ISAP NEWS

The newsletter of the International Society for Archaeological Prospection

Issue 5, October 2005

Contents

Editor's note

Welcome to my first edition of ISAP News. Despite giving everyone a fairly short deadline, contributions have been coming in thick and fast: keep it up!

If you have some news on a site, equipment, new technique, an update on a previous submission, or anything vaguely related to archaeological prospecting that you would like to share, please send a brief piece of text (around 500 words) in MS Word format with images to louise.martin@english-heritage.org.uk.
Next deadline… 14th December 2005.

6th Archaeological Prospection Conference: 14-17 September 2005, National Research Council (CNR), Rome

Salvatore Piro

In recent years, various scientific disciplines have provided the most effective tools for an integrated approach to the knowledge, analysis and safeguard of the Cultural Heritage. In particular Archaeological Prospection represents an entire range of non-invasive methods including all kinds of geophysical methods, satellite and aerial photography, as well as a variety of digital site-recording systems and numerical techniques for elaborating, analysing and representing the different data-sets collected from the surface.
The 6th Conference on Archaeological Prospection, organised jointly by Institute for Technologies Applied to Cultural Heritage (ITABC-CNR), International Society for Archaeological Prospection (ISAP) and the Special Project on "Safeguard of Cutural Heritage" (CNR), held at National Research Council (CNR, Rome, Italy), from September 14 to 17, 2005, attracted a significant interest, leading to 57 oral and 48 poster presentations. The Conference has been characterised by the following thematic sessions:

- Site based studies
- Integrated prospection methods
- Processing, interpretation and visualization
- Technical aspects
- Shallow depth determination
- Remote sensing, GIS, imaging
- Archaeological feedback

Several papers (*Site based studies session*: 12) indicated that there is an increasing enhancement for the application of high-resolution geophysical methods for the site based studies, in particular the application of aerial photography combined with high-resolution magnetic surveys.
Many contributions (*Integrated prospection method session*: 35) focused on the development and application of the integrated geophysical prospection methods (magnetic, GPR and geoelectric methods) and the development of an integrated method based on the application of historical, archaeological, geological, space image data and geophysical surveys.
Several studies (*Processing, interpretation and visualization session*: 20) on the development of processing and interpretation techniques, to enhance the image resolution in 2D and 3D data visualization, have been presented, related to the employement of electrical resistivity tomography, Ground Penetrating Radar and Magnetic methods.
Several papers (*Technical aspects session*: 7) have shown the increasing interest for the development of some experiments to better define the instrumental configuration and the acquisition techniques for optical pumping magnetometer, for Ground Penetrating Radar and for resistivity survey systems.
Case studies on the application of geophysical methods to locate near surface anomalies in natural and urban area (*Shallow depth determination session*: 14) have shown the need to apply high-resolution acquisition and processing techniques.
Papers on the application of satellite images, image processing, spatial analysis and geographical information system (*Remote sensing, GIS, imaging session*: 10) have shown the ability for these techniques to enhance the knowledge and the characterisation of the studied area.
Finally, several papers (*Archaeological feedback session*: 7) based on the studies of project specifications, comparison between geophysical results and archaeological excavations and of evaluation acquisition techniques and integrated approach, have been presented and discussed.
All accepted papers have been published in the "Proceedings – Extended Abstracts" Volume.
During the Conference a total of 167 scientists coming from 24 different countries have participated. In the following table the number of participants, divided for each country, is presented.

Country	Number of participants
Argentina	2
Austria	4
Canada	2
Czech Republic	2
Egypt	1
France	5
Germany	20
Greece	4
Holland	3
Iran	1
Ireland	3
Italy	49
Japan	12
Mexico	1
Poland	6
Russian Federation	12
Slovak Republic	2
South Korea	1
Spain	5
Sweden	1
Switzerland	1
Turkey	2
United Kingdom	24
Ukraine	1
U.S.A.	3

The Organizing Committee of the 6th Archaeological Prospection Conference wish to renew his thanks to the National Research Council, Rome, and to the Institute for Technologies Applied to Cultural Heritage (CNR) for making possible the organisation of the Conference, to the Special Project on "Safeguard of Cultural Heritage" (CNR) for providing the financial support to print the volume of the Extended Abstract", to Wiley & Sons as co-sponsorship of the "Welcome to participants" event of September 13, 2005 at the Protomoteca Hall of Campidoglio in Rome, to Lihtius Informatica S.r.l. as co-sponsor of the conference and to all scientists and scholars who have attended this conference to discuss archaeological prospecting and new approaches – their significance for scientific evaluation and archaeological conservation practice.

ISAP's First Honorary Members

Chris Gaffney

Within the constitution of ISAP are regulations regarding Honorary Membership, specifically *'Honorary Membership, which may be conferred by vote of the membership in General Meeting on individuals or institutions in recognition of distinguished service in the fields of archaeological prospection or related studies, as a means of fostering wider communication or interchange (especially at international level), or for such other reason as the membership may from time to time deem appropriate'.*

At the ISAP AGM held in London on 14th December 2004 five notable figures from the history of archaeological prospecting were proposed as the first Honorary Members of ISAP. The assembled members unanimously agreed to the proposal and since then all of the proposed have accepted this offer. In alphabetical order they are Dr Arnold Aspinall, Dr Albert Hesse, Dr Yasushi Nishimura, Prof. Irwin Scollar and Prof. John Weymouth. For those of you who do not know these people I have collected a few biographical details about each one.

