



## SATELLITE IMAGERY DETECTION OF A POSSIBLE HIPPODROME AND OTHER FEATURES AT THE PTOLEMAIC-ROMAN PORT TOWN OF TAPOSIRIS MAGNA

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### ABSTRACT

*Satellite imagery processing and subsequent analyses have revealed additional suggestive architectural features at Taposiris Magna, including a temenos wall and possible subsidiary structures around the main temple, and clarifications regarding the grid network of city blocks, a potential second large temple enclosure, and a suggestive U-shaped feature that matches the design specifications and measurement ranges for hippodromes.*

A recent assessment of satellite imagery of the Ptolemaic-Roman temple and important port settlement of Taposiris Magna (modern Abusir),<sup>1</sup> which lies 45 km west of Alexandria (figure 1), has confirmed and revealed both new and little known architectural features

in the settlement surrounding the central temple complex.<sup>2</sup> In order to enhance subsurface features that are not normally visible, or which are less clear in aerial photographs and unprocessed satellite imagery,<sup>3</sup> Sarah Parcak manipulated Quickbird multispectral satellite data (60 cm pixel resolution)

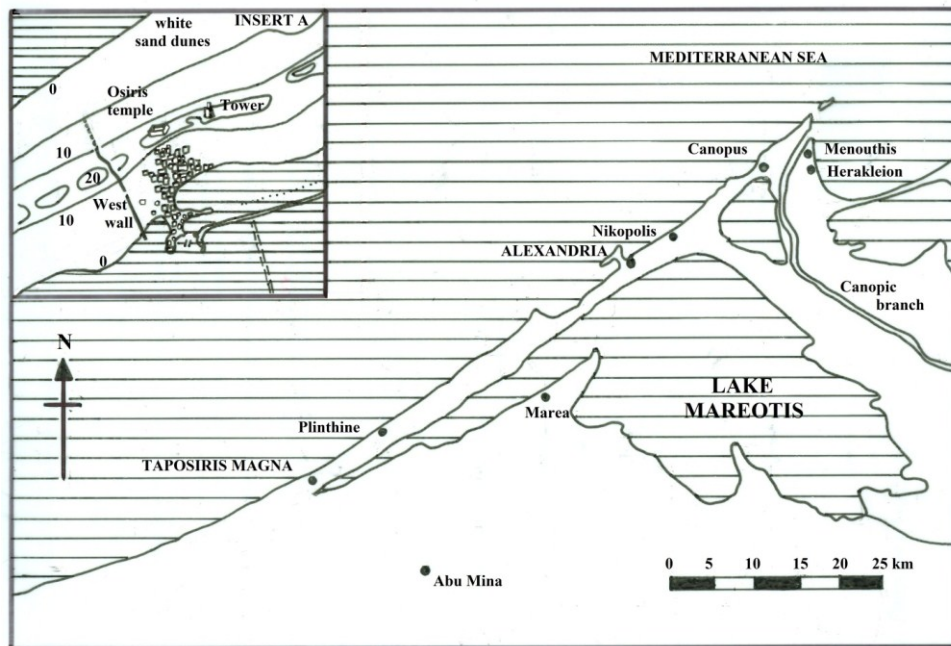


Figure 1: Taposiris Magna and its setting  
(map of Marcotis and environs adapted from Bagnall and Rathbone 2004: 74;  
insert A adapted from De Cosson 1934 map in Vörös 2001: 24)

from February 9<sup>th</sup>, 2009. The late winter date of the imagery enabled her to detect greater differences in plant health: the delta's heavier winter rainfall and differential plant growth and soil moisture retention aided in feature detection. After pan-sharpening the high resolution panchromatic data with the lower resolution multispectral data, she attempted different remote sensing analytical techniques. A basic visual assessment using band combinations allowed her to determine which bands would be most useful for the analysis. Bands 4 (near infrared), 3 (red),

and 2 (green) formed a 432 RGB image. An assessment of vegetation health using a Normalized Difference Vegetation Index (NDVI) found healthier shrubs growing atop several possible structures; using 11 x 11 high pass filters and Gaussian Equalization on the 432 RGB also distinguished additional features. By comparing the NDVI, the filtered imagery, and the visual 432 RGB, Parcak and Mumford found that subsurface architectural features appeared more or less strongly depending on the specific processing techniques used (figure 2).



