UAV Conference 2014

23. – 24.05.2014

Berlin

Big Work for Small Planes – Using UAVs and Kites for Archaeology

ArcLand and the *Berlin Free University Excellence Cluster Topoi* are organising a symposium on the use of *UAVs* (Unmanned Aerial Vehicles) in archaeology and cultural heritage studies in the *Topoi house Dahlem* in Berlin from 23 – 24 May 2014.

In continuation of the first and very productive UAV experts roundtable in Rethymno (Crete) from 22 – 23 January 2014 at the *Institute for Mediterranean studies* F.O.R.T.H., this conference aims to highlight the potential of using UAVs in archaeology and cultural heritage purposes.

On the first day, presentations and posters will focus on case studies of data acquisition and data processing with multicopters, kites etc., discussing also the pros and cons of these devices and the techniques that have been used.

On the second day we will present the use of UAVs in a small *air show* in the *Thielpark* (opposite *Topoi house*). An *open symposium will follow after the show,* giving attendees the opportunity to discuss questions and problems with the pilots and other experts will follow.

Content

Conference Organisation:

Undine Lieberwirth
Topoi Excellence Cluster

Axel G. Posluschny
ArchaeoLandscapes Europe

Contact local organisation:

Undine Lieberwirth M.A. - Exzellenzcluster 264 - Topoi
Tel. +49 30 838 57275
Fax +49 30 838 53770
Email: undine.lieberwirth@fu-berlin.de

Venue

The conference takes place at the **Topoi house Dahlem** oft he Excellence Cluster Topoi at the Free University Berlin.

address: Hittorfstraße 18, 14195 Berlin.

Coffee & Snacks will be served at the venue on **Friday**. Conference participants are welcome to the university **Mensa II**. Please show your conference badge in order to pay by cash.

address: Otto-von-Simson-Straße 26, 14195 Berlin

On **Saturday** there will be a catering service at your own expenses within the venue.

Friday, 23 May from 19:00 p.m.

Informal meeting & dinner at the **pub ‚Luise'** (http://www.luise-dahlem.de/) – own expenses. We reserved a separate room for all conference participants.

address: Königin-Luise-Straße 40-42, 14195 Berlin

The closest metro station to the conference venue is *Thielplatz* station (red mark in the map above) line U3.

Inisde Topoi house:

The registration is located in the Topoi house lobby (green area) and opens on **Friday** at 11 a.m. and on **Saturday** at 9 a.m.

Presentations will be given in the **Conference Room (010).** Posters are displayed in **room 006** where Coffee & Snacks are served.

Wireless Network Access for Conferences and Guests

WiFi-Key: 62nq4wi9

Conference participants or other guests should connect to the wireless network with the SSID `"conference"` and open an arbitrary web page. Instead of that page a form will appear, in which the user can enter the key provided by the conference organizer or host. Access to the wireless network will then be granted, and the user will be automatically forwarded to the web page that was originally opened.
Note: For technical reasons the connection to the wireless network may be interrupted at midnight. On the following day, the user must re-enter the key in order to continue using the wireless network.

Attention: Connections to the wireless network "conference" are not encrypted and can be eavesdropped. To ensure confidentiality and encryption, please use appropriate protocols (https, ssh, VPN).

