Journal of
open archaeology data

Bevan, A and Conolly, J 2012 Intensive Survey Data from Antikythera, Greece. *Journal of Open Archaeology Data* 1:e3, DOI: http://dx.doi.org/10.5334/4f3bcb3f7f21d

DATA PAPER

Intensive Survey Data from Antikythera, Greece

Andrew Bevan[1] and James Conolly[2]

[1] UCL Institute of Archaeology, 31-34 Gordon Square, London WC1H 0PY, United Kingdom

[2] Department of Anthropology, Trent University, 2140 East Bank Drive, Peterborough, ON Canada K9J 7B8

The Antikythera Survey Project was an interdisciplinary programme of fieldwork, artefact study and laboratory analysis that considered the long-term history and human ecology of the small Greek island of Antikythera. It was co-directed by Andrew Bevan (UCL) and James Conolly (Trent), in collaboration with Aris Tsaravopoulos (Greek Archaeological Service), and under the aegis of the Canadian Institute in Greece and the Hellenic Ministry of Culture. Its various primary datasets are unusual, both in the Mediterranean and beyond, for providing intensive survey coverage of an entire island's surface archaeology.

Keywords: archaeology, GIS, landscape, lithics, pottery

Funding statement

The main external funding agencies for the Antikythera Survey Project were the Social Science and Humanities Research Council of Canada (410-2005-0477), the UK Arts and Humanities Research Council (AH/E502989/1), the British Academy (SG-45163) and the Institute for Aegean Prehistory. Further funding was provided by the Mediterranean Archaeological Trust, UCL Institute of Archaeology and Trent University.

Context

Antikythera is a small island (ca. 20.8 sq.km) in the Mediterranean Sea. Despite being comparatively remote from larger land masses in Mediterranean terms, it lies along important routes of maritime interaction between the Peloponnese and Crete, and between the eastern and central Mediterranean. This geographical position has contributed to its very episodic history of human exploitation stretching back some 7,000 years, but with periods of substantial settlement followed by others of near complete abandonment. Highlights of this long-term history include evidence visits by Neolithic hunters from the Cyclades, Bronze Age farms with cultural links to Crete during the period of the Minoan palaces, a fortified settlement of Hellenistic pirates, a clutch of Late Roman communities, some glimpses of Middle Byzantine settlement and a recolonisation by west Cretan families in the late 18th century AD (for an overview, see Bevan et al. 2008[5]; Bevan and Conolly forthcoming[6]).

The datasets described here are the main ones produced by the Antikythera Survey Project (ASP), co-directed by the authors of this article, in collaboration with Aris Tsaravopoulos of the Greek Archaeological Service. The ASP's fieldwork on the island was conducted in 2005-7, followed by several years of further artefact study, and was interested in all periods of human activity on the island from the earliest indications some 7,000 years ago through to the present day. At the core of this programme of research was an intensive pedestrian survey that is highly unusual, if not unique at the time of writing, for having covered an entire island in a uniform manner using intensive survey methods. A second major strand was an emphasis on understanding patterns of landscape capital investment, and the project collected a comprehensive mapping of some 12,000 individual agricultural terraces across the island, along with all visible standing structures, such as houses, shelters, agricultural installations, rock cuttings etc (e.g. Palmer et al. 2010[4]; Bevan and Conolly 2011[3]). In terms of its recording methods, this project adopted many of the established techniques of Mediterranean intensive survey. In what we refer to below as stage-one survey, the entire island was fieldwalked in parallel lines 15-m apart. For certain interesting or problematic surface artefact scatters (particularly those of prehistoric date) this stage-one survey was followed by more detailed stage-two collections on a 10×10-m grid. Finds collected during both stages are all stored in cooperation with the Archaeological Museum on the neighbouring island of Kythera.