Dr Arnold Aspinall

Dr Arnold Aspinall

Dr Aspinall has been an ever present mentor for many geophysicists in a career that has lasted about 40 years in our subject area.

Surprisingly Arnold's interest in archaeology was something of a late development, having studied physics initially and then worked in radio-astronomy with Professor Sir Bernard Lovell at Jodrell Bank.

Arnold's interests were very broad in archaeology which was a reflection of the extra-mural courses he studied at Leeds. Among the first research areas he developed was the use of Neutron Activation Analysis of archaeological material. However, in 1970 he published a paper with one of his research students (John Lynam) which championed the 'Twin-Probe' resistance array. The adoption of this array by so many archaeologists has been a paradigm changing moment in our discipline, but it is a straight jacket that he himself has often broken free from; two of his most recent published papers have been on the 'Schlumberger' and 'Square' arrays.

Arnold established the M.A. in Archaeological Sciences at Bradford; its first graduates were in 1975, which is the same year as the first undergraduates courses were taught in 'Arch.Sci.'. He led the department for over a decade and while head he was the first person to teach a course on geophysical surveying to undergraduates. His commitment to postgraduate and significantly undergraduate teaching has had a major effect on the take up of geophysics by the wider archaeological community in Britain. Arnold was a prominent figure in the rise of the journal 'Archaeological Prospection' and he was Editor for the first 11 years of its existence. He has recently stepped down from this task although he keeps a watchful eye over the direction of the journal in the position of Editor Emeritus.

Arnold responded to the award '*I am, of course, delighted to accept the invitation and, indeed, feel honoured to join such an august band of brothers!*'

Dr Albert Hesse

Albert Hesse has a background in engineering and he says that he was fortunate to undertake a Ph.D in applied geophysics under the tutelage of Prof. I Cagniard and A. Leroy-Gouhran in 1964. For archaeological geophysicists of a certain age Albert will be always linked with the Geophysical Research Centre at Garchy, which he ran from 1982 having risen from trainee engineer in 1960 to the position of Research Director of "Centre National de la Recherche Scientifique" (CNRS). This laboratory produced some of the most innovative research in archaeological geophysics and had such an outstanding reputation during the time he was there that it was commonly referred to as simply 'Garchy'.

Dr Albert Hesse

Although Albert had spent the whole of his working life within the CNRS, his contribution is far more widespread. In particular, throughout his career he sought to be inclusive in his approach to his subject. He achieved this by teaching for nearly 30 years at Paris 1 University, where he profoundly changed the course of French archaeological geophysics by guiding a generation of scientists, and by collaborating on many projects abroad. As early as 1966 he published what was probably the first textbook on archaeological geophysics ('Prospections geophysiques a fiable profondeur. Applications a l'Archeologie) and he was one of the founders of Revue d'Archeometrie. Additionally he believed in archaeology as a scientific puzzle and he was fascinated by all aspects of the subject; his published works are testament to this including statistical analyses of surface distributions and discussions of archaeomagnetic dating of sites in the Near East. Albert was particularly involved with the automation of resistivity surveying without the loss of accuracy or resolution; this he achieved with a series of elegant designs that were published among his frequent scholarly articles.

Dr Yasushi Nishimura

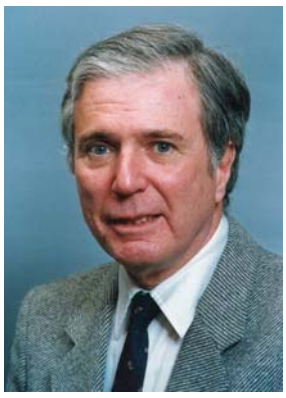
Up until his recent retirement from the Nara National Cultural Properties Research Institute, Dr Nishimura was the only national government employee responsible for directing research activities related to developing the field of archaeological prospection in Japan. His interests are well illustrated by his numerous international and domestic publications, which are largely dedicated to research in archaeological prospection. Dr Nishimura has been an excellent ambassador for our discipline, working all over the

world with academics and practitioners from a host of countries. Notable surveys include Angor Wat in Cambodia, Wroxeter in England, the Villa of Traianos and the Forum Novum in Italy. He has overseen and directed several university projects to produce new geophysical equipment which are dedicated solely to the purpose of archaeology, including continuous wave radar and a vector component magnetometer.

Dr Yasushi Nishimura and long time collaborator Dr Dean Goodman.

