CHAPTER 4

Data Interpretation

Concerning the integration of gradient magnetic data and 3D resistivity data at the Intakhin kiln site, Intakhin Sub-district, Mae Taeng District, Chiang Mai Province, the geophysical data interpretation of the study area is concentrated on magnetic data and 3D resistivity data. The integrated uses of all information thus enabled the interpretation mapping to be reasonable.

The magnetic gradient data in Area 1 (Figures 2.10 – 2.13) and Area 2 (Figures 2.14 – 2.17) were applied to shallow sources. The data are results of the magnetic susceptibility contrast of the kilns and surrounding materials. In addition, the distance of sensor becomes a factor in determining data quality used to locate and map the kilns.

When comparing the results of magnetic data with a sensor distance of 0.5 m and 1.0 m, respectively, a magnetic data sensor distance of 0.5 m provides a resolution and well correlated with the value of 3D resistivity for located boundary of anomalies, better than a sensor distance of 1.0 m

4.1 Vertical Slices of Resistivity Data

The data volume extracted vertical slices to display the lateral extent of the high resistivity zones. The anomalies, viewing in depths from top to bottom of anomalies are not exceeding 1.0 - 1.5 m, and dimensions of anomalies were not over 2x3 m.

The values of resistivity are related to the stratigraphy of soil layers at 1.5 m, which present loam (or moist loam), ash and charcoal, which may present low resistivity values. High resistivity values may indicate voids where kilns have collapsed.

Concerning vertical slices of resistivity data at various sections of representation (Figure 4.1) at Area 1, the anomalies are contiguous between 1.0 – 1.5 m and a resistivity value over 50 Ohm.m, displayed in black rectangles, which may indicate the presence of kilns or other archaeological remains.

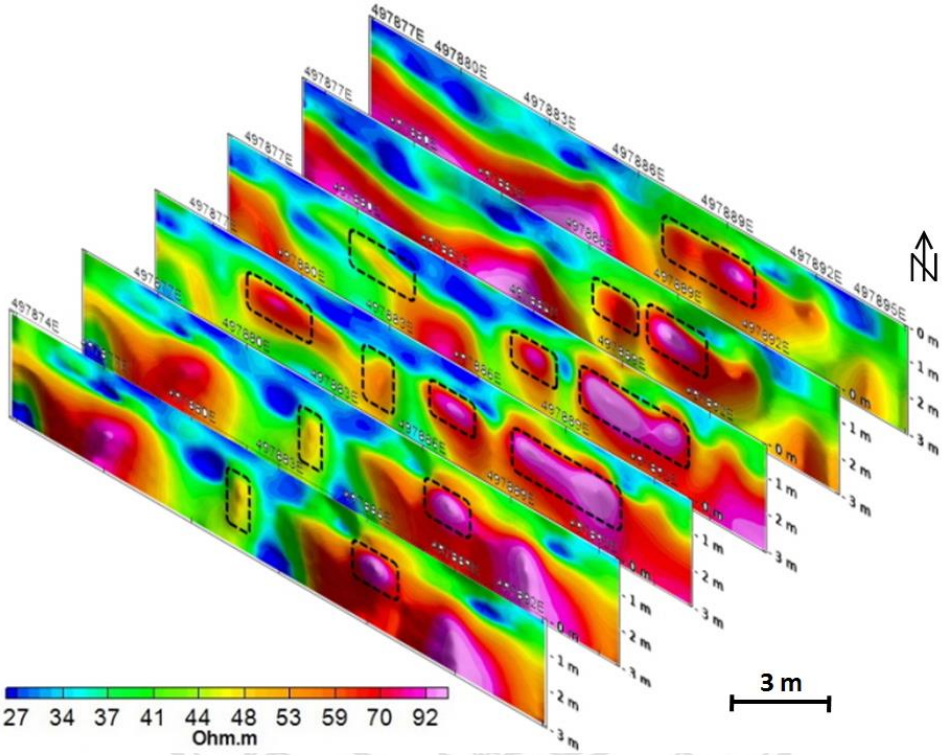

Figure 4.1 Vertical slices of resistivity data at various sections of Area 1 (The black rectangles may indicate position of kilns)

Concerning vertical slices of resistivity data at various section representations (Figure 4.2) in Area 2, high resistivity anomalies are contiguous between 1.0 – 1.5 m and a resistivity value over 200 Ohm.m, displayed in black rectangles, which may indicate the presence of kilns or other archaeological remains.

