

# DAKHLEH OASIS

## MAGNETIC SURVEY 1999-2000

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*The research was part of the Dakhleh Oasis Project (DOP) directed by Prof. Anthony J. Mills.<sup>1)</sup> Objectives included magnetic surveying of Ein el-Gezareen, the Old Kingdom site in the western part of the Oasis, between the towns of el-Qasr and Gedida, in the modern district of Mushia. The site was originally tested and appears in the DOP index as 32/390-K2-2.<sup>2)</sup> A probe 10 by 15 m excavated by A. J. Mills in 1997-1998 revealed mudbrick architecture and fill that contained substantial ash deposits.*

*The goal of the magnetic survey was to provide data on the extent of the settlement and its layout. The results were expected to be useful in view of the big contrast between mudbrick walls and the filling of the rooms in terms of magnetic properties, as well as the relative closeness of the remains to the surface.*

1) Fieldwork in 1999 was carried out by Tatyana Smekalova (Physical Institute, St. Petersburg State University, Russia) and Tomasz Herbich (Polish Center of Archaeology, Warsaw University). In 2000, Mr. Herbich was unable to participate and T. Smekalova continued the fieldwork alone.

2) A.J. Mills, "Dakhelh Oasis Project. Report on the Second Season of Survey, September-December, 1979", *Journal of the Society for the Study of Egyptian Antiques* X, (Toronto 1980), 257-258.

## METHOD AND EQUIPMENT

Two different instruments were used for the survey. Smekalova used Overhauser magnetometer GSM-19WG by Gem systems (Canada). One sensor of the instrument served as a base point; the signal of the traversing sensor and the base station were subtracted to remove temporal daily variations of the Earth's

magnetic field. Herbich used a fluxgate gradiometer FM-36 by Geoscan Research (England).

The measurements were taken along lines 0.5 m apart, the actual points of measurement on a line being spaced 0.3-0.4 m (Overhauser) and 0.5 m (FM-36). Survey height was c. 0.3 m above the surface.

## SURVEY RESULTS

The surveyed area covers 3.86 ha. The results are presented as a gray-scale magnetic map,

negative anomalies coming up as black and positive anomalies as white (Fig. 1).