Somehow during this intensive work load he co-founded the Japanese Society for Archaeological Prospection and has served as President of the organization since its inception. Dr Nishimura is currently working for the Asian Cooperation Center which is a branch of UNESCO in Nara Japan, where he is responsible for introducing and teaching archaeology and human history to students from across all the countries in Asia. Dr Nishimura has always been too modest when discussing his contribution to our subject. In typical fashion he responded to the nomination *'I believe that if I am to deserve such a nomination, that it has only come with the assistance and support of many colleagues and friends, and for this I am very thankful'.*

Prof. Irwin Scollar



Prof. Irwin Scollar

Irwin Scollar is an academic of great renown in many different fields of archaeological science. The common link is, however, the development of software for display and analytical purposes. Although he spent from 1959 to retirement, in 1991, as the head of department for computer methods at Rheinisches Landesmuseum, Bonn, the preceding decade was anything but static; this period included a BSc, Electrical Engineering, Lehigh University 1948, MA, Classical Archaeology, Columbia, 1951, 1953 - 1954, Fellowship at the Metropolitan Museum of Art, New York City and following this, a fellowship from the Belgian American Educational Foundation in Brussels 1954 -1956. In the winter of 1956 he was awarded a fellowship by the American Scandinavian Foundation for study at the National Museum, Copenhagen, Denmark. In 1959 he was awarded a PhD at Edinburgh University after studying the neolithic period in south Belgium under Prof. Stuart Piggott.

Within three years of arriving in Bonn he had introduced systematic aerial photography, geophysical prospecting and computer evaluation of archaeological sites in Germany. His laboratory devised the first digital differential proton magnetometer for archaeology in 1961, and by 1975 he had designed and built the first large scale system for computer image processing in archaeology. This was the realisation of the digital age for both archaeological air photography and geophysical prospecting.

Prof. Scollar has held a lectureship at the University of Cologne in computer methods for archaeology since 1980 and was awarded in 1989 an honorary chair by that university. He was awarded the German Archaeology Prize in 1999 and was made an Honorary Member of the Aerial Archaeology Research Group in 2002. His publications include the standard 'Archaeological Prospecting and Remote Sensing' published in 1990 with three collaborators, one of whom (Albert Hesse) has also been awarded honorary membership of ISAP.

Prof. John Weymouth

Prof. John Weymouth surrounded by colleagues at a field school.

John Weymouth is another physicist who has bridged the divide between the 'hard' sciences and archaeology. In 1951 he completed a Ph.D. at University of California-Berkeley and for the next decade or two was involved in analytical techniques applied to the study of ceramics. In the early 1970s John started surveying with a proton magnetometer; although magnetic survey has remained a constant in his armoury he has researched with many techniques, notably chemical survey which is a link back to his earlier research.

Perhaps the most important factor in John's contribution to archaeological prospection was his great presence as a teacher. In particular he has taught by example to a generation of archaeologists who have participated in projects for the National Park Service; those who have seen him in action talk of his attention to detail and that he practises what he preaches. Many of his important projects have been in association with the Midwest Archeological Center although he has surveyed all manner of sites from native settlements through fur trade posts, to presidential homes. Many of these, such as Big Hidatsa settlement in North Dakota remain classic type sites. In 1998 John was the recipient of the Society of American Archaeology's Fryxell Award for Interdisciplinary Research, the first occasion that an archaeological geophysicist has been privileged to receive this honour. On receiving notification of this award John commented *'As an individual who has been involved in the application of prospection methods for the examination of archaeological sites for many years, I wholeheartedly agree with the aims of the ISAP'*.

Acknowledgements
Thanks are due to Mark Lynot, Alain Tabbagh and Dean Goodman for filling in details that I was unaware of. I have liberally used online material and acknowledge these sources: the photographs of Dr Aspinall, Prof. Scollar and Dr Hesse come from the University of Bradford, the University of Cologne and the Archaeological Prospection 2003 websites respectively. The photograph of Dr Nishimura came via Dean Goodman, while Mark Lynot delved deep in his archives for the group photograph that includes Prof. Weymouth.

Archaeological Prospection and Rediscovery of the Geomagnetic Observatory of Johann Von Lamont (1805-1879) in Munich-Bogenhausen

Joerg Fassbinder

Introduction

On 15th December 1805 Johann von Lamont, was born as John Lamont in Corriemulzie near Bremar in Central Scotland. He is one of the great-grandfathers of geomagnetism and geophysics. Because of the bicentenary jubilee we successfully prospected the first geomagnetic observatory of Lamont - in the area of the Sternwarte in Munich Bogenhausen and declared it as archaeological monument.

Historical background

Born in 1805 in the village Corrienmulzie in Central Scotland and orphaned at the age of 12, John Lamont came to the Scottish Monastery in Regensburg. He received a fellowship and was taken to Regensburg in Bavaria for education in theology and sciences. However, it turned out that his main interests were mathematics and natural sciences. Father Benedict Deasson recognized this giftedness. From 1827 John spent most of his time as a student in the Royal Astronomical observatory, which had been built in München

Bogenhausen between 1816-17. Finally, in the year 1835, at the age of only 29 he was appointed as director of the Royal Astronomical Observatory. In 1836 he became member of the Royal Bavarian Academy of Science and in 1856 was appointed to the Chair in Astronomy at the Ludwig Maximilans University of Munich. He received a high medal from the Bavarian King Ludwig including the privilege of naming himself "Johann von Lamont". On August 5th 1879 he died in his apartment in the Observatory.