Programme

Friday	**23/05/2014**
11:00 h	*Registration open*
13:15 - 13:30 h	*opening*
13:30 - 14:00 h	*Jörg Bofinger / Christoph Steffen, Airborne 3D documentation techniques in cultural heritage management*
14:00 - 14:30 h	*Benjamin Ducke / Marco Block-Berlitz, Archaeocopter.de: UAV-based documentation of archaeological sites with consumer grade hardware and free software*
14:30 - 15:00 h	*Christian Seitz, From ArchEye to ArchEyeAutomatic*
15:00 - 15:30 h	*coffee break*
15:45 - 16:15 h	*Jochen Reinhard, Kite, Copter or Fixed Wing? Comparing different UAV platforms for Low Altitude Aerial Photography*
16:15 - 16:45 h	*Esben Schlosser Mauritsen, Drones in Danish archaeology – so far so good*
16:45 - 17:15 h	*Jamie Quartermaine / Paul Miles, Eight case studies and a conclusion: Practical lessons from recent work by Oxford Archaeology*
17:15 - 17:45 h	*poster presentation & coffee break*
17:45 - 18:15 h	*Kyriacos Themistocleous / Athos Agapiou / Demetrios Alexakis / Branka Cuca / Diofantos G. Hadjimitsis, Lessons learnt From using UAVs in Cyprus: landscapes applications*
18:15 – 18:45 h	*Hans-Peter Thamm, High hopes, myth and reality, the essence of 8 years using different types of UAV for archaeological tasks - lessons learned and actual challenges*
19:00 h - …	*informal meeting & dinner at the pub "Luise" (own expenses)*

Saturday	**24/05/2014**
9:00 h	*registration open*
9:30 – 10:00 h	*UAVs introduction*
10:00 - 12:00 h	*UAVs presentation and air show in the Thielpark*
12:00 – 13:00 h	*lunch break (own expenses)*
13:00 - 15:00 h	*open symposium: questions & answers to the presenters; presentation of a UAV hand book*
15:00 – 15:15 h	*coffee break*
15:15 – 16:15 h	*internal meeting of UAV hand book authors & editors*

Air Show

Saturday, 10 – 12 h

The **air show** will take place in the Thielpark opposite the Topoi house (please see map p. 3). Each pilot or pilot group will have 30 min to present one multicopter.

Open Symposium

Saturday, 13 – 15 h

During the **open symposium** multicopter and kite pilots will present documentation results and are happy to explain their copters in more detail for the audience for about 30 min/pilot or pilot group. Pros and cons of the application can be discussed in detail as well as practical tips for their use at archaeological sites.

Internal Meeting

Saturday, 15 – 16:3 h

UAV hand book authors & editors

Post-conference Excursion

Sunday, 10 – 12:30 h

We organized a post-conference tour to the Berliner former allies NSA Field Station from 10-12:30 a.m. The guided tour (in English) will cost **€ 15/person** on own expenses. For registration please visit our website or contact the registration desk.

Presentation - Abstracts

Friday, *13:30 - 14:00 h*

Airborne 3D documentation techniques in cultural heritage management

Jörg Bofinger / Christoph Steffen

Since 2013 the State Office of Cultural Heritage Management Baden-Wuerttemberg has been applying two new techniques for 3D documentation of archaeological monuments and excavation sites:
1. **Structure From Motion** (*SFM*)
2. **Low Altitude Aerial Photography** (*LAAP*) with an **Unmanned Aerial Vehicle** (*UAV*)
The synthesis of pre-existing 3D topographic datasets (e. g. LIDAR) and SFM and LAAP data provides consistent 3D documentation of single artefacts, complex archaeological features, complete excavations and site topography.
In terms of quality as well as hardware, software and human resources the recent results are revealing a high potential for all varieties of archaeological analysis and presentation.
By means of a few selected case studies, recent 3D documentation activities will be illustrated: The excavation site on the summit of the medieval castle Limburg near Stuttgart, the excavation in the historic monastery in the town of Ellwangen and the underwater world cultural heritage sites of the pile dwellings at the shore of Lake Constance.
In the paper the capabilities of these techniques are discussed as well as problems, limitations and the legal restrictions of UAV use. The multirotor system employed by the state office of cultural heritage management is a HiSystems-octokopter, type OktoXL, with live view radio transmission and GPS navigation. It can be equipped with various cameras, such as a compact camera, DSLR or full HD video camera.

