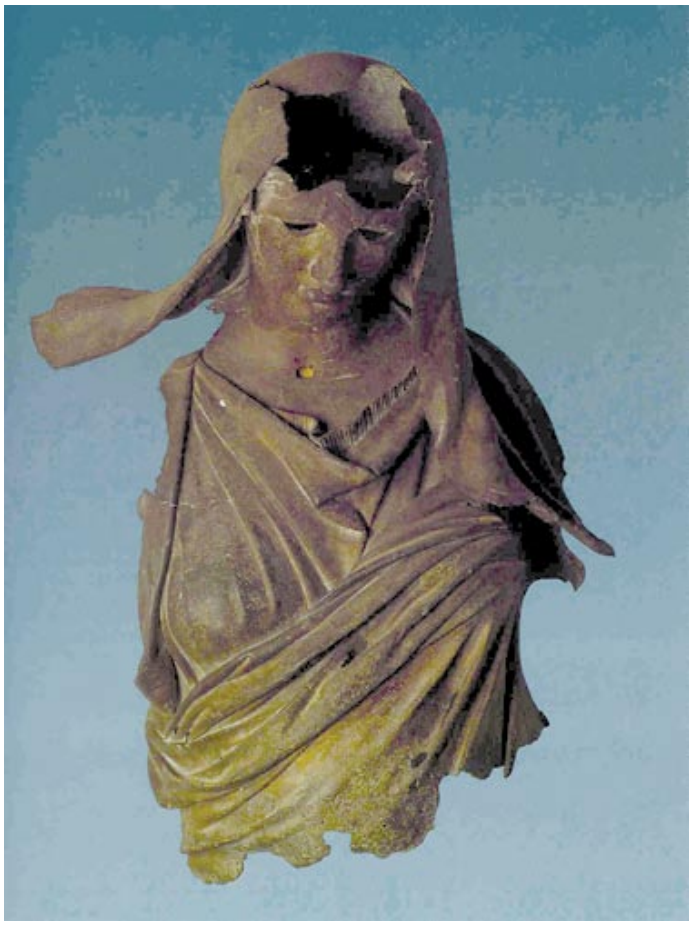
# Report on the Demeter Side Scan Sonar Search and the Aslan Burnu Site Survey, Turkey, 2004

Jeremy Green

Department of Maritime Archaeology, Western Australian Maritime Museum



Report—Department of Maritime Archaeology, Western Australian Maritime Museum, No. 188, 2004.


Figure 1. Map of SW Turkey showing location of Demeter search area and the Aslan Burnu wreck site.

**Introduction**

In late 2003, this author was invited by the Institute of Nautical Archaeology (INA) to take part in the 2004 survey for ancient shipwrecks on the Turkish coast. This was a joint INA–Western Australian Maritime Museum Project and planned to search for the 'Demeter' wreck and carry out a pre-disturbance survey on the Aslan Burnu wreck. The sites are located on the coast west of Bodrum, the Demeter wreck being on the Bozburun Peninsular and the Aslan Burnu wreck on the Datcha Peninsular near Knidos (see Figure 1).

**The historical background to the Demeter bust**

In August 1953, Achmet Erbil, a Bodrum sponge-dragger, 'dropped his trawl 300 meters off the outside point of Arap Adasi, and headed the boat SSW along the shore, passing 300 meters off the first point to the south of Arap Adasi. They continued for less than one mile, pulled up the trawl and found part of a bronze statue in the net.' (Peter Throckmorton, Bodrum Diary, July 3, 1959 and Throckmorton, 1965). It has been variously reported as being found in depths from 80 m up to 100 m, although discussions with captains of *kangava* boats in 2004 suggest that the *kangava* rarely operated deeper than 80 m.

The story of the finding of the Demeter statue is confused. It started in 1958 when Peter Throckmorton, a New York photo-journalist, and Mustafa Kapkin, a Turkish photographer, were drawn to Bodrum because they had heard about the bronze Demeter. In Bodrum they met Kemal Aras, a sponge diver and owner of a sponge-fishing boat, who eventually showed them many an ancient shipwrecks. During this summer two British archaeological illustrators, Honor Frost and John Carswell, heard of Throckmorton's interests and visited him in Bodrum. They interviewed Captain Erbil, but Throckmorton was subsequently unable to locate the wreck site that had yielded the statue (Throckmorton, 1965: 78). It is obvious, according to Throckmorton's account that Ahmet Erbil did not accompany him to the site. 'This was brought home to me at Arap Adasi, where Ahmet Erbil found the famous Demeter nbronze. Mustafa and I mulled over

Figure 2. The bronze Demeter statue in the Izmir Museum.

Figure 3. The Akland Head from the Akland Art Museum.

the chart which we had made from Erbil's description of his find and decided there were only two possible places where a ship bearing the Demeter could have struck'. Frost (1963) first publish the account of the recovery and records: 'Her survival [the Demeter statue] was due to the merest chance. Sheytan was at that time in charge of a *congoa* [*kangava*]…they drew up the Demeter's heavily concreted head. It had torn the net; enraged by this bit of bad luck, one of the younger men said: "Come on, lets throw it back, it's only old rubbish." "What!" said Sheytan, "I'm not retired yet. While I am captain of this boat, I take the decisions. Leave it on deck"' (Frost, 1963: 200). According to Throckmorton (1965: 78) the finder was Achmet Erbil, but this may possibly be the 'Shaitan' Throckmorton (1965: 65) names Ahmet and it is almost impossible to resolve this from the early published accounts. The name of the finder has also subsequently been confused with others and the given names of Erhan and Mehemet in association with Erbil are also mentioned.