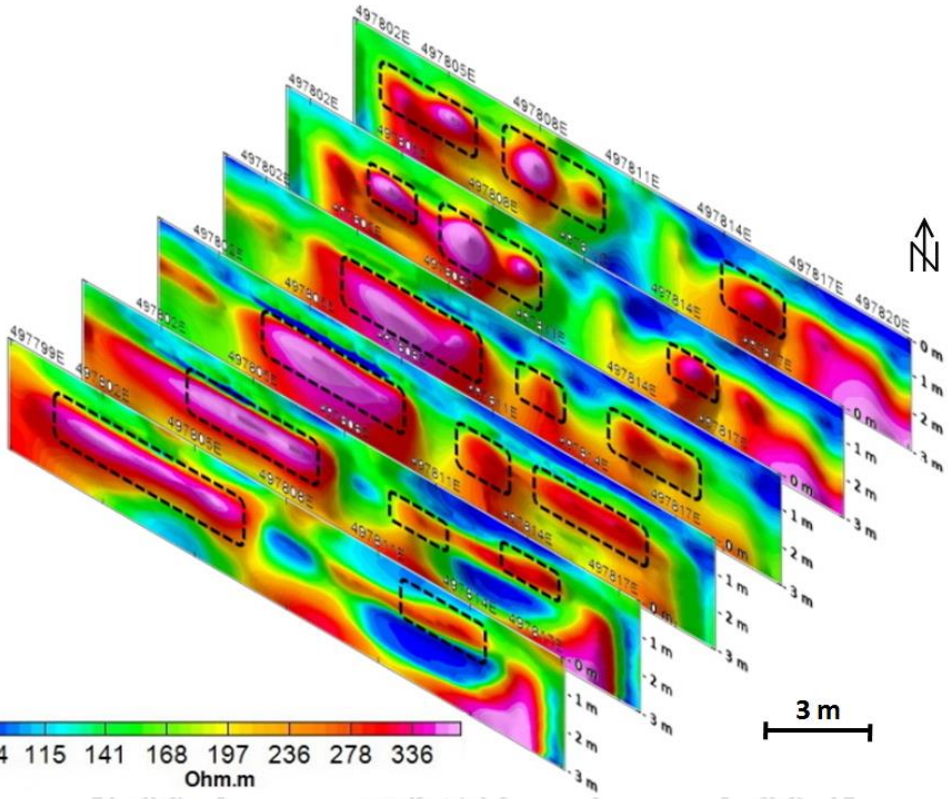

Figure 4.2 Vertical slices of resistivity data at various sections of Area 2 (The black rectangles may indicate position of kilns).

4.2 Horizontal Slices of Resistivity Data

The data volume extracted horizontal slices (Figure 4.3) in order to display the lateral extent of the high resistivity zones. The anomalies are viewed as the continuation of anomaly thicknesses not exceeding 1 - 1.5 m, and dimensions of anomalies not over 2x3 m.

Concerning horizontal slices of resistivity data at various depth representations (Figure 4.3(a)) in Area 1, high resistivity anomalies were located between 0.5 – 1.5 m with a resistivity value over 50 Ohm.m, as displayed in black rectangles, which may indicate the presence of kilns or other archaeological remains.

Concerning horizontal slices of resistivity data at various depth representations (Figure 4.3(b)) in Area 2, high resistivity anomalies were located between 0.5 – 1.5 m with a resistivity value over 200 Ohm.m, as displayed in black rectangles, which may indicate the presence of kilns or other archaeological remains.