Friday, *14:00 - 14:30 h*

Archaeocopter.de: UAV-based documentation of archaeological sites with consumer grade hardware and free software

Benjamin Ducke / Marco Block-Berlitz

The work presented in this paper is part of "Archaeocopter" (www.archaeocopter.de), a joint research project by the University of Applied Sciences Dresden and the Free University of Berlin. We are committed to the design and development of UAVs for airborne image data acquisition in archaeology and related fields. In order to optimise the hardware and software for real-world applications, the project's research and development work is continuously supported and guided by international partners, such as the state heritage management authorities of the German federal state of Saxony, the German Archaeological Institute (DAI) and the Mexican National Institute of Anthropology (INAH).
Our hardware design revolves exclusively around consumer grade devices that are cheap to buy, easy to operate and robust. Our basic data products are HD video streams from fixed focal length, fish eye lens "action cameras" with uncompressed frame data. Contrary to what one might expect from such extreme optics, the resulting data constitute suitable input for the SfM-based 3D reconstruction of buildings, sites or terrain in great detail. Advances in GPU-based parallel processing allow for the rapid production of preview models for quality assurance, while increasingly efficienct, automated workflows allow for on-demand, off-site data processing at full detail level.
To illustrate principles and practice, we present case studies from sites and landscapes in Germany, Italy and Mexico that illustrate the wide range of scenarios and environments in which our approach was validated and optimised. These case studies demonstrate that consumer grade UAVs and cameras function well under many, even adverse working conditions. We believe that new technologies can only have a broad impact if they do not introduce substantial additional costs (in terms of both time and money) into existing workflows and field practices. Of our many successful 3D data acquisition missions, not a sinlge one required the use of expensive specialist UAV hardware, professional grade optical systems, or paid-for software.

Friday, *14:30 - 15:00 h*
From ArchEye to ArchEyeAutomatic
Christian Seitz

In this poster/presentation we will show the ongoing fieldwork and also the results of the "Project ArchEye" and also introduce it's follow-up project „ArchEyeAutomatic".
"Project ArchEye" was started back in 2009 using an Unmanned Aerial Vehicle (UAV), in this case a so called quadrocopter or quadrotor, to document archaeological excavations with high-resolution imagery created from a photo-mosaic. Therefore the author developed a program to calculate a trajectory over the excavation. The user can adjust the resulting pixel resolution on the ground by the data of the camera, the lens and the flight altitude.
We build a better system in 2013, having now both a hexacopter and an octocopter.
In October 2013 the author started his PhD at the research group "Optimization in Robotics and Biomechanics" (ORB) at the "Interdisciplinary Centre for Scientific Computing" (IWR) at the University of Heidelberg. It is an interdisciplinary project, combining Robotics and Computer Science with Building Archaeology and Field Archaeology. Prof. Katja Mombaur (ORB) and Prof. Matthias Untermann (Institute for European Art History, University of Heidelberg) supervise the project.
Financial support is gratefully granted by the German Excellence Initiative within the institutional strategy of the University of Heidelberg and its special funds for twinning projects.
We plan to use the UAVs for automated documentation of historic monuments by applying methods of Computer Vision, Robotics, Mathematical Modeling and Optimization, linked by means of Scientific Computing.
The basic idea is to first acquire an overview 3-D-model of the area using Stereo Vision. Based on this sparse model, an optimized trajectory for the UAV will be planned, so the whole object will be measured in an automated and complete way. There have to be respected several aspects for the optimization of the trajectory, like the quality of the acquired data, details to record and also the flight distance. This makes the resulting data valuable for scientific interpretation in means of documenting historic monuments.

