Contents

Editorial
AARG Chairpiece: March 2017 by Rachel Opitz
Student/young researchers’ scholarships for AARG 2017
AARG 2017: First call for papers
AARG notices: Derrick Riley Bursary
ISAP Fund
Information for contributors

Fantastic images (and where to find them) by Davide Danelli
Palimpsests of medieval landscapes. A case study from Lower Silesia Region, Poland by Grzegorz Kliarszys

Cropmarks

Books of interest?
Maurizio Forte and Stefano Campana (eds), 2016. Digital Methods and Remote Sensing in Archaeology.
Gianluca Cantoro, Jeremia Pelgrom and Tesse D. Stek, 2016. Reading a difficult landscape from the air. A methodological case-study from a WWII airfield in South Italy.
Łukasz Banaszek, 2015. Przeszłe krajobrazy w chmurze punktów (Past landscapes in the point cloud).
Federica Boschi, 2016. Non-destructive field evaluation in Preventive Archaeology. Looking at the current situation in Europe.
Free downloads: Council for British Archaeology, RCHME inventories, Dave Cowley publications

Papers of interest? As yet unread

AARG: general information, membership, addresses, student scholarships
AARGnews is the newsletter of the Aerial Archaeology Research Group

Published twice yearly in March and September

Edited by Rog Palmer

rog.palmer@ntlworld.com

[Cover photo. Colourful quarry at Block Fen, Cambridgeshire, with archaeological excavations. Photo © Jack Powell, 17 January 2017]
Pula, showing the Roman amphitheatre, venue for AARG’s Welcome Reception, to be held on 12 September 2017. Photo: © Rog Palmer: 20140534_239-1: with acknowledgements to Darja Grosman for the flight.

Checking out the Pula beer on behalf of AARG members. Feb 2017. Photo: Sara Popovic.
Editorial 1

How many friends do you have?
In recent years, *Current Archaeology*, one of UK’s archaeology magazines, has asked people to vote for the best this, that and who ‘to have made outstanding contributions to archaeology’. Voting is done by the rabble – us – rather than peers and in cases like this, as is common on several social media sites, the person with the highest number of friends is likely to win. To me, this defeats any element of voting wisdom as, for example, someone voting for the ‘best book’ is unlikely to have read them all, but may have been reminded to vote by one of the authors. OK, this is an aspect of 21st century life and perhaps I ought to cope with it by exercising more caution when being told that certain categories are ‘popular’, ‘best’ or ‘most important’. This year, *Current Archaeology* didn’t make it easy for their voters as one category, *Archaeological Innovation of the last 50 years*, mixed methods of detection such as geophysics and lidar with uses of DNA which have helped demonstrate population spread and links between populations. How can we be asked to value either method of detection, whose uses have had a major influence on the practice of field archaeology, as more-or-less innovative than the scientific advances brought about by uses of DNA? It seems an awkward comparison, and one that can’t easily be made based on some notion of total intellectual impact. Rather, the outcome represents the enthusiasm of each community to participate in the vote and perhaps also helps give voters a sense of belonging.

Awards were presented at the end of February and showed that lidar had more friends, or a more active voting community, than geophysics, DNA, or whatever else was on offer.

Women and aerial women
A current exhibition *Raising Horizons*, at the Geological Society in London, celebrates what the organisers call ‘Two centuries of hidden trowel-blazing history’. In the exhibition, these two centuries are represented by 14 women who worked in archaeology, geology and palaeontology. By the end of February, the website (http://trowelblazers.com/) carried short articles on more than 150 women in those fields, so there is little excuse not to know about those in our discipline, and new articles ‘about truly inspiring women’ are invited. While we don’t really ‘blaze trowels’ in the aerial world we have included a number of women who, by slogging away, have advanced our speciality. There seems also to have been equal sharing of jobs in our aerial world. Flying is not only for blokes just as interpretation is not only for women – our equivalents perhaps of dirty archaeology’s diggers and pot washers. I won’t name names, but note that the most recent list of members issued by Sara-the Secretary showed 52 female names out of a (supposed) membership of 185 – that’s about 28%. Similarly, of the ten elected AARG Chairmen, three have been female giving a similar percentage and suggesting, at least suggesting to me, that there has been equal representation. However, of the unknown total of Hon Members, only one is female which will not meet the 30% share of members. Nominations for female honorary members are welcomed.

GlobalXplorer
We can’t really ignore Sarah Parcak’s attempts to tempt a worldwide usership to locate archaeological objects on satellite images. This has been unleashed following her award of a

---

1 rog.palmer@ntlworld.com
Any identifications submitted will be vetted by her team, which seems a good thing for quality control. However, I there is a concern that too many “no’s” might result either in a lack of interest or in people going off by themselves and claiming to have found this, that and the other that have fooled the experts. We can all remember such ‘discoveries’, ranging from the several Noah’s Arks (summarised in Wikipedia 2017a), via the Bosnian pyramid(s) (Wikipedia 2017b), past that bloke at AARG 2006 who claimed he could find coconuts (and Atlantis) on Landsat images, to several geological ‘hillforts’ in England (eg Wilson 1982, Fig 87; Palmer 1992) and the Czech Republic (correspondence with Martin Godja). The finders of these things were reluctant, or refused, to believe the ‘experts’, claiming that their instinct was more credible than scientific explanation. Balancing harnessing public energy and enthusiasm with the necessary control of expert review is a real challenge. But this is also true nowadays for many other expert opinions in a range of scientific fields. To top the lot, I found a YouTube channel called Martian Archaeology in which you can make up any stories you like. In this example (https://www.youtube.com/watch?v=8tnd0KZR7NY&t=213s), you can see a couple of stone circles, one of which is on a ‘mound’, and even a blue Martian sprawled drunkenly in a crater, plus whatever else you fancy. This is just the type of entertainment we need for AARG’s evening session.

Parcak’s website is at: https://www.globalxplorer.org/ and a glance at it raised a comment from a Polish member: Is that a joke? ‘Look for looting pits with a magnifying glass’. But do try it for yourselves and tell us what you think.

Pula and AARG 2017
A few days before writing this, some of the Committee checked the venue for AARG 2017 and assured ourselves that progress was progressing. As a venue, Pula seems worth the effort to get to and, in the fashion of the times, has walls, great Roman walls.

Details of the proposed conference themes and dates of AARG are given elsewhere in this issue. We advise early booking of accommodation as Pula is a fairly small town and a popular holiday resort. I can also report favourably on some of the local beer which is produced at several new craft breweries in the area (see p3).

AARG’s Evening Sessions were mentioned above and this year we hope to follow through on plans to revive this tradition. These evening sessions are not meant to be serious – in the old days they were not much more than a show of aerial slides – and could perhaps include items that were not offered to the session entitled Mistakes that was proposed for AARG 2016.

This issue
Includes contributions representing the diverse work now carried out by our membership. Uses have been made of satellite images for at least 20 years, with updates being given by Martin Fowler in past issues of AARGnews, and the AARG membership voted to include a ‘mission statement’ to that effect at the 2016 AGM (Opitz 2016) which is reprinted on the last page of this issue. A paper by Davide Danelli enlarges on a survey undertaken as part of his research and includes a list of all currently-available high resolution commercial satellites. I think it is fair to say that wherever in the world you may be working, these images are an essential data source.
The wall of posters from September has been reduced to one paper by Grzegorz Kiarszys that shows the rise and fall of strongholds in Poland and changes to the medieval landscape. Input from aerial images is a small part of this project which shows what can be done by combining information from a range of sources and then writing the results in a way that can be understood and visualised by local communities who now occupy those landscapes.

The turn of the year seems to have been the time to publish and Books of interest? includes comment on those I could keep up with. Perhaps this concentration of publications has been caused by the rush to publish to satisfy managers and the powers that be and – personal opinion – academic quality varies. This is unlikely to change until research again becomes valued for its contribution to scholarship rather than publication being another ticked box in a list of ‘achievements’. There are, however, a few goodies in the pile.

References
Chairpiece: March 2017

Rachel Opitz

Forte and Campana introduce the term ‘polysensing’ in their recent volume “Digital Methods and Remote Sensing in Archaeology” to describe a shift from the predominant practice of using a single remote sensing method on any given project to that of the use of multiple, integrated remote sensing methods in a single project and suggest that, “The transformation of the traditional remote sensing into something else defines new borders for this research field and suggests a new methodological approach.” (Forte and Campana, 2017, Preface). The organization of the volume reflects this, with satellite imagery, aerial and terrestrial laserscanning, discussions of the representation of space, and formal modeling exercises sitting in a single volume. On one hand, integrated approaches are nothing new, and Campana has been a proponent of them in the aerial community for well over a decade (e.g. Campana et al. 2009; Campana, Piro and Felici 2007; Campana 2002). On the other hand, the kind of integration seen in recent years may well represent a new thing. Let us take their proposed idea of a fundamental disciplinary shift seriously for a moment, and I will add my own interpretation of their term: polysensing goes beyond integrating multiple sensors that all fundamentally collect signals that represent various physical phenomena. It assumes close integration of modeled data, sensed data, and derived data. It is the integration across these fundamentally different types of data that will push us to consider a broader set of perspectives. This kind of integration seems worth pursuing as we work to highlight the importance of aerial archaeology within broader communities. Indeed, this kind of integrated aerial archaeology is something we already pursue in principle, and AARGews and the AARG conferences have seen discussions of how we can get talking outside our own specialist community.

How we can best act on the group’s collective sense of a need for improved outreach and cross-disciplinary ties remains an open question. Connections with organizations like ISAP through ArcLand International, and representation on the EAC Remote Sensing Working Group are one route. Active participation in generalist and other specialist conferences is another. The 2017 CAA Conference in Atlanta is approaching as I write, with aerial archaeology featuring in a number of sessions, notably those focused on automation and 3D data. This meeting presents an opportunity to speak outside our core community, to an audience with shared interests and challenges in technical areas including big data management, geospatial applications, effective visualizations, and data integration. It is also a moment to consider how the larger community is facing challenges of connecting technological developments to changes in field and analytical practice, teaching, and standards. By engaging with others facing these broad challenges, we can both improve our own practice and contribute to these efforts.

