

SunoikisisDC  
Digital Approaches to Cultural Heritage 2024  
session 2

# 3D Imaging: From remote sensing to photogrammetry

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# 3D methods

# 3D methods

1. 3D imaging (scanning)
2. 3D modelling (visualisation)
3. Virtual Reality
4. Augmented Reality
5. 3D printing

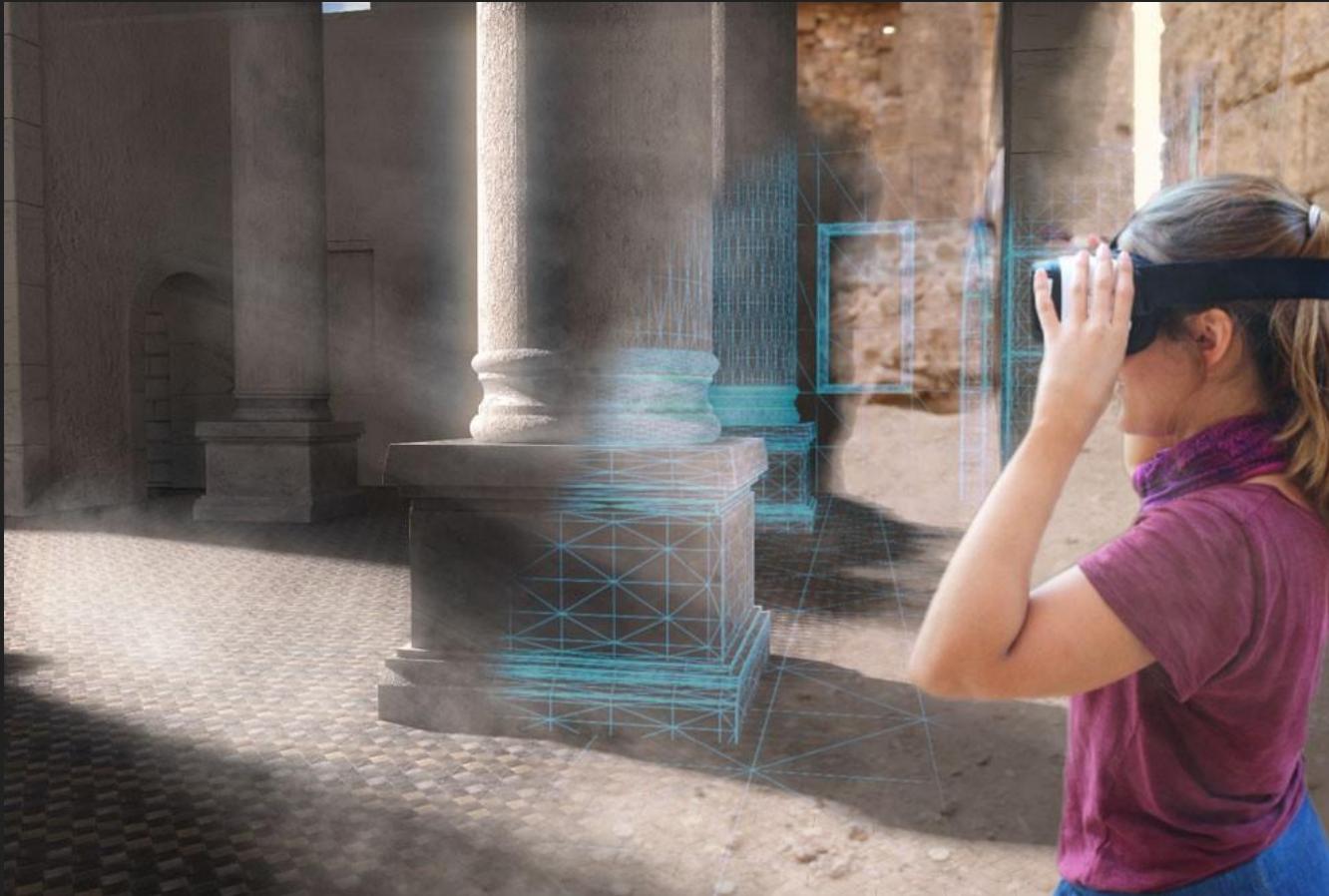
# 1. 3D imaging or scanning



## 2. 3D modelling or visualization



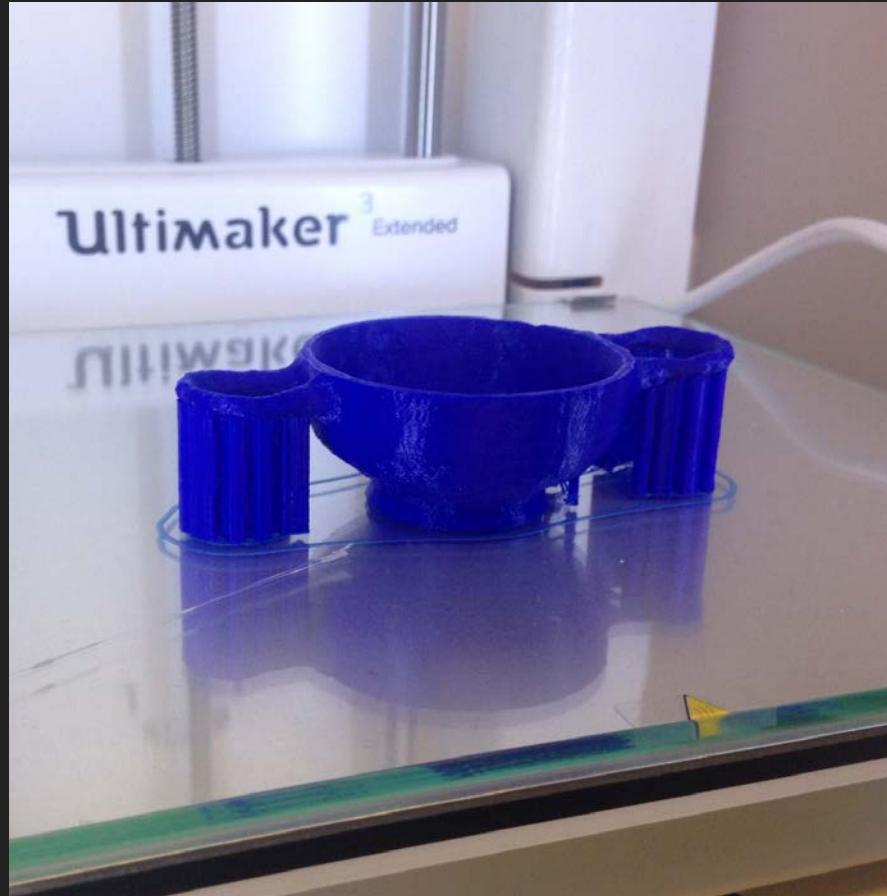
### 3. Virtual Reality (VR)