Friday, *15:45 - 16:15 h*
Kite, Copter or Fixed Wing? Comparing different UAV platforms for Low Altitude Aerial Photography
Jochen Reinhard

The use of camera equipped UAVs in archaeological fieldwork is becoming increasingly popular – but what is the best UAV platform for a given project? In this talk several case studies with distinctively different low cost UAV platforms including kites, multicopters and fixed wing model aircraft will be presented and their individual strengths and weaknesses compared. The topographic situation of the documented archaeological sites ranges from remote desert locations to alpine environments.
Although at first glance kites are technically outdated, they still prove to be a valuable tool for low altitude aerial photography. Being lightweight, transportable and easy to operate, a Kite Aerial Photography (KAP) system can be used for vertical and oblique photography alike. The limited control over the kite's movements results in relatively unordered imagery, but unlike other UAVs a kite can stay airborne for hours. If needed a KAP rig can be kept very cheap and simple – this low-tech approach makes for an unobtrusive and inconspicuous UAV thus avoiding trouble in sensitive areas. The dependency on steady and sufficiently strong winds makes the use of kites more suited to open landscapes, e. g. deserts or coastal areas.
Despite being a quite recent technical development, multicopter UAVs have quickly achieved a key role as a versatile UAV platform. With their four, six or eight electrically powered rotors they epitomise the proverbial "drone". Multicopters are usually equipped with a two or three axis camera gimbal controllable from the ground, a camera live view is transmitted to the ground via a radio link. With GPS assisted steering (including autonomous waypoint navigation) plus their ability to hover on a spot multicopters allow a precise framing of the photographs.
Compared to multicopters, fixed wing UAVs can provide much longer flight times and are able to travel significant distances. Lacking free controllable gimbals and the possibility to hover, they typically provide strips of vertical imagery along their flight path. These characteristics make them an ideal tool for high-resolution mapping of wider areas, imitating vertical mapping surveys with manned aircraft.
Regardless of the platform used to acquire low altitude aerial photographs, recent developments in close range photogrammetry, particularly the Structure from Motion method, allow the creation of precise 3D models from the UAV imagery. From these models e. g. True Orthophotos and Digital

Surface Models (DSMs) with high accuracy and ground resolution can be derived, making them ideally suited for archaeological field documentation.

Friday, *16:15 - 16:45 h*
Drones in Danish archaeology – so far so good
Esben Schlosser Mauritsen

The use of UAV, RPAS or simply drones, has only a short history in Danish archaeology. In 2013 the Danish Agency for Culture funded a project, still running, aiming to do more testing of ways of application, including monitoring of scheduled monuments, and to inspire the Danish archaeological museums include the method in their documentation toolbox.
The project is a cooporation between An Aerial View of the Past (Holstebro Museum), Arhus University, Moesgård Museum and Arkæologi Vestjylland. The results of the tests have been promising, especially when the aerial imagery is processed in Structure from Motion-software. We can measure excavation fields in short time with high precision. The drone photographical measurement can – in a wide extent - replace the often time consuming GPS surveying, which is often quite rough and unsatisfying in quality for archaeological documentation. But also you can also produce DEMs and ortophotos, which adds a new dimension to the documentation. The philosophy of our project is that the drone archaeology should be easy and something most archaeologists or field technicians could learn. It should not only be for specialists. Hence we have used fairly cheap consumer grade equipment with a rather flat learning curve. Our experience is that you can make resonable results with a 1000 Euros ready-to-fly solutions, and solve most documentation needs for excavations.

Friday, *16:45 – 17:15 h*
Eight case studies and a conclusion: Practical lessons from recent work by Oxford Archaeology
Jamie Quartermaine / Paul Miles