After its recovery, the bust was taken back to Bodrum and was abandoned on the beach at Bitez. The eminent English archaeologist George Bean (1953) saw the bust lying on the beach, recognized it as a Greek bronze that he believed to belong to the 4th century BC and ascribed it to be a representation of the goddess Demeter. The statue is an icon of underwater archaeology (Figure 2) and now resides in the Izmir Archaeological Museum.

The Throckmorton group went on to investigate sites at Yassi Ada and the Cape Gelidonya wreck site. From this early survey work by Throckmorton and Frost, a major international excavation of the Bronze Age Cape Gelidonya wreck site was undertaken under the direction of George Bass. This was the turning point in the development of the field of underwater archaeology (Frost, 1963, Throckmorton, 1965). From this early expedition under the auspices of the University Museum of the University of Pennsylvania, Bass went on do other excavations in Turkey and subsequently established the Institute of nautical Archaeology.

The bronze Demeter statue represents a mature woman in a melancholy attitude. The head is bent slightly forward and the hair visible beneath the head covering is combed backwards from each side of the forehead. The top, the back and the section

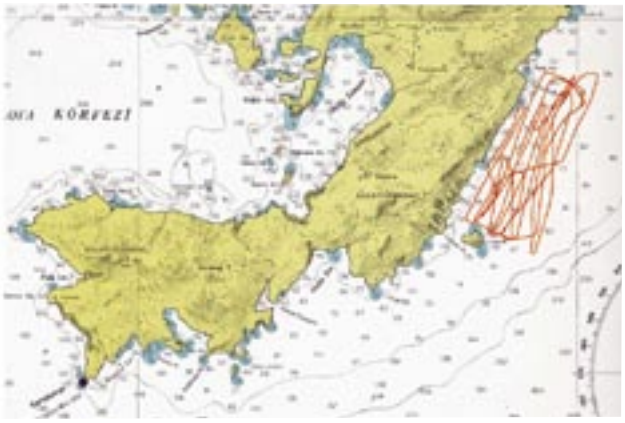


Figure 4. The Rosencrantz survey area in 1967.

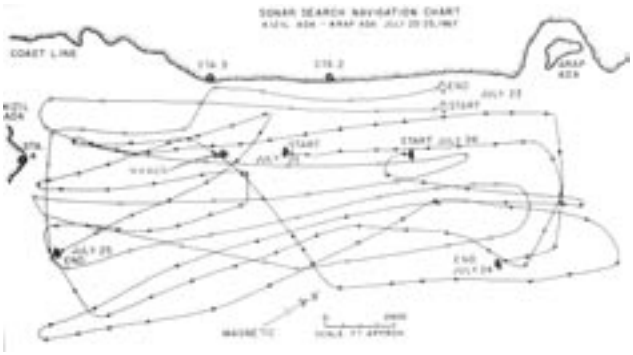


Figure 5. The track of the Rosencrantz survey in 1967.

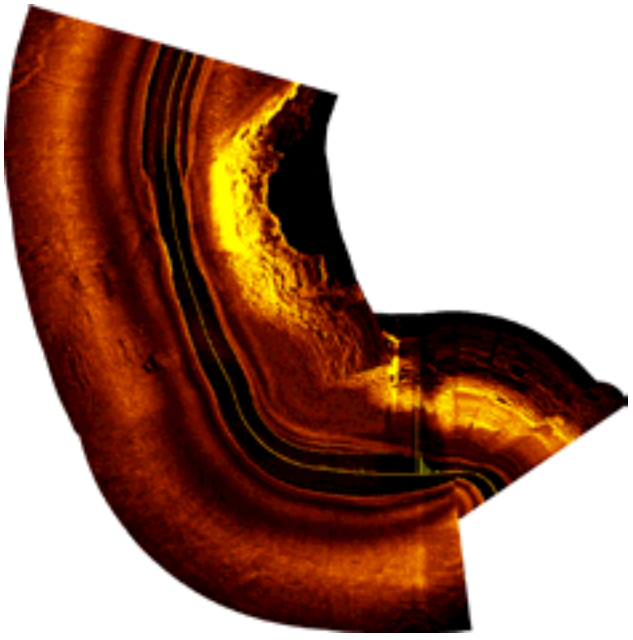


Figure 6. The side scan sonar georeferenced image of sea bed around SW end of Kizel Ada, target on left hand side of track is shown in Figure 26.

Figure 7. Map of the Bozburun Peninsular showing original planned Demeter search area.


Figure 8. Map showing track of the Demeter side scan sonar search area.

Figure 9. Side scan sonar targets 2004.

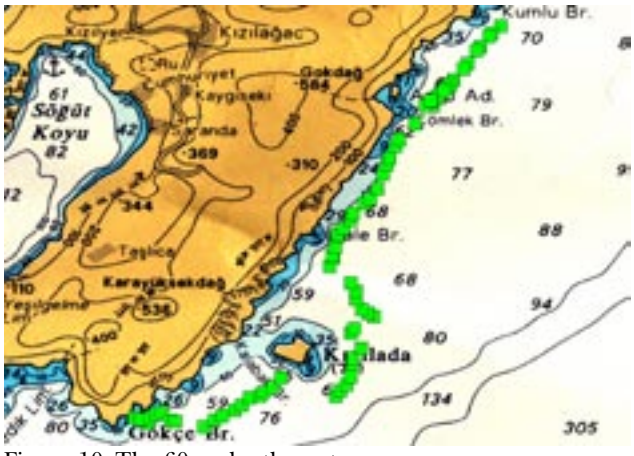


Figure 10. The 60 m depth contour

Figure 11. The sonar search on 11 June.

