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NON-INVASIVE UNDERWATER RESEARCH IN THE ANCIENT PORT OF PTOLEMAIS, LIBYA. NEW TECHNOLOGIES, NEW PERSPECTIVES

Abstract: Polish archaeological mission of the Faculty of Archaeology of the University of Warsaw led by Dr Piotr Jaworski and underwater reconnaissance led by Artur Brzóska worked in the ancient town of Tolmeitha, Libya, in June 2023. A total of about 5.5 km of coastline was explored, with particular emphasis on the harbour area. By employing a hydroacoustic device the team could create two maps. The first is a bathymetric map showing the depth distribution in the harbour and coastal area of the town. The second is a sonar mosaic that allowed anomalies on the bottom to be observed and tentatively interpreted. Thanks to the courtesy of the Tolmeitha Museum aerial photographs were taken with a drone and later compiled into an orthophotograph. Once all the data were integrated, a plan of the harbour with quays and breakwater was created, enabling reconstruction of the size of the harbour and its key installations.

Keywords: underwater archaeology, archaeology of Libya, antiquity, non-invasive archaeology, Ptolemais

Introduction

In June 2023, the Polish Archaeological Mission of the Faculty of Archaeology of the University of Warsaw, led by Dr Piotr Jaworski, worked in Tolmeitha, the site of the ancient town of Ptolemais. Underwater research was conducted by Artur Brzóska, whose aim was to identify the harbour structures and the coastal zone at the level of the town. The reconnaissance was performed in 500 metre wide strips of coastline with the combined total length of approximately 5.5 kilometres, with a particular focus on the harbour area.

History of research

The location and appearance of the harbour has been studied for many years by numerous researchers, such as Carl Hremann Kraeling,[1] who placed the harbour on the western side of the headland and the anchorage on its eastern side, André Laronde,[2] Monika Rekowska,[3] Kazimierz Lewartowski,[4] or Krzysztof Misiewicz.[5]

[1] Kraeling 1962, pp. 38, 48–51.
[2] Laronde 1986, pp. 167–177.
[3] Rekowska 2015, p. 199.
[4] Lewartowski, Misiewicz 2015, pp. 133–141.
[5] Misiewicz 2015.
[6] Jones, Little 1971.

In the late 1960s, the first regular underwater surveys were carried out by a team of British scholars.[6] As part of a project to study ancient harbours in Cyrenaica, they also surveyed the one at Ptolemais. On the basis of these surveys and new data, a series of maps was produced,[7] providing an important reference point for the current research.

In 2009, an Italian archaeological mission led by Carlo Beltrame carried out an underwater reconnaissance of the eastern bay, disproving theories about the western bay being the location of the main harbour. Their evidence includes fragments of a ship found on the eastern side of the headland—between the island (the smaller one, the first from the headland on the eastern side) and the mainland. However, this find remains undated.[8]

In 2020, a mission of Libyan archaeologists carried out an eight-day underwater search in the eastern bay discovering various artefacts, including Roman-era amphorae.[9]

Equipment and method

The survey used a hydroacoustic detection method to collect data allowing mapping of the water body. A Lowrance HDS 12 sub-bottom sonar was used for the underwater survey. In order to obtain a suitable sonar mosaic effect, a straight line was sailed along the shoreline, obtaining reasonably even images. When these were superimposed, a bottom image was created. Only inside the fishing harbour and around the pier was the sailing path perpendicular to the shoreline, due to the small space of these areas. At each stage, echo sounder information was collected in order to obtain as accurate a bathymetric map as possible. Surveys were carried out from the headland westwards to the rocky islet to the east of the town.

Results and conclusions

The study produced two maps. The first is a bathymetric map showing the depth distribution in the harbour as well as in the coastal area of the town. The second is a sonar mosaic, which allowed the observation of anomalies on the bottom and their preliminary interpretation. Thanks to the courtesy of the Tolmeitha Museum aerial photographs were taken using a drone and then compiled into an orthophotomap of parts of the harbour.

The (bathymetric) depth map shows the distribution of depths in the harbour and a strip of the adjoining coastline (Fig. 1). With it, the size of the harbour could be reconstructed. This is an important insight given the changes in the sea level, which has increased by two to four metres since Antiquity.[10] It shows that the harbour was definitively smaller than the coastline suggests today.

The map of sonar traces allowed tracking anomalies and clusters of features that stood out from the background (Fig. 2). In most cases, these were natural rock formations. In one case, however, elements of a breakwater were found, located to the east of the ancient harbour (Figs. 3–4).

