

# Microgravity Methods to Characterize the karst structures in, northwest Algeria

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## Introduction

A gravimetric study was conducted on a site located at Tlemcen, a city of western Algeria, where it was intended to build residential buildings. During the excavation for the preparation of foundations, cavities were discovered. This is confirmed by visual inspection. The study area is geologically composed of dolomitic limestone jurrassique, characterized by strong permeability caused by cracking and karstic formation

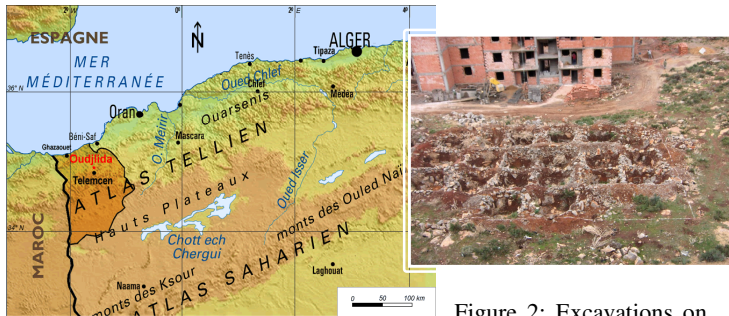


Figure 1: Study area



Figure 2: Excavations on the ground

## Geological setting

the study area is occupied by essentially sedimentary formations formed by carbonate rocks of the compact uniform and karstic dolomite type (Figure 3). These dolomites which date from the middle Jurassic have a very important thickness. They are characterized by a high permeability due to cracking and calcification.

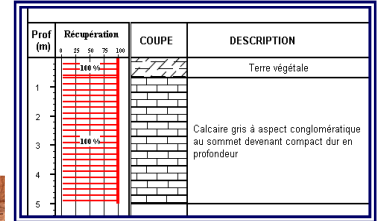


Figure 3: Geological log

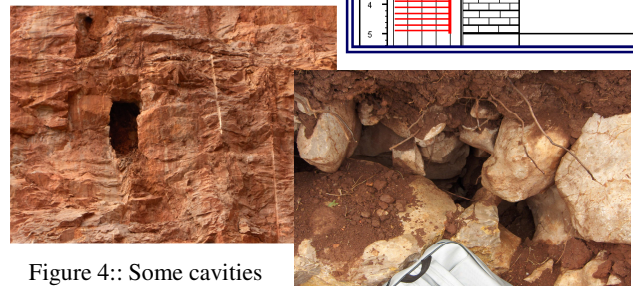


Figure 4: Some cavities observed

## Methodology

The geophysical method more appropriate in this case is the microgravimetric. The gravimetric campaign which lasted 15 days is composed of more than 1000 stations measures and was realized on several zones at the site with a step of 2.5 m. All these stations have been identified topographically.

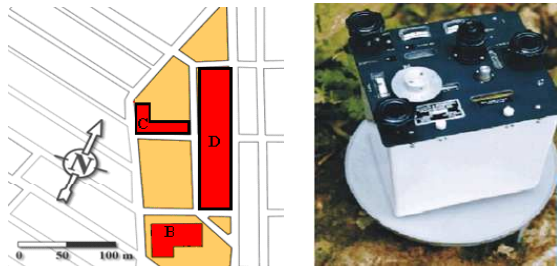


Figure 5: the areas studied

LACOSTE-ROMBERG  
Modelé D

## 3D models

The 3D modelling has been realized using software developed by students « MIG3D », based on the algorithm of Talwani (Talwani & all 1960), it has determinate location and dimensions of the cavities detected ( fig. 8 and 9).

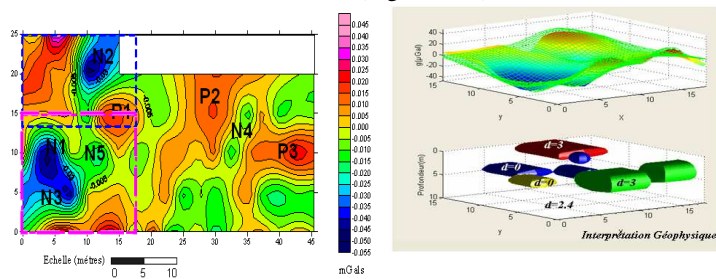


Figure 8 : Residual gravity anomalies (C) Figure 9 : 3D density model

## Results and discussion

The Bouguer anomaly map presents a short-wavelength gravity low which reaches a minimum value up of - 33.190 mGal. A qualitative analysis of this map showed that the relative gravity lows is related to the mass deficit. Some of the anomalies detected by microgravimetric are fig 6 and 7) well correlated with cavities observed on the surface. Mass deficits have been assimilated as underground cavities and that can present a danger to the stability of buildings

Parcel A

Parcel B

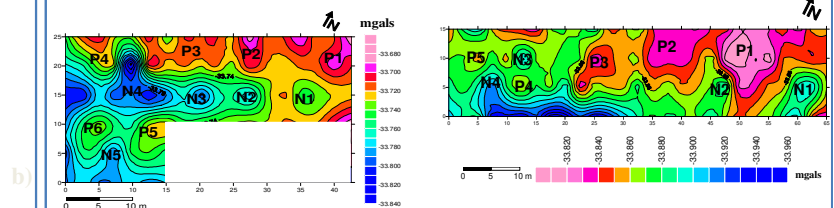


Figure 6 : Bouguer gravity anomalies

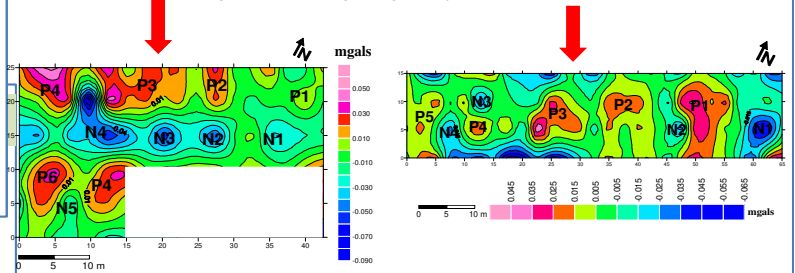


Figure 7 : Residual gravity anomalies

## Conclusion

The results of the geophysical prospecting by microgravimetry method undertaken in the city of Tlemcen show that the negative anomalies highlighted can correspond to mass deficits. The cavities observed on the surface have correlated well with the structures detected. Mass deficits can be likened to underground cavities which can present a danger for constructions