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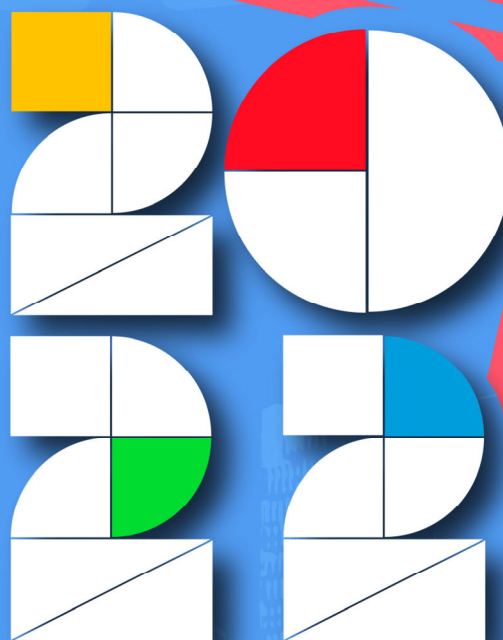
Technology, Science, Social Science & Humanities
International Conference 2022

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Reengineering
Knowledge &
Creativity for
Global Excellence

30
June



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TECHNOLOGY, SCIENCE, SOCIAL SCIENCES AND
HUMANITIES INTERNATIONAL CONFERENCE
TeSSH 2022***

**Reengineering Knowledge and Creativity
for Global Excellence**

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**Papers presented online at
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30 June 2022
UiTM Cawangan Kedah, Merbok
Kedah, Malaysia**

UNIVERSITI TEKNOLOGI MARA CAWANGAN KEDAH

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Foreword

The papers compiled in these e-proceedings are papers presented online at Technology, Science, Social Sciences and Humanities International Conference 2022 (TeSSH I 2022) held on 30 June 2022 at Universiti Teknologi MARA (UiTM) Cawangan Kedah, Kedah, Malaysia. With the theme, ***Reengineering Knowledge and Creativity for Global Excellence***, the conference has brought together presenters of diverse background who shared their conceptual and empirical papers in broad areas that are subsumed under the fields of Technology, Science, Social Sciences and Humanities. These e-proceedings comprise current researches that were undertaken with the rigorous endeavour of knowledge enhancement to ensure that the world of academia will continue to flourish. It is thus hoped that readers will significantly benefit from knowledge contained in these proceedings.

TeSSH I 2022 and these e-proceedings would not have been possible without the great efforts from the presenters, and the generous support from the TeSSH I 2022 committee members and the Rector of UiTM Cawangan Kedah, Prof. Dr. Mohamad Abdullah Hemdi. A heartfelt gratitude is extended to all involved. It is hoped that these e-proceedings will be an impetus to stimulate further studies and research that benefit the society at large.

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Underground Mapping For Islamic Mausoleum

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ABSTRACT

The mausoleum is the final destination after a human being dies. The issue related to the mausoleum is a relatively sensitive issue among family members who have lost a family. The mausoleum chosen for burying or conducting the funeral ceremony depends on the wishes of the family members of the deceased. The problems faced by the management of mausoleums are faced by various types of mausoleums such as Muslim, Chinese, Indian, Christian mausoleums, and others. Problems faced by those who intend to develop areas close to the mausoleum which is strategic for the economic development for local population. Hence, to track or carry out the process of mapping the mausoleum. This is to prevent the planned development does not interfere or damage the existing mausoleum. Especially old unmarked mausoleums or tombstones for Islamic mausoleums have been lost or damaged as a result of human or natural disasters such as floods, landslides, earthquakes and so on. As a result, the GPR (Ground Penetrating Radar) measurement method has the potential to solve the problems faced by the mausoleum management. For mausoleums, GPR can penetrate to a depth of up to 12 feet. Meanwhile, for high-density areas, GPR can assist in identifying mausoleum plots that are still there but unmarked or have been lost. The outcome of the research will hopefully be useful for any stakeholders of mausoleum to better manage its existence.