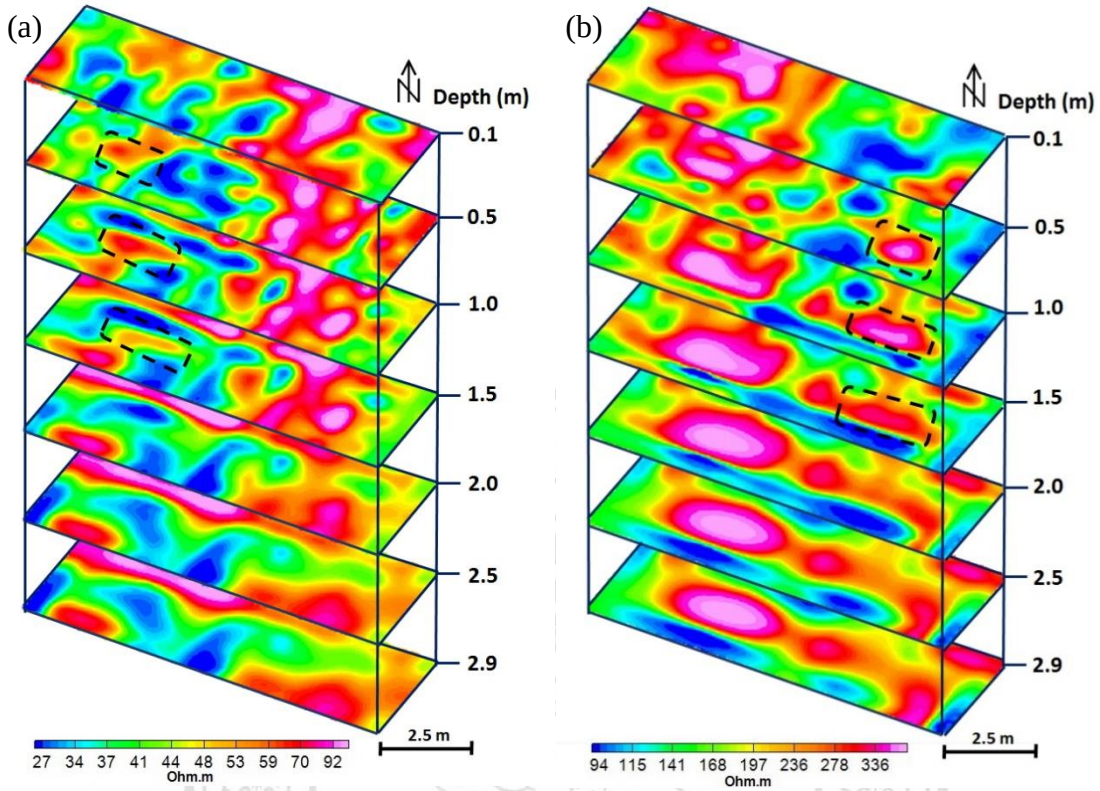

Figure 4.3 Horizontal slices of resistivity data at various depths (a) Area 1, and (b) Area 2 (The black rectangles may indicate position of kilns)

4.3 Integration of Magnetic Gradient Data and 3D Resistivity Data

Data comparison of magnetic horizontal gradient data (Figure 2.10), vertical gradient data (Figure 2.12), total magnetic intensity data filtered by derivatives (Figures 2.20 – 2.21), magnetic data of the analytic signals (Figure 2.26) and resistivity data depth slice (Figure 3.16) in Area 1 is shown in Figure 4.4. Anomalies at depth 1.0 m in Area 1 has most of anomalies at the same position of all magnetic mapped points (black rectangles) may indicate the presence of kilns.

