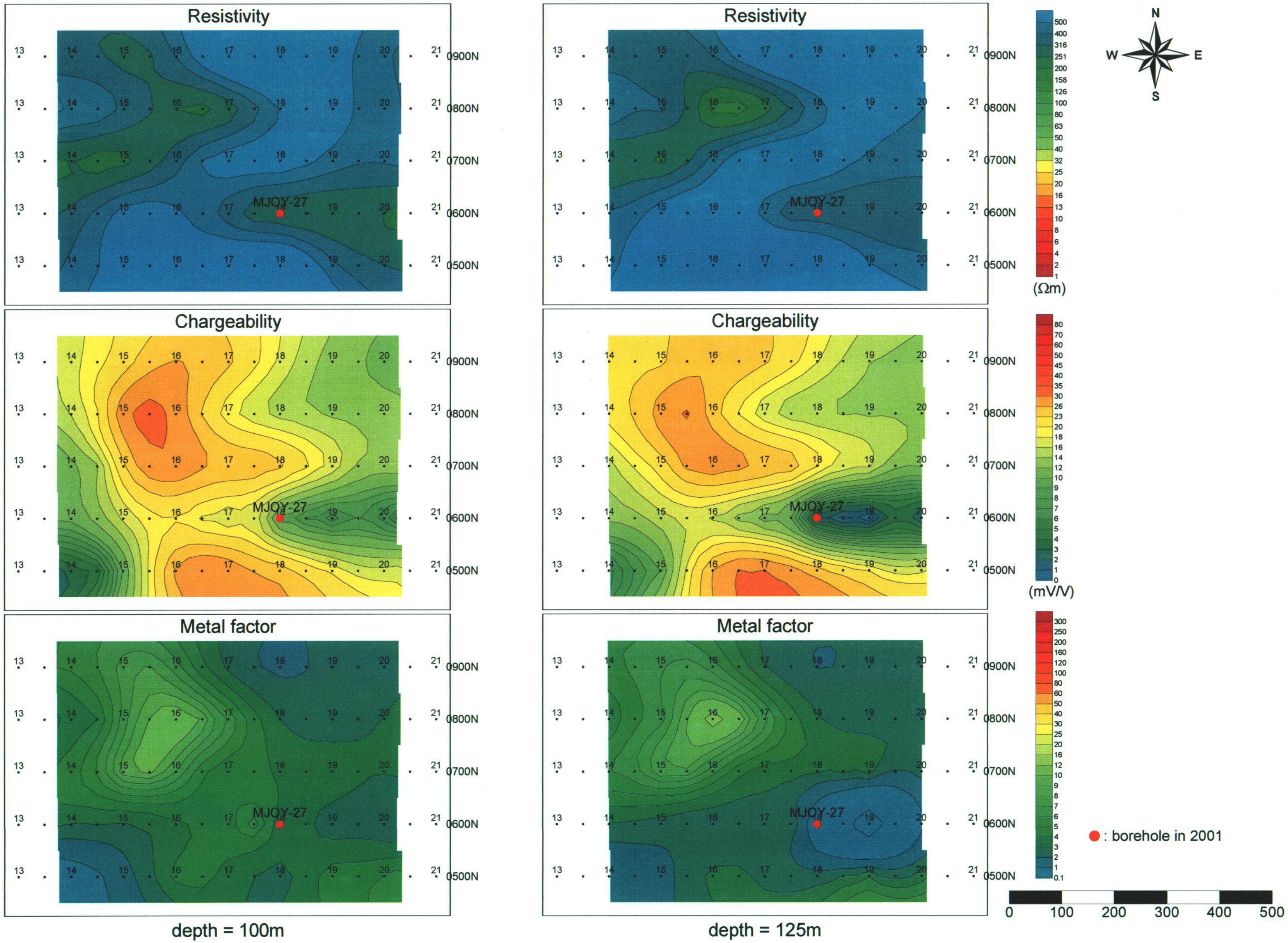

Fig. II 2-40(2) 2D analysis plane maps at the depth of 100m and 125m in Najaid area