Keywords: GPR, Mausoleum, Underground mapping

INTRODUCTION

The management of mausoleums has always been a discussion at various levels either among the public or at the administrative or local government level. The diversity of races and religions in Malaysia is a challenge in managing mausoleums. Muslims in particular are not exempt from issues or problems identified are the lack or absence of Islamic mausoleums in an area, density, damaged and abandoned mausoleums, the issue of waqf land does not gazette and encroachment.

Excavation and relocation of mausoleum are among the last few alternatives in solving problems related to Islamic mausoleums. However, it requires cooperation and management from various authorities. Our country has been hit with several issues related to Islamic mausoleums. Among them, is the discovery of hundreds of old mausoleums believed to be over 100 years old at the bottom of Tasik Pedu, Kuala Nerang, Kedah in 2005 (Nasron, 2015). Therefore, the move-to-move mausoleum is seen to help solve this kind of problem which mainly involves old mausoleum.

The management of non-Muslim mausoleum, especially Christians especially in America and Europe has adopted several high-tech methods in mapping mausoleum, including mapping using the Global Positioning System (GPS) and Ground Penetrating Radar (GPR).

GPR measurement in mausoleum mapping is a foreign approach in mausoleum management in Malaysia. However, this technique has been widely used in Western countries. Underground mapping techniques can detect any physical disturbance to mausoleum and identify unmarked mausoleum plots.

This is because there are many old mausoleums that are not marked, or the markers are missing due to irregular record keeping. There are also cases where mausoleum markers are missing due to natural disasters such as earthquakes, tornadoes, typhoons, and floods. The use of GPR is seen as potential in resolving some issues of Muslims mausoleum in the country. Techniques used abroad can be utilized in the management of Islamic mausoleum such as identifying the location of unplanned burial grounds, relocation of mausoleum sites and conservation of mausoleum.

GPR is a geophysical method that uses radar pulses for subsurface mapping. This non-destructive method uses electromagnetic radiation in the microwave (UHF/VHF frequency) band of the radio spectrum, and detects signals reflected from subsurface structures (Siow & Mazlan, 2013 & Pust, 2019). GPR can be used in a variety of mediums, including rock, soil, ice, clean water, layers and structure. This technique can detect objects, changes in material, cavities, and cracks (Khakiev et al., 2019).

GPR uses a transmitter and receiver antenna or just one that contains both functions (Giannino et al., 2021). The transmission antenna transmits high-frequency short pulse radio waves into the ground (Sherrod et al., 2012). When waves hit an embedded object or obstruction with different dielectric constants, the receiving antenna will record variations in the received signal. acoustic impedance.

The GPR depth rate is influenced by the electrical conductivity of the ground, the transmitted center frequency, and the radiation strength (Alsharahi et al, 2016). The higher the conductivity, the lower the penetration rate. This is because electromagnetic energy is more quickly absorbed as heat, causing a weakness in signal strength at depths (Harry, 2009 and Geophysical Survey System Inc, 2011). High frequencies however do not penetrate as far as low frequencies but provide better resolution.

The optimum depth of penetration is achieved in ice where the depth of penetration can reach several hundred meters. Good penetration can also be achieved in dry sandy soils or large dry materials such as granite, lime and concrete where the penetration depth can reach 15m. For moist or clay areas and soils with high electrical conductivity, the penetration is sometimes only a few centimeters.

GPR has applications in several fields including geology, archeology, environment, engineering, military, forensics, mining, and utilities (Eyre et al., 2016 and Pajewski et al., 2015). For geology, GPR is used to study rock layers, soil, groundwater content and ice. In archeology, GPR application is used. In addition, GPR in the field of environment serves to detect land reclamation, contaminated materials, and waste. For the field of engineering, to make non-destructive testing (NDT) on soil structure, investigating embedded evidence in the field of forensics also uses GPR (Beben et al, 2012 and Eyre et al, 2016). Meanwhile, for the application of GPR in the field of utilities, it serves to provide information for the purpose of mapping communication lines, electrical cables, water pipes and gas pipelines below the ground.