Figure 12. The sonar search on 12 June.

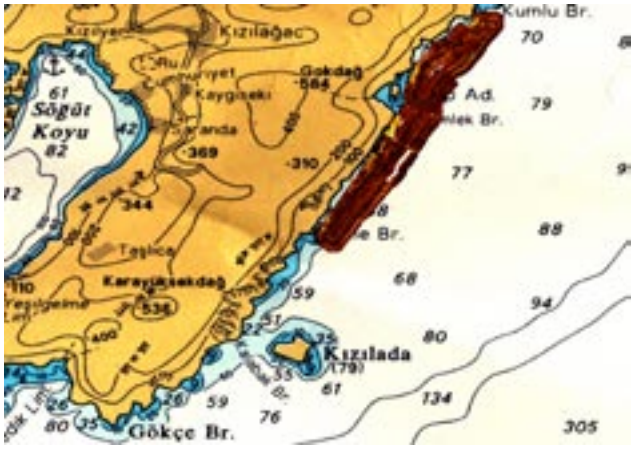


Figure 13. The sonar search on 16 June.

Figure 14. The sonar search on 19 June.

Figure 15. The sonar search on 22 June.

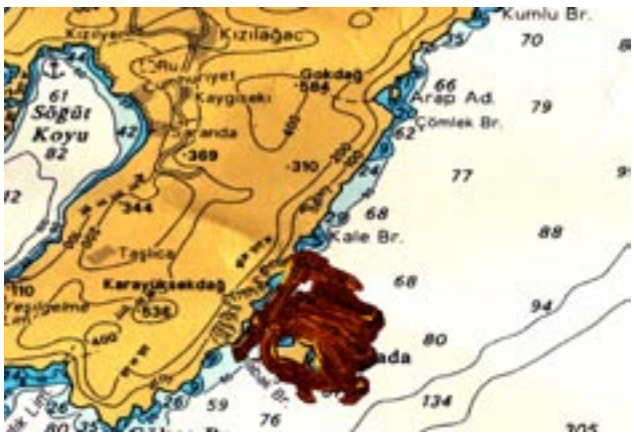


Figure 16. The sonar search on 24 June.

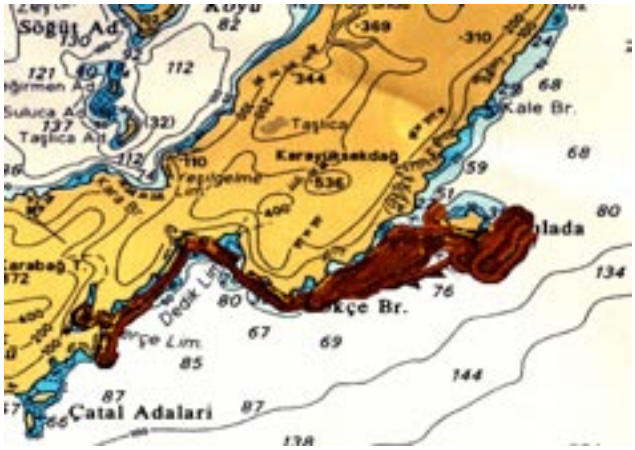


Figure 17. The sonar search on 25 June.

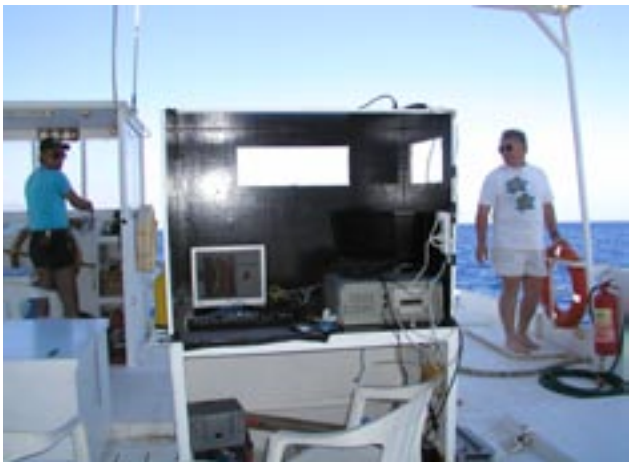


Figure 18. Side scan sonar operations booth showing computer and screen, the steering position on *Millewanda* (left).

Figure 19. Close up of operations booth.

Figure 20. Mark Polzner and Xila Matthews about to deploy the side scan fish, note davit.

Figure 21. The submersible *Carolyne* about to dive.

Figure 22. The submersible *Carolyne* underwater.

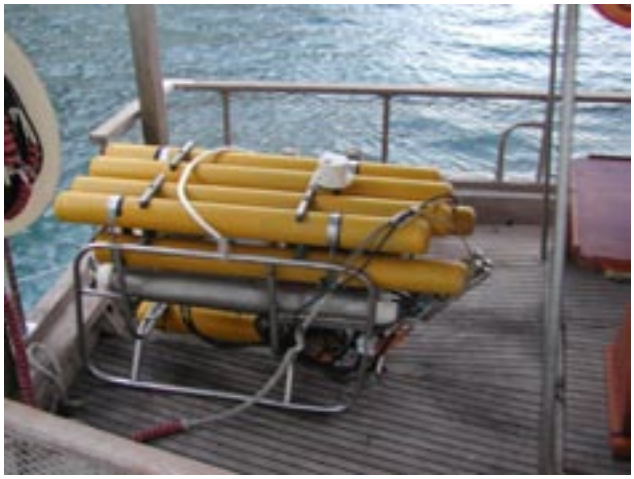


Figure 23. The ROV used to inspect the deep water sites.