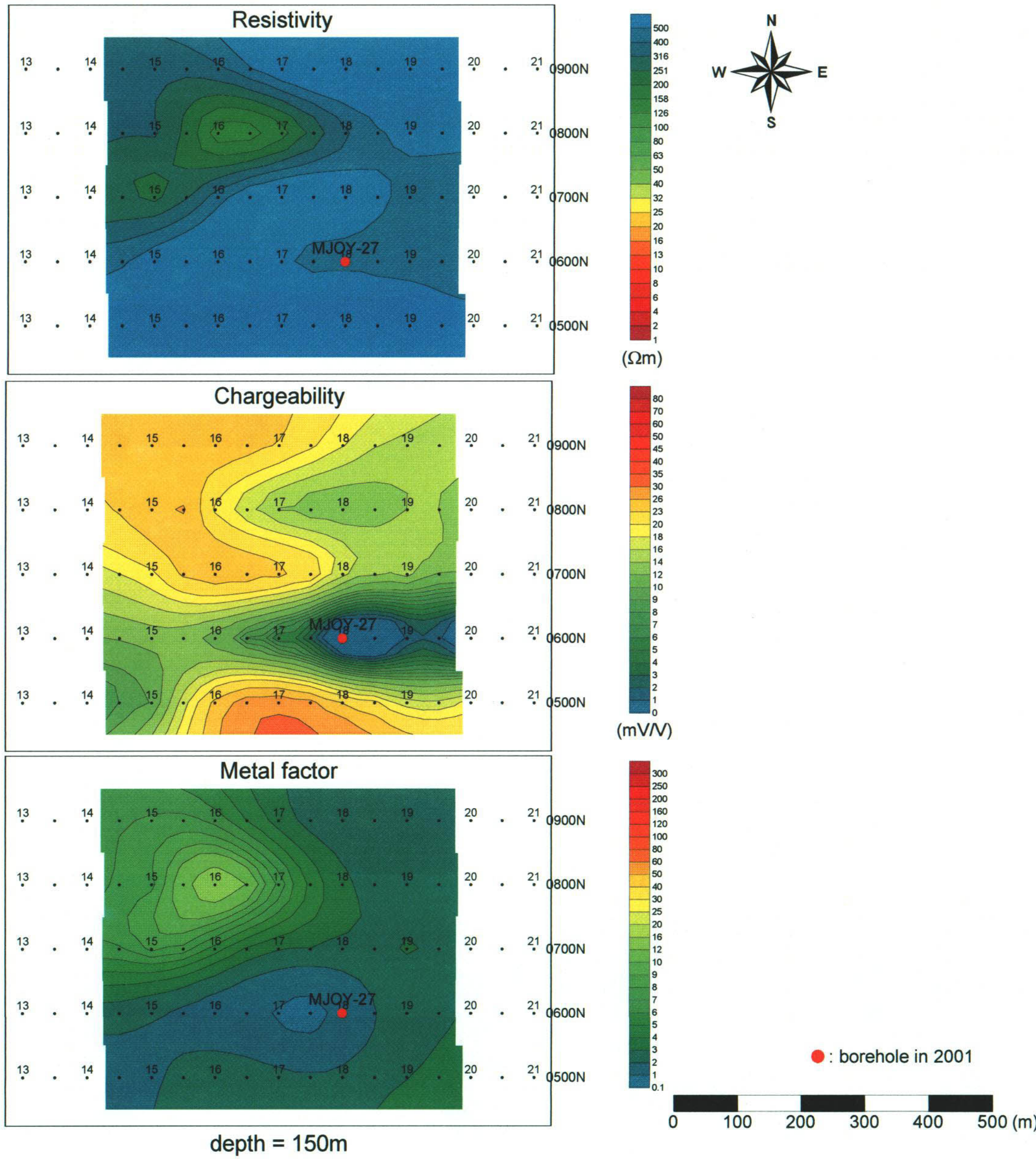

Fig. II 2-40(3) 2D analysis plane maps at the depth of 150m in Najaid area

$$M = \frac{1.87}{V_p} \times \int_{t1}^{t2} V_s dT,$$

where $\boldsymbol{M}$ is the chargeability(mV/V), $\boldsymbol{V_p}$ the primary voltage (V), $\boldsymbol{V_s}$ the secondary voltage (mV), $\boldsymbol{dT}$ the sampling interval (sec), ***t1*** the off-time voltage 450msec and ***t2*** the off-time voltage 1,100msec.