Oxford Archaeology has a long history of experiments with aerial and high-level photography, using a variety of ingenious methods. But it is only in the last three years that this has become a central part of our project surveying procedures, due to the availability of UAVs combined with accessible and high-quality photogrammetric software. Using case studies from eight large landscape, excavation, and buildings surveys since 2011, in the UK and middle-east, this paper will summarise and draw lessons from our experience with pole-cameras, kites, light aircraft, balloons and UAVs.
We will explain why it is the UAV which has made the work truly practical, reliable, speedy, and accurate, in meeting real-life operational deadlines, and in opening up new avenues of research and presentation which would otherwise have been too time-consuming and expensive.
We will also briefly discuss situations where other solutions, such as laser scanning, would be more appropriate for data capture. It is important to stress that the reason for doing the work is the creation of an accurate survey: the tools for data capture are at one level incidental. But the tools now available to us have radically transformed the work that we are able to do. We will look at the opportunities for a mix-and-match approach, using point clouds derived from a variety of different data capture sources.
The paper will briefly describe the hardware and photogrammetric procedures that we use - including the use of data control points to produce accurate models, the use of redundant control points for accuracy testing, and a comparison of performance on Windows 7 and Linux workstations.
Accuracy measurements from the case studies will demonstrate the high quality and reliability of the photogrammetric models, and compare this to the results of traditional survey methods, often on the same site.
This short paper will also briefly discuss the realities of using UAVs in a commercial environment in the UK: for instance, the practicalities of staff training, CAA pilot qualifications, and other Health and Safety and insurance issues.
Oxford Archaeology are particularly lucky to have had one qualified and experienced pilot to champion and push forward this work. We are now at the stage of consolidating our skills and equipment; buying further UAVs and training pilots in each of our three regional offices, as we consider this to be a proven and important part of our toolkit for the recording of future archaeological projects, be they buildings, landscapes or excavations.

Friday, *17:45 - 18:15 h*

Lessons learnt from using UAVs in Cyprus: landscapes applications

Kyriacos Themistocleous / Athos Agapiou / Demetrios Alexakis / Branka Cuca / Diofantos G. Hadjimitsis

Despite the progress in recent years of remote sensing sensors intended for archaeological research, the evaluation of low altitude airborne systems and UAVs is still very limited. Such tools can fill the gap observed between satellite/aerial with “ground truth” data retrieved in the field using handheld spectroradiometers. Although digital cameras have been used on aerial platforms since the early 1990s and several applications have been made for photogrammetric purposes, remote sensing platforms that include VIS/NIR cameras and spectroradiometers, intended for archaeological purposes are still very rare.

The ‘ICAROS’ project was intended to fill the gap in the remote sensing community for using suitable satellite sensors for archaeological research. The low altitude airborne system includes 3 components: a balloon capable of lifting equipment up to 200 meters with a payload transfer up to 10 Kg including a ground control mechanism and wireless aerial platform, the GER 1500 spectroradiometer with coverage from 350 - 1050 nm (weight 3Kg), and a compact, high resolution digital camera with VNIR filter, weighting 2 kg. The low altitude airborne system also includes a ground control mechanism (e.g. wireless camera and screen output) of balloon-enabled viewing of the visual field to record the sensors and other recording parameters, including air temperature, humidity, etc. The mechanism consisted of a harness-like devise that was worn by the researcher. In this way, the user can move along the area of interest and better control the system. The ground control mechanism allowed for wireless control of the spectroradiometer, the cameras, and the aerial platform. Additional equipment can also be attached to the system, including a video camera, thermal camera, particulate matter monitor and data loggers to measure humidity and air pressure. As well, a GPS IMU sensor can also be attached to the system, which provides combined position and orientation information and allows for precise motion information of the system.

The results have shown that such information can be used for a better understanding regarding the spectral properties of crops. Several experiments have been made in different sites in Cyprus using a variety of sensors. Finally a discussion regarding limitations and potentials of UAVs for archeological research is presented.

Friday, *18:15 – 18:45 h*

High hopes, myth and reality, the essence of 8 years using different types of UAV for archaeological tasks - lessons learned and actual challenges

Hans-Peter Thamm

For many research questions in archaeology aerial photos in a very high temporal and spatial resolution are very useful (e.g. documentation of excavations, searching for subsurface artefacts, assessing the precise structure of the greater surroundings of an archaeological site for understanding the functional relation between local and regional scale, and many other more). The fast progress in technique within the last years, triggers the development of the Unmanned Aerial Vehicles (UAV) which are lightweight, performing, robust, reliable, cost efficient, uncomplicated and very easy to handle - as the sale persons of the UAV various companies are not tired to tell the archaeologists.