The call for papers for our annual conference in Pula appears in this issue, and includes ‘Integrated Aerial Archaeology’ as a theme, together with themed sessions on particular kinds of landscape, future practices and emerging approaches, the influence of our discipline’s past and experience on its present state, and how we teach and learn to do and see things. I hope to see many familiar and new faces there, and that we will hear papers that highlight the diverse

---

1 aargchair@gmail.com
interests and backgrounds of our membership, and illustrate the many ways in which aerial archaeology is engaged in archaeology at large.

References


Campana S., Piro S., Felici C. 2007, Integration between different remote-sensing surveys to characterise the Aiali archaeological site (Grosseto, Central Italy), *Proceedings of 7th Archaeological Prospection conference*, pp.122-125.


STUDENT/YOUNG RESEARCHERS’ SCHOLARSHIPS FOR AARG 2017

These scholarships are intended to support bona fide students and young researchers who are interested in aerial archaeology and wish to attend the conference. There is no application form. Please provide the following information in an emailed headed with “Student/Young Researcher Scholarship”: Your interests in archaeology and aerial archaeology; place of study; the name and contact details of a supervisor or employer (email) who can provide a reference; why you would benefit from attending the conference; and an estimate of travel costs to attend. Furthermore, you should also be willing to provide a poster, or for exceptional work provide an abstract for a paper (20 mins) under one of the conference session themes listed above.

Applications should be addressed to Rachel Opitz at aargchair@gmail.com. In addition, there will be a competition for the best Student/Young researcher poster or paper, judged by the Chairman and Vice-Chairman. The prize will be a free 2018 conference package (registration fee, dinner and field trip). All entries for the competition must apply for the Student/Young Researchers Scholarships to be eligible. The closing date for applications is the 1st June 2017.

More information may be found at the Aerial Archaeology Research Group website:

[http://www.univie.ac.at/aarg/](http://www.univie.ac.at/aarg/)
* FIRST CALL FOR PAPERS *

International Aerial Archaeology Conference

AARG 2017

Pula, Croatia

Wednesday 13th to Friday 15th September 2017

Organised by: The Aerial Archaeology Research Group

Papers (20 minutes) and posters (A0) are invited on the themes of:

★ Karstic Landscapes
★ Integrated Aerial Archaeology
★ Learning to See
★ Histories of Practice
★ Aerial Archaeology of the Future

All conference paper and poster offers to: Rachel Opitz,
Department of Anthropology and CVAST, University of South Florida
Email: aarg.chair@gmail.com

Wednesday 13th September and Thursday 14th September - Paper and Poster Sessions
Debate/Discussion Session; Local Session; (Invited Papers)
Themed Sessions (Open Call for Papers)
Poster Session (Open Call for Posters)

Friday 15th September - Field Trip
Full-Day Field Trip to the Brijuni National Park.

Closing date for all proposals (with title and abstract) is the 1st June 2017.
AARG notices

The Derrick Riley Bursary

The Derrick Riley Bursary still exists. It is £500 a year, usually a single award, but sometimes is split and given to two people.

There should be an application form on the Sheffield Archaeology Department website and a Riley Bursary page on the Sheffield website where potential applicants will be able to find information and download the application form.

Finding the relevant page represents the first challenge, but if you can’t please contact Bob Johnston (r.johnston@sheffield.ac.uk) who administers the bursary.

Please apply for this even though it is not used only for conference attendance. AARG has limited funding and access to the Riley Bursary extends this amount to something more useful. No whinging about lack of money if you don’t apply.

ISAP Fund

In August 2015, ISAP announced establishment of a fund to provide support of up to £1000 to assist with members’ projects [membership costs less per year than AARG does] that ‘further the objectives of the Society’.

Info and application form from the ISAP web site: http://www.archprospection.org/isap-fund

Information for AARGnews contributors

AARGnews is published at six-monthly intervals. Copy for AARGnews 55 (September 2017) needs to be with me no later than September 17, 2017 – immediately after AARG. Editorial policy (for want of a better word) tends to be that if I am sent interesting contributions they go in unless there’s a danger of an issue overflowing. Instructions for contributors are no longer on the AARG website, but this issue and a page that can be sent on request may guide.

Please do not use any ‘clever’ formatting and avoid footnotes.

Good-quality jpegs are suitable for illustrations. Tiffs are for archives.

Address for contributions: rog.palmer@ntlworld.com
Fantastic Images (and where to find them)

Davide Danelli^1

Keywords: remote sensing, satellites, HRSI.

1. Introduction

Satellite imagery used in archaeological practice comes from two main sources: declassified satellite imagery and non-military satellite imagery. The utility of declassified imagery for archaeological practice has been undeniable through the last twenty years, starting from David Kennedy's work in Turkey (Kennedy 1998a, b. Major contributions on the subject are listed in Fowler 2004, 2013). The use of declassified imagery is still important in all those studies that imply an historical approach to the use of satellite imagery, or are concerned with history and evolution of a landscape (as in order to protect the cultural landscape, e.g. the EAMENA project). To the present day, though, declassified images are more and more acquiring a support role, even if an undoubtedly important one, and other sources of satellite imagery have outclassed declassified data in terms of spatial and spectral resolution, availability and, to some extent, cost. The role of Earth Observation Satellites in archaeological practice had a massive burst in 2005, when Google Maps and Earth were born (Palmer 2005), and it gained a lot of visibility worldwide, even in the non-archaeological world, in 2016, when Sarah Parcak won the TED Prize and started to build GlobalXplorer (www.globalxplorer.org).

The subject of non-military satellite imagery, and its possible uses in archaeology, was first analysed by Martin Fowler (Fowler 2010). The following table, starting from his work, sorts by date of launch a wide selection of satellites, equipped with sensors that have been considered highly functional for archaeological practice.

3. Data

This table starts with 24th December 1997, when EarlyBird-1 was launched with the sole purpose of taking high resolution images of the Earth surface for commercial purpose, but stopped working only four days later, without taking any pictures. Since then, 47 non-military satellites have followed, and 39 of them are still providing data. When available, informations regarding producers and ground resolution of the optical payload are given.