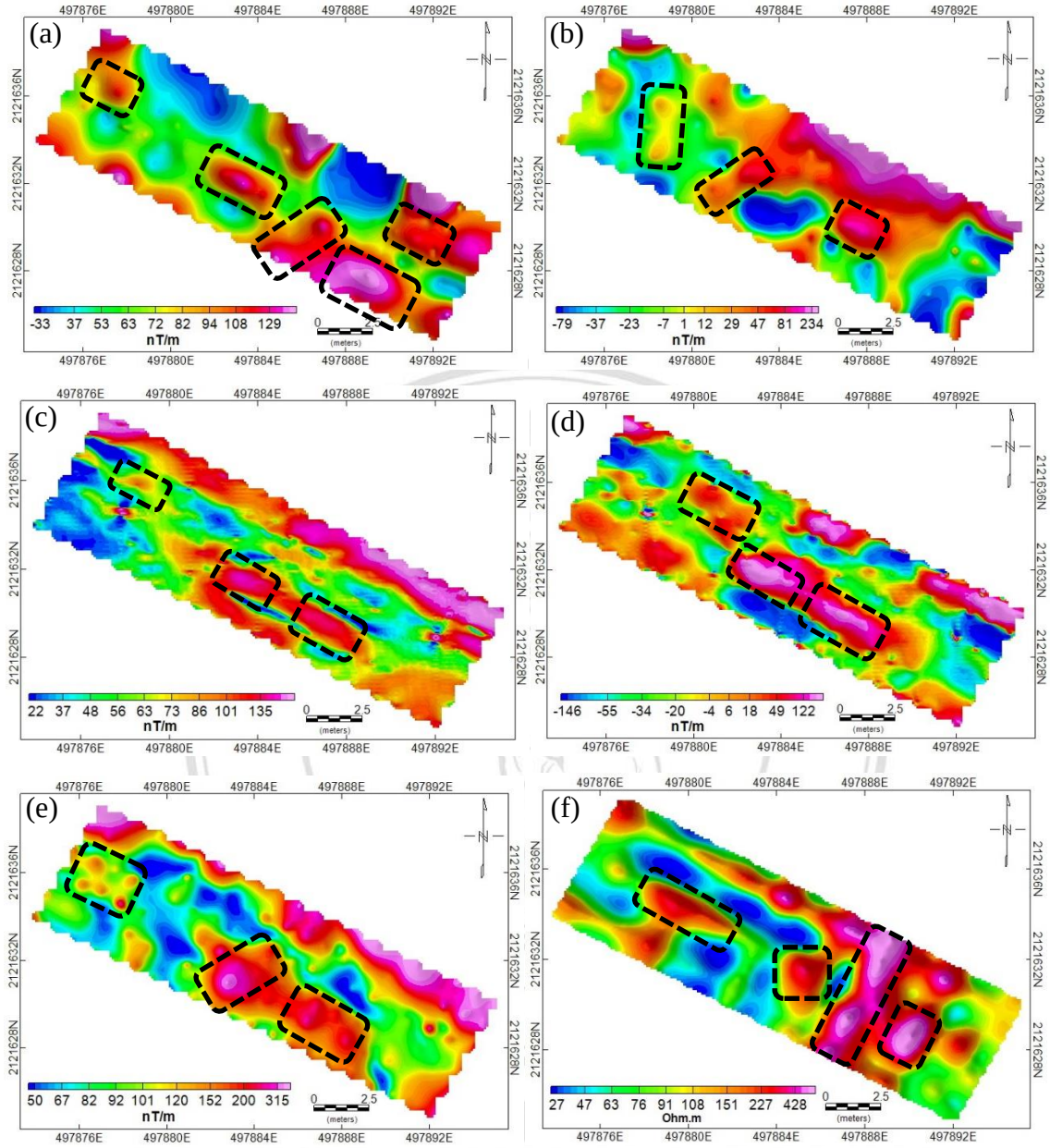

Figure 4.4 Comparison data of Area 1 (Black rectangles are suspect anomaly of kilns).

(a) Horizontal gradient data, sensor distance 0.5 m.

(b) Vertical gradient data, distance sensor 0.5 m.

(c) Derivative of total horizontal magnetic intensity.

(d) Derivative of vertical magnetic intensity.

(e) Analytic signal map of total magnetic intensity.

(f) Resistivity data depth slides at 1.0 m.

Figure 4.5 represents data comparison of magnetic horizontal gradient data (Figure 2.14), vertical gradient data (Figure 2.16), total magnetic intensity data filtered by derivatives (Figures 2.24 – 2.25), magnetic data of analytic signals (Figure 2.27), and resistivity data depth slice (Figure 3.17) in Area 2. Anomalies at depth 1.0 m in Area 2 has most of anomalies at the same position of all magnetic mapped points (black rectangles) may indicate the presence of kilns.

