ISAP NEWS

The newsletter of the International Society for Archaeological Prospection

Issue 45
January 2016

Investigating
Olbia Pontike, Ukraine

Where are the graves?
Surveying Churches

Exploring Fort Edward
National Historic Site, Canada

Happy New Year and welcome to the 45th issue of ISAP News! To start 2016 we have an issue full of surveys: magnetic survey of an Ancient Greek colony in Ukraine, radar survey of dutch churches and magnetic susceptibility survey of an 18th century British colonial fort in Canada. And read on for details of the US National Park Service's archaeological prospection workshop, as well as a new publication on conflict landscapes, which may be of interest.

As ever, please send any contributions, notifications, and cover images for the next newsletter (ISAP News 46) to the email address below by the 31st March 2016. All entries are gratefully received!

Hannah Brown & Paul Johnson

editor@archprospection.org

The Cover Photograph was taken during a GPR survey of Saint-Bavo church, Haarlem, The Netherlands, by SARICON (photo: Sem Peters).

Membership renewal
£7 or €10 for the whole year. Please visit:
http://www.archprospection.org/renew

Archaeological Prospection Journal
Take advantage of the great deal offered to ISAP members by Wiley-Blackwell for this journal:
http://www.archprospection.org/wiley

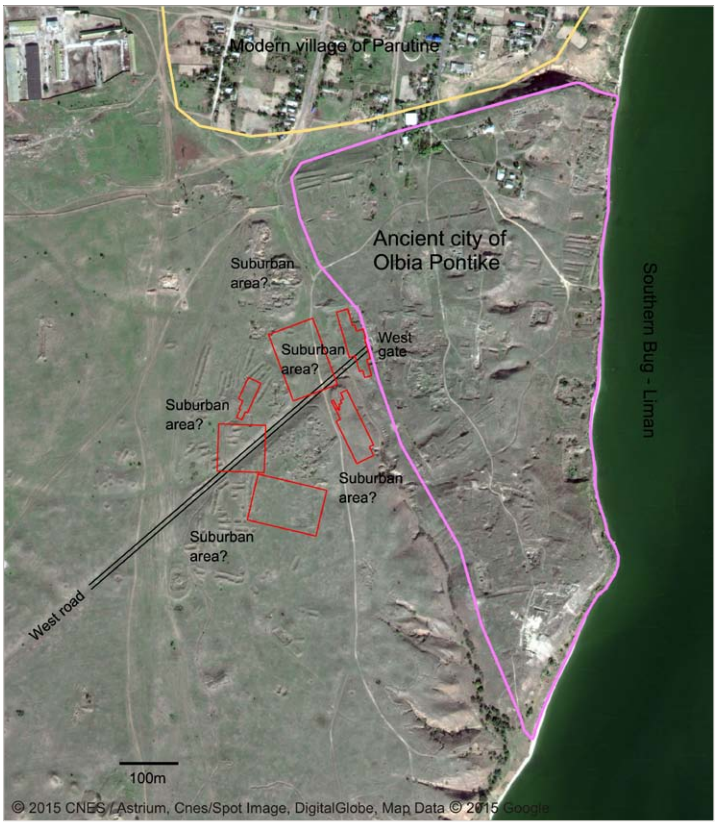
The views expressed in all articles are of the author, and by publishing the article in ISAP News, the ISAP management committee does not endorse them either positively or negatively. Members are encouraged to contact authors directly or to use the discussion list to air their views, should they have any comments about any particular article.

Geomagnetic prospections in the suburb of Olbia Pontike – an ancient Greek Colony in the northern Black Sea area, Ukraine

Arno Patzelt[1], Jochen Fornasier[2], Alla Buyskikh[3], Andrey Ivtchenko[3] & Alexander Kuzmischev[3]

[1]Terrana Geophysik, Moessingen, Germany ap@terrana-geophysik.de
[2]Goethe University, Institute for Archaeological Sciences, Frankfurt, Germany fornasier@em.uni-frankfurt.de
[3]Archaeological Institute of the National Academy of Sciences of the Ukraine,Kiev, Ukraine allabuy@ukr.net

Figure 1a (above) *Location of Olbia in Ukraine.*
Figure 1b (right) *Despite a hundred years of investigations at Olbia, the suburb's size and division are not clear yet. Red lines mark the areas of geomagnetic prospection. Source of satellite image: Google Maps 2015.*



In 2014 a German-Ukrainian team started with a new interdisciplinary project in the territory of the necropolis and the suburb of ancient Olbia, one of the most important cities founded in the course of Greek colonization of the northern Black Sea area. Field surveys have been conducted in the city's centre for several decades (more than a hundred years), and have brought forth a great amount of important information about its origin and genesis. In contrast, very little is known about the suburb's size, division and architecture. In a first step, based on the main excavations of Ju. I. Kozub in the 1960s/1970s, our new project conducted an initial sequence of geophysical prospections in the area of the suburban territory and in 2015 started the first excavations in order to proof the preliminary results.

Method

According to the excavations from the last century in the suburban area, a development with dugouts rather than stone built houses can be expected. Therefore a geomagnetic survey was more favourable than e.g. georadar or resistivity mapping. Furthermore, a fast coverage of larger areas is also possible. The magnetic measurements were performed with a fluxgate gradiometer FEREX DLG 4.032 and four probes CON650 (Foerster, Germany). The portable survey setup is shown in **fig. 2** (overleaf). The probes are mounted on a carrier frame, spaced 0.5m from each other horizontally. Measurements were done along parallel lines spaced 0.5 m apart and 8 data points per meter were recorded along the profile lines, resulting in 16 data points per sqm. For data processing Geoplot 3 (Geoscan Research) was used. Final graphical processing and output (magnetograms) was done with Surfer 11 (Golden Software).

Field work

The geomagnetic field survey took part within 8 days in August 2014, starting in the vicinity of the West gate on both sides of the prominent West road. If here the archeological situation is comparable to the city center, remains of ancient settlements could be expected alongside this important transport axis, as well. As a reference, additional measurement areas off the West road and in the supposed transition zone between suburb and necropolis of the classical period were chosen. Unfortunately, a full coverage of the area of our interest was not possible. Parts of the area were disturbed with excavation trenches and piles