---

^1 davide.danelli@gmail.com
<table>
<thead>
<tr>
<th>Name</th>
<th>Producer</th>
<th>Launch date</th>
<th>In orbit</th>
<th>PAN (m)</th>
<th>MS (m)</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>EarlyBird-1</td>
<td>EarthWatch</td>
<td>24.12.1997</td>
<td>-</td>
<td>3</td>
<td>15</td>
<td>EarlyBird-1 was the first satellite ever to be built with the sole goal of achieving high resolution images for commercial purpose. Unfortunately, all contacts were lost 4 days after launch, and no image was taken.</td>
</tr>
<tr>
<td>Ikonos</td>
<td>EarthWatch</td>
<td>24.9.1999</td>
<td>-</td>
<td>0.81</td>
<td>3.2</td>
<td>Originally named Ikonos-2, it was re-named after the launch failure of Ikonos-1 on April 27th, 1999. In orbit until March 31st, 2015.</td>
</tr>
<tr>
<td>EROS A</td>
<td>ISI</td>
<td>5.12.2000</td>
<td>✔</td>
<td>1,5</td>
<td></td>
<td>First Israeli commercial satellite, produced by Israeli Aerospace Industry.</td>
</tr>
<tr>
<td>OrbView-4</td>
<td>GeoEye</td>
<td>21.9.2001</td>
<td>-</td>
<td>1</td>
<td>4</td>
<td>Launch failure. First satellite ever equipped with hyperspectral scanners. (Ground resolution of OV-1 &amp; -2 was &gt;1km, and OV-3 was launched two years later). DigitalGlobe bought GeoEye in January 2013.</td>
</tr>
<tr>
<td>QuickBird-2</td>
<td>DigitalGlobe</td>
<td>18.10.2001</td>
<td>-</td>
<td>0.61</td>
<td>2.44</td>
<td>EarthWatch inc. became DigitalGlobe inc. in September 2001. QB-1's launch was not successful. QB-2 stayed in orbit until January 24th, 2015.</td>
</tr>
<tr>
<td>SPOT-5</td>
<td>CNES</td>
<td>3.5.2002</td>
<td>-</td>
<td>2,5</td>
<td>10</td>
<td>Fifth Satellite Pour l'Observation de la Terre of the French Centre National d'Etudes Spatiales. His older brother, SPOT-4, in orbit from 1998 to 2013, had a 10m PAN and 20m MS ground resolution. SPOT-5 stopped working on March 31st, 2015.</td>
</tr>
<tr>
<td>OrbView-3</td>
<td>GeoEye</td>
<td>26.6.2003</td>
<td>-</td>
<td>1</td>
<td>4</td>
<td>No image was taken after April 23rd, 2007. On March 13th, 2011, the satellite was taken down.</td>
</tr>
<tr>
<td>FORMOSAT-2</td>
<td>NSPO</td>
<td>21.5.2004</td>
<td>-</td>
<td>2</td>
<td>8</td>
<td>First HRS from Republic of China (Taiwan)'s National Space Organization. Its scanners could achieve 2m PAN images and 8m 4-bands multispectral images. After twelve years, it was decommissioned on 1st Aug 2016.</td>
</tr>
<tr>
<td>CartoSat-1 (IRS-P5)</td>
<td>ISRO</td>
<td>5.5.2005</td>
<td>✔</td>
<td>2,5</td>
<td></td>
<td>First HRS produced by ISRO, India Space Research Organisation. It was equipped with a panchromatic camera only.</td>
</tr>
<tr>
<td>EROS B</td>
<td>ISI</td>
<td>25.4.2006</td>
<td>✔</td>
<td>0.6</td>
<td></td>
<td>Second HR satellite launched by Israeli Space Agency.</td>
</tr>
<tr>
<td>Resurs-DK-1</td>
<td>NTs OMZ</td>
<td>15.6.2006</td>
<td>-</td>
<td>1</td>
<td>2-3</td>
<td>First HR civil satellite of Russian space agency. It remained in orbit longer than expected, and communications finally terminated on February 17th, 2016.</td>
</tr>
<tr>
<td>CartoSat-2</td>
<td>ISRO</td>
<td>10.01.2007</td>
<td>✔</td>
<td>0.8</td>
<td></td>
<td>Second Indian HRS, first to have a better resolution than 1m²/px.</td>
</tr>
<tr>
<td>WorldView-1</td>
<td>DigitalGlobe</td>
<td>18.9.2007</td>
<td>✔</td>
<td>0.41</td>
<td></td>
<td>DigitalGlobe's WorldView, at the moment the constellation of satellites with the highest resolution, was the first to achieve a resolution better than 0.5m. However, until June 2014, only US Government could access the maximum resolution, and denied the</td>
</tr>
<tr>
<td>Satellite Name</td>
<td>Operator</td>
<td>Launch Date</td>
<td>Resolution</td>
<td>Information</td>
<td></td>
<td></td>
</tr>
<tr>
<td>---------------</td>
<td>----------</td>
<td>-------------</td>
<td>------------</td>
<td>-------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RadarSat-2</td>
<td>CSA</td>
<td>14.12.2007</td>
<td>3</td>
<td>First HR satellite of the Canadian Space Agency, and first SAR ever to get to the threshold of 3m ground resolution (RadarSat-1's ground resolution was 10x9 meters at its best).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CartoSat-2A</td>
<td>ISRO</td>
<td>28.04.2008</td>
<td>0.8</td>
<td>Third Indian HRS.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GeoEye-1 (OrbView-5)</td>
<td>GeoEye</td>
<td>06.09.2008</td>
<td>0.41/1.65</td>
<td>The US government prohibition to sell imagery with a resolution better than 0.5m was also in force for GeoEye, later acquired by DigitalGlobe itself. First MS imagery with ground resolution better than 2m.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WorldView-2</td>
<td>DigitalGlobe</td>
<td>8.10.2009</td>
<td>0.41/1.85</td>
<td>First satellite of the WorldView constellation equipped with a MS scanner.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CartoSat-2B</td>
<td>ISRO</td>
<td>12.7.2010</td>
<td>0.80</td>
<td>Fourth HRS of the Indian constellation.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pléiades-1A</td>
<td>CNES</td>
<td>17.12.2011</td>
<td>0.5/2.8</td>
<td>First of a two HRS constellation commissioned to the Centre Nationale d'Etudes Spatiales, SPOT satellites producers, by the ESA, European Space Agency.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>KompSat-3</td>
<td>KARI</td>
<td>27.5.2012</td>
<td>0.7/2.8</td>
<td>First HRS of the Korea Aerospace Research Institute, South Korean space agency.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPOT-6</td>
<td>CNES</td>
<td>9.9.2012</td>
<td>2</td>
<td>Sixth French satellite Pour l'Observation de la Terre, ten years after the launch of SPOT-5.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pléiades-1B</td>
<td>CNES</td>
<td>2.12.2012</td>
<td>0.5/2.8</td>
<td>Second of the two Pléiades satellites.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Resurs-P1</td>
<td>Roscosmos</td>
<td>25.6.2013</td>
<td>1</td>
<td>Second Russian HRS.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SkySat-1</td>
<td>Skybox Imaging (then TerraBella)</td>
<td>21.11.2013</td>
<td>0.9/2</td>
<td>Skybox Imaging, founded in 2009, launched its first HRS back in 2013. Less than a year later (Aug 2014), the company was acquired by Google inc. for half a million USD, and renamed Terra Bella (italian for Beautiful Earth), from Terra Bella ave., Mountain View, CA, where Google is based.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPOT-7</td>
<td>CNES</td>
<td>30.6.2014</td>
<td>2</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SkySat-2</td>
<td>Skybox Imaging</td>
<td>8.7.2014</td>
<td>0.9/2</td>
<td>Second Skybox/Terra Bella HRS.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WorldView-3</td>
<td>DigitalGlobe</td>
<td>13.08.2014</td>
<td>0.31/1.24</td>
<td>The third WorldView satellite, along with the fourth, are equipped with the best optical scanners available on market. Until Feb. 2015 US government forbade the selling of the maximum resolution images. Its MS scanner can record images in 16 bands (6 in visible light, 2 NIR from 770 to 1040nm, and 8 SWIR from 1195 to 2365nm) at a</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
maximum resolution of 1,24m. On top of that, WorldView-3 is also equipped with a CAVIS scanner (Clouds, Aerosols, Vapors, Ice and Snow) that records images in 12 bands from 405 to 2245nm, with a ground resolution of 30m.

<table>
<thead>
<tr>
<th>Satellite</th>
<th>Agency</th>
<th>Launch Date</th>
<th>Max Res (PAN)</th>
<th>Max Res (MS)</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>GaoFen-2</td>
<td>CNSA</td>
<td>19.8.2014</td>
<td>0.8</td>
<td>3.2</td>
<td>Second chinese HRS, first with a resolution better than 1m.</td>
</tr>
<tr>
<td>Resurs-P2</td>
<td>Roscosmos</td>
<td>26.12.2014</td>
<td>1</td>
<td>3.4</td>
<td>Second Russian HRS.</td>
</tr>
<tr>
<td>KompSat-3A</td>
<td>KARI</td>
<td>25.3.2015</td>
<td>0.55</td>
<td>2.2</td>
<td>Probably the best HRS in the Chinese constellation, although technical data have not been released.</td>
</tr>
<tr>
<td>GaoFen-8</td>
<td>CNSA</td>
<td>26.6.2015</td>
<td>?</td>
<td>?</td>
<td>HRS triplet with better than 1m resolution launched by Surrey Satellite Technology Ltd., associated with Surrey University.</td>
</tr>
<tr>
<td>TripleSat</td>
<td>SSTL</td>
<td>10.7.2015</td>
<td>0.8</td>
<td>3.2</td>
<td>Chinese HRS with better known resolution.</td>
</tr>
<tr>
<td>GaoFen-9</td>
<td>CNSA</td>
<td>14.9.2015</td>
<td>0.5</td>
<td>2</td>
<td>Best Indian HRS at the moment, with a resolution of 0.6m PAN and 2m MS.</td>
</tr>
<tr>
<td>Rersus-P3</td>
<td>Roscosmos</td>
<td>13.3.2016</td>
<td>1</td>
<td>3.4</td>
<td>On the same missile that carried PerúSat-1 there were also 4 SkySat satellites of the Terra Bella/Google HR constellation. In the future, said constellation is to be composed of 21 elements.</td>
</tr>
<tr>
<td>CartoSat-2C</td>
<td>ISRO</td>
<td>22.6.2016</td>
<td>0.65</td>
<td>2</td>
<td>First satellite of the Comisión Nacional de Investigación y Desarrollo Aeroespacial, Peruvian Space Agency.</td>
</tr>
<tr>
<td>SkySat-3</td>
<td>TerraBella</td>
<td>22.6.2016</td>
<td>0.9</td>
<td>2</td>
<td>On the same missile that carried PerúSat-1 there were also 4 SkySat satellites of the Terra Bella/Google HR constellation. In the future, said constellation is to be composed of 21 elements. On 3rd February 2017, Planet Labs inc. stated on its website to have acquired TerraBella from Google.</td>
</tr>
<tr>
<td>PerúSat-1</td>
<td>CONIDA</td>
<td>16.9.2016</td>
<td>0.7</td>
<td>2</td>
<td>The launch, originally scheduled for June and then for September 2016, was re-scheduled due to the wildfire that burned the woods surrounding the base of Vanderberg, CA, where the launch was set. Along with WorldView-3, it is the satellite which takes the images with the best resolution on the market.</td>
</tr>
<tr>
<td>SkySat-4/-7</td>
<td>TerraBella</td>
<td>16.9.2016</td>
<td>0.9</td>
<td>2</td>
<td>The satellite, commissioned by the Turkish Ministry of Defence to the Italian company Telespazio, was the first Turkish HRS to break the barrier of 1m PAN resolution. His “older brother”, Göktürk-2, was launched on Dec 12th, 2012, and it can take images with a resolution of 2.5m PAN, 10m in four MS bands e 20m in an experimental SWIR band.</td>
</tr>
<tr>
<td>Göktürk-1</td>
<td>Turkish Aerospace Industries</td>
<td>05.12.2016</td>
<td>0.8</td>
<td>/</td>
<td></td>
</tr>
</tbody>
</table>
The two GaoJing minisatellites, first steps of a newer and wider Chinese constellation, were launched on Dec 28th, 2016. However, mistakes were made during the launch, and part of the missile payload crashed to the ground. After a couple of weeks of uncertainty about their fate, the two satellites became operative on Jan 12th 2017.


2. Which resolution is High Resolution?

Before analysing the potential archaeological utility of the data presented in the table, explanation of some premises seem necessary.

First of all, it must be specified why some satellites have been included whereas others have not. The criterion of ‘High Resolution’ is not absolute: what was high resolution twenty years ago may not be considered as such right now (which seems natural, given that, in 1997, the thought of taking high resolution pictures of your lunch on a mobile phone device and storing them on a free-of-charge internet cloud service, which could be considered standard procedure nowadays, was pure science fiction). Thus, keeping in mind the leaps in technology that happened in the last twenty years, the satellite list includes sensors that, back when they were launched, were rightfully considered the cutting edge (or at least close to it) of technology, and can still give acceptable results today (i.e. with standing monumental archaeological remains in dry lands). As an example, we may consider EROS-A and SPOT 5: their ground sampling resolution, respectively 1.5 and 2.5m at nadir, could hardly be considered "high", if their scheduled launch was set tomorrow; back in 2002, though, when LANDSAT-5 and -7 had a maximum resolution of 30m at nadir, and the only other available products were top-class DigitalGlobe and GeoEye satellites, they could have served as a valid alternative.