The use of GPR in the mapping of mausoleum with radar can determine the shape of the human body that has decayed due to the increase of organic matter in the soil. Radar can also detect changes made to the soil structure when excavation is done (Arnold, 2015; Eyre et al., 2016) will return to its original state. GPR is a camping technique in identifying old mausoleum. For mausoleum, GPR can usually penetrate to a depth of up to 12 m. GPR can be used in verifying the accuracy of old or idle records. Sometimes, records may be lost or not well preserved. Natural disasters such as floods can also easily damage mausoleum by causing mausoleum to settle causing the surface of mausoleum to be damaged.

For a high-density area GPR can help identify the remaining mausoleum and maintain a suitable distance between the mausoleums. GPR is also very helpful when there is a development project near the mausoleum. It can identify boundaries and ensure no mausoleum protrude from. When a mausoleum is identified through GPR, it will be marked with a picket or measuring flag and its position will be measured with optical equipment or GPS. An AutoCAD plan showing all marked and unmarked mausoleum is produced as a record.

OBJECTIVES

The objective of this study is to assist the Department of Religion in solving problems related to mausoleum in terms of:

1. Trace the remains that are still in the mausoleum at Taman Kelisa, Parit Raja, Batu Pahat Johor for development purposes.
2. Test the ability of GPR (Ground Penetrating Radar) in providing feedback related to the remains in the mausoleum.

METHODOLOGY

Among the equipment that will be used in conducting this study is the Noggin SmartCart GPR. Noggin is a complete GPR system in one package. This user-friendly high-performance system provides real-time display via DVL (Digital Video Logger) display unit. In addition to accurate positioning, users obtain results directly in the field.

This device is created for rugged activities, Noggin SmartCart GPR can operate in various environments whether hot or rainy and can be stored at outdoor temperatures. Lightweight units can be moved from one location to another and provided in several configurations. Measurement work will be carried out easily and faster.

Radio detection RD 316 Metal Detector is a magnetic induction magnetometer that uses patented technology in which the sensor is electronically stabilized for high performance which is for objects such as storage tanks, drums and iron pipes up to a depth of 4.5m (Ghani et al., 2013). The device has features such as audio tones that sound when detecting embedded objects, LCD screen that shows the signal strength in the form of bar graphs. High sensitivity especially in high density areas.

Total station is an optical measuring instrument used in surveying work today. It is a combination of theodolite and distance measuring instrument (EDM). Total station type Nikon DTM-352 Electronic Total Station. Nikon Electronic Total Station combines several key features such as optics high quality Nikon, on-board measurement program and ideal design. Nikon optical lenses and ideal design. Nikon optical lenses provide brighter and clearer image visuals even in low lighting environments and less distortion even in long distance measurements, allowing better scrutiny more accurate in each measurement.

EKKO MAPPER is a software for producing depth maps and cross-sections of GPR data. The process from measurement data to production only takes a few minutes, making GPR mapping work easier and more efficient. The main features of EKKO MAPPER software, a structured interface system, integrated program environment to display various cross-sections and depths. Variable resolution to optimize data processing.