(2) Results

Electrical properties of rocks samples from outcroppings and core drillings were measured in the laboratory and their results are indicated in Table Ⅱ-2-2 (1)~(3).

The core samples consist of pillow lava and massive lava. Almost all samples show silicification. Many samples include veins of pyrite or chalcopyrite dissemination.

The resistivity values of core samples range from 1.6 to 14kΩm. Average value is about 1.5kΩm. In the case of these samples, the resistivity value depends on several factors, such as the strength of silicification and amount of metallic mineral. In general, strong silicification causes resistivity to become high while large amount of metallic mineral show low resistivity.

The samples Nos. 16, 19 and 22 show low resistivity values under 100Ωm. In the samples Nos 19 and 22, veins of pyrite and chalcopyrite are developed, indicating low resistivity values due to the high content of metallic minerals.

In the sample No 22, veins of chalcopiryte-piryte continue along the direction of the measurement of the sample showing such a low resistivity value of 1.6Ωm. In the sample No 16, mineralization and silicification cannot be confirmed. Other samples show high resistivity above 100Ωm reflecting the influence of the strong silicification. The resistivity of 6 stockwork samples ranged between 1.6 and 3kΩm, therefore it is difficult to prospect for stockwork ore on the basis of only resistivity results.

The chargeability values of core samples range from 0.5 to 149.1mV/V with an average value of 14.7mV/V. The chargeability value depends on the amount of sulphide. The samples, which include chalcopyrite vein, and stockwork ore samples show high chargeability above 7.5mV/V. The chargeability values of the samples in which only pyrite dissemination is recognized range between 1.4 and 7.9mV/V.

Outcrop samples consist of basalt, andesite, gabbros, mudstone and limestone.

Outcrop samples show generally high resistivity values ranging from 479.9Ωm to 50kΩm. Especially, limestone and gabbro show high values above 10kΩm. Limestone shows anisotropy.

The chargeability values of outcrop samples range from 0.3 to 8.8mV/V. Except for the samples Nos.52 (basalt), 57 (basaltic andesite), 60 and 61; the values are less than 4mV/V. The high chargeability values of No.52 and 57 are caused by clay minerals. The high values of No.36 and 39 are caused by magnetite.

2-6 Further Considerations

According to the TDIP results of the Phase I, anomalies caused by mineralization were detected in the five areas. New massive sulphide was not be detected, but promising stockwork ore was confirmed