Similarly, satellites launched in recent years that fail to give competitive results (approximately considered below the threshold of 1m ground resolution) have not been included. This is mainly due to a high possibility of a disadvantageous quality/price ratio: in fact, for the same price of new data commissioned from these satellites, better products may be found from other companies. Or, if a high level of detail is not strictly needed, old archive images can be bought, with no need for expensive new imagery. In this case we may consider the Flock constellation, from Planet Labs inc., who recently acquired TerraBella from Google. From January 9th, 2014 to February 15th, 2017 there have been 16 separate launches (Flock-1, -1b, -1c, -1d, -1d', -1e, -1f, -2, -2b, -2c, -2d, -2e, -2e', -2k, -2p, 3p), and in each launch a whole constellation of ‘doves’ (nanosatellites, each measuring 30x10x10 cm) has been sent in orbit, for a grand total of 263 nanosatellites in little more than three years – and more
launches are scheduled later in 2017 (http://space.skyrocket.de/doc_sdat/flock-1.htm, for a general overview. For a more specific description of all launches, see single blog entries on the Planet Labs blog: https://www.planet.com/pulse/). Indubitably, this is a remarkable result: a high number of small low-cost satellites that can monitor the whole Earth’s surface on a daily basis. But optical sensors on the ‘doves’ grant a maximum GSD of 3-5m: it is a level of detail that could be used for many purposes, but is a little too low for archaeology in 2017. That is why they have not been included in the table.

At the same time, in the list there was no mention to low-resolution Earth observation satellites that have effectively been used for archaeological purpose in the past, such as ASTER, the 15-band multispectral sensor equipped on NASA satellite ‘Terra’ launched in 1999, which reaches a 15m GSD in four V/NIR bands (SWIR reaches 30m GSD and TIR 90m. Its archaeological potential has been examined by Altaweel 2005), or Sentinel-2A, first satellite of a twin constellation launched within the ESA’s Copernicus Programme in 2015, equipped with a 13-band MS imager that reaches 10m GSD (only in four V/NIR bands. Other bands are set on 20 or 60m GSD), or LANDSAT satellites themselves (the potential of both Sentinel and LANDSAT for archaeological practice was evaluated by Agapiou et al. 2014). This is because the purpose of the table was to give a list of satellites that have the best potential for archaeological use in the next future, and not to ratify results so far achieved from satellite archaeology.

Finally, as is apparent in the previous paragraph, satellite images are not mere pretty vertical PAN or PS pictures which may or may not reveal archaeological traces from the orbit: technological improvements that have brought better spatial resolution have also led to higher detail in spectral resolution, which is equally important in archaeological practice: first employments of IR films and filters go back to the 1950s in France (Edeine 1956) and the 1960s in US (Gumerman, Lyons 1971). As it can be seen in the table, many contemporary satellites carry a MS sensor which, in 16 cases, has a GSD of 2m or better. Furthermore, the number of bands in which the electromagnetic spectrum is divided has widened, reaching 30 bands on WorldView-3. Actually, ‘only’ 16 of the 30 bands achieve scans with the best GSD, 1,24m. The other twelve, known as CAVIS (Clouds, Aerosols, Vapors, Ice and Snow) are used for climate control, and have a 30m ground resolution. Nonetheless, the use of six bands in visible light, two NIR and eight SWIR bands with a 1,24m GSD could be extremely useful for archaeological practice, especially if sharpened with a 0,31m PAN optical sensor.

4. Archaeological utility

As it can be seen, an increasing number of non-military HR satellites for Earth observation has been launched in the past twenty years, with twelve of them launched in 2016 alone. The growth pattern of the number of HRS launched/in orbit can be seen in this graphic, updated to 27th February 2017:
Of the 39 HR satellites still in orbit, 29 can record images with a spatial resolution better than 1m/px. Without any doubt, the DigitalGlobe constellation stands out among them, both in spatial and spectral resolution: it owns all five existing commercial satellites that can take PAN pictures with a higher resolution than 0,5m/px (the four WorldViews and GeoEye-1), and both satellites that reach a GSD <2m in MS imaging (WorldView-3 and -4. WorldView-3’s MS sensor is also the best MS scanner in terms of sheer band numbers, since it can work in 8 V/NIR bands, 8 SWIR, and 12 bands for climate control known as “CAVIS”). After DigitalGlobe come the European (Pleiades), Chinese, Korean, Indian and Israeli satellites, all of them capable of taking images with a resolution between 0,5 and 0,6m/px. But how many of these satellites are effectively useful for archaeologists, and how much would it cost us to buy HR images from them? To answer this question, contacts have been made with fourteen different HRS owners.

In one case (FORMOSAT-2), the pricelist was directly available on the website of NSPO (http://www.nspo.org.tw/2008e/imagesell/model.htm). In another case (EROS A/B) the producing company (ImageSat International, http://www.imagesatintl.com/) directly answered my inquiries; elsewhere (DigitalGlobe, CNES, CSA), my requests have been forwarded to commercial distributors, which respectively are:

- European Space Imaging (http://www.euspaceimaging.com/),
- Airbus Defence and Space (https://airbusdefenceandspace.com/),
- MDA Geospatial Services (http://mdacorporation.com/geospatial/international).

Sadly, other companies have not returned an answer to my e-mails.
<table>
<thead>
<tr>
<th>Name</th>
<th>Satellite(s) owned</th>
<th>Price*</th>
</tr>
</thead>
<tbody>
<tr>
<td>DigitalGlobe</td>
<td>WorldView (1 to 4) GeoEye-1</td>
<td>Archive images can be browsed on the</td>
</tr>
<tr>
<td></td>
<td></td>
<td>DigitalGlobe Imagefinder</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(<a href="https://browse.digitalglobe.com/imagefinder)">https://browse.digitalglobe.com/imagefinder)</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Prices start from 17,5 $/km² (+19% tax),</td>
</tr>
<tr>
<td></td>
<td></td>
<td>with a minimum order of 25km² (GSD 50cm),</td>
</tr>
<tr>
<td></td>
<td></td>
<td>with a minimum total of ~500 $. New</td>
</tr>
<tr>
<td></td>
<td></td>
<td>collections need a minimum order of</td>
</tr>
<tr>
<td></td>
<td></td>
<td>100km², and prices vary according to</td>
</tr>
<tr>
<td></td>
<td></td>
<td>resolution, selected spectral bands, cloud</td>
</tr>
<tr>
<td></td>
<td></td>
<td>cover, and product rendering and licences.</td>
</tr>
<tr>
<td>TerraBella</td>
<td>SkySat (1 to 7)</td>
<td>No answer was given to an email sent to</td>
</tr>
<tr>
<td></td>
<td></td>
<td><a href="mailto:terrabella-info@google.com">terrabella-info@google.com</a> on 11th Jan 2017</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Maybe this is because, on 3rd Feb 2017,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Planet Labs, inc. stated to have acquired</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TerraBella from Google on its website</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(<a href="https://www.planet.com/pulse/planet-to-acquire-terra-bella-from-google/">https://www.planet.com/pulse/planet-to-acquire-terra-bella-from-google/</a>).</td>
</tr>
<tr>
<td>Surrey Satellite Technology Ltd. (SSTL)</td>
<td>TripleSat</td>
<td>The e-mail sent to <a href="mailto:info@sstl.co.uk">info@sstl.co.uk</a> on 11th</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Jan 2017 received no answer.</td>
</tr>
<tr>
<td>National Space Organisation (NSPO)</td>
<td>FORMOSAT-2</td>
<td>A pricelist can be found here:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Prices around 2000 € per archive image.</td>
</tr>
<tr>
<td>ImageSat International (ISI)</td>
<td>EROS A (1,5m nadir)</td>
<td>Archive: 0,5US$/km², min. 200km²</td>
</tr>
<tr>
<td></td>
<td></td>
<td>EROS B (0,7m nadir)</td>
</tr>
<tr>
<td>Research Center for Earth Operative</td>
<td>Rersus-DK-1</td>
<td>An e-mail has been sent to</td>
</tr>
<tr>
<td>Monitoring (NTs OMZ)</td>
<td></td>
<td><a href="mailto:ntsomz@ntsomz.ru">ntsomz@ntsomz.ru</a>, but no answer has been</td>
</tr>
<tr>
<td></td>
<td></td>
<td>given.</td>
</tr>
<tr>
<td>Centre National d'Études Spatiales (CNES)</td>
<td>SPOT (6, 7) (1,5m nadir)</td>
<td>Archive: 2,9/3,8€/km² (PAN/MS), min. 100km²</td>
</tr>
<tr>
<td></td>
<td></td>
<td>New: varies according to the number of</td>
</tr>
<tr>
<td></td>
<td></td>
<td>observations, cloud cover and availability</td>
</tr>
<tr>
<td></td>
<td></td>
<td>of the area of interest; for a single shot,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9,20€/km², min. 500km²</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pléiades (1, 2) (0,5m nadir)</td>
</tr>
<tr>
<td>India Space Research Organisation (ISRO)</td>
<td>CartoSats (1, 2, 2A, 2B, 2C)</td>
<td>On the “contact us” website page, the</td>
</tr>
<tr>
<td></td>
<td></td>
<td>address to which requests regarding satellite data products should be sent is <a href="mailto:sales@nrsc.gov.in">sales@nrsc.gov.in</a>. No answer was given to my e-mails.</td>
</tr>
<tr>
<td>Roscosmos</td>
<td>Rersus-P (1 to 3)</td>
<td>No contact address was available on the</td>
</tr>
<tr>
<td></td>
<td></td>
<td>website. An e-mail has been sent to the</td>
</tr>
<tr>
<td></td>
<td></td>
<td>only address present, <a href="mailto:press@roscosmos.ru">press@roscosmos.ru</a>,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>but no answer was given.</td>
</tr>
<tr>
<td>Canadian Space Agency (CSA)</td>
<td>RadarSat-2</td>
<td>Spotlight mode (single look complex, 1m):</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6000CANS</td>
</tr>
</tbody>
</table>
5. Conclusions

The quality and the detail of contemporary High Resolution Satellite Imagery is undoubtedly of great importance for the archaeological practice, and a table of all the satellites in orbit and all the companies from which every archaeologist can purchase images can be certainly helpful. Nonetheless, although the number of satellites has grown a lot in the last few years, the price of the best satellite imagery is still too high for many of our pockets. However, high quality archive data is starting to become more affordable (a 25km² Pleiades archive image with 0,5m nadir resolution can be bought with no more than 250€). Still, this paper highlights, once again, the capital importance of tools like Google Earth for the archaeological world. As it seems, it may continue to be a primary source for many years to come.