Figure 24. A lead stocked anchor on the Kizel Ada dive site.

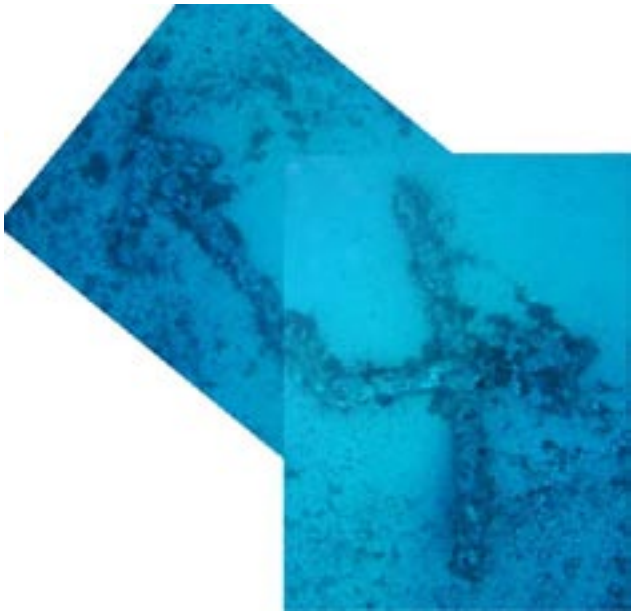


Figure 25. A large iron anchor, possibly Byzantine at Kizel Ada site.

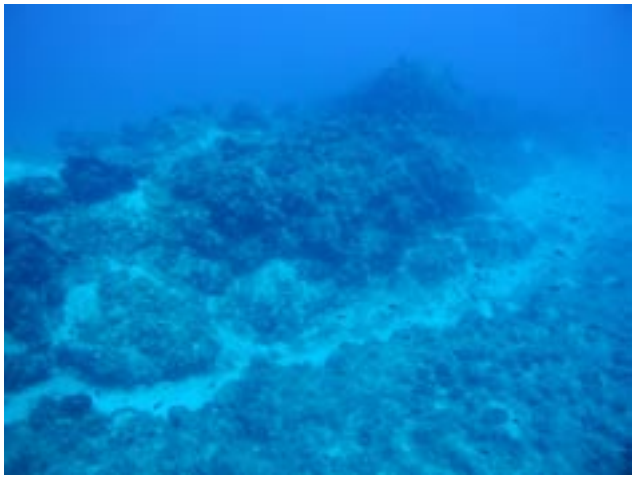


Figure 26. The large rock outcrop sonar target.

below the waist are broken and missing. She is wearing a himation which covers her head and left breast and is then wound round the body in folds, to pass under the right breast. Under the himation she is wearing a peplos which folds in such a way as to reveal the right breast. At the neck a part of the chiton can be seen beneath the peplos. The statue has been described by Ridgway (1997a & b), who dates it early 3rd century BC and questions Bean's ascribing the statue to the goddess Demeter.

Life-size original Greek bronzes from the 5th and 4th centuries BC are rare (only 4 from the 5th century and not many more from the 4th century). Most of the studies of statues from the Classical Period are from Roman marble copies or from literary references. The Demeter bust could have been part of a cargo of Greek statues plundered by the Romans from a Greek sanctuary, or, simply, a statue being delivered somewhere. A number of Roman sculpture carriers have been discovered but none have been methodically excavated (Deborah Carlson, pers. comm.).

It should also be noted that the bust is only a very small fragment of the statue. 'The statue has suffered greatly in its misfortune' (Ridgeway, 1967b) The lower torso below the waist is missing, the whole of the rear of the statue and both arms. This suggests that the statue may have been damaged in the recovery and that remains of the statue lie somewhere in the vicinity of the find.

**The Akland head**

Although there are few bronze statues, another female head is located in the Willaim Hayes Memorial Museum, now the Akland Art Museum, University of North Carolina. This head is similar to the Demeter statue, being a female with a fillet and himation covering the head (Figure 3). The pose is different and it is not clear if the statue dates from the same period. Immerwwahr (1969) notes technical similarities between the heads, but concludes that the works are not stylistically close and is inconclusive in dating the head to the 4th or 2nd century BC. It is, however, said to come from Turkey in the 1970s, possibly from the sea. It is interesting to speculate if this could have come from the same area and been part of the same cargo (Immerwahr, 1969 and Mattusch, 1996). Certainly the head is damaged in the same way as the Demeter

although it is said to lack the pitting and erosion of the Demeter (Immerwahr, 1969: note 13).

**The Rosencrantz wreck site**

In 1965 George Bass searched unsuccessfully for the 'Demeter wreck' using a towed television camera attached to a *kangava* (Bass & Joline, 1967; Bass, 1971). In 1967 a side scan sonar survey was carried out over the area using a Scripps Institute for Oceanography side scan sonar operating at 100–120 KHz. A total of 145 targets were logged; these were later reduced to 26, of which 14 were thought to be possible wreck sites (Rosencrantz *et al.* 1972; Bass & Rosencrantz, 1972). The targets were fixed using three transits (theodolite) located on shore. The position of the survey vessel was logged by these transit operators using a two-way radio to coordinate the survey. The position of the boat was therefore recorded and correlated with the side scan sonar trace. The targets located were investigated in 1968, using a submersible television camera and resection form the original 1967 survey. The television system used was a Hydro Products Model TC303 with artificial lighting and 170 m of cable. All the targets were located and one was definitely identified as a wreck (Bass & Rosencrantz, 1968: Figure ??; see also Rosencrantz *et al.* 1972: Plate 142). The survey proved to be very successful, in spite of the operational water depth of 83–100 m and difficulties operating the static camera in rough conditions.