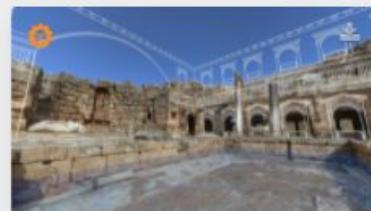


## 4. Augmented Reality (AR)

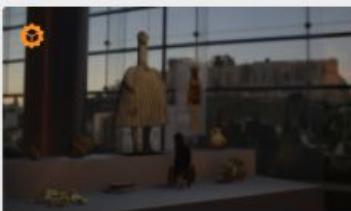


## 5. 3D printing

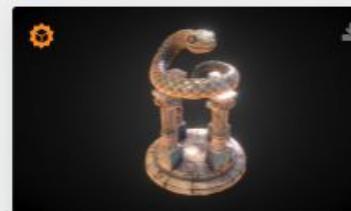




Peirene ... 13.5k 21 367



Ancient gre... 4.7k 4 21



Snake St... 8.5k 11 180



Greek Ba... 2.1k 19 122



The Three ... 6.1k 0 95



Ancient Gr... 3k 14 233



Discobol... 20.5k 1 150



Ancient Gr... 6.4k 1 112



Al Khaz... 26.2k 20 497



Stone Ancie... 2.7k 4 74



Stadium o... 3.3k 1 105



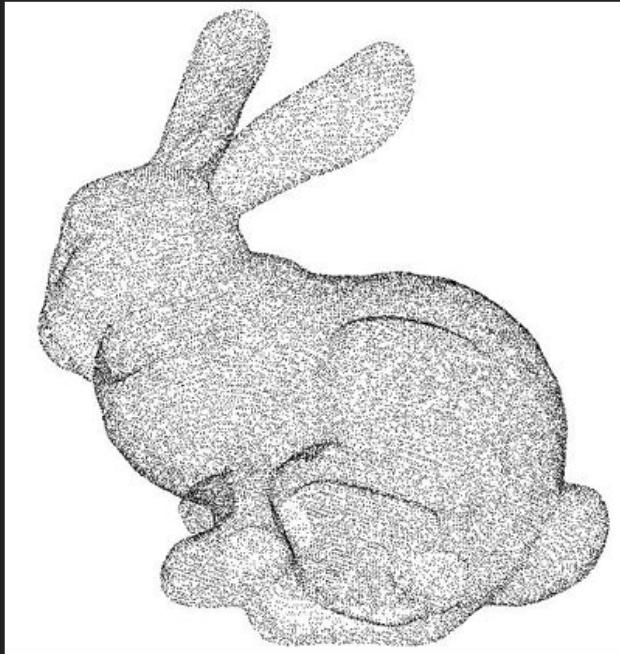
Greek Pott... 1.2k 0 19

# 3D imaging

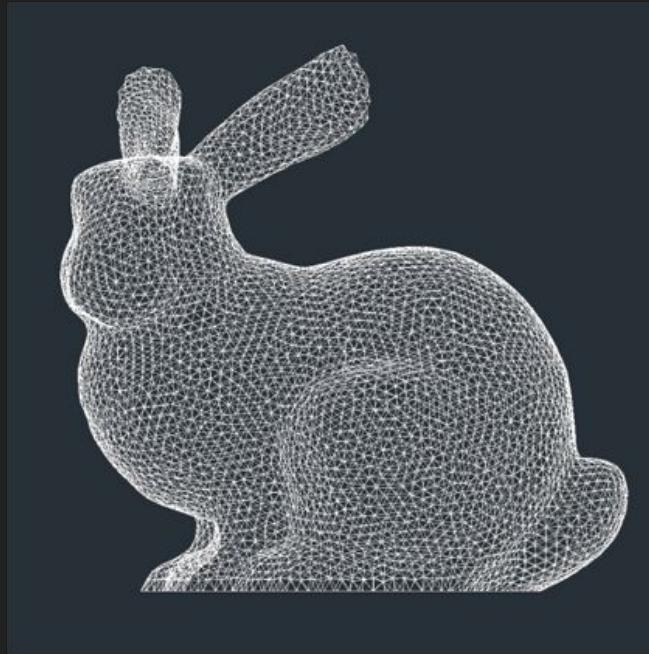
# 3D technologies and formats

1. Point cloud vs mesh
2. Laser scanning:
  - a. time of flight / triangulation / structured light
3. Computer Tomography / XRay
4. Photogrammetry / Structure from Motion
5. Reflective Transformation Imaging

# 3D Imaging outputs



Point Cloud



3D Mesh

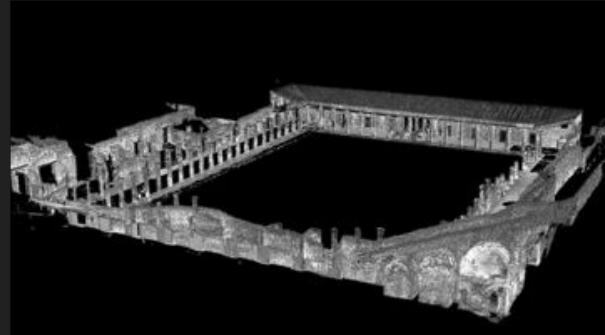
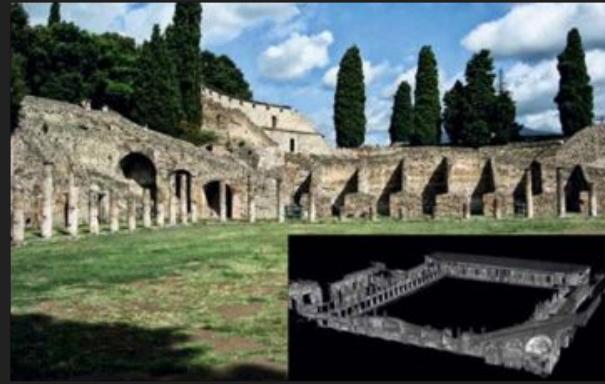
# Laser Scanning Time of Flight

