

## **Characterization of archaeological structures using the magnetic method in Thaje archaeological site, Saudi Arabia**

Rozan Alkhatib Alkontar (1), Paul Calou (1), Jérôme Rohmer (2), and Marc Munsch (1)

(1) UMR 7516, Institut de Physique du Globe de Strasbourg (IPGS), École et Observatoire des Sciences de la Terre (EOST), University of Strasbourg, Bâtiment Blessig, 1 rue Blessig, F-67084 Strasbourg cedex, France., (2) UMR 7041 Archéologie et Sciences de l'Antiquité, Pensionnaire de la Fondation Thiers (CNRS / Institut de France), 21, allée de l'Université, F-92023 Nanterre cedex, France

Among the surface methods of exploration that have been developed to meet the new requirements of archaeological research, geophysical methods offer a wide range of applications in the study of buried deposits. As a result of the most recent development, the magnetic field- prospection method is very efficient to highlight buried foundations even if the corresponding construction material is weakly magnetized like, for example, limestone. The magnetic field, that is being measured in a specific place and at a specific time, is the vector sum of the main regional magnetic field, the effect of subsurface structures, the temporal variation (mainly solar influence) and local disturbances such as power lines, buildings, fences . . .

The measurement method is implemented by using an array of fluxgate 3-components magnetometers carried 1 m above the floor. The advantage of using vector magnetometers is that magnetic compensation can be achieved. An array of four magnetometers are used to survey the archaeological site of Thaje (100-300 yr BC), Saudi Arabia, and to obtain a precise location of measurements, a differential global navigation satellite system is used with an accuracy of about 10 cm relative to the base station. 25 hectares have been surveyed within 13 days and data are compile to obtain a total magnetic intensity map with a node spacing of 25 cm.

The map is interpreted using magnetic field transforms, such as reduction to the pole, fractional vertical derivatives. Tilt-angle. The results show a fairly precise plan of the city where main streets, buildings and rampart can be clearly distinguished.