Once all the data had been integrated, a plan of the harbour with quays and breakwater was created, enabling reconstruction of its key installations (Fig. 5). The harbour was bounded to the west by a promontory, divided in the middle by an island and quay installations, and to the east by an island with a breakwater. The central island together with the quays divided the harbour into western and eastern basins. Both basins were accessed through entrances from the north. The western

[7] Yorke, Davidson 2017.
[8] Beltrame 2012, pp. 315–326.
[9] Emrage, Nikolaus 2023, p. 162.
[10] Kraeling 1962, p. 49; Laronde 1989, p. 326.

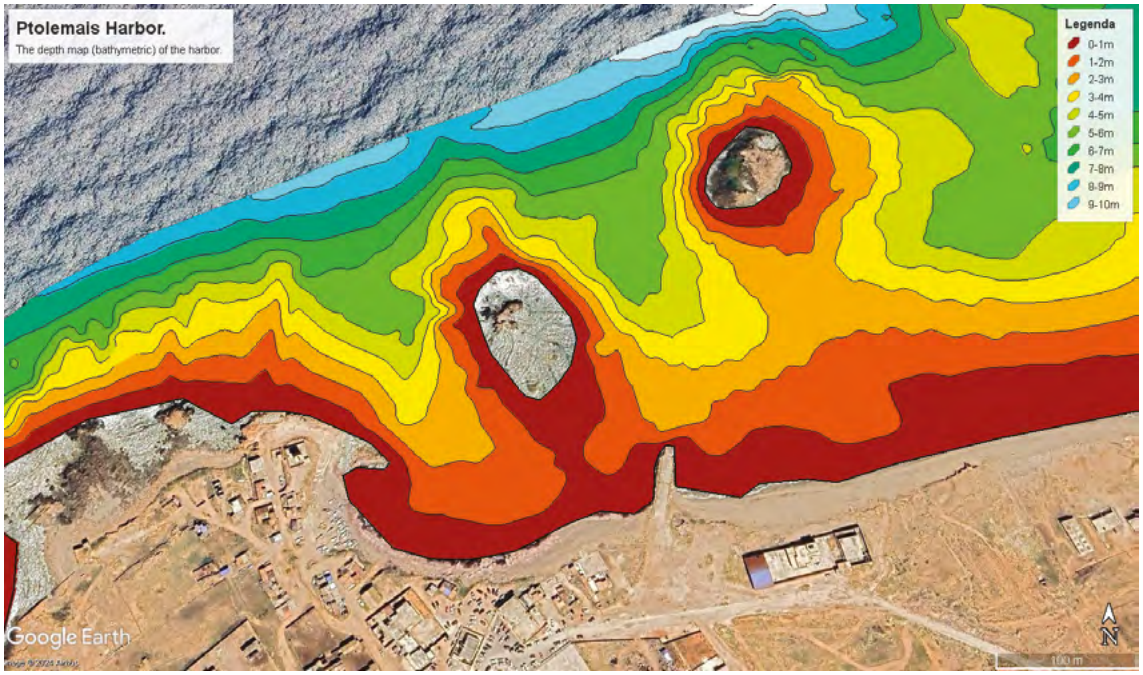

Fig. 1. Depth map (bathymetric) of the harbour (elaborated by A. Brzóska).

Fig. 2. Sonar mosaic map (elaborated by P. Prejs and A. Brzóska).

section measures 1 hectare (80 × 130 m) and the eastern section 3 hectares (180 × 190 m). The maximum depth reaches 5 metres. The division of the harbour space into two basins may have been related to the location of a military harbour in one of them, following the example of Apollonia.[11]

[11] Laronde 1989, p. 325.