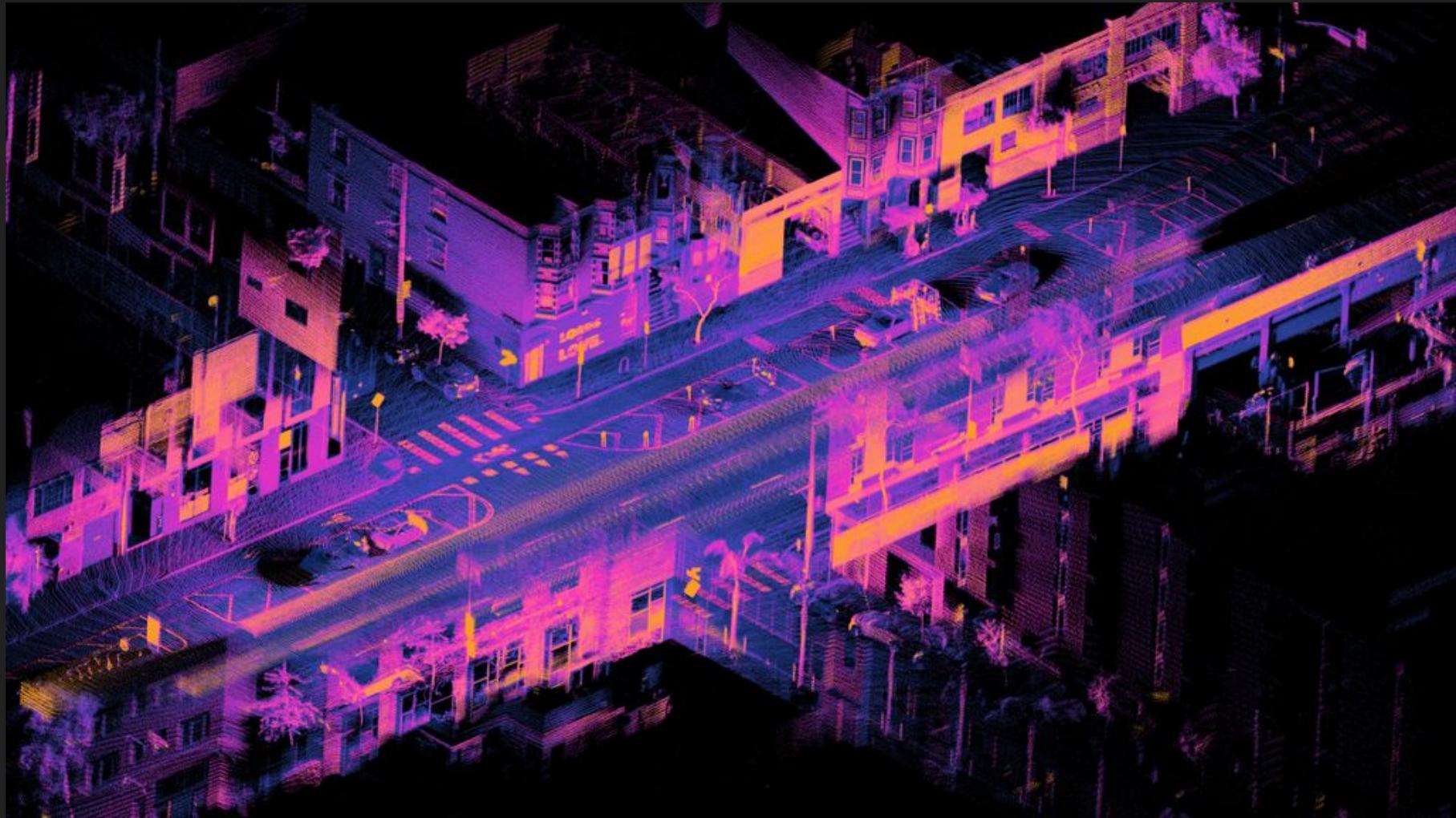
## PROS

- \* Good geometric fidelity
- \* Suitable for large areas

## CONS

- \* Cost
- \* Massive data set
- \* Slow process
- \* Not accurate on smaller artefacts





# Laser Scanning Triangulation

- \* Cheaper
- \* Better on smaller surfaces (not adequate for larger ones)
- \* Portable
- \* Ready to use

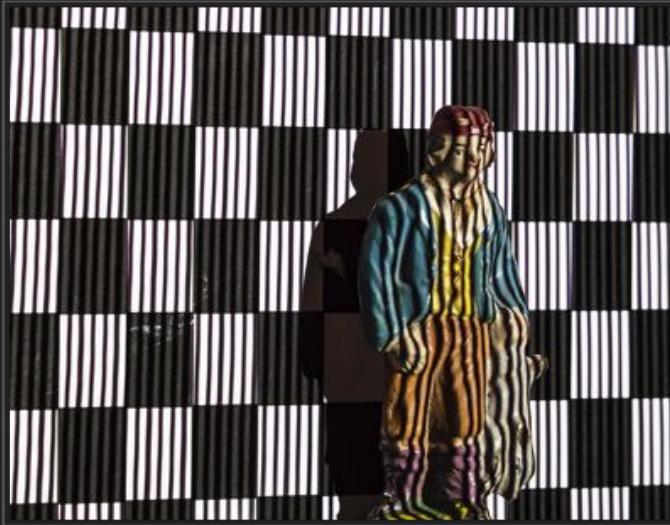


<http://surveyequipment.com/faro-scanner-freestyle-3d/>



<http://www.nextengine.com/>

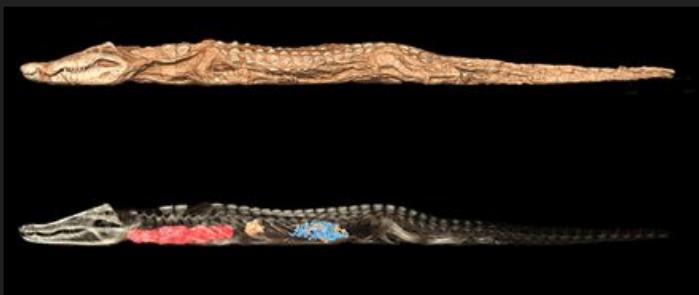
# Structured Light



3D scanning by Structured Light using a mini (pico) projector coupled with the “3D scanning software” developed by D. Moreno and G.Taubin at Brown University School of Engineering.