Fig. 1: Johann von Lamont (1805-1879). Oil painting of K.Reschhäuser, 1896

The early 1830's were very important for geomagnetism due to the work of Carl Friedrich Gauss and Alexander von Humboldt. Humboldt convinced both the Russian Academy of Science in St. Petersburg in 1829 and then the Royal Society in London in 1836 of the need to establish a global network of geomagnetic observatories. A. Kupffer from St. Petersburg established four observatories in Russia while E. Sabine and H. Lloyd organised the foundation of geomagnetic observatories in the British Empire. These ideas were supported by C.F. Gauss and W. Weber who founded the "Göttinger Magnetischer Verein" which aimed to install a global network of geomagnetic observatories. The geomagnetic observatory in Munich 1840 is a result of these activities and was supported by money of King Ludwig I and King Maximilian II. The location of the observatory was in the area of the Astronomical Observatory in Munich Bogenhausen. Observation started at 6:00 o'clock on the 1st August 1840 with the measurements taken by Lamont himself. Variations of the declination and the horizontal intensity were first measured with instruments built by Gauss and Mayerstein in Göttingen, consisting of suspended magnets with a weight of 11.7kg.

It is well known that the observatory consists of four 8.8m long and 1.8m wide tunnels, which were oriented to approximately magnetic North, East, South and West, the floor was 3.8m below the surface level to avoid the daily temperature variations (see sketch from 1904, Fig. 2). Illumination came from windows in the roof. The site was connected to the main observatory building by a 35m long tunnel. The tunnel to the west had an opening to observe the cross of the St. Anna church for a reference measurement with a theodolite.

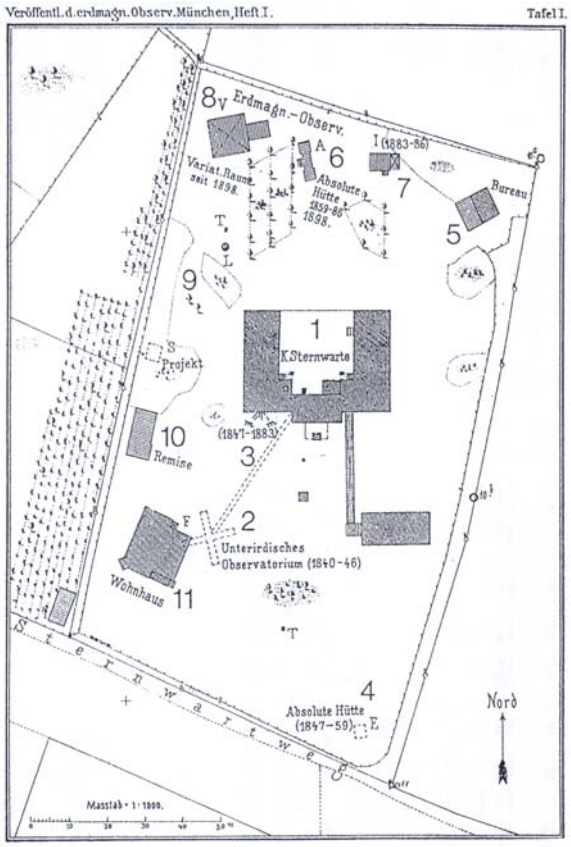


Fig. 2: Sketch of the area from 1904. (1) Main building of the Sternwarte; (2) first geomagnetic observatory 1840-1846; (3-4, 6-8) other observatories for geomagnetism of later times; (9) "Earthquake house"; (10) Remise; (11) residential house.

After six years the first wooden substructures broke down and were subsequently replaced by similar new buildings made of stone. Due the development of new instruments for the measurement of the Earth's magnetic field by Lamont the buildings could be designed much smaller.

In the late 1840's and early 1850's Lamont also undertook regional magnetic surveys at about 120 points in the Kingdom of Bavaria. Later he extended his measurements to other States of southern Germany and central Europe resulting in the publication in 1854 of maps with Isolines for D, H, and I. These maps are now part of the classical literature of geomagnetism.

Some of Lamont's measured points – all were well described and documented – can still be used today. But the first one in Bogenhausen was early given up and destroyed and replaced by smaller buildings. Due to the growth of the city of Munich and the disturbing industrial noise the geomagnetic observatory had been at Fürstenfeldbruck since 1938.

The subsurface site, as well as the Lamont's home at Bogenhausen has been buried beneath grass and trees in the park of the Astronomical Observatory. On the occasion of the bicentenary jubilee of Lamont's Birthday and on request of my teacher Professor H.C. Soffel, the Chair of Geophysical Institute of Munich 1983-2002, we undertook magnetic and resistivity prospection in order to find the exact location of the magnetic observatory and furthermore to get some information on the condition and actual state of the monument.
The rough position of the former residential house of Lamont as well the substructures of the Observatory itself is known from the sketch of 1904 (Fig. 2), but nothing is known of the room layout nor of the exact location of the subsurface observatory. The area of suspicion could be narrowed down to a size of 40 x 40 meters. Here we first made a magnetic prospection with the total field caesium magnetometer, followed by a resistivity survey with Geoscan RM15 instrument.