Table Ⅱ-2-2(1) Resistivity and chargeability of core samples in Phase I

No.	Borehole	Depth (m)	Resistivity (Ωm)	Chargeability (mV/V)	Rock Name and Formation	Alteration and Mineralization
1	MJOY-2	167.70	4147.0	7.5	Ma (Lasail)	silicified, with pyrite veinlet and dissemination(sl)
2		180.75	1713.0	3.3	Pw (Lasail)	silicified, with pyrite veinlet and dissemination(sl)
3		195.90	687.2	3.0	Pw (Lasail)	silicified, with epidote and pyrite dissemination(sl)
4	MJOY-3	18.20	139.0	1.5	Ma (Lasail)	silicified
5		65.20	114.8	4.0	Pw (Lasail)	slightly silicified
6		140.10	132.8	2.4	Pw (Lasail)	silicified, with pyrite veinlet and dissemination
7		157.30	120.6	4.3	Pw (Lasail)	silicified, with pyrite veinlet and dissemination
8		167.30	145.1	1.4	Pw (Lasail)	silicified, with pyrite dissemination(sl)
9		189.50	157.7	30.6	Pw (Lasail)	silicified, SW ore, with pyrite-chalcopyrite veinlets and pyrite dissemination
10		202.50	223.1	22.3	Pw (Lasail)	silicified, SW ore, with pyrite-chalcopyrite veinlets
11		216.90	798.4	2.6	Pw (Lasail)	silicified, with pyrite dissemination(sl)
12		225.40	1583.0	14.4	Pw (Lasail)	silicified, with pyrite-chalcopyrite veinlets
13		241.30	836.2	7.5	Pw (Lasail)	silicified, SW ore, with pyrite-chalcopyrite veinlets and pyrite dissemination
14	MJOY-5	30.00	341.5	1.3	Ma (Lasail)	slightly silicified
15		58.85	190.5	4.2	Ma (Lasail)	
16		103.40	56.8	0.5	Pw (Lasail)	
17		131.40	134.6	48.4	Pw (Lasail)	silicified, SW ore, with pyrite-chalcopyrite veinlets and pyrite and chalcopyrite dissemination(sl)
18		170.15	265.5	2.6	Pw (Lasail)	silicified, with pyrite dissemination(sl)
19		208.20	13.4	149.1	Pw (Lasail)	silicified, with chalcopyrite veinlet and pyrite dissemination(sl)
20	MJOY-6	24.95	5225.0	7.9	Pw (Lasail)	silicified, with pyrite dissemination(sl)
21		73.60	2525.5	5.2	Pw (Lasail)	silicified, with pyrite dissemination(sl)
22		152.80	1.6	75.1	Pw (Lasail)	silicified, SW ore, with pyrite-chalcopyrite veinlets and pyrite dissemination(sl)
23		176.80	1606.0	3.4	Pw (Lasail)	silicified, with pyrite veinlet and pyrite dissemination(sl)
24		222.80	3172.5	8.7	Pw (Lasail)	silicified, SW ore, with chalcopyrite veinlet and pyrite dissemination(sl)
25	MJOY-7	26.00	99.0	2.4	Pw (Lasail)	slightly silicified, with pyrite veinlet and pyrite dissemination(sl)
26		83.95	856.4	7.1	Ma (Lasail)	slightly silicified, with pyrite veinlet and pyrite dissemination(sl)
27		117.45	1509.5	9.4	Pw (Lasail)	slightly silicified, with pyrite-chalcopyrite veinlets
28		183.10	541.4	3.3	Pw (Lasail)	slightly silicified
29		215.20	2570.0	5.0	Pw (Lasail)	slightly silicified, with pyrite dissemination(sl)
30		249.10	501.0	2.4	Pw (Lasail)	slightly silicified

Remarks Pw: Pillow lava (sl): Slight
Ma: Massive lava SW: Stockwork

Table II-2-2(2) Resistivity and chargeability of core samples in Phase II

No.	Borehole	Depth (m)	Resistivity (Ωm)	Chargeability (mV/V)	Rock Name and Formation	Alteration and Mineralization
31	MJOY-22	53.50	161.0	3.4	Pw (Lasail)	
32		88.50	126.0	1.4	Pw (Lasail)	slightly silicified, with dense quartz veinlets.
33		119.00	397.0	2.3	Pw (Lasail)	silicified, with quartz veinlets.
34	MJOY-23	63.20	1165.0	4.3	Pw (Lasail)	slightly silicified.
35		79.50	2477.0	1.9	Pw (Lasail)	silicified, with scarce quartz veinlets.
36		147.00	592.0	4.4	Pw (Geotimes)	silicified, with dense quartz-calcite veinlets associated with hematite and specularite.
37		148.00	544.0	4.1	Pw (Geotimes)	silicified, with dense quartz-calcite veinlets associated with hematite and specularite.
38	MJOY-25	43.50	183.0	4.6	Pw (Lasail)	silicified, with dense quartz veinlets.
39		85.10	281.0	0.8	Pw (Lasail)	slightly silicified.
40		107.60	5892.0	3.9	Pw (Lasail)	silicified, with quartz veinlets.
41		125.90	2093.0	23.0	Pw (Lasail)	silicified, with dense quartz veinlets.
42		150.50	1343.0	40.9	Pw (Lasail)	silicified, with dense pyrite-chalcopyrite bearing quartz veinlets.
43	MJOY-27	20.35	1101.0	4.0	Pw (Lasail)	silicified, with scarce quartz veinlets.
44		79.10	1318.0	8.4	Pw (Lasail)	silicified, with scarce pyrite-chalcopyrite bearing quartz-epidote veinlets, slight pyrite dissemination.
45		134.80	3939.0	8.0	Pw (Lasail)	silicified, with scarce pyrite-chalcopyrite bearing quartz-epidote veinlets, slight pyrite dissemination.
46	MJOY-24	35.50	1328.0	14.9	Pw (Lasail)	silicified, with dense quartz-calcite veinlets associated with hematite and specularite.
47		49.60	2200.0	16.2	Pw (Lasail)	silicified, with dense quartz-calcite veinlets associated with hematite and specularite.
48		94.80	1687.0	25.2	Pw (Lasail)	strongly silicified, with dense quartz-calcite veinlets associated with pyrite, chalcopyrite and specularite.
49		111.90	14033.0	14.5	Pw (Lasail)	strongly silicified, with dense quartz-calcite veinlets associated with pyrite, chalcopyrite and specularite.
50		133.80	1871.0	3.2	Pw (Lasail)	silicified, with dense quartz-calcite veinlets associated with pyrite and specularite.
51		149.50	3294.0	3.0	Ma (Lasail)	silicified, with scarce quartz veinlets associated with pyrite and specularite.