6. References

Agapiou et al. 2014

Altaweel 2005
<table>
<thead>
<tr>
<th>Author/Year</th>
<th>Reference</th>
</tr>
</thead>
</table>
Palimpsests of medieval landscapes.  
A case study from Lower Silesia Region, Poland  
Grzegorz Kiarszys

Abstract  
This paper is a presentation of the results of archaeological landscape studies which were carried out by the Department of Archaeology, Szczecin University between 2014-2015 in Lower Silesia Region, Poland. Case studies were focused on early medieval strongholds and late medieval motte castles located in this region. The chronological framework was defined between the 8/9th century AD to the end of 15th century AD. The research aimed to popularize use of non-invasive methods in archaeology, as well as to promote knowledge about archaeological monuments in the district Góra to the local community. The narration about medieval fortified settlements was approached as the history of group identity emerging from the social dynamics and conflicts, presented at the background of three different socio-political systems.

Key words: landscape archaeology, palimpsest, non-invasive methods, medieval strongholds, motte castles, social conflict, Poland

(...) past is not a peaceful landscape lying there behind me, a country in which I can stroll wherever I please, and which will gradually show me all its secret hills and dales. As I was moving forward, so it was crumbling. Time's erosion grievously afflicts what memories remain: 'Most of the wreckage that can be seen is colourless, distorted, frozen; its meaning escapes me (...) all that's left is a skeleton. I shall never find my plans again, my hopes and fears - I shall not find myself.'

(Simone de Beauvoir, Old Age, pp. 407-408)

Introduction

A famous geographer, Yi-Fu Tuan (1987, 239-240), wrote once that the relationship between past and cultural landscape can be appreciated especially by those who live a space filled with historical monuments and works of arts. Indeed, Europe seems to be a true museum with unimaginably rich collection. However, the presence of the monuments and artefacts alone does not necessarily have to direct one's thoughts towards the past. Their values and meanings are in fact created within contemporary culture discourse and depend on our knowledge, perspective and the manner in which we approach and perceive them.

The purpose of this paper is to present results of archaeological landscape studies which were carried out by the Department of Archaeology, Szczecin University between 2014 and 2015 in the Lower Silesia Region, Poland. Case studies were focused on early medieval strongholds and late medieval motte castles located in this region (Figure 1). Chronological framework was defined between 8/9th century AD to the end of 15th century AD. Those monuments are often considered by the local population as mysterious objects of anthropogenic origin. However, the awareness of their purpose and cultural value is seldom
recognized by the local society. The main aim of the research was to promote to local community knowledge about archaeological monuments in the district Góra, and to restore social memory of cultural heritage sites.

Figure 1. The location of medieval strongholds in the district Góra (© G. Kierszys)

**Palimpsests of medieval landscapes**

The presence of our surrounding world seems to emerge from the omnipresent past which is hidden not only in historical buildings, but also behind 'contemporary' field systems, drainage ditches, farms, fruit trees planted on baulks, piles of stones collected year after year from arable fields, causeways, the courses of roads and many other sites. The Polish landscape is full of villages and towns of spatial plans that date back to the medieval period. Some of the actions undertaken by past societies left permanent marks in the landscape. After centuries those traces were either conserved, transformed or covered by results of later activities (e.g. Barford 2005; Rączkowski 2008, 144). To describe this complicated process O. G. S. Crawford (1953) referred to a metaphor of palimpsest - a writing material, that due to its value, was written and erased many times. Obviously, in this comparison the surface of earth is approached as such 'writing material' and its content consists of material remains left by past humans.

However, we can also approach this metaphor in a wider sense, not only as 'material signs' but also as relics of the social memory transmitted between succeeding generations, through centuries. Cultural landscape means not only our physical surrounding, but most of all, it is a way we think about the world and act in it (Tilley 1994; Wylie 2009, 1–2). Together with cultural changes, the spatial activities were also changing. Every historical epoch may be characterized by different intellectual streams, economic bases, spiritual life, and socio-political regimes. Factors which were manifest in different ways of thinking and new cultural strategies but also in what was left for them in the landscape.
Non-invasive methods in the studies of medieval strongholds of district Góra

Results of modern non-invasive methods are rarely presented to the public in Poland, remaining objects of interest restricted to professional and academic users. It is believed, however, that application of such methods as aerial photography, airborne laser scanning, magnetometry and historical cartography can also be valuable in the process of construction of narration about specific archaeological features. As such, they can provide a persuasive and aesthetic background in any discourse to local communities.

The archaeological studies of medieval strongholds in district Góra were based mostly on non-invasive methods. However, where it was possible they were supplemented by the results of earlier excavations and fieldwalking. The first step of empirical stage of research was the archival query that aimed to find all known medieval strongholds from the area of interest. The next step was based on analysis of historical cartography examples of which are in Figure 2.

Figure 2. Selected examples of archival sources used in the case study: A. The Village of Chróścina on the 1940 German photomap. The red arrow indicates the late medieval motte; B. The same village on the 1933 German Messtischblatt map; C. Remains of the early medieval stronghold at Sądowel on the 1826 German Urmessrischblatt map; D. The stronghold at Sądowel on Wrede’s map of 1747-1753; E. The early medieval stronghold at Chróścina on the 1940 German photomap; F. the late medieval motte castle at Belcz Maly on the 1826 German Urmessschblatt map (© Szczecin University)
Collected information was compared in the GIS database with ALS visualizations, contemporary topographical maps, oblique and vertical aerial photographs and the results of a caesium magnetometry survey. Two aerial surveys were undertaken, one in the summer of 2014, the other in early spring, 2015. The last part of the empirical stage of the research was field verification of recorded strongholds.

The first medieval world: Tribal Period

(...) they go to the marshy meadows overgrown by scrubs, and they draw a circle or a square according to the shape and size of the stronghold they are planning to build. They dig a moat around it and pile the soil reinforcing it with wood until such rampart will gain the size they expect. Then, they mark the place for the gate and build a wooden bridge leading to it.

(Abraham ben Jacob, Sephardi Jew from the Caliphate of Cordoba, 10th century merchant and traveller, about strongholds build by Slavs.)

During the 8th and 9th centuries, the territories of Silesia were populated by numerous Slavic tribes. The written sources allow us to believe that the north-eastern rims of Silesia were inhabited by the tribe of Dziadoszanie (Latin: Diedesi). Most likely the earliest examples of strongholds known from the study area can be assigned to those people (Leciejewicz 1976, 64–65; Lodowski 1980, 118–123; Modzelewski 1987, 36; Czapla 2006, 147; 2014).

The Slavic word "gród" (English: stronghold) does not have the direct military connotation, however, it does not exclude such meaning either. It was used to describe an area enclosed by a kind of fence or wall. The very same word was used to define permanently uninhabited sacred pagan enclosures, refuges, fortified settlements inhabited by craftsman and tradesman, as well as tribal cultural centres surrounded by an earth and wooden rampart (Moździoch 2002,41; Urbańczyk 2014, 27). Within the study area are the remains of five such strongholds dated to the Tribal Period (Figure 3).

Early medieval Slavic tribes usually built their strongholds on slight elevations located on the floor of river valleys at places where trade routes crossed fords and other important sites had to be guarded. They were surrounded by numerous bustling settlements (e.g. Modzelewski 1987: 38). In their vicinity barrow cemeteries were sometimes located, symbolically separated from the settlements by a stream or a river, but placed at the exposed higher ground and visible from the distance. Within the present research area there are no surviving tribal barrow cemeteries, however close to the stronghold at Lipowiec on the western bank of the Oder River there is a barrow cemetery in Orsk. It consists of about 70 mounds of diameter 8-14m and height of 0,5-2m (Figure 3E).

The remains of tribal strongholds recorded in district Góra most possibly belonged to lesser territorial groups. Those were rather small structures of diameter about 65-70 m (measured together with a moat) (Figure 4). The central stronghold, and the main seat of the tribal duke was located outside the district Góra, close to contemporary village of Przedmoście, and was much larger with an area of about 3 ha (Czapla 2007).

Despite popular opinion, from the perspective of a medieval man, strongholds were relatively easy to find in the landscape as they were located on exposed sites, often close to the busy water ways. They were constructed not only to provide safe space, but also to be seen from a long distance. A traveller or merchant could pass three or four of these riverside structures each day of his journey (Kiarszys 2015, 82).

The ring of the rampart and the moat filled with water could also be seen as a certain type of symbolic barrier. They sealed off the space of stronghold from the outer world,
preventing an insight from the outside. They could protect not only from hostile people but also from diseases, demons and evil magic.

Figure 3. ALS visualisations of examples of early medieval earthworks from the tribal period: A. Stronghold at Bartodzieje; B. Stronghold at Chrościna; C. Stronghold at Kruszyniec; D. Stronghold at Lipowiec; E. Barrow cemetery at Orsk; F. Stronghold at Lubiel; (A, B, C, D, F - combination of digital terrain model and analytical hillshading; E - combination of analytical hillshading and Local Relief Model), m. n. p. m. = m. a. s. l. (G. Kiarzys, © Szczecin University)
Figure 4. The results of magnetometry. Magnetic anomalies indicate that the tribal strongholds at: A. Kruszyniec, B. Chróścina and C. Lipowiec were burned. D. Interpretation of cropmarks indicate the presence of a tribal village near the stronghold at Lipowiec (the zigzag shaped feature is the remains of WW2 trenches: aerial photograph by M. Kostyrko). E. The rampart of the stronghold at Lipowiec; F. Rampart of the stronghold at Kruszyniec (G. Kiarszys, W. Małkowski, K. Misiewicz, © Szczecin University)
The second Medieval World: Castrum Sandouel – The new landscape order

His folk needs indeed a supervision alike cattle,
same as stubborn donkey requires a lash;
the folk is the enemy of the reign exercised in the best interest of the ruler,
if he does not use harsh penalties

(Bishop Theitmar of Merseburg (VIII, 2) about the subjects of the Polish king Boleslaw Chrobry)

During turbulent times of war the stronghold was a safe space. Its high ramparts, deep moat and mighty gate were difficult to breach, especially if we consider a fact, that contemporary raids were focused on pillage. Thus, burning the whole stronghold during the siege, together with potential captives and all goods that were sheltered inside it, was seen as a failure. However, the face of war changed at the end of 10th century due to the expansion of the Polish Piast monarchy in the Silesia region. These Polish rulers (dukes) aimed not only to collect rich spoils, but most of all, to introduce new means of power, religion and social order. Silesian tribes did not know how to fight such a war, thus in a relatively short time, they were conquered and permanently subordinated to the Piast Monarchy. Artistic reconstructions of the strongholds at Lipowiec and Bartodzieje during this time are shown in Figure 5.