Results

The result of the magnetic prospection was as expected from the history of the site. The area is heavily contaminated by iron, either by the remains of the residential house or by the barrage during the Second World War. Therefore the traces of the walls were not visible in the magnetogram (Fig.3). However there are four strong magnetic anomalies, three of them (with intensities of roughly +9300.0nT) in the area of the house but one (intensity + 5300.0 nT) was located to be exactly in the southern tunnel the magnetic observatory. It is possible that the origin of this last one is the old 11.7kg heavy suspended magnet of the first Gaussian system – though this must be left open for discussion.

Results of the resistivity survey reveal a fine and clear picture of the "archaeological" structures in the ground (Fig. 4.). The walls and the ground of the residential house have been mapped, and those of the Remise turned out very clearly too. But moreover the layout of the magnetic observatory was also detected because of differences in the density of the soil beneath the ground.

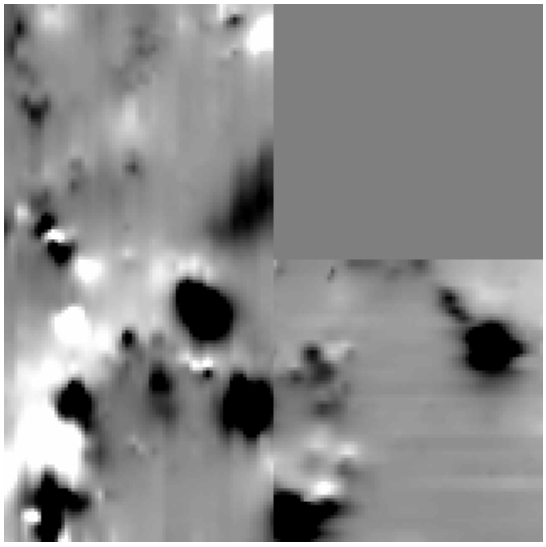


Fig. 3: Sternwartgelände München Bogenhausen: Magnetogram of the first geomagnetic observatory. The strong anomaly on the right side of the picture is in a great depth and is exactly inside the south tunnel of the substructure of the geomagnetic observatory.

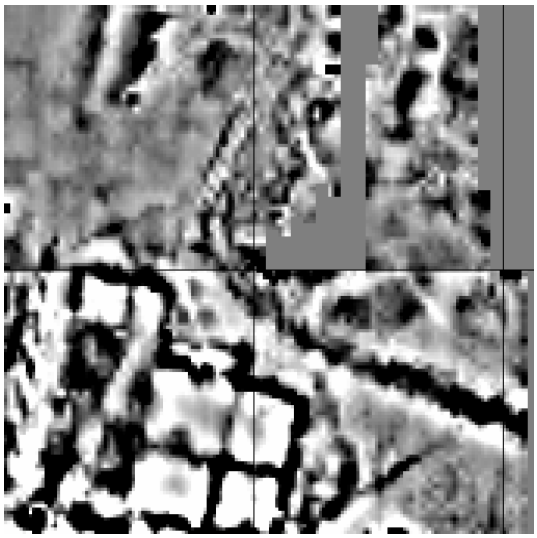


Fig. 4: Sternwartgelände München Bogenhausen: Resistogram of the site clearly showing the remains of the residential house as well as parts from the Remise. The traces of the substructures of the magnetic observatory are vague but clearly locatable.

The interpretation of the prospection results was compared with the actual topographical map of the site (Fig. 5). This outline also serves as a basis for

the protection of the monument as an archaeological site. Because of the extraordinary historical significance for the origin of geomagnetism and geophysics of the site the Bavarian State Department for Monuments and Sites decided to declare the area as protected archaeological monument.

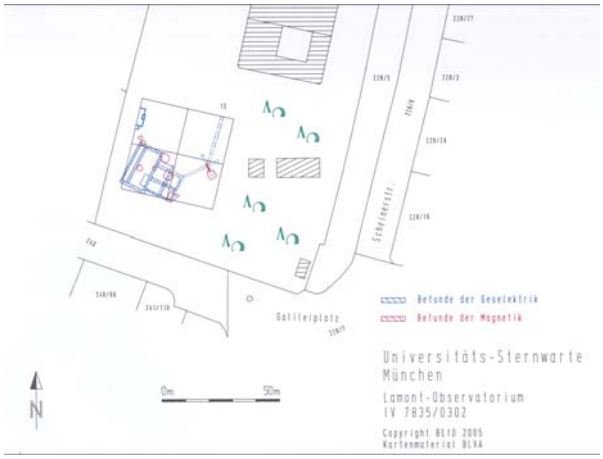


Fig. 5: Sternwartgelände München Bogenhausen. Topographical map of the area in the year 2005. The map serves as a basis for the protection of the site.