- \* Fast
- \* Accurate
- \* Has to be performed in a studio
- \* Requires calibration
- \* Is slightly out of date, but still used and researched

# CT Scan (Computed Tomography)



- \* Expensive
- \* Non portable
- \* Requires training
- \* Non invasive
- \* Virtual autopsy

Images of CT scans used by the British Museum for the exhibitions  
“Ancient Lives, New Discoveries” and “Scanning Sobekh”.

# Photogrammetry

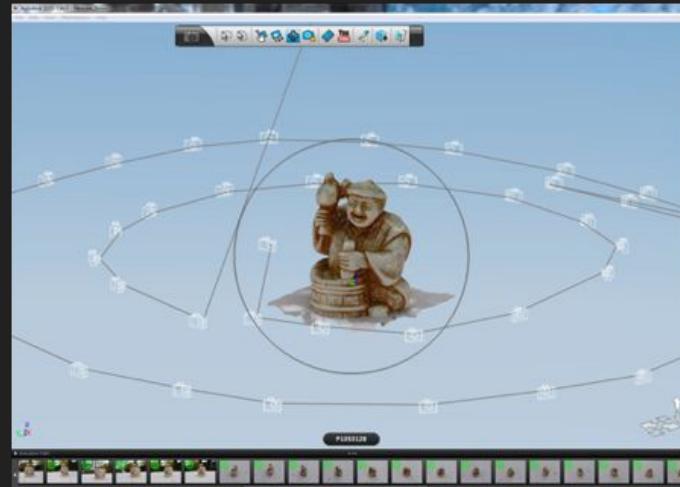
- \* Based on triangulation
- \* Cheap
- \* Easy to learn
- \* Portable equipment
- \* 3D mesh as an output

Agisoft Photoscan

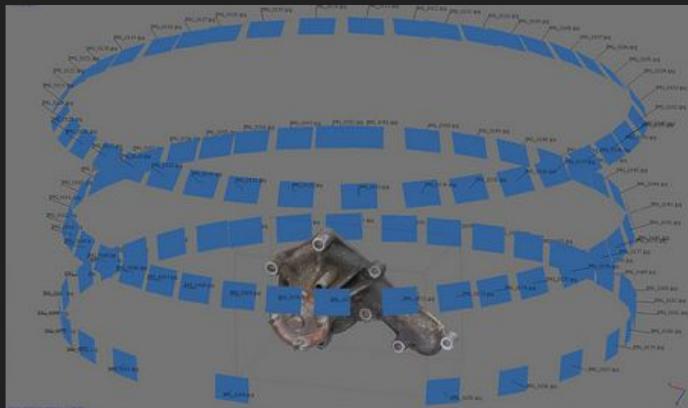
<http://www.agisoft.com/>

3DF Zephyr

<https://www.3dflow.net/3df-zephyr-free/>



Capture with 123D catch <http://www.tcpproject.net>



Capture with Photoscan <https://www.flickr.com/photos/erik-nl/sets/72157628813159493/>

# Structure from Motion

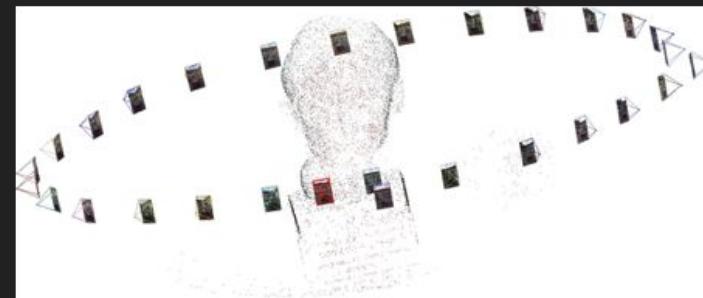
- \* Similar to Photogrammetry

Visual SfM

- \* Cheap

<http://ccwu.me/vsfm/>

- \* Relatively simple to use (but requires more IT skills)