Figure 2: 432-RGB on a Quickbird pan-sharpened image with 11x11 high pass filter (S. Parcak)



Figure 3: Detail of Osiris Temple (upper left), suggested hippodrome (center right), and network of streets (Sarah Parcak)

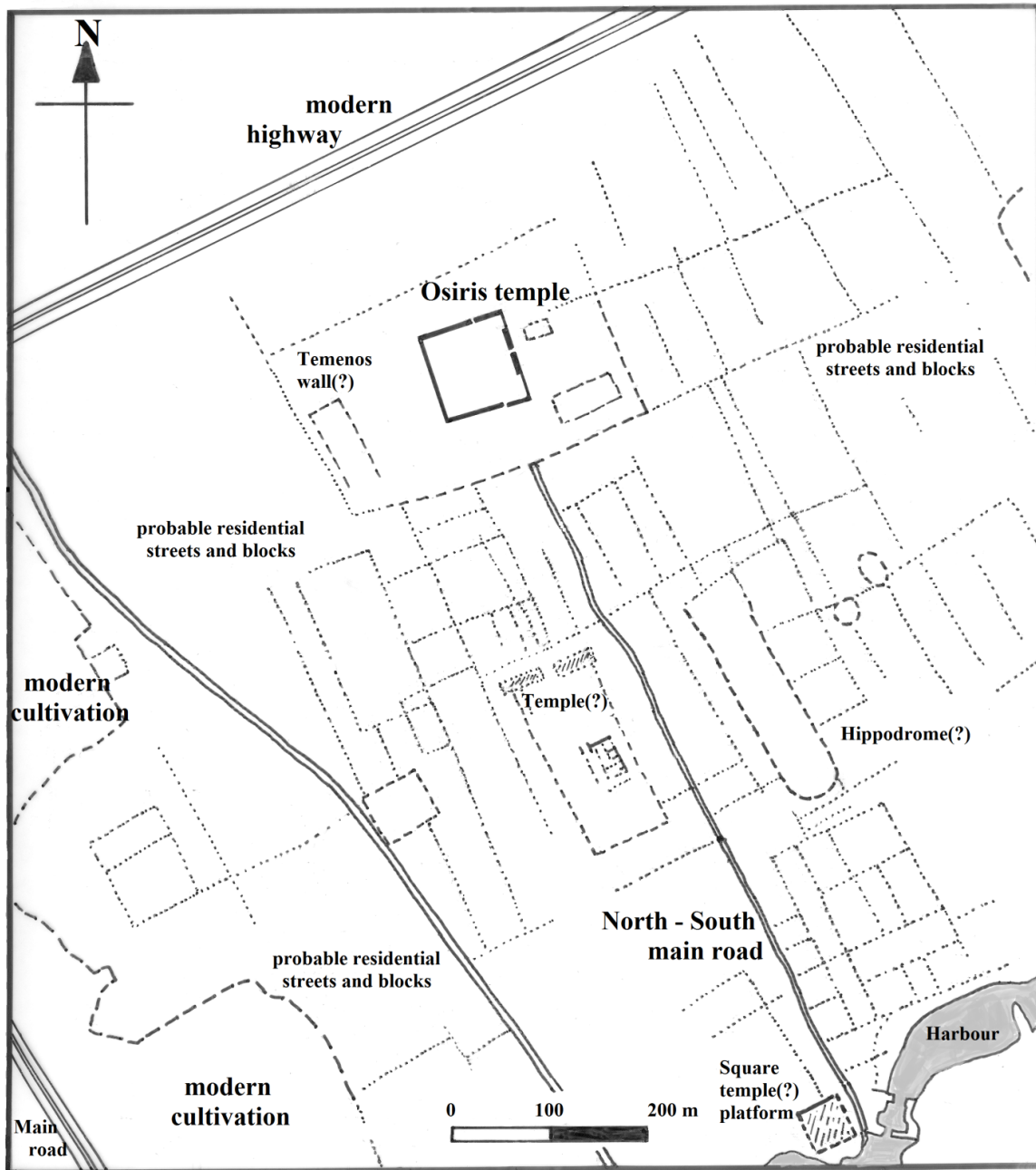


Figure 4: Simplified rendition of major streets, side roads, housing blocks, temples, hippodrome(?), and other features from the satellite image of Taposiris Magna (G. Mumford)

Greg Mumford subsequently assessed and digitized the main architectural features from a 1 by 2 m printout of the processed satellite image (figures 3-4), observing the remains of an apparent outer mud brick enclosure around the main, 86 by 92 m northern, stone temple (dedicated to Osiris),<sup>4</sup> with hints of three outlying rectilinear structures in the main temple precinct; Mumford also traced a grid network of minor to major streets with many residential blocks and a few larger outlying structures, including a square feature (perhaps a temple platform),<sup>5</sup> a potential third temple precinct (between this feature and the main temple), and a depression that is highly suggestive of a

hippodrome (i.e., “race track”). This potential “race track” is located in a distinct U-shaped, shallow depression measuring at least 55–60 m wide by 230+ m long, and is in alignment with the town’s street network. The feature’s dimensions match the lower range for hippodromes elsewhere: for instance, several hippodromes are known in Roman Egypt, such as at Alexandria,<sup>6</sup> Antinopolis,<sup>7</sup> Oxyrhynchus,<sup>8</sup> and Pelusium,<sup>9</sup> while additional examples appear elsewhere in Roman North Africa.<sup>10</sup> However, a surface investigation is required at Taposiris Magna to verify whether this port town had a hippodrome like several, if not many, other substantial settlements in Roman Egypt.