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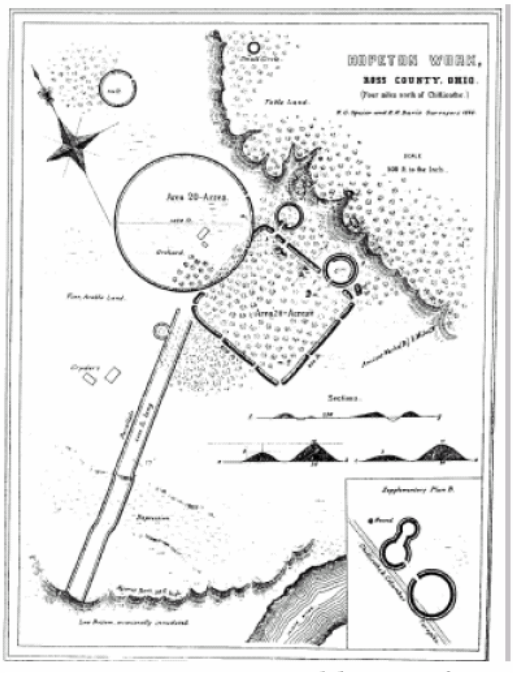
J.W.E.Fassbinder, D.Ebner, 2005, Geomagnetisches Observatorium Johann von Lamonts wieder entdeckt. Zum 200. Geburtstag eines Pioniers der Geomagnetik und Landvermessung in Bayern. Denkmalpflege Info B 132, 55-56.

A Large Area Magnetic Survey of a Hopewell Earthwork, Ohio, USA

John Weymouth

The Hopewell Native American culture is represented by a number of large earthworks in the south central part of the state of Ohio, USA. Several of the sites are part of the Hopewell Culture National Historic Park, National Park Service (NPS) which was created by the Federal Government in 1992. Most of this culture dates from roughly 1900 years ago. Many of these earthworks were mapped in the mid-19th century by Squier and Davis (Squier and Davis 1848). In a desire to learn something of the construction of the earthworks and to learn more about the Hopewell culture, the Midwest Archaeological Center, NPS (MWAC) is currently conducting research at some of these sites.

One of the major sites, the Hopeton Earthworks, near the city of Chillicothe, Ohio, has been extensively studied since 1994. The earthworks consist of a large square, about 280m on edge, a large circle, about 320 m across, a few smaller circles, and two long parallel lines extending out from the square. In 1848, as mapped by Squier and Davis (1848) (see Figure), the walls of the works were up to 4 m high, but agriculture in the intervening years has reduced the earthworks down to where, in some places, they can no longer be seen.



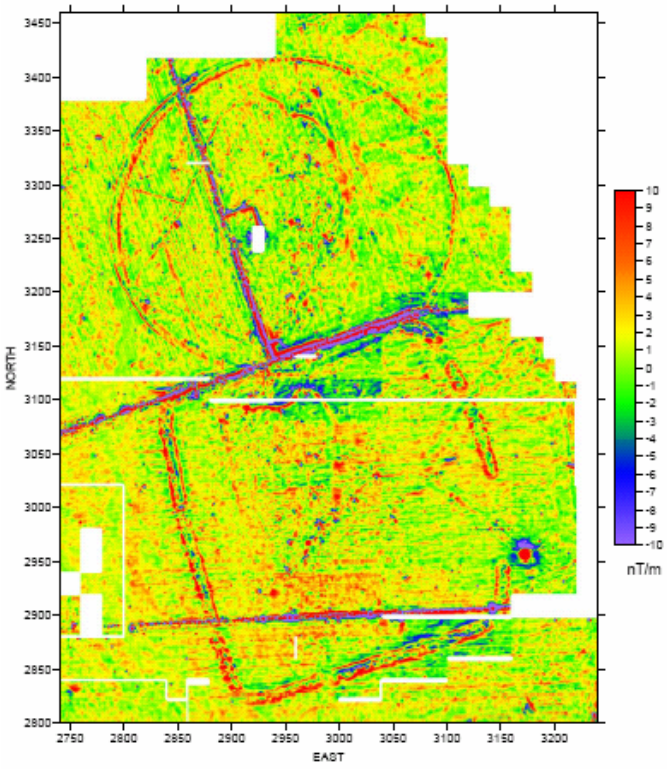
Hopeton as mapped by Squier and Davis

As part of the study of Hopeton a geophysical survey was carried out in a five year period, starting in 2001 (Lynott and Weymouth 2002), over the whole of the earthworks. Several instruments were used over parts of the site, including the Geoscan FM36 gradiometer, the Geoscan RM15 resistance meter, and a Geonics EM38 conductivity meter. However the bulk of the data were obtained with a Geometric G858 caesium gradiometer. From 2001 through 2005 the gradiometer survey covered 27.44 hectares.

Geometric G858 Survey Crew

The caesium gradiometer was operated with a two person crew, one person holding the sensors on a vertical pole and the other the electronic pack. The lower sensor was 30 cm above the surface, the upper sensor 100 cm above the lower. In this configuration the data were almost corrected total field data. The Figure shows the gradiometer crew. The gradiometer was operated in the "walking mode" with a time interval of 0.2 sec on traverses separated by 1 m, the interval on each traverses being about 20 cm. A map of the overall results is shown in the Figure.