But after working now 10 years with many different types of UAV for different tasks in archaeological and other disciplines, it turns out that there is quite a big gap between the very optimistic image the sale persons of the UAV companies are painting and the manifold problems which occurs in the real world using UAV for day to day work in archaeology.

In the presentation the possibilities and challenges of the different types of UAV for archaeological will be presented. As well the necessity of setting up a structured and complete work flow for using the UAV is to be discussed. Starting from the very early planning of the campaign - where many problems can be created or avoided, over the choice of the suitable type of UAV and sensors, performing the field campaign and dealing with ground truth, to the processing of the photos, the extraction of information and integration of the results in a general information system will be discussed on the basis of many case studies.

A successful use of UAV in archaeology requires often much more time, expertise and, surprise, surprise, much more money than expected. As well a consistent organisation structure for using,

maintaining and information extraction from the UAS images must be set up, with enough money to pay competent people.
The presentation as well will point out, which future developments are needed till UAV are really reliable day to day tools for archaeologists and what are the actual trends towards these goals.

Poster – Abstracts

Mapping Viking Age and Medieval harbour sites with Kite Aerial Photography

Ronny Weßling / Joris Coolen / Natascha Mehler

In 2013 two potential Viking Age and Medieval harbour sites in Norway and the Faroe Islands were intensively surveyed with Kite Aerial Photography.The work forms part of a research project on Harbours in the North Atlantic (ca. 800-1300), funded by the DFG. Large scale, high resolution terrain models of these maritime landscapes were calculated from theresultingimages using Agisoft PhotoScan. The generated 3D-models serve as compensation for lacking ALS-data for general mapping and landscape visualisation as well as for inspection of relief details and modelling of geomorphological changes. The aim of the poster is to show the chances but also the limits of Kite Aerial Photography and Image Based Modelling in different environments. On the islandofVeøy (Norway) the model covers an area of about11 ha with a maximum ground sampling distance of 1.2 cm. Difficult thermal winds inthe fjord system, a widely forested landscape and tidal changes severely hampered the recording process. The use of kiteswith very high line angel (Rokakku, KAP-foil) enabled a high coverage despite high trees and buildings. In Sandur (Faroe Islands) ever changing wind and light conditions were a challenge that was overcome by the use of different sized kites and by hacking the camera to automatically choose a proper shutter speed. The resulting model covers more than 47 ha with a maximal ground sampling distance of 2.5 cm. Both models revealed some interesting structures like a possible mole and the remains of a post-medieval boat house. The surface models can be used to test various narratives of these structures in a dynamic coastal environment.

Keeping costs low while UAV flies high: the archaeologist's perspective

Gianluca Cantoro

Until some years ago, remotely controlled devices were expensive toys for grown up kids. They normally required high assembly skills, soldering, electronics and mechanics. It required plenty of spare time for auto-training and… recovering from failures. In the last years/months the low cost RC (Remote Control) phenomena is raising exponentially, bringing a number of unexperienced people from different fields to put “something” in the air with a ground controlling system.
Few companies are actually contending the primate of cheapest UAV (Unmanned Aerial Vehicle, sometimes-called “UAS”, for Systems) solution, while others are creating their commercial nice in the growing market. If this helps to keep devices affordable and user-friendly, it also raises new problems and needs for updated regulation for safety and security. At the same time, these “ready to fly (RTF)” machines –a condensation of technology with the appeal of a fancy toy– lack sometimes in basic requirements of very high valuable features for aerial archaeologists and photo-interpreters.
The paper shows how easy it would be nowadays to build a customized UAV, given a low budget and a specific (archaeological) need. Examples are provided with average costs and benefits in comparison with available RTF devices.

