Detection of ancient latrines within the Chambord Castle (France) foundation by using microgravimetric survey



Introduction

Ancient works have blocked the accesses to latrines of achaeological interest. Memory of their number and location has been lost. These installations often contain furniture potentially rich in terms of castle life knowledge. The microgravimetric method is well suited to seek for these buried caves.



Typical latrines:

The known latrines offer the possibility to calibrate expected anomalies, in order to plan the survey and to lay down the spatial sampling and required accuracy. (Drawing E. Johannot)



Method

The microgravimetry method consists in measuring the gravity variations resulting from underground density heterogeneities. The practical unit is the microGal, which also equals 10-8 m/s². A representative expected anomaly reaches 10 to 50 microGal.

Instrumentation

Measuring the gravity (g) by using a microgravimeter (here a Scintrex CG-3M device) requires a few minutes. The probe is based on the measurement of the position of a mass suspended with a spring made of silica. Thermostatisation should be better than 1/1000 K within the spring chamber. The survey is carried out by measuring over a 2m X 2m grid to draw up an anomaly map.

Processing and interpretation

Several basic corrections are necessary, like the tidal one or the thermal drift reduction. However, the most important work consists in taking in account the attraction of the castle's structures themselves, which significantly contribute to the observed gravity value. To process, close walls and towers are split in numerous blocks for which the proper contributions are stacked to estimate the actual attraction. The figures below ilustrate these steps.



Final maps

Anomaly maps finally obtained by subtracting the calculated model from measured data are overlaid on castle plans (figures below). The geophysicits then validate a posteriori the data coherence and can estimate the void's depth and volume. Later, archaeologists drill through the floor to reach the cavities, here successfully.



Nicolas FLORSCH (University ParisVI) Sylvain CAILLOUX (Chambord Castle Christian CAMERLYNCK (University Paris VI) Isabelle GUYOT (Geophysicist) Dominic HOFBAUER (Chambord Castle) Muriel LLUBES (University of La Rochelle) Mikhail KARPYTCHEV (University of La Rochelle)De Delphine ORSEAU (University of La Rochelle) Henri ROBAIN (Institut de Recherche pour le Développement) (All France)





Found cavities:

Robert de Parme's tower