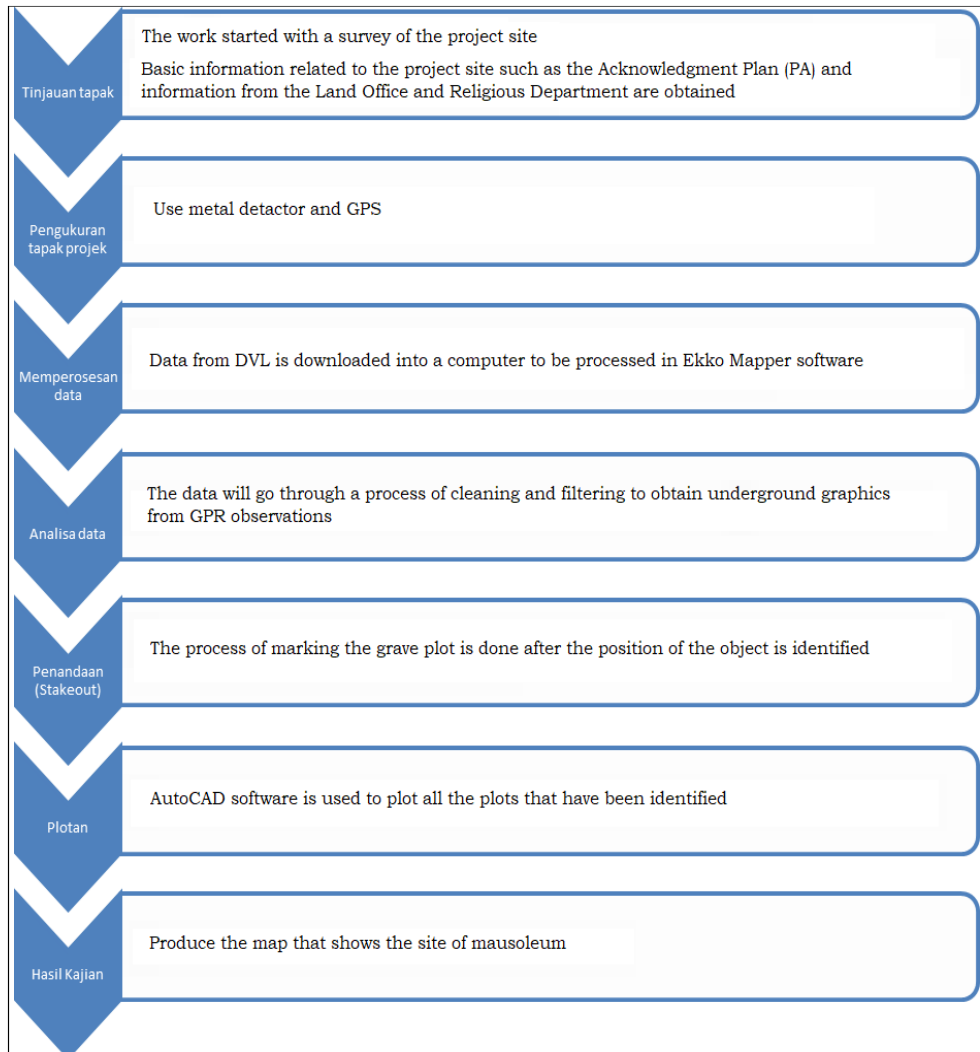


Figure 1: Research Methodology

Site Investigation

The work started with a survey of the project site first as shown in Figure 1. This is important to ensure the mapping work runs smoothly. Before that, basic information related to the project site such as the Acknowledgment Plan (PA) and information from the Land Office and Religious Department are obtained first. Evidence from local residents was also taken because the location of the area is so close to the residential area in addition to the information that can help to facilitate the work in the field. In addition to PA, references are also made using satellite images. This is to ensure that proper planning can be done before the survey work is started.

Measurement

Based on tests made at the site, the metal detector responds to the tombstones found. So, the earliest process is to detect the distribution of tombstones that may be under the mound of soil. The specific area is used as a test site with an area of 20 m x 20 m grid. The grid matches are marked using pickets and paint.

After the grid is identified, the process of creating a survey line and scanning using GPR is carried out. Scanning is repeated in several survey lines until the entire grid is complete.

GPR observation data is monitored from time to time to see the potential of the area traversed in the survey line.

Measurements are made using the Total Station with reference to the datum, which is the boundary stone from the nearby lot. The purpose of this measurement is to establish a survey control station in the scanning grid area.

Data Analyzation

1. Data from DVL is downloaded into a computer to be processed in Ekko Mappersoftware.
2. The data will go through a process of cleaning and filtering to obtain undergroundgraphics from GPR observations.
3. The following is an example of a slicing map, cross-section and long-section at a depthof 2.7m. Figure 2 and 3 show the result.