In terms of digital recording, this project was unusual for the detail of its treatment of the location, dating and other attributes of its artefacts. First, all artefacts and standing structures were entered individually in a database (with information on shape, size, decoration, fabric, date, location, etc.), rather than in aggregate, and these records were all the result of sustained laboratory study rather than decisions in the field (for specialist discussion and selected catalogues, see Pentedeka et al. 2010[2];Quercia et al. 2011[7]; Johnston et al. forthcoming[8]; Conolly and Bevan forthcoming[9]). Where further specialist analysis has been conducted, this is linked with the rest of the artefact record (e.g. ceramic petrogrpahy, see Pentedeka et al. 2010[2]). Second, the project sought to standardise the recording of the spatial location of all material culture, regardless of the survey method by which it was observed, such that all finds and observations had an effective spatial precision of ±10 m, rather than some, for example, only being resolved to the resolution of a larger survey unit (e.g. Bevan and Conolly 2009[10]). Third and finally, it was the first substantial fieldwork project, to our knowledge, to adopt a probabilistic approach to assigning dates to individual collected artefacts (for the details of this method, see below and Bevan et al. forthcoming[1]).

Spatial Coverage

Description: Antikythera (island and primary spatial coverage); Potamos, Galaniana, (largest villages); Kythera (neighbouring island); Crete (neighbouring island); Greece (country); Mediterranean (macro-region); Europe (macro-region)

- Northern boundary: 35.91°N
- Southern boundary: 35.82°N
- Western boundary: 23.27°E
- Eastern boundary: 23.33°E (all WGS84)

Temporal Coverage

c.5000 BC – AD 2000

Methods

Steps

Basic stage-one and stage-two survey units (tracts, grids) were recorded in the field via a combination of handheld GPS and print-outs of satellite imagery. These units were usually digitised as vector polygons the day after they were walked (in 2005-6) and then checked for overall consistency as a compete dataset in 2007. Finds from stage-one fieldwalking survey (see a subset within pottery, lithics, other) were however recorded more accurately than the basic tract unit: for each 10-m segment that each surveyor walked which allowed their absolute positioning along individual walked line and in absolute space via a semiautomated routine. Within each 10-m segment, find locations have been randomised to assist plotting, but their effective relative accuracy is only ±10 m. The location of finds from stage-two grid collection were randomised within each 10×10-m grid square and have an approximately comparable accuracy.

Laboratory study of the survey finds proceeded in a series of three seasons (2006-8), with multiple specialists arriving at consensus views on dating and attribution in cases where there was disagreement or significant uncertainty. Instead ofassigning each find a categorical date in the traditional way (e.g. “Hellenistic, or possibly Late Roman”), specialists agreed on a rough percentage confidence that the artefact belonged to a particular phase or phases (e.g. c.70% Hellenistic, c.30% Late Roman) and this is the dating method included, for example, in the pottery dataset (see Bevan et al. forthcoming[1]).

Petrographic thin sections (petrography) were analysed using a Leitz Laborlux 12 POL polarizing microscope to characterise both their mineralogical composition and texture, and so as to assess possible geological provenance, clay tempering or mixing, and pot- firing conditions. To understand the latter, small chips from all the samples were also refired at 1000 °C in oxidizing conditions using a Naberthem L5/P furnace, with the chips allowed to achieve a maximum temperature gradually over 2 hours, kept stable for 1 hour, then left to cool overnight (see Pentedeka et al. 2010[2]).

Terraces and standing structures (terraces, structs) were first noted per tract survey unit, then physically revisited and finally mapped in greater detail via handheld GPS and historic aerial photos. Geological breaks (geology) were mapped via combination of field visits with GPS and with reference to a de-correlated and stretched set of ASTER SWIR bands.

Sampling Strategy

The above methods of data collection reflect three field sampling strategies.

(1) Stage-one involved surveyors walking in parallel lines 15-m apart, counting and collecting finds in a corridor approximately 2-m wide — because, surveyors worked in teams of typically five people, and often broke up their practical work by field or 100-m-long units, some land use information is recorded in polygonal sub-hectare ‘tracts’ (see tracts), but most of the data about artefacts or structures is resolved to the level of the walker (and finds to within a 10-m subsegment of their walked line). This approach was applied to the entire island and the only gaps were a very limited number of extreme slopes (e.g. on certain coastal cliffs). As part of this stage, permanent collections were only made of ‘feature’ potsherds (bases, rims, handles, decorated pieces), but of all other finds.