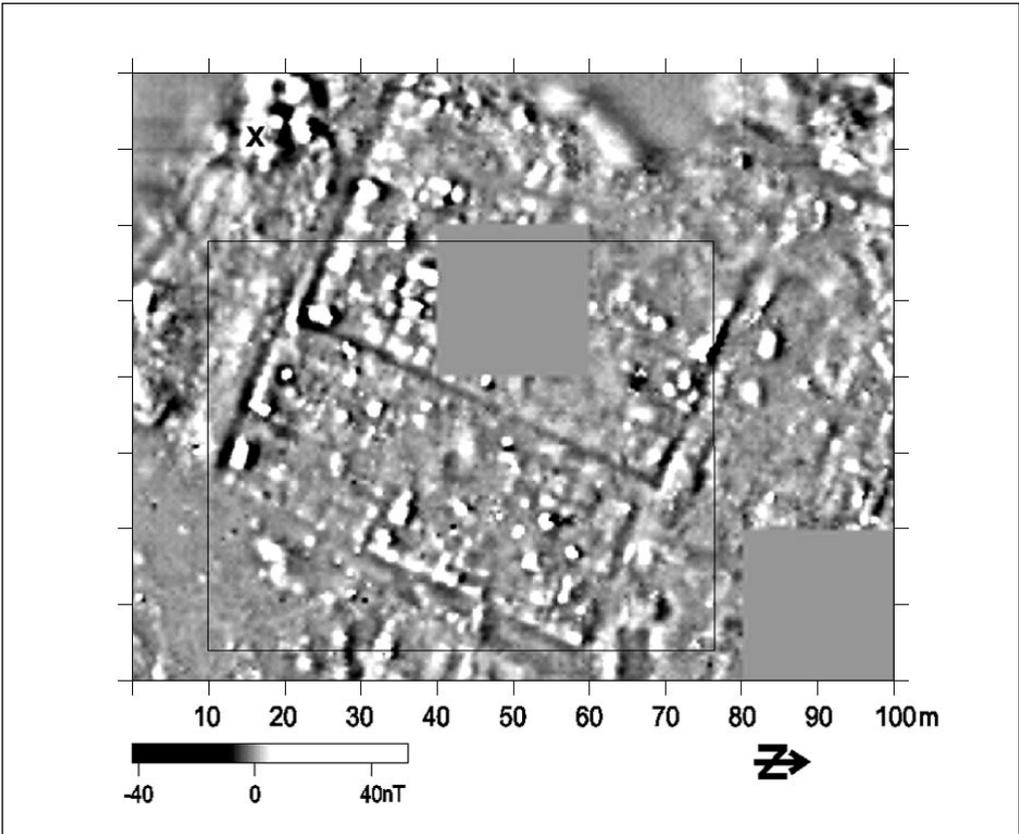


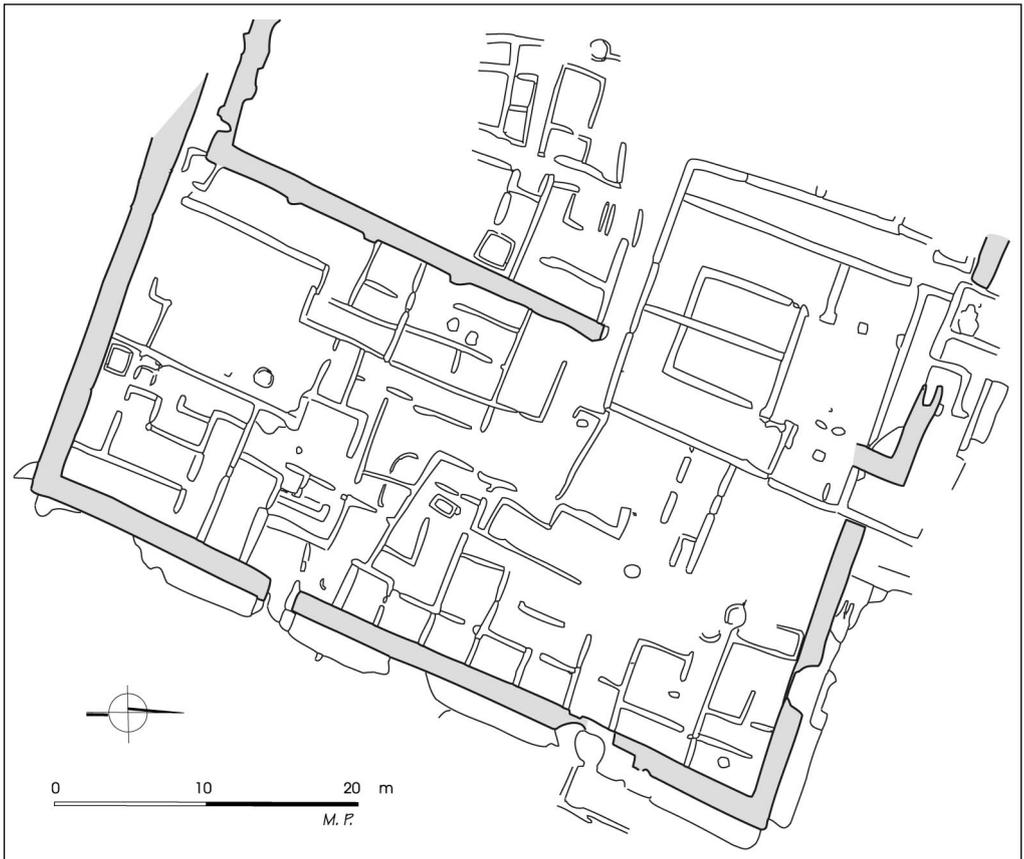
Fig. 1. Magnetic map showing the eastern part of the settlement. Measurement using Fluxgate gradiometer FM 36. Raster 0.5 x 0.5 m. The rectangular frame in the picture corresponds to the area covered in Fig. 2 (Processed image T. Herbich)

The survey revealed a big rectangular structure, measuring 54 by 112 m, with a mutually perpendicular grid of linear negative anomalies and positive local anomalies. The short axis of the structure is about 25 degrees from north to east. Based on test excavation results, one can easily suppose that the grid of linear anomalies reflects the walls of habitations. The big rectangular structure could be an enclosure wall, about 1-1.5 m thick. Local positive anomalies could correspond to ovens, kilns, ashes.

The main enclosure consists of three parts: eastern, central and western. The eastern part (54 by 20 m) is slightly

displaced to the south, suggesting that it had been constructed at a different time than the other parts. Surface clearing of the eastern part of the enclosure, carried out by A.J. Mills in 2000, revealed a plan that shows good correspondence with the magnetic map (*Fig. 2*).

The survey revealed several groups of very strong anomalies outside the main structure (e.g., structure marked as "X" in *Fig. 1*). The high amplitude of values could suggest that the anomalies correspond to industrial areas, probably pottery kilns, situated outside the enclosure wall because of the danger of fire.



*Fig. 2. Schematic plan of the eastern part of the settlement after clearing the tops of walls in 2000 (Drawing M. Puzkarski after A.J. Mills)*

## CONCLUSIONS

The magnetic survey at the site of Ein el-Gezareen confirmed the effectiveness of the magnetic method for the investigation of mudbrick architectural remains. It is so far the best example of the application of magnetic research in the Egyptian oases.

The possibilities of tracing mudbrick structures have been demonstrated recently also by the results of magnetic surveys, which have been carried out in

Qantir<sup>3)</sup> and Tell Farkha<sup>4)</sup> in the Delta. The speed, with which the measurements are taken (it took about 12 hours of work to survey the area presented in *Fig. 1*), as well as the amount of information contained on the map demonstrates the high potential of the method in archaeological research wherever the archaeologist has the need to investigate extensive areas.

3) E. Pusch, "Towards a map of Pyramesse", *Egyptian Archaeology* 14 (1999), 13-15; E. Pusch, J. Fassbinder, "Palast-Tempel-auswaertiges Amt? Oder: sind Nilschlammauern magnetisch zu erfassen?", *Aegypten und Levante* IX (2000), 135-153.

4) M. Chłodnicki, K.M. Ciałowicz, *PAM X, Reports 1998* (1999), 69; *PAM XI, Reports 1999* (2000), 73-74.