**The 2004 search**

The 2004 search utilised the Department of Maritime Archaeology's Marine Sonic side scan sonar; a 150/600 KHz dual frequency system interfacing with a GPS for real-time navigation control. On arriving in Turkey in June 2004, a meeting was held at the INA Bodrum office to decide the extent of the search area. The objective of the 2004 survey was to search from slightly north of Arap Adasi to Kizilada up to the 100 m depth contour (following the early reports of Throckmorton, 1965 and Frost, 1965, although Bass, 1966 mentions 30m). Initially it was decided to search the area shown in Figure 7. However, it was discovered that the search capacity of both the submersible *Carolyn* and the diving team was 60 m and it was thought, at the time, there was no possibility of investigating deeper targets. The hydrographic chart of the area shows that the coastline on the Bozburun Peninsular drops rapidly from sea level to about 50–60 m and then levels out slowly deepening to about 100 m where it again falls rapidly to about 300 m and more. This confined the search area to a rather narrow strip of sea-bed relatively close to the shore. This is not ideal territory for the operation of side scan sonar because the steeply sloping rock cliff face descending to the sandy area around 50 m generally continues for some way beyond the sand–rock interface, with small and large rock outcrops often protruding from the sand. These outcrops can often resemble wreck sites. Ideally, the side scan sonar should be operated in flat sandy areas well away from reefs and rock cliff faces.

The side scan survey was mostly conducted on the *Millewanda* a catamaran that was the support vessel for the *Carolyn*. A computer operations booth was set up in the deck of the vessel (Figures 18 & 19) and the side scan fish was deployed from a davit on the stern of the vessel (Figure 20). The fish was found to operate best with about 70 m of cable deployed, usually resulting in the fish operating at a depth of about 40 m. The vessel usually operated at about 2-3 knots, however currents strongly influenced the depth of the detector head. The side scan traces were converted to GeoTIFFs (Figure 6) and then placed on a GIS so that the area covered by the side scan could be carefully monitored.

As the bathometry in the area was not accurate enough to delineate the 60 m contour, a brief hydrographic survey was conducted using the INA research vessel *Virazon*. The *Virazon* followed the 60 m contour in a zig-zag pathway, crossing and re-crossing the contour; the GPS was used to mark the precise point that the vessel crossed the 60 m point. This information was put onto a Geographical Information System (GIS) to outline the search area (Figure 10). The survey area was divided into four areas: 1. Narrow strip from Arap Adasi to Kale Burnu; 2. A roughly square area from Kale Burnu to Kalabak Burnu and Kizilada; 3. A roughly triangular area including Gökçe Burnu, Kizilada and Kalabak Burnu; and 4. The coastal strip from Gökçe Burnu to Serçe Liman.

Sonar searches were conducted on 11, 12, 16, 19, 22, 24 and 25 June and examination of the sonar records indicated that the area was covered