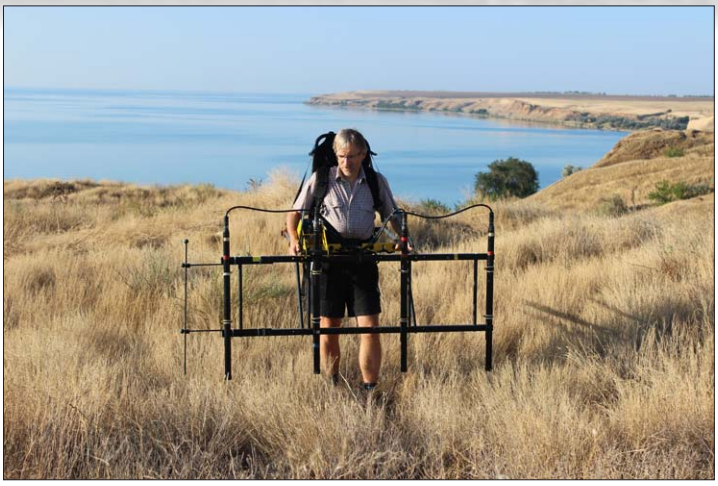
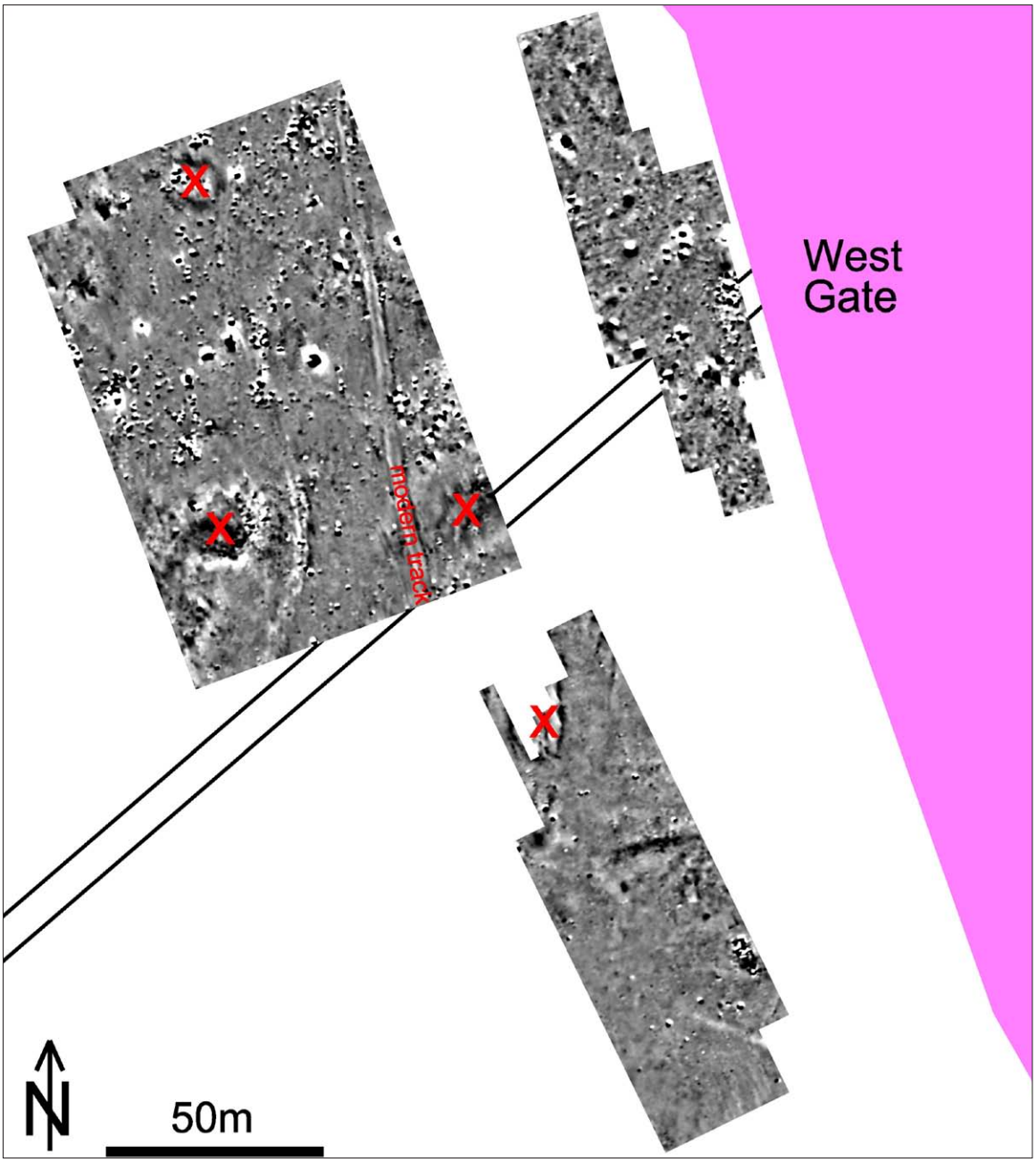


Figure 2a (above) *Magnetic prospection at Olbia Pontike. In the background, the Liman of the Southern Bug is visible.*
Figure 2b (right) *Investigation area along the West road, running in a depression.*

Figure 3 (below) *Magnetograms of areas close to the West gate. Data are clipped to -5 nT (white) and +5 nT (black). Red x mark old excavation areas and earth heaps.*



of excavated soil, in some cases also with WWII trenches and debris (iron parts, mainly wire and spikes from former fences) from modern activity.

Results

Fig. 3 shows the magnetograms for the surveyed areas close to the West gate. There is almost no evidence for a more or less dense settlement or even individual dugouts. Therefore the prospection was extended further to the west. The resulting magnetograms are shown in **fig. 4** (overleaf). In the undisturbed areas, numerous anomalies of weak positive field values, with extensions of about 2 - 12 sqm, are clearly visible. These anomalies are interpreted as former dugouts and in case of smaller anomalies as storage pits or garbage pits. This would confirm the former thesis that the suburb was situated not immediately outside the western town wall, but instead started a distance of at least 100 - 200 m away from the wall in the upper parts of the area. The suburb seems to be located to both sides of the west road and might cover an area of at least 6 hectares.