(2) Stage-two sampled just less than 1% of the landscape via more detailed surface collections on a 10x10m grid. Within each grid square, an exhaustive permanent collection of cultural material was made within a 5 sq.m vacuum circle (over five minutes), whilst in the rest of the square, only feature potsherds and other finds were collected.

(3) The recording of standing remains (structs), agricultural terraces (terraces) and geology often began with stage-one fieldwalking, but thereafter involved dedicated revisits to large parts of the landscape and more detailed mapping assisted by satellite and aerial remote sensing.

In addition, the petrographic sampling of prehistoric pottery fabrics (see petrography) was based on initial macroscopic groupings, and also informed by previous petrographic work by Dr. Evangelia Kiriatzi (Fitch Laboratory, Athens) on the neighbouring island of Kythera (and to a lesser extent, by work in western Crete).

Quality Control

All artefact records (pottery, petrography, lithics, other) have been checked to ensure that they are include sensible entries and are standardised wherever possible (e.g. so that pottery types are recorded consistently and probabilistic artefact dates sum to 100). All vector polygons (tracts, grids, coast, geology) have been checked for overlaps and slivers. Each dataset comes with its own metadata (in an accompanying .txt file for all .csv datasets and as .xml for all .shp datasets). All spatial data is recorded in the UTM 34N WGS84 coordinate system.

Constraints

All datasets have what we would consider to be a working spatial accuracy of ±10 m. Stage-two grid collections prioritised prehistoric scatters and we have have only catalogued prehistoric sherds for these — comparative spatial analysis across a wider set of chronological periods should therefore work primarily with the finds from stage-one survey (that can be queried as a subset of pottery, lithics and other).

Dataset Description

Object Name

- *walkers* — three files providing the data, metadata and field type definitions (.csv, .txt, .csvt respectively) for records made by individual walkers during stage-one fieldwalking.
- *counts* – three files providing the data, metadata and field type definitions (.csv, .txt, .csvt respectively) for potsherds countedduring stage-one fieldwalking.
- *pottery* – three files providing the data, metadata and field type definitions (.csv, .txt, .csvt respectively) for the main pottery database, assembled various artefact specialists.
- *petrography* – three files providing the data, metadata and field type definitions (.csv, .txt, .csvt respectively) for those sherds sampled for thin section petrography.
- *lithics* – three files providing the data, metadata and field type definitions (.csv, .txt, .csvt respectively) for the main lithics database.
- *other* – three files providing the data, metadata and field type definitions (.csv, .txt, .csvt respectively) for the main database of all non-ceramic and non-lithic finds.
- *structs* – three files providing the data, metadata and field type definitions (.csv, .txt, .csvt respectively) for the main database of all standing remains, except for terraces.
- *coast* — a vector polygon dataset (.shp and associated files) with the shape of Antkythera's coastline.
- *geology* –a vector polygon dataset (.shp and associated files) with the main bedrock units on Antkythera.
- *tracts* – a vector polygon dataset (.shp and associated files) with the main stage-one survey units.
- *grids* – a vector polygon dataset (.shp and associated files) with the main stage-two survey units.
- *terraces* – vector line dataset (.shp and associated files) with all observable agricultural terraces (i.e. the location of each terrace riser) on Antikythera.

Data Type

primary data, processed data

Format Names and Versions

.csv, .txt, .shp

Creation Dates

Most of these datasets were created in 2005-7 and finalised shortly thereafter. The pottery, petrography, lithics and other were assembled more slowly and final changes were still being made in 2011.

Dataset Creators, Roles and Affiliations

Primary survey datasets (tracts, grids, counts, walkers, structs, terraces, coast) involved the input of a large team. Please see the acknowledgements for a complete alphabetical list.