- \* Accurate colour information

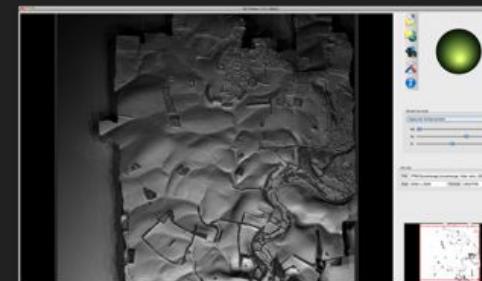


- \* Long processing time

- \* Output in point cloud

# Reflectance Transformation Imaging (RTI)

- \* Virtual relighting
- \* Cheap (when not performed with the dome)
- \* Free software
- \* Can only be seen (easily) in the viewer



# Photogrammetry exercise



# FALERI NOVI PROJECT



UNIVERSITY  
OF LONDON



UNIVERSITY OF  
TORONTO

B\_S\_R  
BRITISH SCHOOL  
AT ROME

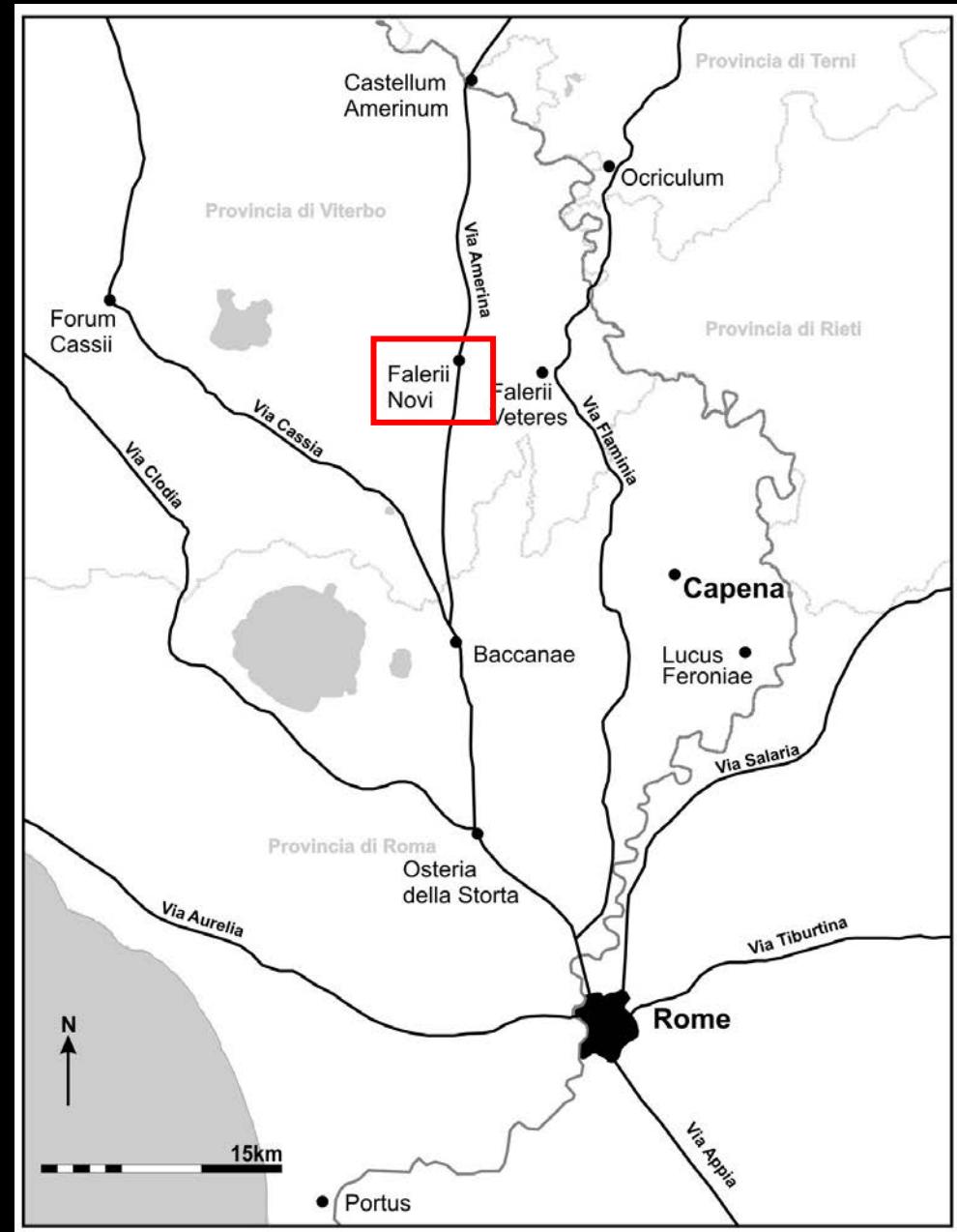


UNIVERSITÀ  
DEGLI STUDI  
FIRENZE



HARVARD  
UNIVERSITY

GHENT  
UNIVERSITY



Google Earth

Data SIO, NOAA, U.S. Navy, NGA, GEBCO

Image Landsat / Copernicus

Data SIO, NOAA, U.S. Navy, NGA, GEBCO  
Image Landsat / Copernicus



Aerial satellite view of the archaeological site of Falerii Novi, showing the large, roughly rectangular walled area of the ancient city. The site is surrounded by green fields and some modern infrastructure like roads and small buildings. The text 'Falerii Novi' is overlaid at the top center, and '30 ha' is overlaid inside the site's perimeter.