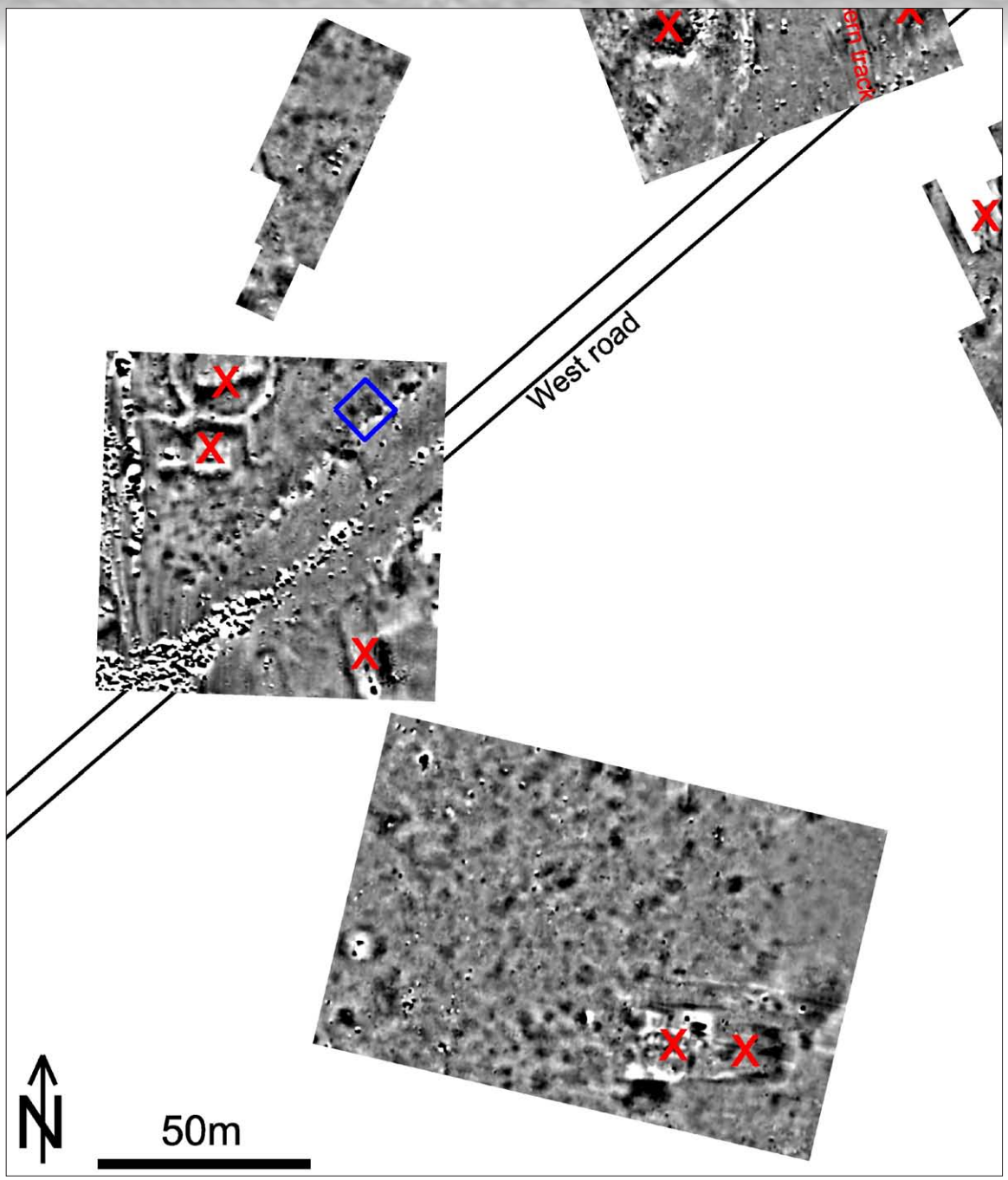
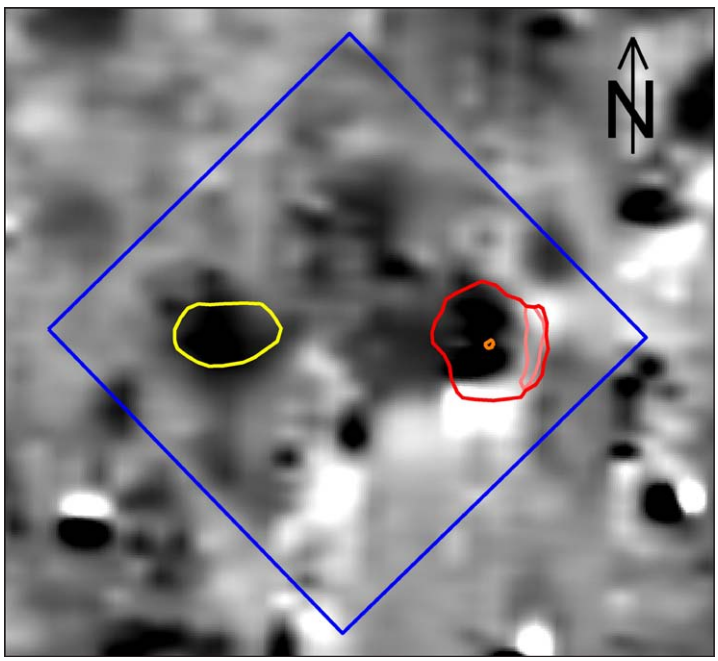


Figure 4 (left) *Magnetograms (data clipped as in fig. 3) around the West road further to the west. The blue rectangle marks the subsequent excavation site.*

Figure 5 (below)*Magnetogram (detail) with excavation results. The blue square marks the excavation area of 10 x 10 m.*

Excavation

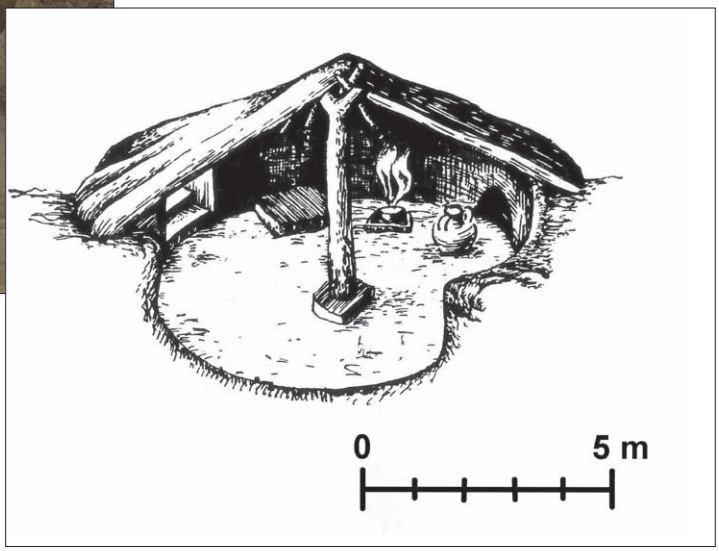
To confirm the interpretation of suburban structures, excavations of two assumed dugouts took place. The results were convincing (**fig. 5**). The positive anomalies correlate precisely with two semi-dugouts. The right one (red) was completely excavated, the excavation of the left one (yellow) will be continued in summer 2016. The semi-dugout on the right is carved about 1.2 m into the ground. The size of this house is about 3.10 m in diameter, giving an total area of approximately 10 sqm. In the eastern corner of the dugout a bench (orange line in **fig. 5**) is carved into the loamy soil. In the centre on the floor a large flat stone (brown dot in **fig. 5**) was found, which was holding a central post supporting the roof construction (**fig. 6a, b**). Numerous findings of pot sherds, coins and other artefacts allow for precise dating and reconstruction of suburban living in the end of 6/5th centuries BC.



Continued overleaf...

Figure 6a (left) Fig. 6a: Semi-dugout of the end of 6/5th century BC, excavated in summer 2015. Note the bench in the east and the central post stone.

Figure 6b (below) Reconstruction of a semi-dugout, based on archaeological results in the central part of Olbia (modified from Vinogradov and Kryžickij , 1995, fig. 10)



Conclusion

The geomagnetic method proved to be successful in locating the suburb of Olbia and enables precise excavation of individual dugouts. Further geomagnetic prospections will provide more detailed information on the total extent of the suburban area.

Acknowledgements

The geomagnetic field surveys were made possible by funds of the Fritz Thyssen Stiftung für Wissenschaftsförderung, as preparatory work for the joint German-Ukrainian research project, which has been funded by the German Research Foundation (DFG) since 2015. We would like to express our gratitude to both organizations for the generous support.

References

V. V. Krapivina, Olbia. In: D. V. Grammenos/E. K. Petropoulos (Eds.), Ancient Greek Colonies in the Black Sea, Vol. I. (Thessaloniki 2003) 389–465.

Ju. G. Vinogradov and S. D. Kryžickij, Olbia. Eine altgriechische Stadt im nordwestlichen Schwarzmeerraum (Leiden 1995).

К. К. Марченко, К вопросу о так называемом предместье Олвии. Вестник древней истории 3, 1982, 126–135. [K. K. Martchenko, To the question of the so-called Suburb of Olbia. Vestnik drevnej istorii 3, 1982, 126–135].

Ю. І. Козуб, Передмістя Ольвії. Археологія 29, 1979, 3–34 [Ju. I. Kozub, The Suburb of Olbia. Archeologija 29, 1979, 3–34].

Photocredits:

1a, 2b, 6a: Olbia-Project, Goethe-Universität Frankfurt; 1b, 2a, 3, 4, 5: Terrana Geophysik, Moessingen; 6b: modified after: Ju. G. Vinogradov/S. D. Kryžickij, Olbia. Eine altgriechische Stadt im nordwestlichen Schwarzmeerraum (Leiden 1995), fig. 10.

Take me to church!