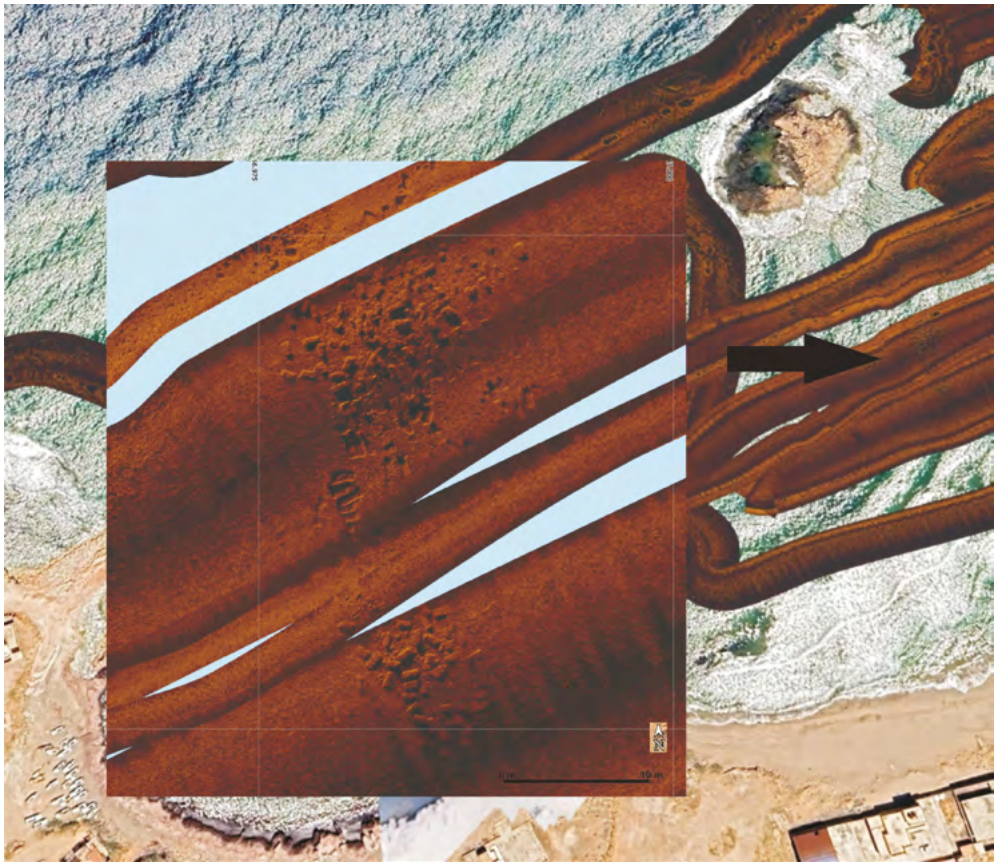

Fig. 3. Sonar mosaic map. Eastern breakwater (elaborated by P. Prejs and A. Brzóska).

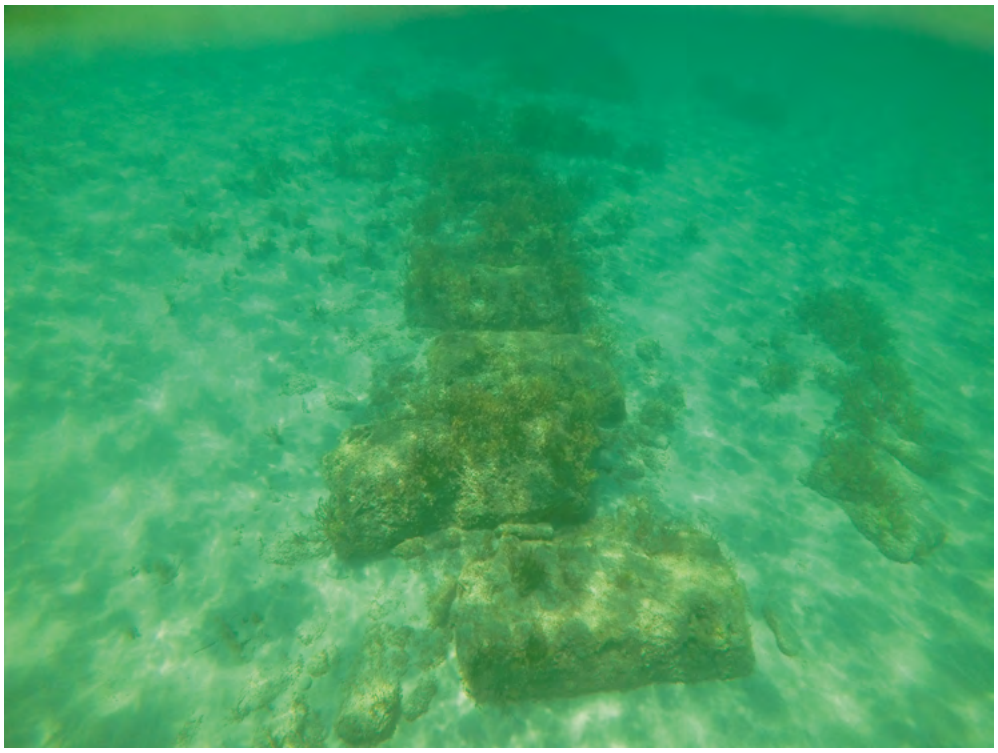

Fig. 4. Eastern breakwater (elaborated by A. Brzóska).