Figure 5. Artistic reconstructions of the stronghold at Lipowiec (above) and the stronghold at Bartodzieje (below). (Author Dariusz Bufnal, © Szczecin University)
Within a single generation, the landscapes of the Slavic tribes of Silesia had completely changed. Old strongholds were either burned or abandoned, some villages were deserted. In their place, new settlements were built according to the rules introduced by the Piasts (Moździoch 1990, 27; Kurnatowska 1992, 78-79; Lodowski 2000, 394; 2002).

The strongholds raised by the monarchy had slightly different purposes to their tribal predecessors. They were centres of state economy, administration, tax collection and a kind of military barracks. The commander of a stronghold was appointed by the duke, and the territory subordinated to him was called the castellany (Lalik 1967, 13-15).

During this period, only one state stronghold was built within the area of study. It was constructed at Sądowel in the second half of the 11th century, close to the large settlements that had existed there since the tribal period. In their vicinity, a large iron production centre based on the local bog iron ore was confirmed during earlier excavations, as well as some other branches of craft production (e.g. glass, pottery, textiles etc.) (Lodowski 1972, 207; Moździoch 1990, 82-83; 1992, 161-162). These goods were produced mainly to fulfil the needs of the ducal court, but also for a local market.

Figure 6. The state stronghold of Sądowel: A. combination of digital terrain model and analytical hillshading; B. Results of magnetometry indicate that the stronghold was burned. The circular dipolar anomaly indicates the presence of relics of a burned early medieval rampart while the rectangular anomaly inside it is a relic of the late medieval motte built in the 14th century; C. Aerial photograph of the stronghold at Sądowel; D. Ground photograph of the stronghold at Sądowel (G. Kiarszys, W. Małkowski, K. Misiewicz, © Szczecin University)
The state stronghold at Sądowel was an unimposing structure of 120m diameter and that was raised on the bank of the Barycz River (Figure 6). It was larger than its tribal predecessors, and yet much smaller than the strongholds built in the centre of the Piast state territory in the Greater Poland Province. Due to its size and location at the borderline between Silesia and Greater Poland it didn’t have great military meaning and its commander had only a few knights and menials at his disposal. At this time, the Sądowel area was distinctly less populated and developed than surrounding regions. The relative inefficiency of the economical basis of the Piast Monarchy resulted in the building and support of fewer strongholds in comparison to the tribal times. However, the centralized system of power, together with aggressive and expansive politics, proved to be more effective than tribal organization (Moździoch 1992; Kiarszys 2015, 99).

The state strongholds might have had high ramparts and were manifestation of power and prestige, but their foundations were built on the fear shared by the whole aristocracy from the folk. Each day after sunset, ducal officials barricaded themselves inside the strongholds, as if they were in a heavily guarded prison. For commoners, the sight of the state stronghold was not associated with the positive idea of stabilization and great achievements of the monarchy, but with enslavement, oppression, hunger and a sense of powerlessness.

**The stronghold at Sądowel from historical sources**

*Henry V was taken prisoner in dishonourable manner, abducted naked from the baths, he was put into a paltry cloak and forced to ride a horse for the whole day and night, eventually he was brought to Sądowel (…) (Jan Długosz (IV, 7, 1293), about the abduction of Henry V the Fat by Henry III of Głogów)*

The oldest and half legendary record of the state stronghold at Sądowel can be found in the Polish-Silesian Chronicle and the Chronicle of Polish Dukes. They describe an alleged encounter between Bolesław III Wrymouth (the future Duke of Poland) and his brother Zbigniew, who was supported by Czechs and Pomeranians. From this judgment day of the triumph of Bolesław III Wrymouth, Sądowel gained its name ("Sądowel" was made from word "sąd" which means "court of law") (Nowakowski 2008b, 173). Sądowel (as Sandoul) was mentioned again in the bull of Pope Adrian IV made for bishopric of Wrocław in 1155, and in the bull of Pope Innocent IV from 1245 (Kaletynowie, Lodowski 1968, 19; Nowakowski 2008b, 173).

There is also a record of a church that was built at Sądowel in the 12th century. Until the 14th century, Sądowel was still the seat of the archpriest of the Góra region, even though by that time it had lost its political meaning and become a small settlement (Młynarska–Kaletynowa 1993, 40).

The stronghold at Sądowel witnessed also some important historical events. A document from 1217 mentions a meeting at Sądowel (Zandouel) between the duke of Greater Poland, Władysław III Spindleshanks, and the duke of Wrocław, Henry the Bearded which ended the war between two aristocrats (Zientara 1975, 233–234).

Another odd event related to the stronghold of Sądowel took place on the 9th of February 1281, and was depicted in detail by the annalist Jan Długosz. On that day the duke of Wrocław, Henry IV the Righteous, organized a rally. The meeting was scheduled originally for a large number of noble guests, however eventually only three of the invited dukes arrived: the duke of Legnica, Henry V the Fat; the duke of Greater Poland, Przemysł II (the future king of Poland), and the duke of Głogów, Henry III (Figure 7). Henry IV the Righteous
did not plan to discuss any political matters with his guests. Instead of that he abducted them, conveyed them in secrecy to Wrocław and put them in a dungeon. He kept them prison until they agreed to become his vassals (Długosz IV, vol. 7, 1281, 271–273).

Thirteen years after those events in 1294, Henry III of Głogów abducted Henry V the Fat. He kidnapped him while visiting the baths in Wrocław from where he was transported to Sądowel, and eventually to Głogów where he was imprisoned in small iron cage (Długosz IV, vol. 7, 1293, 351–353).

Figure 7. The rally of dukes at Sądowel in 1281 (above). From the right: Przemysł II, in the centre of the background Henry IV the Righteous, on the left Henry III of Głogów and Henry V the Fat (in the background). The siege of Sądowel in 1319 by Bolesław III of Brzeg (below). (Author Dariusz Bufnal, © Szczecin University)
At the end of the 13th century Sądowel lost its political meaning. On the 18th of May 1288, Henry III of Głogów granted the stronghold and a strip of land along the river Barycz to the knight named Gotwin (Cetwiński 1982, 224). In the same year, Henry III founded the town of Góra, and a year later the town of Wąsosz. These new settlements grew, soon gaining significant economical meaning. The Sądowel castellany was liquidated in about 1290. However, the stronghold of Sądowel continued to exist until 1319, when it was captured and burnt by duke Bolesław III of Brzeg, during a war against Konrad I of Oleśnica (Figure 7) (Moździoch 1990: 89).

Third Medieval World: The landscapes of towerhouses

At the turn of 13th century Silesia had become a mosaic of politically unstable, large and small dukedoms, ruled by lords from different branches of the Piast dynasty who continuously plotted intrigues and fought local wars with each other (Chorowska 2003, 19; Żerelik 2007, 45-80). However, the economy and cultural life was blooming. Together with the introduction of new laws, arrival of settlers from different parts of Europe and intensive colonization, the cultural landscape of the north-eastern part of Lower Silesia completely changed its shape. In some ways those processes can be seen as the very beginning of the landscape we know today.

Rural areas soon filled with newly-founded villages of characteristic spatial patterns, often dominated by the towers of parish churches. Shapeless fields and meadows were turned into regular strips of land that were leased. After the first windmills were built their numbers started to grow quickly. Towns became the administrative and economic hearts of the region. At the crossroads of more important routes, gallows were erected and a pillory was raised in the centre of the main town square. The communes started to acquire an actual influence on some aspects and rules of social and economic life (Łowmiański 1985, 416-419; Jurek 1996, 5-6).

During the 13th century, the first stone and brick castles were build by dukes, and knights started to raise fortified residences (motte). By the middle of the 14th century, fortified towerhouses were already very common and an inherent element of the Silesian landscape (Nadolski 1985, 5; Kajzer 1993, 101). Most of the state strongholds built in early medieval lost their political and economic meaning during that period and ceased to be used. However, the history of the stronghold of Sądowel does not end together with its fire in 1319. After several decades, at the very same place, the motte castle was built (Nowakowski 2008b).

For that reason, the stronghold of Sądowel is a unique example of an archeological site that continued to exist throughout very long period. The first unfortified settlement was built in the area during the tribal period. Later at the same place the early medieval Piast Monarchy stronghold was raised, and in the late medieval the material from its ruins was used to build motte castle. Thus it can be said that it is a kind of a link between landscapes created by early medieval Slavic tribes, the Piast monarchy and late medieval feudal society: a palimpsest of three completely different worlds, recorded at the site of Sądowel.