Ferry van den Oever
SARICON, The Netherlands fvandenoever@saricon.nl

Recently our company has beem experiencing a steadily increasing demand for non-destructive surveys in churches or cloister-like buildings. The aims of the surveys and the different questions asked by clients range from:

just show me what you can see! to *Where are the graves?*
Are there any crypts/cellars? Are there former foundations visible in your data?
Is there any empty space left for future burials?
How many were buried here?
Do the tombstones correspond with actual graves?
Where are the utilities? (We kind of lost the drawings)
Are burials stacked on top of each other?

The reasons for these questions can range from:
- restoration works in general
- specific archaeological works
- installing floor heating
- need for empty space, to
- general interest or sometimes even verifying rumours (?)

I wrote this article just to show you how I go about this, what my experiences are and how I tackle certain issues. This is by no means the correct or the only way, but just the way I work.

The above mentioned myriad questions need to be postulated as a logical research-question. Only then can a sensible survey be setup. Sometimes clients are too eager or impatient, they just want us to pull out some piece of equipment and start beeping, probing, flashing and collecting data. As you all know, this is not the way to handle this. In the back of my mind I know that in this case using GPR will be the most appropriate technique, but I still want to tick off all the other possibilities (depending on site circumstances, aim and survey goal, time and money etc…). If we settle for GPR, then I want to take my time to select the most suitable system available for me.

Figure. 1 *Jewish cemetery: is there any space left?*

I have been using the following systems:
- ZOND 12e, 300 & 500 mHz. These systems are very suitable in combination with GPS, when surveying outside the buildings of course.
- IDS HiMod (dual antenna 200-600MHz) (using local grids inside buildings)
- IDS Opera Duo (dual antenna 250-700MHz) (using local grids inside buildings)

The software (data collection, dataprocessing, drawings, presentation) I use are:
- PRISM2
- TRACK11.1
- Voxler3
- Ouverture 1.1.3
- GRED-HD
- QGIS2.12.0

Preparations

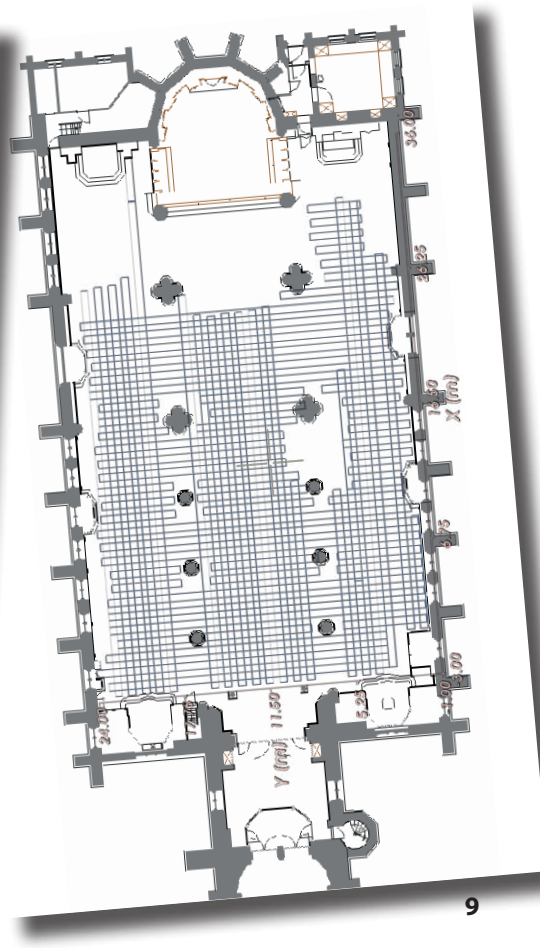
Before we start surveying, the logistic hassle with the client starts: "Are you absolutely sure that there are no decent digital groundplans for us to use? Yes, we need as much church furniture removed as possible. Yes, preferably all chairs, benches etc. No, not just displaced a few meters but out of the building, please. Yes, we definitely want to measure survey lines as long as possible. No, moving all the furniture was not part of our assignment. Of course we can lend a hand. We would like to start early in the day, so could you remove the furniture the day before? Yes, coffee would be great…" Well, you get the picture.

The pictures on the next page are just some examples of fieldwork...

Above left to right:
Figure 2 Burning calories while surveying. **Figure 3** A stop before the altar. **Figure 4** Mother Mary. **Figure 5** Looking for former foundations.
Below left to right: Figure 6 Small rubber cones. **Figure 7** The flooring acts as grid layout. **Figure 8** Example grid layout.

The layout of the grid

Well, no GPS so I take the old tape measures. Hold 'em down with duct tape. Forget about the spraypaint, but these little cones (**fig. 6**) come in handy. Sometimes the layout of the tiles can give you a good directional view (**fig. 7**). **Fig. 8** is an example of grid layout.



What do I encounter in the data?

It starts off with the flooring, of course. Sometimes there are nice, small tiles with small regular joints. These joints can be visible in the data. Sometimes however, there are some unpleasant surprises. In the Great Saint Bavo cathedral in Haarlem, all of the graves and cellars were emptied in the 19th century and filled with sand. The walls of the individual cellars are clearly visible. But the floor was 100% paved with large tombstones (mostly Belgian Bluestone or Arden Blue, a.k.a. Petit Granite, a very popular Carboniferous grey-bluish crinoidal limestone that becomes shiny black when polished). The floor looks very beautiful, but there are relatively large joints between the stones (1-3cm). The joint weren't filled. This causes serious airgaps that are very visible in the radar data, and interferes with the timeslices. The right filters will only eliminate part of the problem.

