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Magnetic mapping and interpretation of an archaeological site in Syria

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Among the subsurface methods of exploration that have been developed to meet the new requirements of archaeological research, geophysical methods offer a very wide range of applications in the study of buried deposits.
In their latest developments, the prospecting method based on the measurement of the magnetic field is particularly effective at very different types of sites, ranging from prehistoric times to the most recent.
The measured magnetic field observed at a place and at a time, results from the vector sum of the main regional field, the effect of subsurface structures, local disturbances such as power lines, buildings, fences, and the diurnal variation (solar influence).
The principle of the magnetic method is, from magnetic measurements on a flat plane above the prospected surface, to study the three-dimensional variations of magnetization producing the magnetic anomalies.
The use of magnetic surveys for archaeological prospecting is a well-established and versatile technique, and wide ranges of data processing routines are often applied to further enhance acquired data or derive source parameters.
The main purpose of this work was to acquire new magnetic data on the field and to propose quantitative interpretations of magnetic maps obtained on three archaeological sites of Bronze Age in Syria (Badiyah ANR program).
More precisely, some results are presented concerning one of the three sites, the Tell Al-Rawda-site which corresponds to a circular city of Early Bronze Age with a radius of about 200 m. Several profiles are used to characterize magnetizations.
A large portion of archaeological geophysical data are concerned primarily with identifying the location and spatial extent of buried remains, although the data collected are likely to contain further information relating to the depth and geometry of anomalous features.
A simple magnetic model corresponding to rectangular structures uniformly magnetized associated to walls cannot explain the magnetic anomalies. On contrary, the shape of the magnetic anomalies implies to propose magnetized or non-magnetized structures with a width of several meters. To fit completely the shape of the magnetic anomaly, an iterative algorithm is used consisting of modifying the shape of the top of the magnetized layer.