Photogrammetric low altitude fieldwork in "Neolithic Thessaly (Greece)": potentials and issues

Gianluca Cantoro

Thessaly is a region of mainland central Greece characterized by fertile plain-lands, made by alluvial soils, particularly good for the production of grain, cattle, and sheep. In this region, hundreds of “magoules” –prehistoric settlements known elsewhere as mounds or tells– were identified, dating from Early Neolithic period until Bronze Age.
Neolithic Thessaly is traditionally an interesting area for understanding human partitioning and territoriality of the landscape by non-hierarchical, ‘egalitarian’ human groups and it was therefore chosen as experimental area for further non-destructive large-scale archaeological investigations.
The goal of the research project “Innovative Geophysical Approaches for the Study of Early Agricultural Villages of Neolithic Thessaly” which is implemented under the "ARISTEIA" Action of the "Operational Programme Education and Lifelong Learning" and is co-funded by the European Social Fund (ESF) and National Resources, is the development of methodologies for the registration and mapping of the specific Neolithic settlements through geomorphological and aerial remote sensing approaches.

In November 2013, a field campaign has been undertaken in selected number of sites where different kind of systematic geophysical measurements were collected simultaneously with UAV photogrammetric sessions.
The paper will focus in first results of the photogrammetric campaign, showing achieved goals, UAV performance assessment and lessons-learned during the low altitude aerial survey. Particular importance is given to archaeologically meaningful outputs.

Low-cost kite aerial photography: three examples

Mikołaj Kostyrko / Adam Lokś

In our poster we would like to present three examples of low cost kite aerial photography (KAP) kits for mapping archeological sites.
Our goal is to find a low-cost portable solution which would be easy to use. We are also seeking a solution that could be handled even by kids. Our main goal is to find a kite aerial photography kit that could be easy to use and easy to access by the local community with which we are cooperating. By doing so to give them a chance of making their own kite aerial photography kits and hopefully of documenting heritage sites from air.
Our idea was to test tree vary different types of kites. One is a toy kite made for the beginners in acrobatics, the second one is specially made for light weight kite aerial photography and the last one is a kite that is used in KAP and that could be easily assembled form the parts that can be found in a hardware store.
The two of the kits are based on kites produced in Poland, Junior 1,3 (two-line kite) and Fotokite 180 (one-line kite). For making photos we used a GoPro camera and a compact Canon camera. The third kit will be based on a self-made Rokkau kite. We would like to show the advantages and disadvantages of using those kites.

Presenters & Pilots

Agapiou, Athos
athos.agapiou@cut.ac.cy

Alexsakis, Dimitrios
dimitrios.alexakis@cut.ac.cy

Block-Berlitz, Marco
block@htw-dresden.de

Bofinger, Jörg
joerg.bofinger@rps.bwl.de

Cantoro, Gianluca
gianluca.cantoro@gmail.com

Coolen, Joris

Cuca, Branka
branka.cuca@cut.ac.cy

Ducke, Benjamin
benducke@fastmail.fm

Hadjimitsis, Diofantos G.
d.hadjimitsis@cut.ac.cy

Kostyrko, Mikołaj
mkostyrko@gmail.com

Lokś, Adam
loksfly@gmail.com

Mauritsen, Esben Schlosser
esm@arkvest.dk

Mehler, Natascha

Miles, Paul
paul.miles@oxfordarchaeology.com

Quartermaine, Jamie

Reinhard, Jochen
jochenreinhard@web.de

Seitz, Christian
christian.seitz@archeye.de

Steffen, Christoph
Christoph.Steffen@rps.bwl.de

Thamm, Hans-Peter
hp.thamm@gmail.com

Themistocleous, Kyriacos
k.themistocleous@cut.ac.cy

Wessling, Ronny
ronny.wessling@univie.ac.at