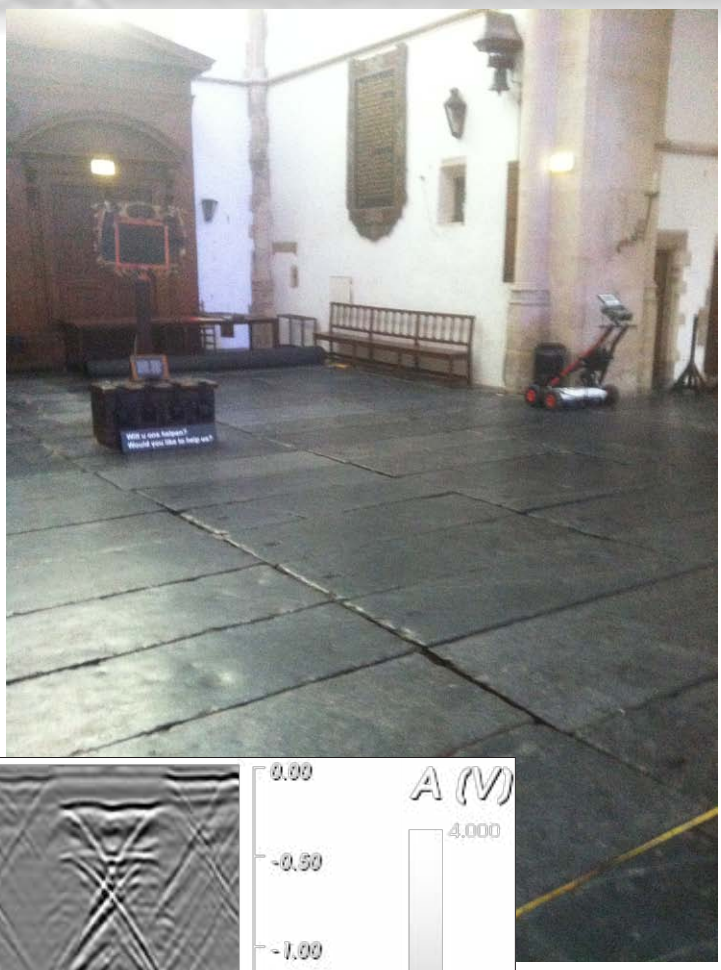
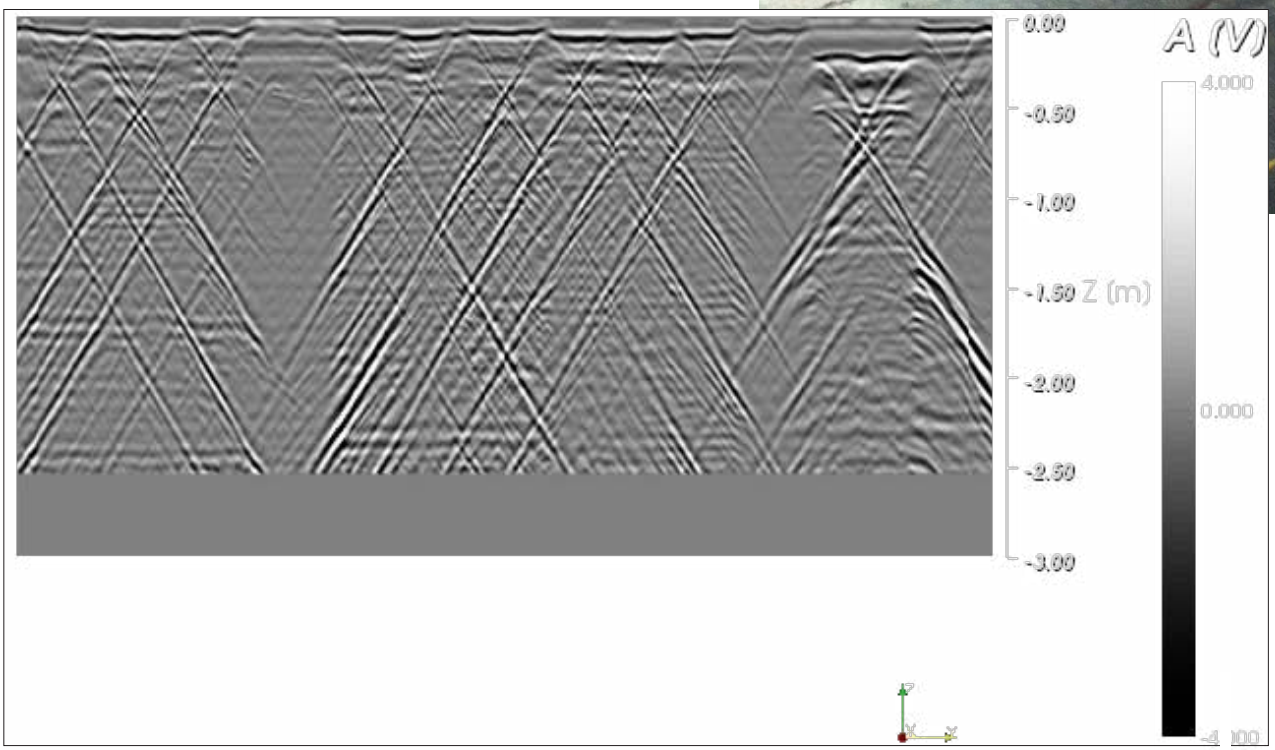


Figure 9 (right) *Wide joints in flooring.*

Figure 10 (below) *Hyperbolas caused by wide joints.*



Apart from the flooring

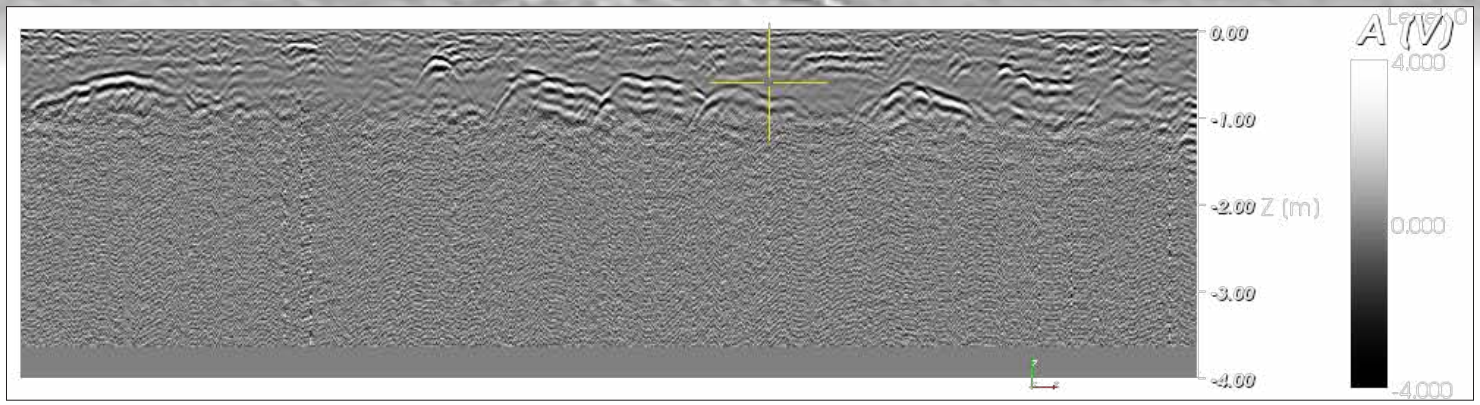
Sometimes I encounter a part of the heater system where they release hot air. The grid is clearly visible as a large metal structure. Well, there are the graves of course. The pictures below are an example of graves surveyed, parallel (**fig. 11**, overleaf) and perpendicular (**fig. 12**, overleaf) to the graves.

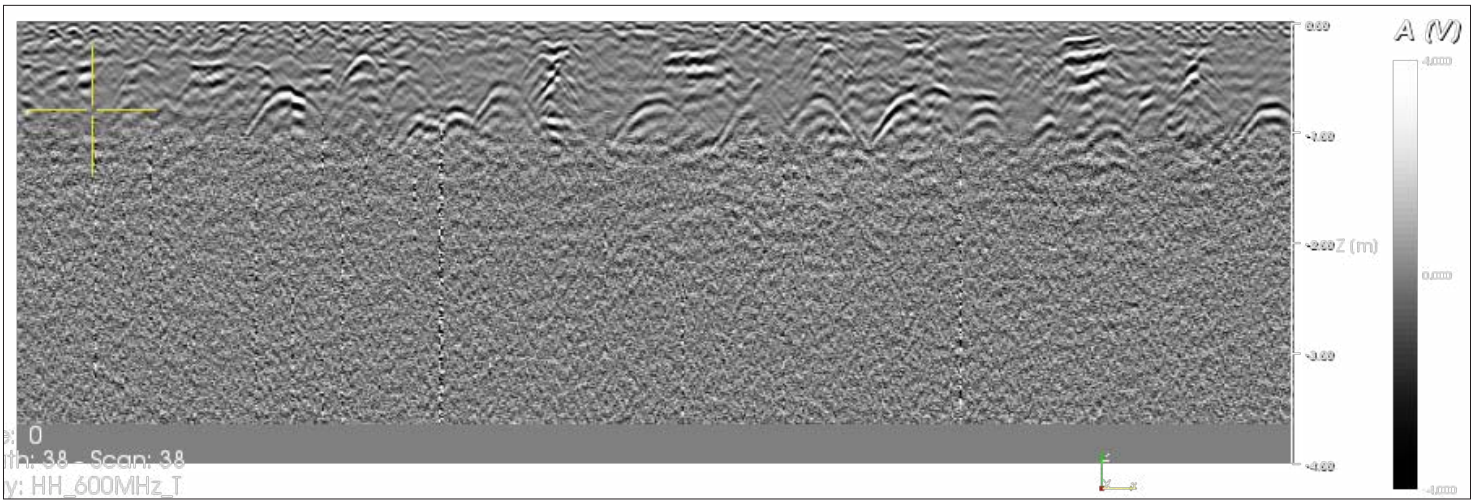
And apart from individual burials, there are crypts and cellars. **Fig. 13** (overleaf) is a radargram with very distinctive reflections of a crypt.