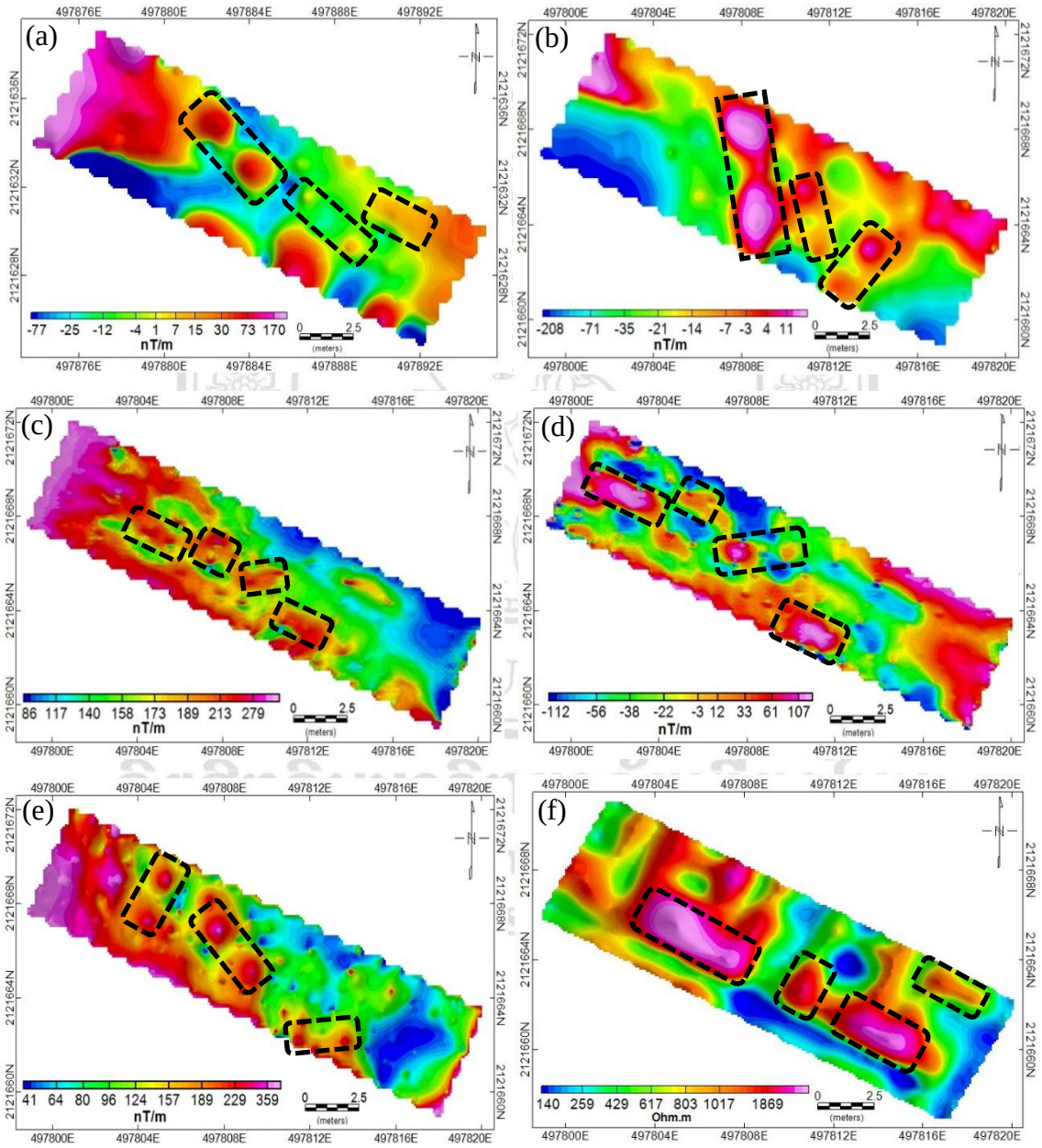

Figure 4.5 Comparison data of Area 2 (Black rectangles are suspect anomaly of kilns).

(a) Horizontal gradient data, sensor distance 0.5 m.

(b) Vertical gradient data, distance sensor 0.5 m.

(c) Derivative of total horizontal magnetic intensity.

(d) Derivative of vertical magnetic intensity.

(e) Analytic signal map of total magnetic intensity.

(f) Resistivity data depth slides at 1.0 m.

4.4 3D Visualization of the Areas

The kiln structures are more clearly traceable in these 3D visualizations. In addition, the archaeological structures are displayed by volumetric values beyond transparency in the visualization.

All resistivity tomography values from different depths are rendered in 3D volumes of Area 1 (Figure 4.6). Anomalies have an apparent resistivity of 50 Ohm.m, and are poised in the southeast (SE) to northwest (NW), at depths of 0.5 - 1.5 m. The dimensions of anomalies are circa 2x3 m, and the coordinates of anomalies lie in a position 497880E/2121635N (black circle).