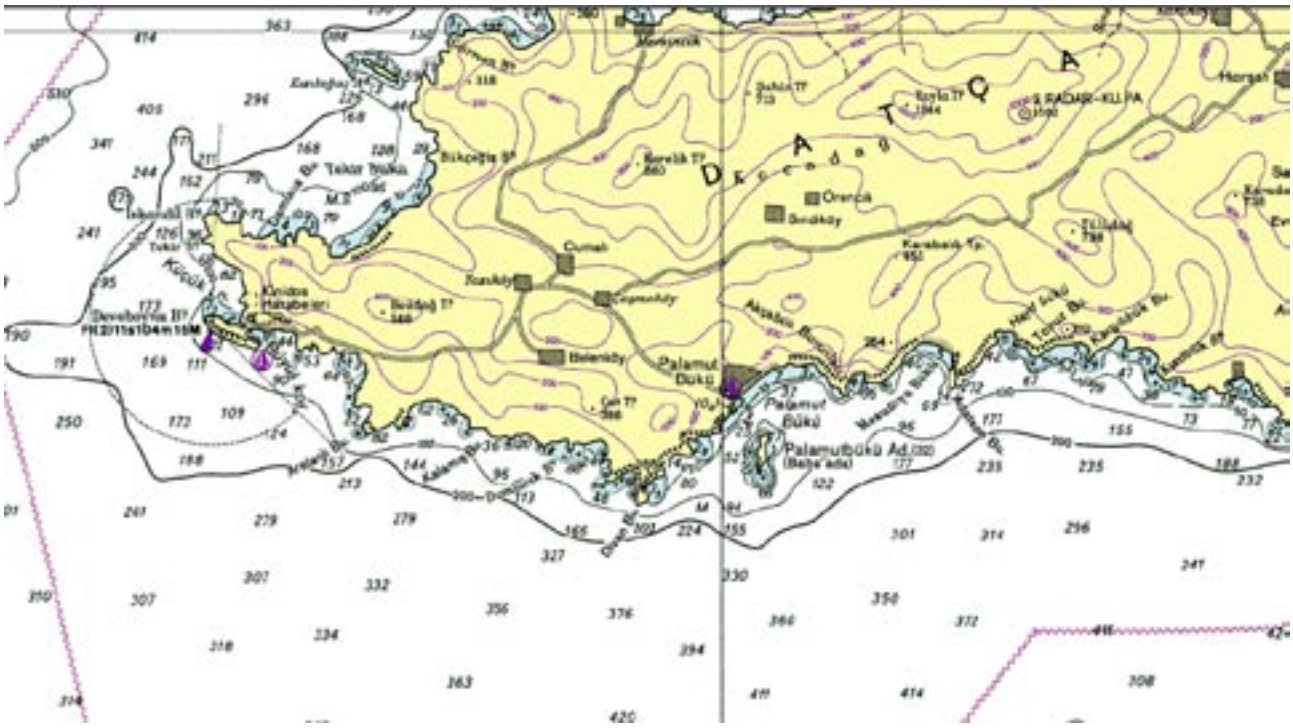



Figure 27. Map of the Datcha peninsular showing Knidos with the two harbours and Arslani Burnu. Aslan Burnu is the smaller headland above the 22 m mark and Koca Burnu is the large headland marked Arslani Burnu on the map.

with about a 100% overlap (see Figures 8 and 10–17). A large number of targets were identified in the area, some of which lay outside the range of diving operations (Figure 9). Targets within the diving capability of the *Carolyn* (Figures 21–22) or divers were investigated. A number of promising targets were found on examination to be rock outcrops or underwater reefs (Figure 26). Some cultural material was found, including a lead stock of a Roman style anchor (Figure 24) and several large iron anchors of type often found in the Byzantine period (Figure 25). Subsequently, a deep water target and two un-located shallow water targets were investigated using a ROV (Figure 23).

During the search for the Demeter site an attempt was made to relocate the wreck site located by Don Rosencrantz in 1967. The site was shown in Figure 5 (above) taken from the plan given in the report by Rosencrantz *et al.* (1972: 261, Fig. 139). A target was found in the approximate position calculated from the plan, but this also turned out to be a rock outcrop.

It is obvious that the source of the Demeter statue lies somewhere in the vicinity. Our search area was limited because of the operational capacity of the submersible and divers and the sonar survey was not as extensive as it could have been because of operational problems. It is possible that the Demeter could have been found previously in a *kangava* and abandoned to be found a second time. This could extend the limits of the search area, however, the 1967–8 search resulted in only one wreck site, although this was not thoroughly investigated. The relative success of the ROV in investigating sonar targets suggests that any future survey would benefit from a side scan–ROV operation, since there is no need for a large team or large support vessels. Once the targets had been identified and a preliminary inspection made, a subsequent, more extensive operation could be carried out.

**The Aslan Burnu wreck site survey**

The Aslan Burnu wreck site is located a few miles east of Knidos (Figure 27) just off Koça Burnu. The objective of this survey was to attempt to determine if there were buried amphora in the sandy area below the base of the rock cliff. The site is notable for a very large rock in the centre of the site approximately 3 m high and about 5 m by 3 m (see Figure 28).

Three methods were used to attempt to determine if there was buried material: close plot magnetometer; probe; and metal detector. This technique has been used before in Cyprus on the Kyrenia and Cape


Figure 28. Photomosaic of the Aslan Burnu Site made in 2003 by Robin Piercy.

Andreas wrecks (Green, *et al*, 1967; Green, 1971a & b). A baseline was set up on the site just below the large rock (see Figure 28). Three parallel lines were established at two metre intervals to form the basis of a survey grid. The lines were marked at 2 metre intervals forming a regular 2 metre grid. A series of probe runs were made along the lines at 2 metre intervals to test the quantity of overburden. The probe was marked at 250 mm intervals, and some assessment of the nature of the material the probe encountered was recorded (ceramic, rock, no contact). The results of this survey are shown as a contour plot in Figure 29.

The magnetometer survey was carried out using a Littlemore Scientific Engineering Small Boats Magnetometer. The detector head was placed on a small plastic crate so that it was about 250 mm off the sea-bed. This was to reduce the effect of small iron objects on the surface of the sea bed that could mask deeper magnetic anomalies. The operator placed the head on the sea-bed at a point on the grid, then moved about 3 m away from the head and advised the surface operator through the underwater communications system that a reading could be taken. Once a stable reading had been noted on the magnetometer recorder, the underwater operator was advised, and the head was moved to the next position. At the start of each day a reference reading was made at a fixed position in order to allow for diurnal variation. The results of this survey are shown as a contour plot in Figure 30. Finally some metal detector work was carried out on the site, but this was not recorded.

The results showed that there were some small magnetic anomalies on the site, but nothing suggesting a large concentration of ceramic or metal. It is known that ceramic material when heated above its Curé Point become magnetized by the Earth's magnetic field. Within the kiln, all the individual dipoles of each object are aligned with the Earth's magnetic field, producing a very intense magnetic anomaly. Obviously, when amphora are unpacked from a kiln, they will loose their orientation and in general the direction of the magnetic field of each amphora will be random, thus tending to cancel each other out. As a result the strong field is lost, however, if the detector head passes close by the amphora or any fired ceramic, there will be a magnetic anomaly. Examples of this were noted on the Kyrenia and Cape Andreas shipwrecks in Cyprus (Green, *et al.* 1967 & Green, 1971a & b). The probe survey (Figure 29) also indicated that there was little ceramic below the sand and that within the survey area the sand cover was rarely more than 400 mm deep, again suggesting that it was unlikely that there was a substantial cargo buried beneath the sand.