Former foundations

In many cases the pillars are linked by a single foundation. Most of the time, this foundation between the pillars is clearly visible in the radardata. **Fig. 14** (page 12) shows a timeslice with the foundation (yellow /light blue color) linking the line of pillars on the right side. Sometimes there are also foundations of former churches visible. At least it looks like foundations of an older structure or earlier building phase. Of course, decent desk research and possible trial trenches should give a definite answer.

Apart from the deceased from long ago, there is an occasional encounter with fresher corpses (fig. **15**, overleaf).





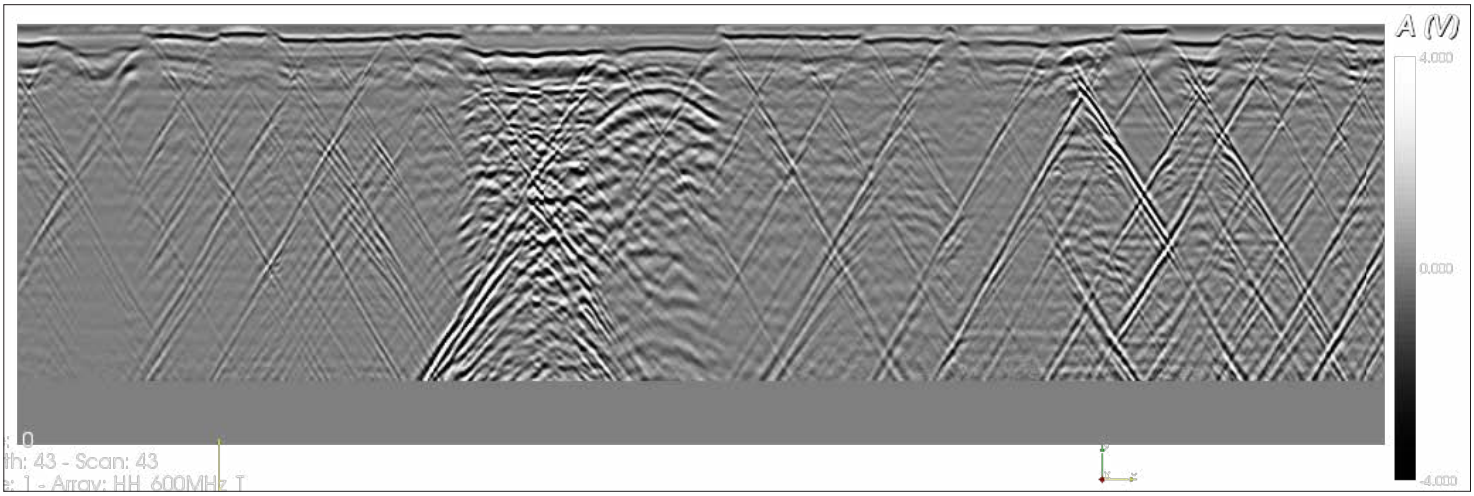


Figure 11 (top) *Graves parallel to survey line.*
Figure 12 (middle) *Graves perpendicular to survey line.*
Figure 13 (above) *Crypt.*
Figure 14 (overleaf) *Foundations*
Figure 15 *(**right**) A bat.*

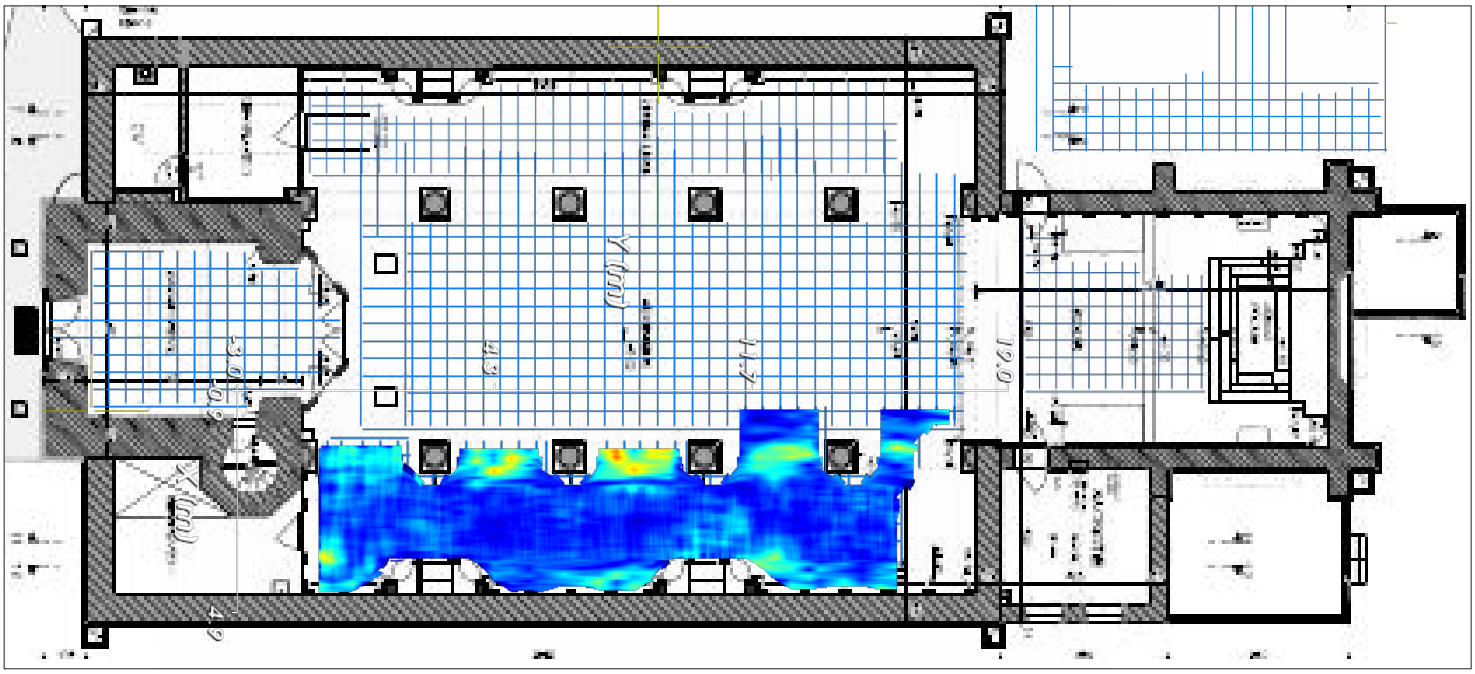
Conclusion

Well, there is no real conclusion. This was just a report of our findings while conducting church-surveys.

All in all, at Saricon, we enjoy our surveys. We try to do our best but there is always room for improvement. So, any tips, hints & tricks are more than welcome.

How do you go about conducting church-surveys?