The most notable result of the geophysical survey was the observation that the walls of the square and circle are very distinctly visible in the magnetic survey data. The sharp lines in the magnetic data are in marked contrast to the existing topography of the walls which is very gradual due to years of agricultural activities. The Figure shows an overlay of a topographic map on a section of the magnetic map of the wall. The sharp magnetic contrast between the core of the wall and the surrounding soils suggested that the walls must have been constructed from a material that differed markedly from the surrounding soils. The strong magnetic

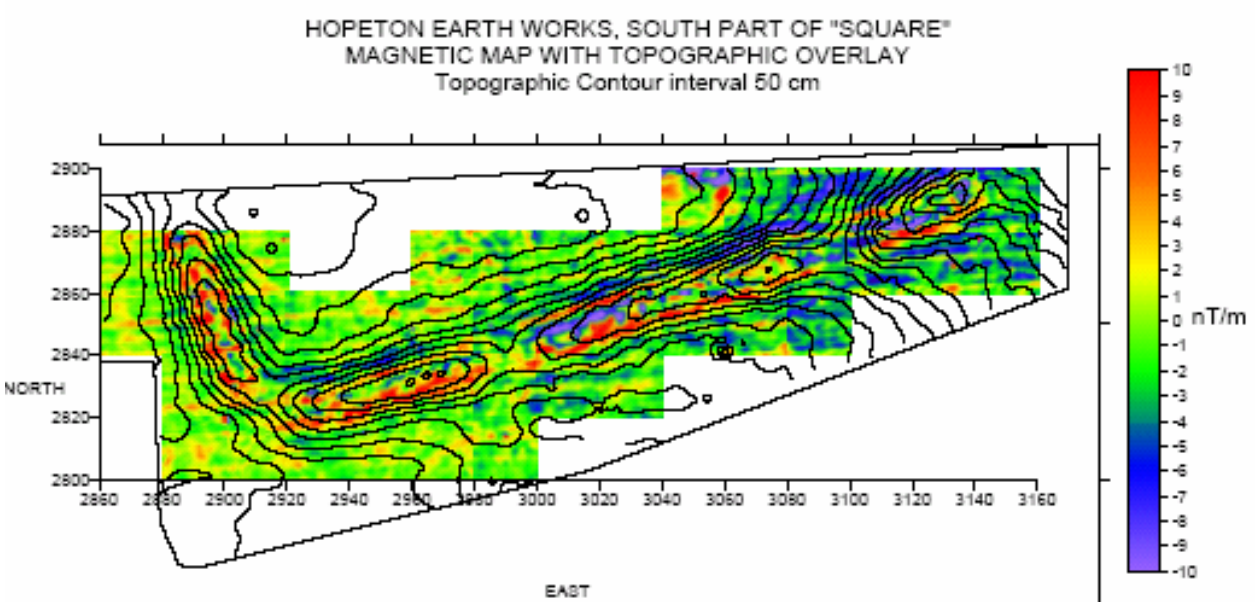


CESIUM GRADIOMETER MAP OF HOPETON EARTHWORKS
GRIDDED TO 1 m X 1m

lines marking the earthwork wall lines are separated by about 10 to 15 m and the magnetic maxima are 15 to 20 nT above the background The anomalous streaks that occur at various places are caused by deep plough scars.

Throughout the areas inside and outside the wall lines, anomalies were examined for possible features of archaeological significance. The anomalies identified several pits and some fire hearths. One post-hole containing some burned earth lead to the excavation of several more post holes and a fire hearth that marked a house structure.

Seven trenches were excavated across the wall lines at various places. The trench walls were examined with a smaller magnetometer by Bruce Bevan, Geosight. Rinita Dalan, Minnesota State University, Moorhead, measured magnetic susceptibility of soil samples from the wall faces. Rolfe Mandel, University of Kansas, studied the geomorphology of the construction. All of this aided Mark Lynott and other members of the MWAC in the interpretation of the construction sequence. The construction of the earthworks clearly involved moving a lot of earth. The placement of different kinds of soils on the tops of the walls, as evidenced by the magnetic data, was very carefully planned.



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Muffled Explosions

Immo Trinks

Recently, while trawling the internet for archaeological prospection publications, I came across an interesting article published in April 1984 in the *Leading Edge of Exploration* (originally published in 1956) by Daniel Linehan (1904-1987), Reverend and geophysicist at Boston College and discoverer of the "T" phase that can be found in some earthquakes. The article was entitled "*A seismic problem in St. Peter's Basilica*". Daniel Linehan describes seismic and resistivity archaeological prospection surveys which he undertook with Joseph Lynch in and around St. Peter's Basilica at Vatican City in the year 1951. Linehan had been asked by Monsignore Ludovicus Kaas, administrator of St. Peter's Basilica, to assist archaeological investigations that had been undertaken since 1939, when a workman discovered pagan tombs after breaking through a wall.

The targets of interest for an archaeological prospection in Vatican City were the existence and location of pagan and early Christian tombs at the site of St. Peter's Basilica as well as the location of a circus in which Nero was believed to have held games.