**Acknowledgements**

The author would like to thank Professor George Bass for his support in initiating my involvement in this project. I would like to thank Faith Hentschel, the director of the survey for all her help and assistance. I would like to pay tribute to Faith's leadership that helped to make this survey such fun, in spite of often overwhelming difficulties. The INA Bodrum crew, Mark Polzer, Xila Matthews, Murat Tilev,

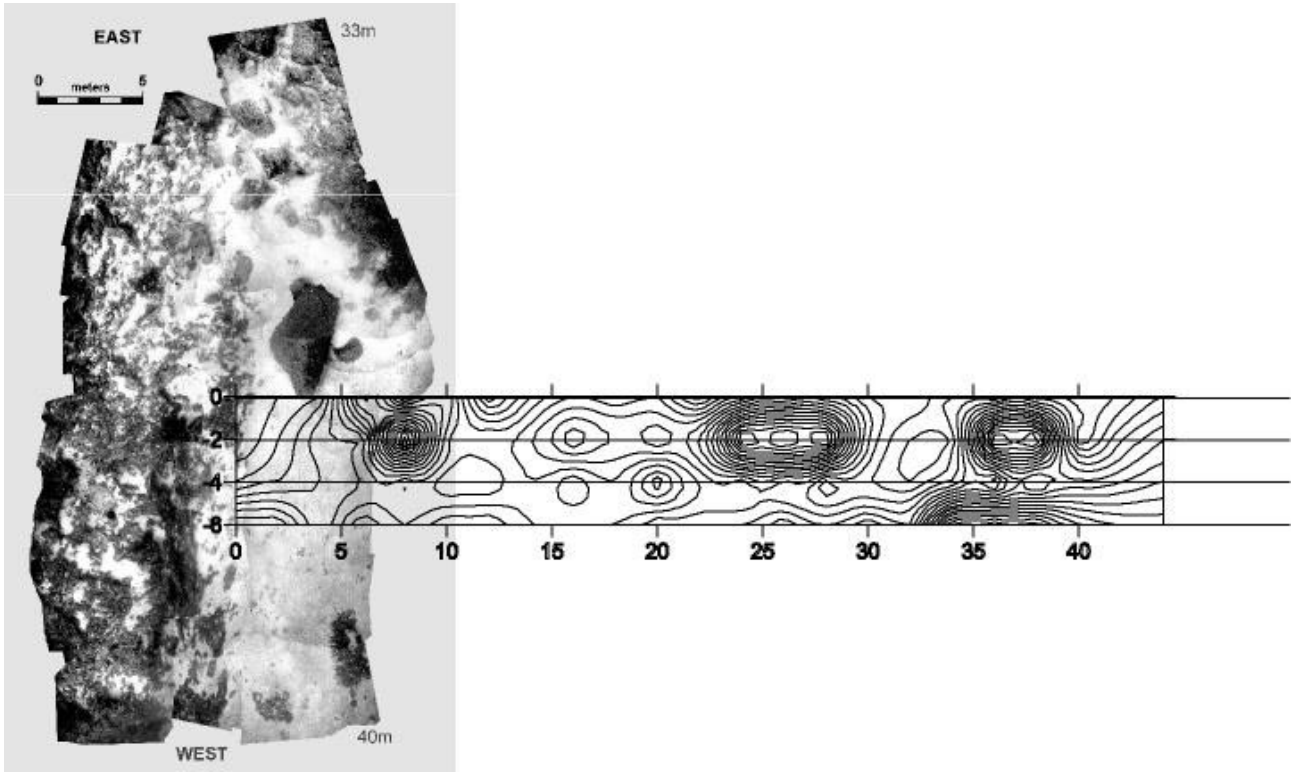



Figure 29. Probe survey of the Aslan Burnu site.