Figure 14 *Foundations*



High-resolution magnetic susceptibility survey at Fort Edward National Historic Site, Canada

Jonathan Fowler[1] & Duncan McNeill[2]

[1] Saint Mary's University, Halifax, Canada — Jonathan.Fowler@smu.ca

[2] Geonics Ltd, Mississauga (retired) — duncanmcneill@bwr.eastlink.ca

Figure 1 *A view to the north looking over Fort Edward National Historic Site to the estuary beyond. The earthworks and blockhouse are visible, as is a cellar depression associated with the soldiers' barracks.*

Fort Edward National Historic Site of Canada is perched upon a low hill overlooking the town of Windsor, Nova Scotia, at the gateway of the fertile Annapolis Valley. Its muted earthworks watch over the confluence of the St-Croix and Avon rivers, whose names serve as reminders of imperial struggle that formerly convulsed this borderland colony.

Located at the north eastern edge of Britain's American colonies, Nova Scotia (or Acadie), changed hands frequently during the colonial period. By the 18th century, a small garrison cast a wary eye over a landscape nominally part of Britain's empire but in reality populated mostly by French and Indigenous people. Fort Edward was established in June of 1750 to monitor the locals and safeguard the overland route to the new capital at Halifax, and in 1755, in the lead up to the Seven Years' War, it served as one of many bases from which British and New England forces rounded up and deported the French population.

Aside from a solitary timber blockhouse - the oldest in the country - the fact that so little remains above ground at Fort Edward makes this an interesting test case for archaeological geophysics. Timber soldiers' barracks and officers' quarters appear on period maps, surviving long enough to be captured by early photography. These are promising targets. More appealing still was the chance of detecting traces of the French parish church of Notre Dame de l'Assomption, which occupied this hilltop before the military occupation.

Geophysical survey was performed with the Geonics EM38B, an electromagnetic instrument that simultaneously measures both terrain magnetic susceptibility and electrical conductivity to a depth of the order of one-half metre. Unlike a magnetometer, which infers variations in terrain susceptibility by measuring perturbations in the earth's magnetic field, the EM38B directly measures susceptibility at each survey point, thus offering greater spatial resolution, ease of interpretation, and improved detection of susceptibility variations in horizontal thin-sheet targets (often of archaeological interest).

Our survey grid was laid out to cover the fort's interior and data were collected along 111 parallel N/S lines, each 50 m long with 50 cm interline spacing, at a rate of 5 readings per second. Each line yielded, on average, 639 readings, for a total of 70,956 data points. One operator completed the survey in a single day with the support of several assistants who helped maintain survey geometry, collected field notes, and interacted with curious visitors.

Data were processed in two stages. Survey geometry and linear drift were first corrected with DAT38BW software from Geonics. The exported xyz file was then gridded and contoured with Surfer 12 software from Golden Software, which offers a variety of options for data interpolation and visualization. The data plot to the right illustrates the usefulness of coloured contours for terrain susceptibility data. The blockhouse is evident, as are several modern features (a flag pole, cairn, and lighting system). The high degree of spatial resolution clearly shows the outlines of the barracks and officers' quarters, complete with what appear to be cobblestone surfaces and drains between the buildings and the parade. The conductivity data is essentially responding to the ground moisture content.

Archaeological mitigation in 1986, undertaken by Parks Canada in advance of renovations, recovered traces of charcoal and burnt daub beneath the floor of the blockhouse, slighted by the structure's footings. Daub was a common building material of the colonial French population, and the hardened by-product of the burning of a daub building should be visible in magnetic susceptibility data as well as to the archaeologist's naked eye. It is in this connection that the susceptibility anomaly extending west from the blockhouse footprint draws our interest.

Our initial geophysical survey, the first of its kind at Fort Edward, vividly illustrates the power of magnetic susceptibility surveys to rapidly identify, delineate, and map archaeological deposits even in relatively noisy contexts. Future research will extend the survey to the extramural environment, where historical documents and maps indicate a variety of ancillary structures, including the garrison cemetery and an 18th century truckhouse.

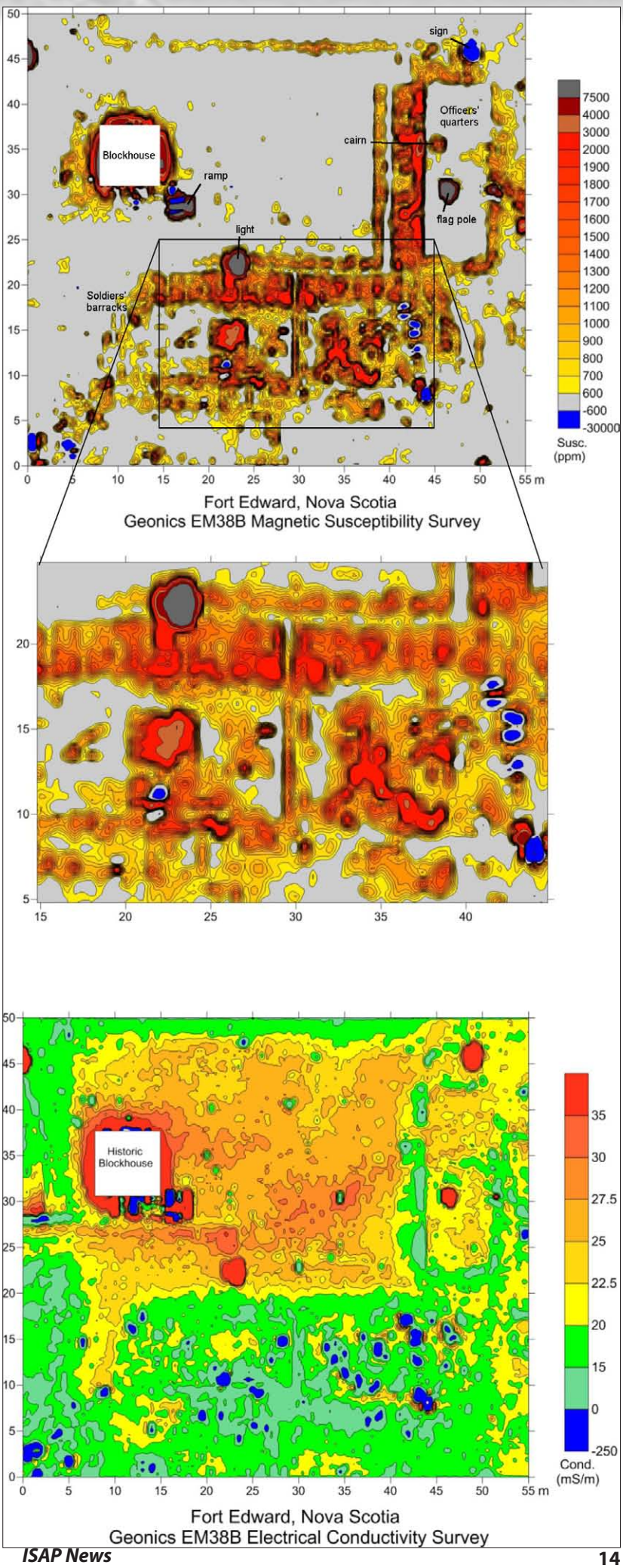


Figure 2 *Contour plots of magnetic susceptibility and conductivity data. North at top.*

Conflict Landscapes and Archaeology from Above

http://www.ashgate.com/isbn/9781472464385

Edited by Birger Stichelbaut and David Cowley

The study of conflict archaeology has developed rapidly over the last decade, fuelled in equal measure by technological advances and creative analytical frameworks. Nowhere is this truer than in the inter-disciplinary fields of archaeological practice that combine traditional sources such as historical photographs and maps with 3D digital topographic data from Airborne Laser Scanning (ALS) and large scale geophysical prospection. For twentieth-century conflict landscapes and their surviving archaeological remains, these developments have encouraged a shift from a site oriented approach towards landscape-scaled research. This volume brings together a wide range of perspectives, setting traditional approaches that draw on historical and contemporary aerial photographs alongside cutting-edge prospection techniques, cross-disciplinary analyses and innovative methods of presenting this material to audiences.