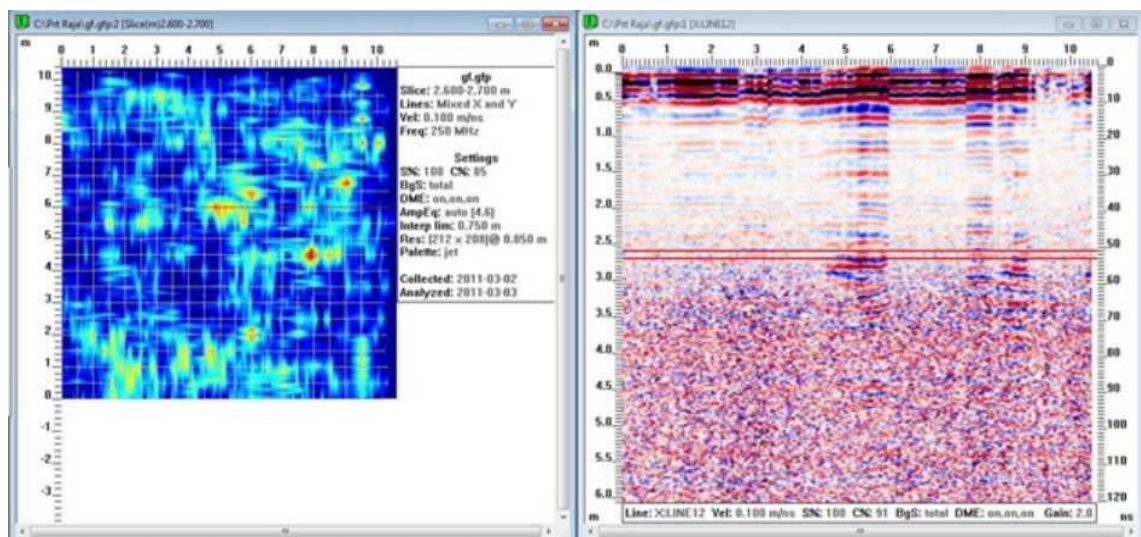


Figure 2: Slicing map (left) and cross-sectional map (right)

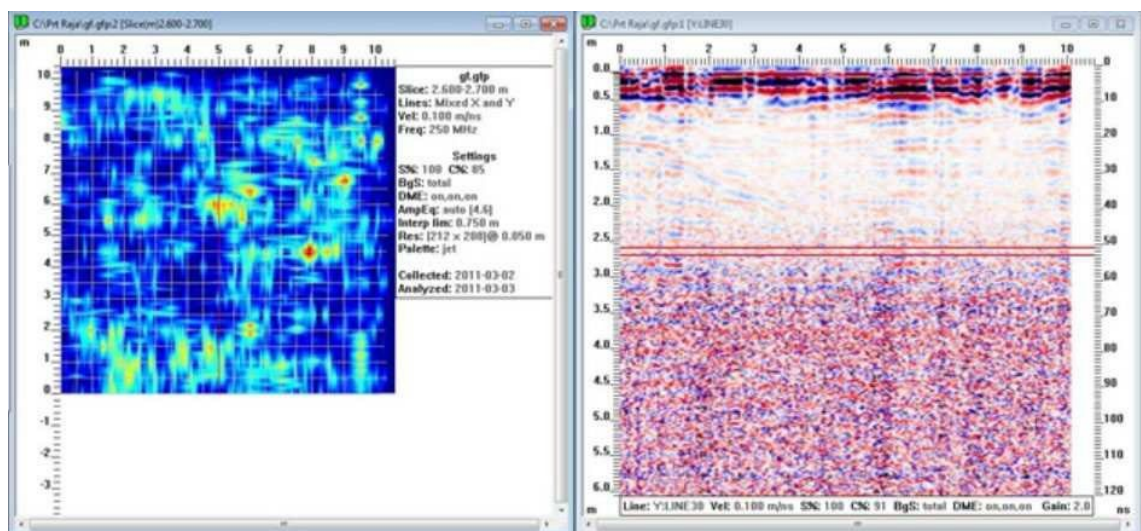


Figure 3: Slicing map (left) dan longitudinal cross section (right)

Stakeout

The process of marking the mausoleum plot is done after the position of the object is identified. This process is done by making a stakeout using a GNSS receiver device guided by the local Cassini coordinate system.

ANALYSIS

Figures 4 show the cross section made on the observation data using GPR technique, Ekko Mapper software has successfully detected some anomalies in the soil in the area that has been made grid scanning. loose or empty due to the process of excavation done for the purpose of burying the body. And it is believed to be a burial pit or mausoleum based on its depth of about 3 m or 10 feet based on the method of excavating Muslim mausoleum.