Remarks

Pw: Pillow lava (sl): Slight

Ma: Massive lava

Table Ⅱ-2-2(3) Resistivity and chargeability of outcrop samples in Phase I

No.	Sample Name	Location (UTM)	Resistivity (Ωm)	Chargeability (mV/V)	Rock Name and Formation	Alteration and Mineralization
52	YN01	459800E 2617750N	974.2	7.3	Ba; Ma, light green. Lasail	silicified
53	YN02	459800E 2618400N	5169.3	3.5	Do; dike, light green. Lasail	silicified
54	YN03	460000E 2616500N	3287.3	2.3	Ba; lava, greenish gley. Lasail	
55	YN04	460000E 2618250N	492.0	2.5	Mu; metalliferous sediment, reddish brown. in Lasail	
56	YN05	460200E 2616750N	8107.8	2.0	Andesite; pillow lava, light gley.	
57	YN06	460400E 2615050N	474.9	5.2	Basaltic andesite; lava, dark gley. Aley	
58	YN07	460400E 2618424N	1720.3	2.5	Do; dike, light green. Sheeted dike	similar to YN03
59	YN09	456600E 2617300N	8071.5	3.2	Limestone; magnetic, black. Pre ophiolite	
60	YN10	456400E 2616650N	18.3k, 9.8k, 38.6k	8.8, 4.3, 7.1	Limestone; gley Olistostrom	
61	YN11	456200E 2617750N	49.4k, 12.7k, 6.9k	7.6, 1.1, 1.0	Limestone; white Olistostrom	
62	YN18	455200E 2618300N	11.2k, 4.9k	2.6, 1.0	Gabbro	typical
63	YN27	458940E 2615827N	653.2	0.3	Basaltic andesite; feeder dike, light green. Aley	silicified

Remarks

Ba: Basalt
Pw: Pillow lava
Ma: Massive lava
Do: Dolerite
Mu: Mudsotne

through the geophysical anomalies in Quron Al-Akhbab area. In the area of Hayl as Safil where ore body had been confirmed, IP anomaly caused by the ore body was clearly detected. Though the ore bodies Al Ashgar and Al Jadeed present comparatively small-scale massive sulphide, the IP survey detected them as low resistivity-high chargeability distributions. This result shows the effectiveness of the TDIP method to detect massive sulphide ore bodies. The stockwork ore found in the area of Quron Al- Akhbab clarifies that the stockwork ore shows in general high chargeability and medium-high resistivity characteristics. In the south east of the Rakah mine and the north area, resistivity does not show so low values, but chargeability shows high values.

More detailed results in the resistivity and chargeability at shallow levels were obtained by the TDIP survey in Phase II at the 5 areas mentioned above, which used this time a dipole configuration of 50m. The spacing between lines was limited to 100m. By using this array, the following results were obtained

In the area of Tawi Rakah, IP anomaly was found limited around the mineralized zone on the surface.

In the area of Najaid, 2 chargeability anomalies were found. Drilling survey was carried out in one of them.

In the area of the Rakah gold mine, a remarkable IP anomaly was found limited around the open pit. An IP anomaly was found extended from the open pit to the southwest. To clarify its nature, a drilling survey was carried out at 1600N 250E. Besides the results obtained for the open pit, rather high chargeability was detected in the depth of the east part from the line 1700N station 5.0. Another anomaly was obtained at the deeper part of the line 1500N around the stations 4.0~5.0. This latter anomaly seems to be caused by the development of pyrite dissemination that was found at the depths of 170m in the drilling MJOY-1 (400E, 1550N) carried out in Phase I.