National Park Service's 2016 Archaeological Prospection Workshop

The National Park Service's 2016 workshop on archaeological prospection techniques entitled Current Archeological Prospection Advances for Non-destructive Investigations of Fort Gadsden, a War of 1812 Fort and Fight will be held May 16--20, 2016, at the War of 1812 Fort Gadsden site in Florida.

Lodging will be in Tallahassee, Florida at a motel to be determined. The lectures will be at the Southeast Archeological Center in Tallahassee, Florida. The field exercises will take place at the Fort Gadsden site in Apalachicola National Forest, Franklin County, Florida.

The site consists of two successive forts. The first was built by the British during the War of 1812. It occupied a strategic spot along the Apalachicola River. On July 27, 1816, U.S. Navy forces bombarded the fort hitting the ammunition shed inside the fort. The resulting explosion killed more than 300 African-Americans holding the fort. In 1818, a second fort was built in the heart of Spanish territory under the direction of Major General Andrew Jackson. The fort remained in use until 1821 when Florida became a U.S. Territory.

Co-sponsors for the workshop include the National Park Service's Midwest Archeological Center, Southeast Archeological Center, and the National Center for Preservation Technology and Training; and the Apalachicola National Forest.

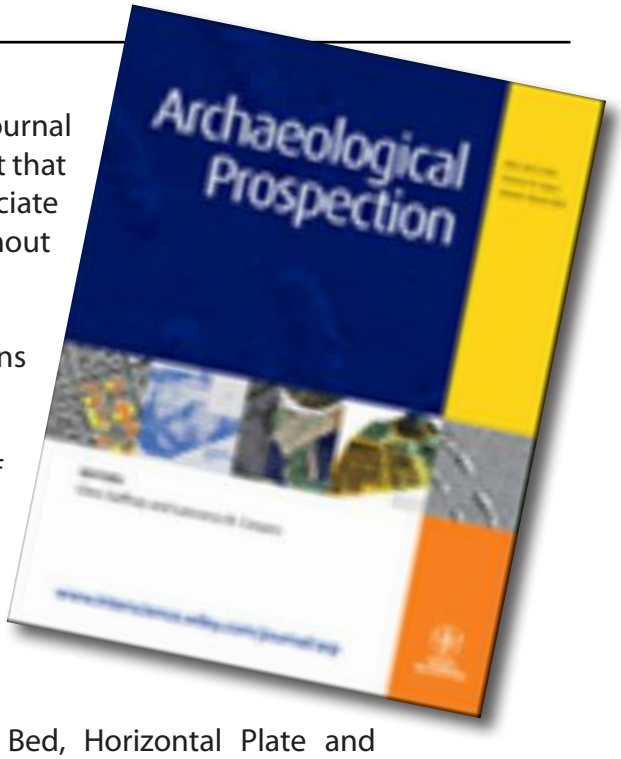
This will be the twenty-sixth year of the workshop dedicated to the use of geophysical, aerial photography, and other remote sensing methods as they apply to the identification, evaluation, conservation, and protection of archaeological resources across this Nation. The workshop will present lectures on the theory of operation, methodology, processing, and interpretation with on-hands use of the equipment in the field.

There is a registration charge of $475.00. Application forms are available on the Midwest Archeological Center's web page at <http://www.nps.gov/mwac/>. Payment may be made by credit card through the Friends of NCPTT for non-government employees. Federal employees may pay by check, through a training form (SF-182) or by credit card through the Friends of NCPTT. For further information, please contact Steven L. DeVore, Archeologist, National Park Service, Midwest Archeological Center, Federal Building, Room 474, 100 Centennial Mall North, Lincoln, Nebraska 68508-3873: tel: (402) 437-5392, ext. 141; fax: (402) 437-5098; email: <steve_de_vore@nps.gov>.

editor@archprospection.org

Journal Notification

Archaeological Prospection 22 (4)



In case you missed the announcement, the Impact Factor for the journal has increased to **1.917**. This is a very healthy value and is the highest that the journal has achieved. We would like to thank all the authors, Associate Editors and reviewers who have helped produce this high IF – without them this would not have been possible.

For the record, the latest issue of Archaeological Prospection contains the following articles:

A Multidimensional Research Strategy for the Evaluation of Settlement Pits: 3D Electrical Resistivity Tomography, Magnetic Prospection and Soil Chemistry
Erich Nowaczinski, Gerd Schukraft, Knut Rassmann, Samantha Reiter, Nils Müller-Scheeßel, Stefan Hecht, Bernhard Eitel, Olaf Bubenzer and Jozef Bátora

Quantitative Interpretation of Magnetic Anomalies from Thick Bed, Horizontal Plate and Intermediate Models Under Complex Physical-Geological Environments in Archaeological Prospection
Lev V. Eppelbaum

Use of Soil Apparent Electrical Resistivity Contact Sensors for the Extensive Study of Archaeological Sites
José María Terrón, Victorino Mayoral, José Ángel Salgado, Francisco Antonio Galea, Víctor Hurtado Pérez, Carlos Odriozola, Pedro Mateos and Antonio Pizzo

A Geophysical Tool for the Conservation of a Decorated Cave – a Case Study for the Lascaux Cave
Shan Xu, Colette Sirieix, Catherine Ferrier, Delphine Lacanette-Puyo, Joelle Riss and Philippe Malaurent

Western Section of the 'Dry Moat' Channel Surrounding Step Pyramid Complex in Saqqara in the Light of Ground-penetrating Radar Prospection
Fabian Welc, Radosław Mieszkowski, Jerzy Trzciński and Sebastian Kowalczyk

Dr Chris Gaffney & Prof. Larry Conyers

UNIVERSITY of BRADFORD

MSc Archaeological Prospection
Shallow Geophysics
At The University of Bradford, UK

The course is a highly focused postgraduate degree programme which develops specialist skills in the theory and practice of archaeological prospection, in particular in near-surface geophysics.

It provides students with knowledge and experience of the principal geophysical and geochemical techniques currently available for the detection of buried archaeological features and other near-surface targets. The course provides appropriate background to materials and soil science, together with the relevant mathematical principles.

Other methods of detection such as remote sensing, topographical survey and field-walking are introduced as essential components of an integrated approach to landscape assessment. Sampling procedures and the computer treatment and display of field data from all methods are critically examined with the aid of case studies based on field experience. Skills and knowledge are developed through lectures, seminars, laboratory and fieldwork classes and a substantial individual research dissertation.

Course Syllabus:
- Electrical Methods of Survey
- Magnetic and Electromagnetic Methods of Survey
- Site Evaluation Strategies
- GIS for Practitioners
- The Nature of Matter
- Treatment, Display and Interpretation of Field Data
- Soils and Chemical Prospection
- Dissertation (MSc)

Special Features:
- In-depth specialist training, including hands-on experience in the Division's geophysics and computer laboratories and in the field
- First destination figures indicate that about 85% of postgraduates in Archaeological Sciences achieve work or further studies in the discipline or cognate areas

For more information visit:
http://www.bradford.ac.uk/study/courses/view/?c=archaeological-prospection-shallow-geophysics-msc-full-time
or contact Dr Chris Gaffney: c.gaffney@bradford.ac.uk