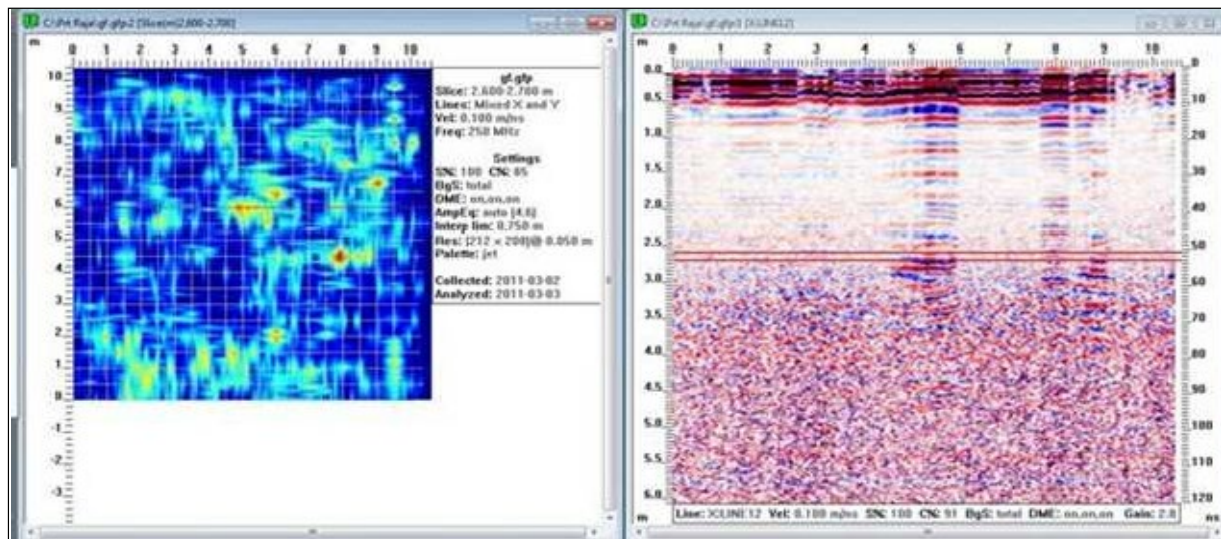


Figure 4: Slicing map and longitudinal cross section at 2.7m depth

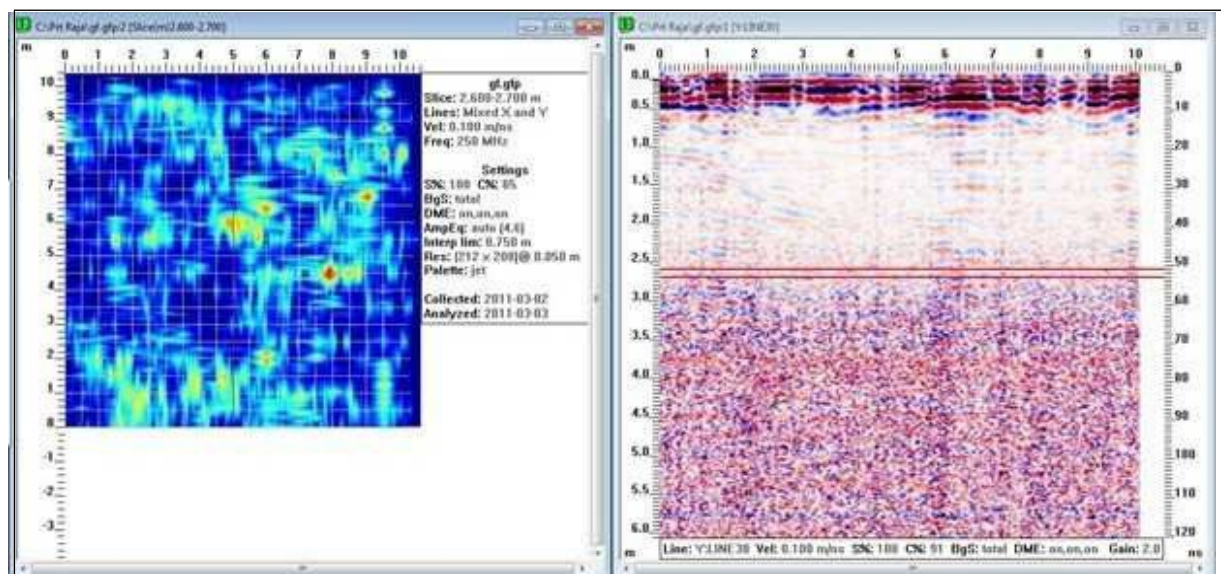


Figure 5: Results of a plotted 3D

Figure 5 shows the results of a plotted 3D map showing that no real objects could be detected at a depth of 1.5 m. But the situation changes significantly when many objects are detected at a depth of 2.8 m in Figure 6. However, when the depth reaches 3.1 m, the presence of objects decreases which is shown in the GPR data. The data obtained show there are objects at a certain depth.

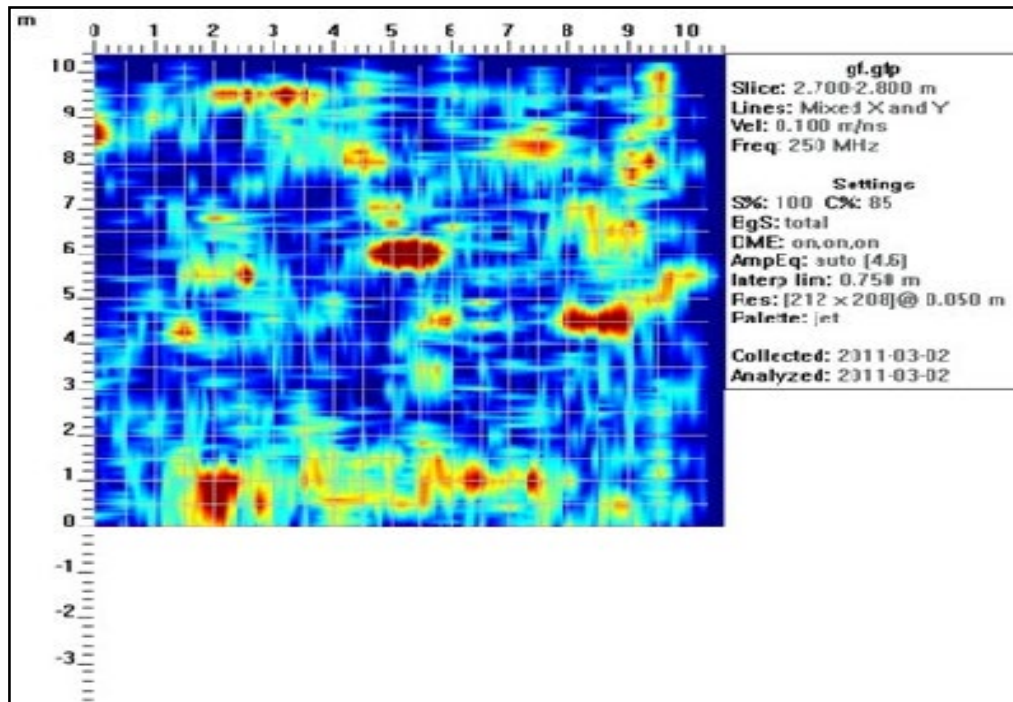


Figure 6: Slicing map and 3D map at 2.8m depth

The process of marking the mausoleum is done after the position of the object has been identified. This process is done by making the marking using a GNSS receiver (Global navigation Satellite System) based on the local Cassini coordinate system. GPR techniques that have been run. AutoCAD software is used to plot all the plots that have been identified. The process of excavation and removal of mausoleum can be carried out after the coordinates of each mausoleum have been obtained.

CONCLUSION

In conclusion, underground mapping of Islamic mausoleum using GPR technique has the potential to identify and determine mausoleum plots that cannot be identified, missing the position, lost markers (tombstones) or those that have been submerged due to natural disasters. Therefore, it can address problems related to the mausoleum transfer process and locating mausoleum sites for the purpose of mausoleum site relocation and land reclamation for development purposes.

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