About 12 earthworks of motte castles still survive within the borders of the district Góra. Late medieval fortified residences in the study area often took the form of a motte - a towerhouse built of timber-frame construction filled with clay (more rarely completely wooden or built of brick and stone). The manor house was usually placed on an artificial mound (usually rectangular in shape) and surrounded by a palisade and moat (Figures 8 and 9) (e.g. Nowakowski 2002; 2008a, 246-247, 277; Biermann, Kieseler, Nowakowski 2011).
Figure 8. Selected examples of motte castles in the district Góra shown as ALS visualisations (combination of digital terrain model and analytical hillshading). A. Bełcz Mały; B. Ostrawa; C. Chróścina; D. Żuchłów; E. Aerial photograph of the motte at Chróścina; F. Aerial photograph of the stronghold at Żuchłów (G. Kiarszys, © Szczecin University)
Fortified residences fulfilled many different functions. Some of them were owned by dukes and were treated as the seat of their officials (especially those built in towns or the borderlands), while others were private family seats of gentry (Chorowska 2003, 112). They became visible signs in the landscape. Clear manifestation of land ownership and power over a certain territory, as well as a symbol of prestige and aristocratic identity. The view from the towerhouse could reach very far, as the district Góra lies in relatively flat area. Thus, it was common for several adjacent motes to be within view of one another. Such situations may be also interpreted as a way of affirmation of the aristocratic ties.
Mottes were fortified manor houses, not really feudal castles of meaningful military potential. They could well protect the family of a knight against small groups of robbers and marauders, and guarantee a safe place at night. However, their defensive capabilities were very limited. They could easily be captured by a regular army, especially one equipped with gunpowder weapons. Thus, most of them were burned and destroyed in numerous wars that struck Silesia in the second half of 15th century (Figure 9). Historical sources rarely mention the event of the destruction of a motte. In only few circumstances the fire of late medieval fortified residences can be related to historical events like for example the war of 1480 when the duke of Głogów Jan II the Mad layed siege to and burned the mottes owned by the Liedlau family in the villages of Żuchlów and Niechlów (Jurek 1993, 250).

During the next century, gentry moved to unfortified manor houses surrounded by sophisticated parks and gardens. But yet those were often built in close vicinity to the ruins of their old motte as demonstration of ‘ancient roots’ and the continuity of the family.

Conclusions

Medieval strongholds are often considered by archaeologists as primarily military structures. However, the military function was only one of many. The history of medieval fortified settlements can be also told as the history of a group identity emerging from the social dynamics and conflicts. During the early medieval tribal period (from 8/9th to 10th century), beside military purposes, strongholds also served as cultural and ritual centers. Due to the expansion of the early Piast Monarchy (from the end of the 10th century) most tribal strongholds were abandoned and new fortified settlements of judicial and administrative purposes were build. Their spatial location reflected the new territorial organization enforced by Piast’s Monarchy. Together with the introduction of a new socio-economical order, colonization based on German law and development of towns, most of the early medieval strongholds were abandoned by the end of the 13th century. Since that time, mainly in the countryside, motte castles started to be built, marking the property of gentry and symbolizing the new means of power.

The research presented demonstrates the potential of non-invasive methods both as scientific tools for landscape studies and as a medium for popularization of archaeological knowledge addressed to enthusiasts. Such methods serve not only as a means of recording and identification (‘discovering’) of heritage sites but are also a persuasive and visual part of narration about the past. One of the outcomes of the present case study was a book Three medieval worlds. Iuxta castrum Sandouel, published at the end of 2015 (Kiarszys 2015). It used relatively simple language and some hypothetical artistic ‘reconstructions’ to make the ‘scientific narration’ intelligible to the wider public. However, it seems that reconstructions of their appearance and dimensions is simply not enough to present the purpose and the role that was played by medieval strongholds in the past. Even advanced techniques do not allow direct insight into the past since their use only registers contemporary phenomena through which archaeological features are manifesting. Knowledge about the past emerges from interpretation based on preliminary knowledge and applied theories - the most difficult and intellectual part of archaeological research.

The past is the property of every member of society. Besides the official academic version, there are other, more individual and regional approaches cultivated by archaeology enthusiasts. Such a dimension of the past is often emotional and personal and exists through an understanding of local identity and human imagination. It combines personal experiences, stories and visits to places and it is often very different from an academic view.
Acknowledgments

This work was supported by the Polish Ministry of Culture, the National Heritage Board of Poland under Grant number 2739/14/FPK/NID and ArcheoLandscapes Europe

Bibliography


Nowakowski, D. 2008a, Siedziby książęce i rycerskie księstwa głogowskiego w średniowieczu, Wrocław: Instytut Archeologii i Etnologii PAN.


Cropmarks

Harvested by Rog Palmer

(weblinks were accessed on various dates between September 2016 and March 2017)

Drone photographic competition
No, not pictures of drones, pictures ‘taken by’ drones (as the blurb says). It continues: ‘Drone photography is a new kind of visual language. It’s a new way of seeing the world.’ We’re back in a way to arty photographs, but any of you who have drones may fancy entering this competition which seems to be an annual event. Links, and previous winning pictures, can be tracked from the link below.

http://www.livescience.com/51596-drone-photography-contest-winners.html

DSLR in orbit
Well, almost. A plan by Canon to put into orbit a 65kg satellite using ‘a telescope affixed to an imaging device based on Canon’s EOS 5D camera’. Resolution is reckoned to be about 1m so we’re getting closer to the archaeological satellite I proposed in a past editorial.


WorldView 4
But while we’re waiting … on 2 December 2016, Digital Globe released the first public image taken by their WorldView 4 satellite which has 30cm resolution capabilities. This (and probably more images by the time this issue is published) is available for download from the microsite below.

http://worldview4.digitalglobe.com/#/main

Woodland art
Liam Emmery, a forester from County Donegal, created a huge Celtic cross in a wood by planting different species of trees. Aerial views at the following links.

http://www.atlasobscura.com/articles/a-massive-celtic-cross-is-secretly-growing-in-an-irish-forest

(thanks to Lidka Žuk)

Visual interpretation
A very nice short film using aerial views and imagination to recreate White Caterthun hill fort in Angus, Scotland. What a dark and depressing place it would have been if people lived inside.


(thanks to Vedrana Glavaš)

NASA’s lidar satellite
Nasa’s OSIRIS-REx (Origins, Spectral Interpretation, Resource Identification, Security-Regolith Explorer) mission will use lidar to map an asteroid. Images released on the website below are from the OSIRIS-Rex kit, but the text does not make it clear whether they were

---

1 rog.palmer@ntlworld.com
collected from a low altitude test run or from a satellite. If the former, yawn, if the latter we have another useful platform for archaeology. And, I suppose, we can’t call it ALS any more…?

https://www.nasa.gov/directors/spacetech/spinoff/feature/glimpse_of_stone_age

Enhancing images – or not
A short, no-nonsense page about what can and cannot be enhanced on images. The examples are digital, but it applies to film and prints.

http://blog.digitalglobe.com/2016/12/14/enhance-that/?utm_source=facebook&utm_campaign=enhance-that&utm_medium=social

Aerial landscape photography
This is not archaeology, but pretty stuff included in a series of blogs/articles by landscape photographer, Erez Marom. For those of you with money to spare, he also runs workshops in spectacular locations, some of which offer optional aerial viewpoints.

https://www.erezmarom.com/blog

An assortment of early kiteborne photographers
The links below result from an hour’s idle chat with Nina Heiska one evening on facebook. I’ll make little comment about them other than to suggest that you follow the links in the first of them to get an idea of the size and weight of one of the cameras involved – and the results it achieved.


And an early rocket-lifted camera
From the same chat…


(thanks to Nina Heiska)

While down in the jungle…
…are ‘mysterious earthworks’. [Why is nothing straightforward anymore?] Anyway, these ‘geoglyphs’ have been recorded by ‘experts’ from an assortment of universities who have identified ‘more than 450 … large geometrical geoglyphs’ in an area of 13,000 sq km in Acre State, Brazil. The number of sites sounds impressive, but works out at about one every 30 sq km, which does not sound quite as good although the work also investigates past use and clearing of Amazonian forests within this huge survey area. More details may be in a forthcoming paper in Proceedings of the National Academy of Sciences of the USA. This preliminary note was gleaned from:

Happy 50th birthday
A page of reminiscing by Damian Grady for Historic England (and it forebears) celebrating 50 years of ‘Flying for Heritage’. It gives brief background on John Hampton’s early flights, the introduction of mapping and current work. A set of pics at the end are of unusually generous size for a HE (and its relations) to give away and those within the text provide clear examples although, to my eye on a calibrated screen, the black and white ones are a bit dark.

https://historicengland.org.uk/whats-new/research/50-years-flying/

Thermal gear from TeAx Technology
A camera which, claims the blurb, can record thermal and visual wavelengths simultaneously. It will fit some drones (or you could buy one from the manufacturer) and has dedicated software. You may need to be rich to buy it as the first offering was for £500.00 off – now out of date. It seems the sort of tool that LBI might try out for us…

http://thermalcapture.com/thermalcapture-fusion-beyond-drone-thermal-imaging/

ThermoViewer software and test data can be downloaded at: http://thermalcapture.com/upgraded-meet-the-new-thermoviewer-2-0-post-processing-for-aligned-rgb-thermal-data/

Planet – and crop monitoring
This is a so-called ‘startup company’ that has something like 120 small satellites positioned to record the whole planet on a daily basis. Resolution is ‘medium’, with figures given (where I could find them) at about 4m per pixel. However, at this resolution it seems possible to keep an eye on crop development or bare-earth cultivation and chose the right time to acquire high resolution satellite images, to fly your area-cover photographs, or even to suggest to observers when and where to fly. The website is worth a look for the one or two of you who may see this as useful and who have corporate money to buy into the data. There are further comments on this Flock in the contribution by Davide Danelli in this issue.

https://www.planet.com/

DJI’s Matrice 200 series UAV
This looks like a wonder drone. We must be getting closer to using these things for serious aerial survey.

http://www.dji.com/matrice-200-series
https://www.youtube.com/watch?v=xWzybk2aDw&feature=youtu.be

(thanks to Geert Verhoeven)

Australia from above
Any Australian members or visitors to Oz may want to enter an ‘Australia from above’ photo competition to win a UAV.

https://www.skypixel.com/events/australia
Books of interest?