Falerii Novi

30 ha

# Magnetometry surveys 1997-8 and 2002-8



Large scale magnetometry  
(FM 36, Fluxgate Gradiometer)

BSR Project co-directed by  
Simon Keay and Martin Millett

# Falerii Novi: Magnetometry interpretation



Keay et al. (2000) *Falerii Novi: a new survey of the walled area*. *PBSR* 68: 1-93.

Falerii Novi  
Ground Penetrating Radar (GPR)

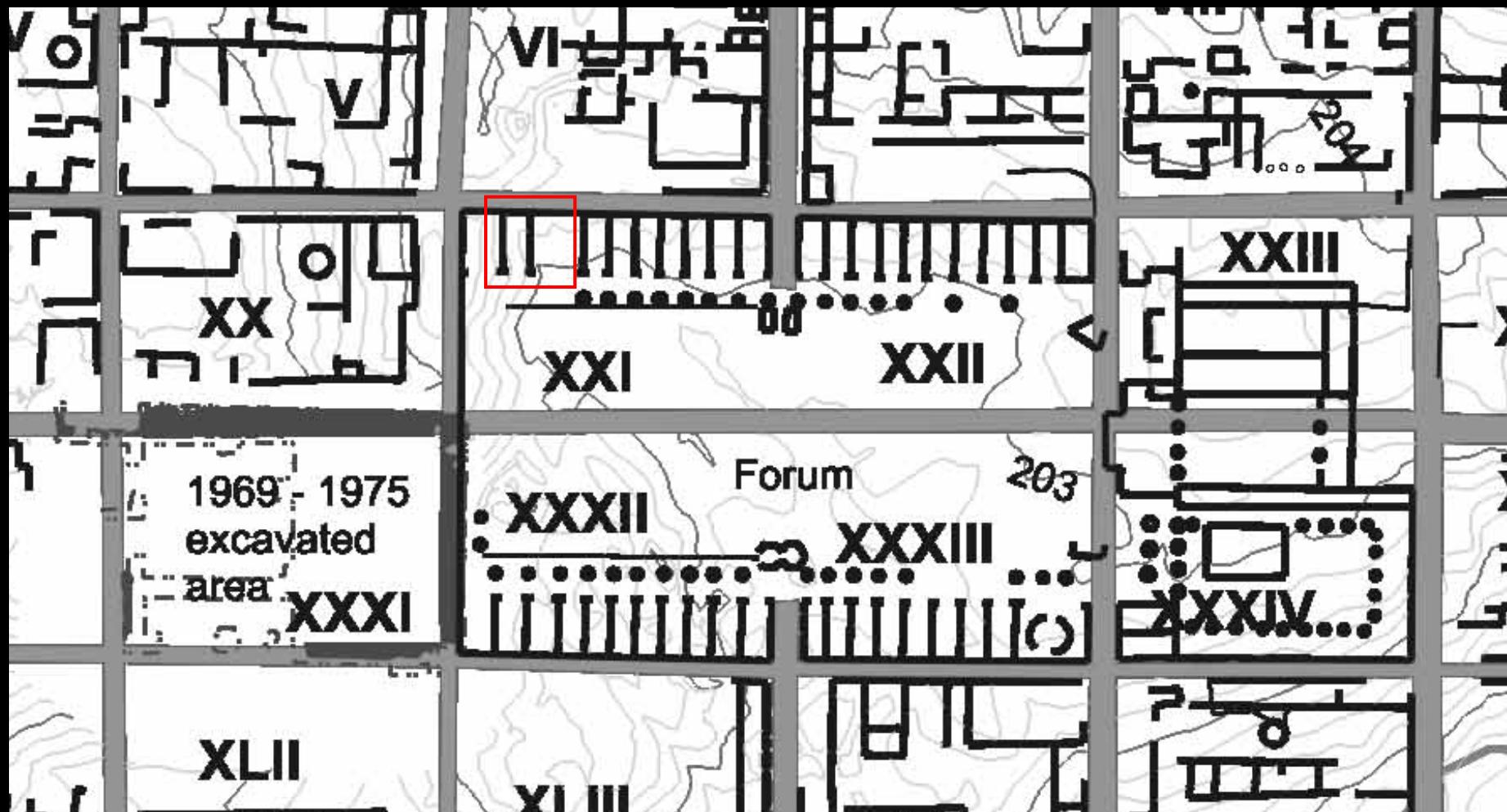


0 80 160 240 320 400 m

N

Depth: 35-40 cm

## Magnetometry interpretation of the forum area



Keay et al. (2000) *Falerii Novi: a new survey of the walled area*. *PBSR* 68: 1-93.