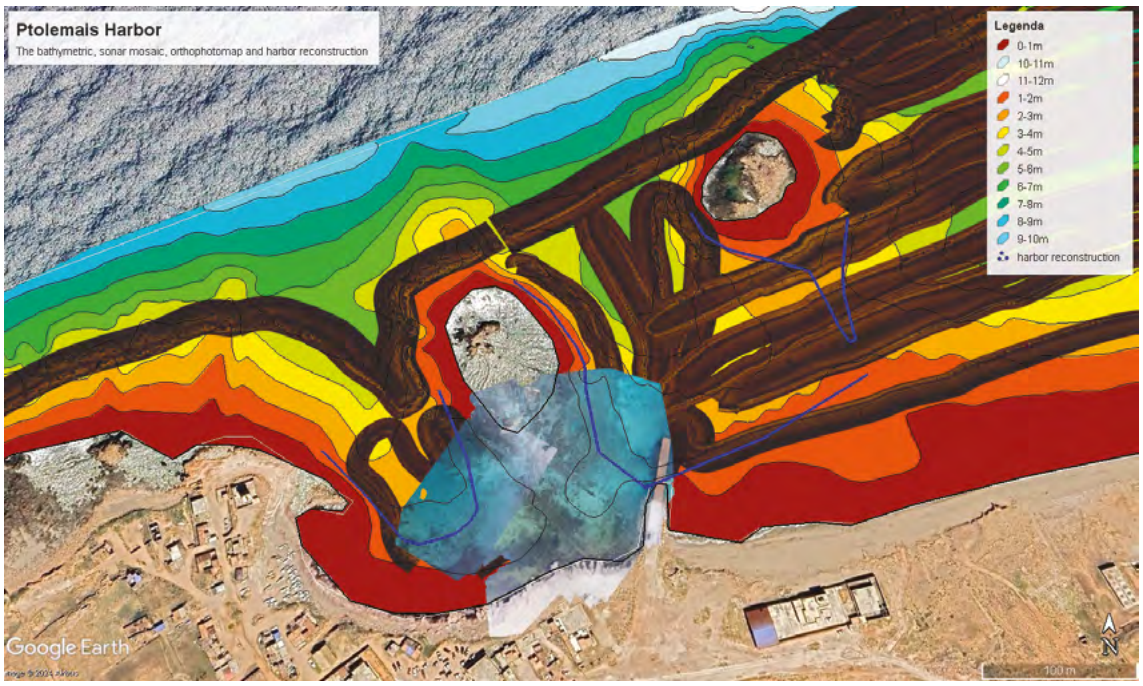

Fig. 5. Integrated plan with harbour reconstruction (elaborated by A. Brzóska).

Further sonar surveys are planned in the coming years. Particular consideration should be given to the harbour space and a small rocky island to the east located approximately 3 kilometres to the east of the harbour. According to local divers, ship anchors and a field of amphorae remains are to be found there. It is important to integrate information from all sources—aerial photographs, sonar images, and underwater photographs—into a single map of this part of the coast.

Bibliography

Beltrame C. 2012	C. Beltrame, "New Evidence for the Submerged Ancient Harbour Structures at Tolmetha and Leptis Magna, Libya", The International Journal of Nautical Archaeology 41.2, pp. 315–326.
Emrage, Nikolaus 2023	A. Emrage, J. Nikolaus, "Coastal and maritime archaeology in Cyrenaica, Libya: history, developments, site identification and challenges", *Libyan Studies* 54, pp. 160–178.
Jones, Little 1971	G. D. B. Jones, J. H. Little, "Coastal Settlement in Cyrenaica", The Journal of Roman Studies 61, pp. 64–79.
Kraeling 1964	C. H. Kraeling, *Ptolemais, City of the Libyan Pentapolis*, Oriental Institute Publications 90.
Laronde 1986	A. Laronde, « Les ports de la Cyrénaïque: Ptolémais et Apollonia; in L'Africa Romana », [in :] Atti del III Convegno di studio, Sassari 13–15 dicembre 1985, ed. A. Mastino, pp. 167–177.
Laronde 1989	A. Laronde, « Recherches sous-marines dans le port d'Apollonia de Cyrénaïque », *Bulletin de la Société Nationale des Antiquaires de France* 1987 (1989), pp. 322–332.
Lewartowski, Misiewicz 2015	K. Lewartowski, K. Misiewicz, "Searching for an ancient port of Ptolemais", [in:] *Ptolemais in Cyrenaica: results of non-invasive surveys*, eds. P. Jaworski, K. Misiewicz, pp. 147–155.

Misiewicz 2015 — K. Misiewicz, "Technical and methodological aspects of non-invasive surveys in Ptolemais", [in:] *Ptolemais in Cyrenaica: results of non-invasive surveys*, eds. P. Jaworski, K. Misiewicz, pp. 1–12.

Rekowska 2019 — M. Rekowska, Ptolemais and Apollonia. Some Remarks about the Planning and Functioning of Two Port Cities in Cyrenaica", [in:] Greco-Roman Cities at the Crossroads of Cultures. The 20th Anniversary of Polish-Egyptian Conservation Mission Marina el-Alamein, eds. G. Bąkowska-Czerner, R. Czerner, pp. 194–206.

Yorke, Davidson 2017 — R. A. Yorke, D. P. Davidson, "The Harbour at Ptolemais: Hellenistic City of the Libyan Pentapolis", *The International Journal of Nautical Archaeology* 2017, pp. 1–24

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