Seismic refraction lines were shot north, west and south of the Basilica along alleyways between buildings. These alleyways are paved with plates of volcanic material, lying on a thin layer of sand. The plates were removed in order to dig four feet deep shot holes while the seismometers were placed on the ground. No survey lines were measured on the Piazza San Pietro since this area had been investigated through earlier excavations.

Reportedly, "*Dynamite was the only workable agent* [as seismic source] *outside the Basilica*". Inside the Basilica a 30-pound weight, an iron plate and a hammer were used to generate the required seismic energy. The subsurface below the marble floor of the Michelangelo Basilica was investigated with a dense spread spacing of 10 feet (3.05m) and the possible existence of rooms, walls or filled rooms was noted from differing signal characteristics. Outside the Basilica the seismic measurements made it possible to determine the depth of a clay layer to nine feet, with an error of

one foot as proved through later excavation. Furthermore, the discovery of buried walls belonging to an older chapel south of Constantine's Basilica is reported. The noise caused by tourists and pilgrims during daytime forced the survey to be partly conducted at night. Father Linehan writes: "*No doubt some of the residents of Vatican City were quite surprised to hear muffled explosions at 11 p.m.*"

Central part of Vatican City as seen from space using Google Earth.

In addition to the seismic survey, electrical resistivity measurements were made, but the penetration depth of the method was limited due to buildings restricting the length of the survey lines.

Unfortunately, no examples of the seismic or resistivity data are shown in the article. It is possible that the Vatican archives harbour some of these very early archaeological prospection results.

Considering the resolution that is achievable today using Ground Penetrating Radar (GPR) with frequencies between 100 MHz and 1000 MHz, interesting results could be obtained from non-destructive measurements in and around St. Peter's Basilica. Using multi-antenna array systems, such as the *GSSI TerraVision* or the *Malå Geosciences CART* system, large areas could be surveyed very quickly at high spatial resolution (~10cm cross-line profile spacing). Measurements inside the Basilica could be conducted with single antenna GPR systems without regard of noise interference from tourists, and without endangering the sleep of his holiness. Only Radio Vatican may cause interference with the measurements, a problem that had already troubled Daniel Linehan in 1951.

Reference

Daniel Linehan, *A seismic problem in St. Peter's Basilica*, Geophysical Case Histories, Vol. 2, SEG, 1956.

Conference announcements

National Park Service's 2006 Archaeological Prospection Workshop: 15-19 May 2006

The National Park Service's 2006 workshop on archaeological prospection techniques entitled *Current Archaeological Prospection Advances for Non-Destructive Investigations in the 21st Century* will be held May 15-19, 2006, at the Fort Frederica National Monument, Georgia. Lodging will be at the Quality Inn Island House on St. Simons Island, Georgia. This will be the sixteenth 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 this year will focus on the theory of operation, methodology, processing, interpretation, and on-hands use of the equipment in the field. There is a tuition charge of $475.00. Application forms are available on the Midwest Archeological Center's web page at <http://www.cr.nps.gov/mwac/>. 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>.

Education and Culture

Culture 2000

WORKSHOP "MILITARY AERIAL PHOTOGRAPHY AND ARCHAEOLOGY"

It is our great pleasure to invite you to participate to the workshop 'Military Aerial Photography and Archaeology'. This workshop is organised within the Culture 2000 project "European Landscapes. Past, present and future". It will be organised by Ghent University and the In Flanders Fields Museum.

Where: Ieper (Belgium), In Flanders Fields Museum
When: 19-21 October 2006
Congress Language: English
Papers: max. 25 min.

Themes and programme

A first theme of the workshop (***Archives, Inventories and History of military aerial photographs***) would focus on the presentation of the main collections of World War I and World War II aerial photographs. Historical contributions paying attention to institutions involved in military aerial photography during both world wars would be accepted. For practical reasons, we limit our vision on the studies of the European area and on both world wars of the 20th century.

Main questions are 'where are these archives', 'what do they contain', 'which areas are involved', 'what are the potentialities for historical and archaeological research', …

A second session of the workshop (***Processing military aerial photographs***) will concentrate on modern processing of historical aerial archives and their applications for archaeology (whether battlefield archaeology or not). Detailed surveys, processing of the images (stereoscopy, digital analyse), use for inventories and management of the archaeological heritage (through GIS).

If you are interested in presenting a paper, please send your application to Birger.Stichelbaut@ugent.be, mentioning the title of your paper and a short abstract **before January 31st, 2006.**

The Organising Committee:

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UNIVERSITEIT GENT

STAD IEPER

ARCHAEOLOGICAL PROSPECTION

NITRA 2007

The 7th International Conference on Archaeological Prospection will be held in Nitra, Slovakia, and will be organised by the Archaeological Institute of Slovak Academy of Sciences.

Nitra is one of the oldest town settlements in Slovakia. As early as the 9th century, it was a princely seat and bishopric of the Great Moravian Empire and later it welcomed the pretender to the throne of Hungary. In 830, the first Christian church in Slovakia saw the light of day there. Nitra became an independent royal town in 1248. It suffered from several Turkish invasions. The Nitra Castle is the most visited monument in the city.

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