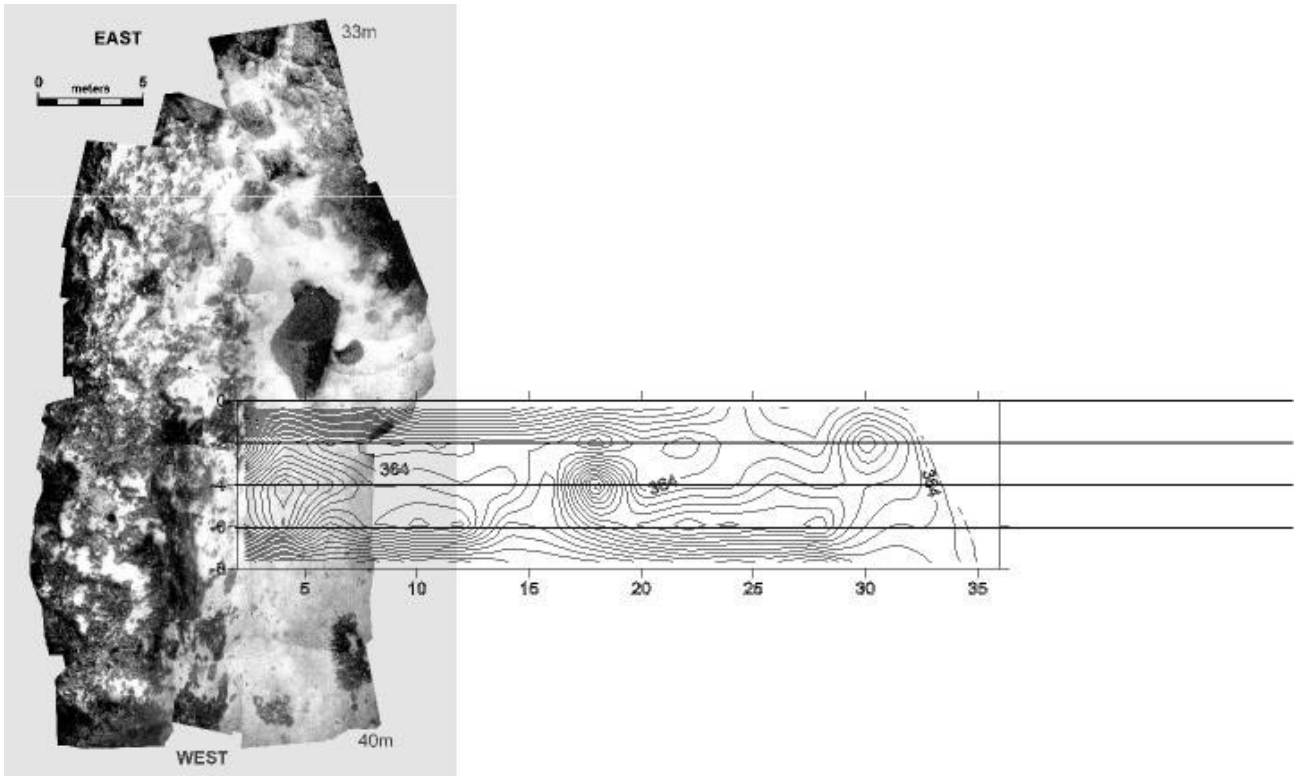



Figure 29. Magnetometer survey of the Aslan Burnu site.

Fayyaz, Tufan Turanli, Zafer, Ali, Bayran and Robin Piercy. Also supporting this project was Prospero Productions who were making a documentary film of the work. Prospero helped with the logistics and I am particularly grateful to Ed Punchard and Rhian Skirving and the film crew Malcolm Ludgate, Phillip Bull and Lurie Chalanda. Also William Hall of Littlemore Scientific Engineering provided a 300 m magnetometer cable for the project.

I am grateful to the Western Australian Museum for giving permission to work on this project.

## References

Bass, G.F., 1966, *Archaeology under water*. Thames and Hudson, London.

Bass, G.F., 1971, Underwater archaeological explorations in Turkey (Grant No. 518). In: P.H.Oehser (ed.), *National Geographic Society Research Reports 1965*. National Geographic Society, Washington, D.C.:15–22.

Bass, G.F. and Joliene, L.T., 1968, Problems of deep wreck identification. *Expedition*, **11**.1: 9–12.

Bass. G. F., and Rosencrantz, D. M., 1968, A diversified program for the study of shallow water searching and mapping techniques. Report submitted to the Office of Naval Research, Washington, D.C.

Bass, G.F. and Fernald, R., 1971, Underwater archaeological explorations in Turkey. National geographic Society Research Report, 1965 Projects.

Bass, G.F. and Rosencrantz, D.M., 1972, Submersible in underwater search and photogrammetric mapping. In: UNESCO, *Underwater Archaeology: A Nascent Discipline*, UNESCO, Paris: 271–283.

Bass, G.F. and Rosencrantz, D.M., 1977, The *Asherah*—a pioneer in search of the past. In: R.A. Geyer, ed., S*ubmersible and Their Use in Oceanography and Ocean Engineering*, Elsevier Publishing, Amsterdam, Oxford, New York: 335–51.

Bass, G.F. and Rosloff, J.P., 1980, INA's survey of Turkish underwater sites. National Geographic Society Report Grant No. 2187-80.

Bean, G.E., 1953, A masterpiece from the sea. *Illustrated London News*, **748** (7 Nov).

Frost, H., 1963, *Under the Mediterranean: Marine Antiquities*. Routledge and Kegan Paul, London.

Fuchs, W., 1969, *Die Skulptur der Griechen*. Hirmer Verlag, Munchen.

Green, J.N., Hall, E.T. and Katzev, M.L., 1967, Survey of a Greek shipwreck off Kyrenia, Cyprus. *Archaeometry*, **10**: 47-56.

Green, J.N., 1971a, Cape Andreas: a survey of a tile wreck. *Prospezioni Archaeologiche*. **6**: 61–64.

Green, J.N., 1971b, An underwater archaeological survey of Cape Andreas, Cyprus 1969–1970: a preliminary report. In: D.J. Blackman (ed.) *Maritime Archaeology, Proceedings of the 23 Symposium of the Colston Research Society, University of Bristol 4–8 April 1971*. Butterworths, London.

Hall, E.T., 1966, The use of the proton magnetometer in underwater archaeology. *Archaeometry*, **9**: 32–44.

Hall, E.T., 1972, Wreck prospecting with a magnetometer. In: UNESCO, *Underwater Archaeology: A Nascent Discipline*, UNESCO, Paris: 285–293.

Immerwahr, S.A., 1969, A new greek bronze head in the Ackland Museum*, Hesperia,* **38***:* 150–56.

Mattusch, C.C., 1996, *The Fire of Hephaistos: Large Classical Bronzes from North American Collections*. Harvard University Art Museums, Cambridge, Massachusetts.

Richer, G.M.A., 1930, *The Sculptures and Sculptors of teh Greeks*. Yale University Press.

Ridgeway, B.S., 1967a, The lady from the sea: a Greek bronze in Turkey. *American Journal of Archaeology*, **71**:329–34.

Ridgeway, B.S., 1967b, The bronze Lady from the Sea. *Expedition*, **10**.1: 2–9.

Rosencrantz, D.M., Klein, M. and Edgerton, H.E., 1972, The use of sonar. In: UNESCO, *Underwater Archaeology: A Nascent Discipline*, UNESCO, Paris: 257–270.

Throckmorton, P., 1965, *The Lost Ships: an adventure in Undersea Archaeology*. Jonathon Cape, London.