Rog Palmer

Either I am especially grumpy this year or is archaeological writing getting poorer? While I appreciate that our overworked academics are expected to teach, be nice to paying students, obtain grants, carry out research and write a book a year, I would expect all of these (except maybe being nice to students) to be undertaken with academic integrity and the intent to produce something worthwhile rather than just to produce something. I name no names, but some of the following seem to lack clear thinking, discussion with peers, and purpose.

Maurizio Forte and Stefano Campana (eds), 2016. Digital Methods and Remote Sensing in Archaeology. Springer International (Switzerland). ISBN 978-3-319-40658-9 (e-book), 978-3-319-40656-5 (print). 455+ pages. £82.00 (hardback).

The blurb indicates that the book ‘…debuts the new scope of Remote Sensing…’ then mentions just about every method of data collection and, because of the editors’ interests, ‘…new perspectives—the views of history possible with Remote Sensing and fostered in part by immersive, interactive 3D and 4D environments [are] discussed in this volume.’ Springer’s blurb lists the contributions to this edited volume and gives an idea of the geographical areas they cover. Some of the contents are relevant to the aerial world or to those who attempt to reconstruct past landscapes – but be warned, I was told that some of the contributions may be 2-3 years old.

See also Rachel Opitz’s comments in Chairpiece, this issue.


Not yet published but the blurb includes: ‘The principal goals of geoarchaeology lie in understanding the relationships between humans and their environment.’ For which, as we know, interpretation of aerial images can play a great part by indicating topography, former water courses, soil deposits and so on as well as traces of human activity. Unfortunately, Springer’s blurb doesn’t say much more than other than to give an alphabetical list of contents to help indicate to a potential reader what is on offer for $549.00. Contents seem to mix elementary knowledge (eg Soils) with techniques (eg, X-ray diffraction) and sites (eg, Stonehenge) which presumably have geoarchaeological merit.

A further guide to content may come from the chapter (Remote Sensing in Archaeology) that Stefano Campana, its author, put on Academia. The chapter includes parts about aerial history, how we see archaeological sites, and types of image. However, it makes no mention of soils, alluvium, colluvium, geology or anything else related to geoarchaeology that has

1 rog.palmer@ntlworld.com
bearing on ‘the relationships between humans and their environment’ and may also indicate zones in which aerial images show us no archaeological information. This really is a wasted opportunity.


*From the blurb:*

J Henry Fair is an American photographer and environmental activist, based in New York. With his images, Fair has called attention to environmental and political problems in different regions of the world. He is best known for his “*Industrial Scars*” series, abstract-expressionist photographs of detritus and externalities, which has been exhibited around the world at major museums, galleries, and educational institutions.

I bought a copy as a different kind of picture book and the photographs include some quite beautiful abstract art and then notes what caused it – usually pollution from by-products of our pursuit of fossil fuels, minerals and food – while showing some of mankind’s abuse, damage and destruction of the planet. The photographs have been taken from low-flying aircraft and are mostly obliques and, as with archaeological targeted photographs, they tell only part of the story. There is also a certain amount of ‘dramatic licence’ due to changes of scale and use of some very close-up views of particular aspects to demonstrate selected environmental issues. In parallel with this book, I recommend that the reader visits some of the sites on Google Earth where they will see the true extent (and rapidity, if you use the timeline) of destruction and pollution that is occurring. The book creates art from some of the industrial processes that have become necessary to modern living and, by using the aerial photographs to highlight environmental concerns, it shows how ruthlessly-efficient we have become at destroying the planet we are borrowing for a short time.

A selection of photographs can be seen at the following sites:

http://papadakis.net/industrial-scars/


As the title says, a short summary (in Hungarian and English) of work done in 2011. Mostly Roman but mentioning earlier and later sites. Aerial photography, interpretation and transformation, ground checking. Notes and illustrates the use of ‘image segmentation’ to enhance photographs.

This paper attempts to understand why the Melfese area of Italy is relatively blank from the air yet the adjacent Foggia Plain is highly populated. As a case study, the authors examine aerial evidence of the WW2 airfield at Venosa and its subsequent return to cultivated land. I may be missing something, but fail to understand how the visibility of gravel-paved airfield features, that appear to show mostly as soil marks or extremely-poor growth of crops, helps assess the potential of crop growth over ditches. However, the authors are confident that: ‘This guidance from the recent past can now be used in future archaeological studies to provide a better understanding of the interaction between man and the landscape…’.

Despite the fact that the website of Elsevier, the publisher, shows an editorial board numbering 52 people (of whom I have heard of two) the Journal of Cultural Heritage does not appear to be a peer-reviewed publication. Which may explain a lot.

Łukasz Banaszek, 2015. Przeszłe krajobrazy w chmurze punktów (Past landscapes in the point cloud). Poznań: Uniwersytet im. Adama Mickiewicza w Poznaniu. Seria Archeologia nr 54. ISBN 978-83-232-2993-3, ISSN 0554-8195. Copies can be bought, but, since January 2017, the book has become freely-available through open access: https://www.academia.edu/23052338/Przesz%C5%82e_krajobrazy_w_chmurze_punkt%C3%B3w_Past_landscapes_in_the_point_cloud

This is for our Polish readers as otherwise there is only an abstract and 4½ page summary in English – not even the bi-lingual captions that sometimes we get from our European colleagues. The abstract tells us that ‘The main purpose of this book is to identify the relationship between the application of Airborne Laser Scanning (ALS) in archaeological research and the interpretative potential of archaeology’.


This chapter notes the various ways in which developer-led archaeology is tackled in several European countries and examines the roles of and belief in non-destructive methods as part of that.

Perhaps of interest to those of you who merge UAV images and use them for more than just pretty illustrations. This article comments on data collected during four flights with differing associated ground control and processed using three software packages (one of which is open source). Centimetric results in x, y and z seem good to me, but I'm not a photogrammetrist.

http://www.mdpi.com/2072-4292/9/2/118

This is a technical 45-page article (and an 87MB download) that has applied various enhancement techniques to SAR images within several small test areas of agricultural or pastoral land on mainly volcanic deposits near Rome. Conclusions include the observations that, ‘…surface residues over buried archaeological features clearly appear in imagery derived from both the intensity and the phase of SAR data.’ and that ‘Comparisons between $\sigma^0$ backscatter, coherence and DEMs have aided interpretation of trace features as manifestations of positive and negative crop marks, soil marks and topographic residues.’ The author ends by suggesting that ‘SAR data analysis could become a routine and cost-effective technique …’ but is unlikely to replace conventional methods although it may complement them.

**Council for British Archaeology Research Reports**
For any of you who remain unaware of that digital copies of the Council for British Archaeology’s Research Reports, plus other goodies, are available for free download from ADS. Of particular aerial interest may be:

http://archaeologydataservice.ac.uk/archives/view/cba_rr/rr12.cfm

Maxwell (ed) 1983. The impact of aerial reconnaissance on archaeology. Report no. 49:
http://archaeologydataservice.ac.uk/archives/view/cba_rr/rr49.cfm
(thanks for the reminder from Geert Verhoeven)

**RCHME Inventories**
This may be old news, but digital copies can be freely downloaded from *British History Online*. The website seems only to hold the English Inventories – I was unable to find any from Wales or Scotland. There are also VCH volumes and a selection of pre-grid OS maps (1:10560 and 1:2500). Plus other goodies with a promise of more to come.

http://www.british-history.ac.uk/


For any of you who didn’t buy the paper books, pdf copies can now be downloaded from Dave Cowley’s Academia page.

https://www.academia.edu/6730518/Landscapes_through_the_Lens_Aerial_Photographs_and_the_Historic_Environment

https://www.academia.edu/6730527/From_the_air_understanding_aerial_archaeology
Papers of interest? As yet unread

Rog Palmer¹


http://dx.doi.org/10.1016/j.jas.2014.02.015

[This may have been noted in an earlier issue. Collecting high-resolution thermal imagery using a UAV.]


http://dx.doi.org/10.1371/journal.pone.0159890


[Stefano was so quick to get this in Academia that no volume and page numbers had been issued.]

¹ rog.palmer@ntlworld.com
The Aerial Archaeology Research Group

AARG sees the aerial perspective as integral to the pursuit of key questions in archaeology and heritage, including landscape character, long term landscape change, human ecodynamics, and the experience of place. We are a community of heritage professionals, researchers, students and independent scholars dedicated to education, research and outreach initiatives involving the acquisition and application of data from airborne platforms. AARG provides opportunities for networking, mentorship, and exchanges of ideas on theories, methods and technologies related to aerial archaeology. The organization supports an annual conference, workshops, training schools, and publications.

Membership is open to all who have an interest or practical involvement in aerial archaeology, remote sensing and landscape studies.

AARG is a registered charity: number SC 023162.

AARG homepage.  http://aarg.univie.ac.at/

Membership/subscription rates:

<table>
<thead>
<tr>
<th>Category</th>
<th>Individual</th>
<th>20.00 Euro</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students *</td>
<td>£10.00</td>
<td>14.00 Euro</td>
</tr>
<tr>
<td>Institutional</td>
<td>£25.00</td>
<td>35.00 Euro</td>
</tr>
</tbody>
</table>

* and applicants residing in Albania, Bulgaria, Croatia, Czech Republic, Hungary, Montenegro, Poland, Romania, Serbia, Slovakia, Slovenia, and countries of the former Soviet Union.

Subscription reminders may be sent out on January 1

Methods of payment:

- Standing Order mandate /Electronic funds transfer
- PayPal
- Sterling or Euro bank notes

Bank details are available on request for direct payment from overseas.

Please contact the Secretary: aarg.secretary@googlemail.com

Copyright. Copyright © in AARGnews rests with the individual authors.

Student scholarships. AARG has a limited number of student scholarships for attendance at its annual meeting. These are aimed at supporting bona fide students who are interested in aerial topics and may wish to attend.

Anyone wishing to apply should write to AARG’s Chairman (aargchair@gmail.com) with information about their interests in archaeology and aerial archaeology, as well as their place of study. The annual closing date for applications to the annual AARG conference is 1 June. Other meetings for which scholarships may be available will be advertised on an ad hoc basis. Support for conference attendance may also come from the Riley Fund (see elsewhere, this issue).