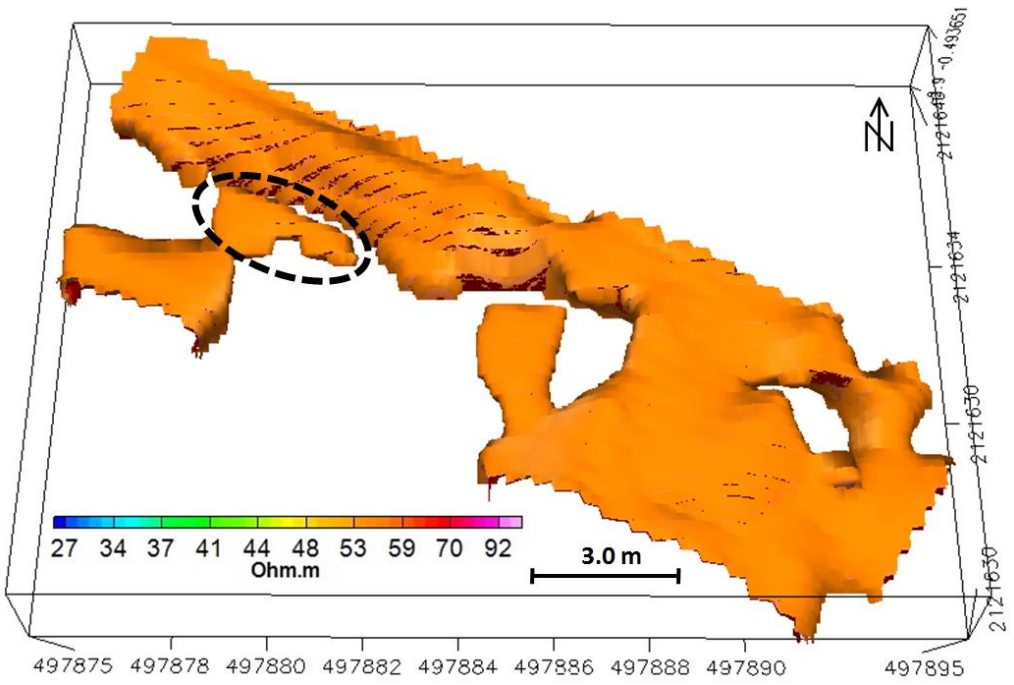

Figure 4.6 3D resistivity volumetric representation in Area 1 (Black circle is suspect kiln).

All resistivity tomography values from different depths are rendered in 3D volumes of Area 2 (Figure 4.7). Anomalies have an apparent resistivity of 350 Ohm.m, and are poised in the southeast (SE) to northwest (NW), at depths of 0.5 - 1.5 m. The dimensions of anomalies are circa 2x3.5 m, and the coordinates of anomalies lie in a position 497814E/2121660N (black circle).

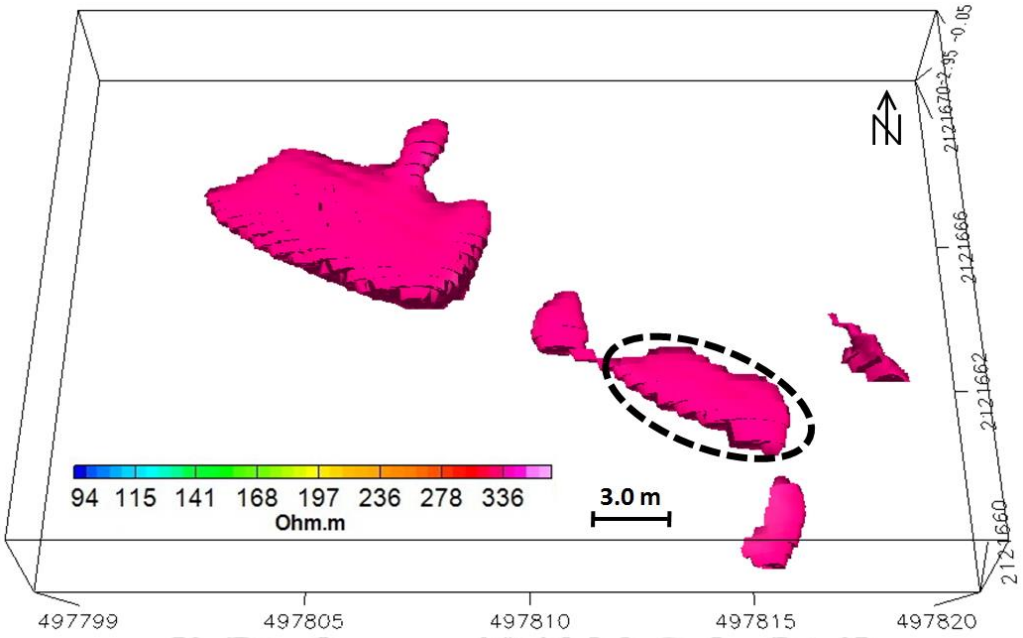

Figure 4.7 3D resistivity volumetric representation in Area 2 (Black circle is suspect kiln).

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