NOTES

- 1 This study was originally funded by the British Broadcasting Corporation (BBC-Wales) as part of a project focusing upon satellite imagery detection of unknown and little known Ancient Egyptian sites.
- 2 Ochsenschlager (1999: 759–60) noted that an earlier town existed here during Alexander the Great’s visit, but it has yet to be found; see Bagnall and Rathbone (2004: 74 figure. 2.5.1, 77–78, figure 2.5.3); Davoli (2010: 351).
- 3 Ochsenschlager (1999: 760–61) describes the exterior town grid network and a main north-south street as being visible, including a western, 2 m wide north-south wall between the Mediterranean and Lake Marcotis (see Vörös 2001: 24, 1934 map of Taposiris Magna); the eastern wall remains undiscovered.
- 4 See Helck (1985: 233); Vörös (2001); *idem* (2004). Arnold (1999: 193–94, figure 144) adds that a naos for Osiris, dedicated by Amasis, may indicate an initial Saite establishment of this temple.
- 5 This probably represents a postulated small temple platform, located near Lake Marcotis in 1975 by Ochsenschlager (1999: 761).
- 6 Bagnall and Rathbone (2004: 42, 56, 62) suggest that Alexandria’s fragmentary hippodrome, located near the Serapeum, extended 500 m in length.
- 7 This hippodrome is 80–90 m wide by at least 315–40 m long (Bagnall and Rathbone 2004: 170–71 figure 6.3.8 plan); Davoli (2010: 361, 365) cites 77 by 307 m; (see google earth: Antinopolis).
- 8 Bowman *et. al.* (2007: 90, 136–37 figure 10.8 no. 1 hippodrome?) reconstruct a 100 m wide by 400 m long race track; this track is dated to the 6<sup>th</sup> century AD (Bowman 1986: 145).
- 9 Bagnall and Rathbone (2004: 85–86 Pelousion [Tell el-Farama]).
- 10 Raven (1993: 112) cites six surviving hippodromes to the west in North Africa, including one at Leptis Magna (Tripolitania).

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