- *pottery* – Andrew Bevan (UCL), Alan Johnston (UCL), Alessandro Quercia (Leicester), Lindsay Spencer (formerly UCL) and Joanita Vroom (Amsterdam)
- *petrography* - primarily Areti Pentedeka (Fitch Laboratory, Athens), Evangelia Kiriatzi (Fitch Laboratory, Athens)andLindsay Spencer (formerly UCL),with further assistance from Andrew Bevan (UCL)
- *lithics* – primarily James Conolly (Trent), with further assistance from Andrew Bevan (UCL)
- *other* — primarily Andrew Bevan (UCL), with further assistance from James Conolly (Trent)
- *geology* — a combination of fieldwork by Ruth Siddall (UCL) and remote sensing by Andrew Bevan (UCL)

Repository Location

UK Archaeology Data Service Collection 1115 (doi: 10.5284/1012484)

Publication Date

05/02/2012

Language

English (a Greek language summary of the project methods and results can be found at www.ucl.ac.uk/asp/ or www.tuarc.trentu.ca/asp/).

License

Creative Commons CC-BY 3.0

Reuse Potential

Due to their unusual coverage of an entire landscape, these datasets would provided a good basis for developing a tutorial on survey, GIS and/or spatial analysis in archaeology. They also lend themselves to the comparative analysis of evidence from other intensive Mediterranean surveys that are in the public domain (e.g. http://dx.doi.org/10.5284/1000271, http://dx.doi.org/10.5284/1000208, http://dx.doi.org/10.5284/1000103 and, to a lesser extent, also http://dx.doi.org/10.5284/1000351), albeit with due attention to the fact that the intensive methods used are not identical. The ASP data is particularly reusable because artefact locations, dates and identifications are recorded individually in the database rather than in aggregate. The standing structures and terraces from Antikythera are also the kinds of modern mappings of the rural landscape that have high potential for reuse and cross-cultural comparison.

One limitation in terms of re-use is worth highlighting. Much of the analysis presented in publications of the survey data from this project also makes use of one or more proprietary datasets, such as Quickbird satellite imagery and/or a 10-m Digital Elevation Model (the latter built from 2-4 m contours on Hellenic Military Geographical Service paper maps, digitised and interpolated by ASP). It has not been possible to release these under the same licensing conditions which limits the degree to which certain kinds of landscape modelling can be replicated solely via the data in the repository.

Acknowledgements

This project was carried out under the auspices of the Canadian Institute in Greece and with a permit from the Greek Ministry of Culture and Tourism. Our projectcollaborator and co-director, Aris Tsaravopoulos (Greek Archaeological Service), has been great source of encouragement and advice throughout. We would also like to thank all those agencies who contributed funds to the project: the Social Science and Humanities Research Council of Canada, the UK Arts and Humanities Research Council, the Institute for Aegean Prehistory, British Academy, the Mediterranean Archaeological Trust, Trent University and the UCL Institute of Archaeology. The authors have benefited greatly from being involved in another intensive survey undertaken on the neighbouring island of Kythera (the Kythera Island Project) and would like to thank its co-directors, Cyprian Broodbank and Evangelia Kiriatzi for a wide range of advice and support. The following were also extremely helpful as points of contact in the project's earlier stages: Ted Banning, John Bennet, John Cherry, Jack Davis, Jennifer Moody, Lucia Nixon, Jonathan Tomlinson and Todd Whitelaw. Further heartfelt thanks to the present-day inhabitants of Antikythera for their generosity, help and warm welcome, particularly Andreas Charchalakis, Manolis Charchalakis, Nikitas Galanis, Georgos Katsanevakis, Maria Katsanevakis, Marinos Katsanevakis, Myronas Patakakis, Dionysis Progolakis and Myronas Progolakis. During our fieldwork, three different doctors on posting to the island were also extremely supportive. Finally, we are particularly grateful to the many people who contributed to our data collection (with sincere apologies for any inaccuracies or omissions): Yvette Balbaligo, Sam Baldwin, Laura Banducci, Jennifer Blunt, Thomas Booker, Stuart Brookes, Nancy Champagne, Kate Chan, Richard Chapman, Maria Choleva, Sue Colledge, Chris Constanides, Mike Court, Enrico Crema, Jim Culley, Jo Cutler, Georgie Darroch, Sofie Davis, Varina Delrieu, Susan Demarkar, Katie Derret, Nikoletta Dimitropoulou, Valentina Domenichi, Kate Dougherty, Kevan Edinburgh, Kalliopi Fouseki, Charles Frederick, Nikita Galanis, Julie Gray, Laura Hadley, Brenna Hassett, Greg Hives, Vickie James, Raminder Kaur, Sach Killam, Evangelia Kiriatzi, Iannis Kozatsas, Dan Lawrence, Elena Liossi, Ian Lucas, Richard Luckyn-Malone, Steven Markofsky, Andy May, Rhianne McKay, Scott McRae, Will Megarry, Sirja Moilanen, Haggai Mor, Charoula Moutsiou, Denitsa Nenova,Anna Nicola, Gemma Norburn, James O'Neill, Sean O'Neill, Carol Palmer, Monica Palmero, Georgia Panagopoulou, Ismene Papakirillou, Areti Pentedeka, Libby Percival, Oliver Pryce, Ruth Siddall, Manjinder Sidhu, Lindsay Spencer, Anna Stellatou, Mike Stringer, Carolyn Swan, Carmen Ting, Joanita Vroom, Steve White, Aaron Wolpert, Berber Wouda.

References

1. **Bevan, A, Conolly, J, Hennig, C, Johnston, A, Quercia, A, Spencer, L** and **Vroom, J** 2013 Measuring chronological uncertainty in intensive survey finds. A case study from Antikythera, Greece. *Archaeometry* 55(2): 312–328, DOI: http://dx.doi.org/10.1111/j.1475-4754.2012.00674.x
2. **Pentedeka, A, Kiriatzi, E, Spencer, L, Bevan, A** and **Conolly, J** 2010 From fabrics to island connections: macroscopic and microscopic approaches to the prehistoric pottery of Antikythera. *Annual of the British School at Athens* 105: 1–81. DOI: http://dx.doi.org/10.1017/S0068245400000368
3. **Bevan, A** and **Conolly, J** 2011 Terraced fields and Mediterranean landscape structure: an analytical case study from Antikythera, Greece. *Ecological Modelling* 222(7): 1303–1314, DOI: http://dx.doi.org/10.1016/j.ecolmodel.2010.12.016
4. **Palmer, C, Colledge, S, Bevan, A** and **Conolly, J** 2010 Vegetation recolonisation of abandoned agricultural terraces on Antikythera, Greece. *Environmental Archaeology* 15(1): 64–80, DOI: http://dx.doi.org/10.1179/146141010X12640787648973
5. **Bevan, A, Conolly, J** and **Tsaravopoulos, A** 2008 The fragile communities of Antikythera. *Archaeology International* 10: 32–36, DOI: http://dx.doi.org/10.5334/ai.1007
6. **Bevan, A** and **Conolly, J** *Mediterranean Fragility and Persistence. Antikythera's Island Communities*. Cambridge: Cambridge University Press (forthcoming).
7. **Quercia, A, Johnston, A, Bevan, A, Conolly, J** and **Tsaravopoulos, A** 2011 Roman pottery from an intensive survey of Antikythera, Greece. *The Annual of the British School at Athens* 106: 47–98, DOI: http://dx.doi.org/10.1017/S0068245411000037
8. **Johnston, A, Quercia, A, Tsaravopoulos, A, Bevan, A** and **Conolly, J** 2012 Pots, piracy and Aegila. Hellenistic ceramics from an intensive survey of Antikythera, Greece. *The Annual of the British School at Athens* 107: 247–272, DOI: http://dx.doi.org/10.1017/S0068245412000019
9. **Bevan, A** and **Conolly, J** Lithic technology and the early prehistory of Antikythera (forthcoming - paper under review).
10. **Bevan, A** and **Conolly, J** 2009 Modelling spatial heterogeneity and nonstationarity in artifact-rich landscapes. *Journal of Archaeological Science* 36(4): 956–964, DOI: http://dx.doi.org/10.1016/j.jas.2008.11.023

How to cite this article: Bevan, A and Conolly, J 2012 Intensive Survey Data from Antikythera, Greece. *Journal of Open Archaeology Data* 1:e3, DOI: http://dx.doi.org/10.5334/4f3bcb3f7f21d

Published: 15 February 2012

The *Journal of Open Archaeology Data* is a peer-reviewed open access journal published by Ubiquity Press

OPEN ACCESS