GPR of Area 5



## Area 5: Excavated state vs GPR



Drone  
imagery/photogrammetry



+

Laser scanning



+

Software: Cyclone, Metashape,  
ArcGIS/QGIS



# 3D Imaging: From remote sensing to photogrammetry



SunoikisisDC Digital Approaches to Cultural Heritage: Session 2  
Thursday January 18, 2024.

Stephen Kay

British School at Rome  
[www.bsr.ac.uk](http://www.bsr.ac.uk)

## Geophysical Prospection



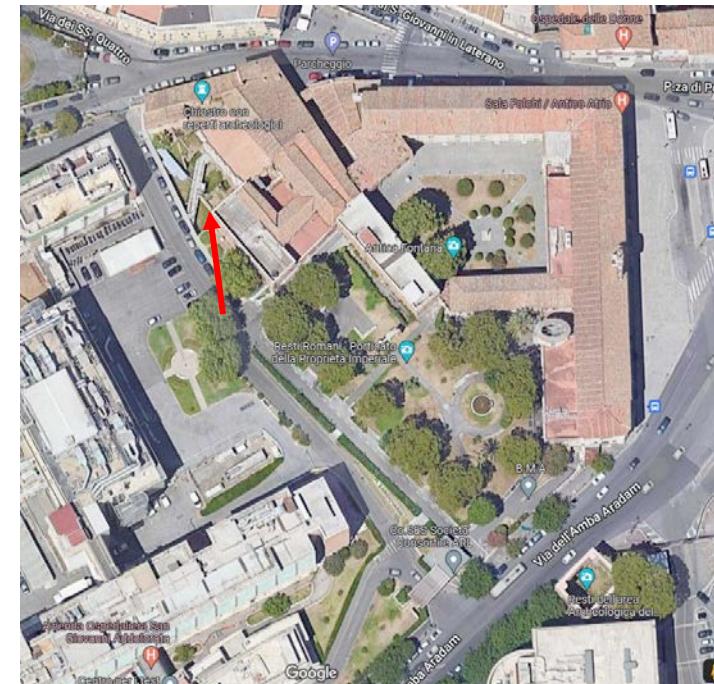
*GPR survey. Piazza Venezia, Rome*

## 3D recording



*Laser scan recording. Carafa Chapel, Santa Maria Sopra Minerva, Rome*

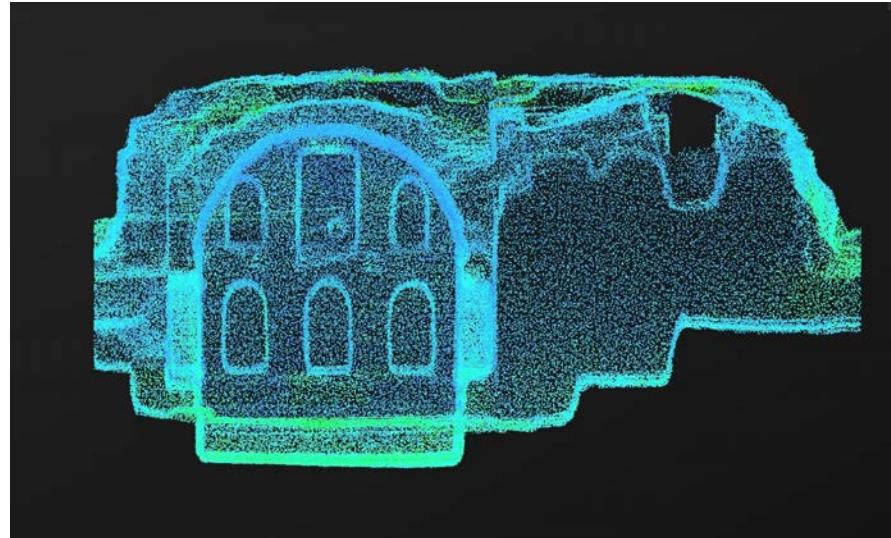
# Non-invasive techniques: Photogrammetry. Some examples (1)



San Giovanni in Laterano Hospital, Rome

# Non-invasive techniques: Photogrammetry. Some examples (1)

*Nymphaeum  
Q.Mutius,  
Segni, Lazio*

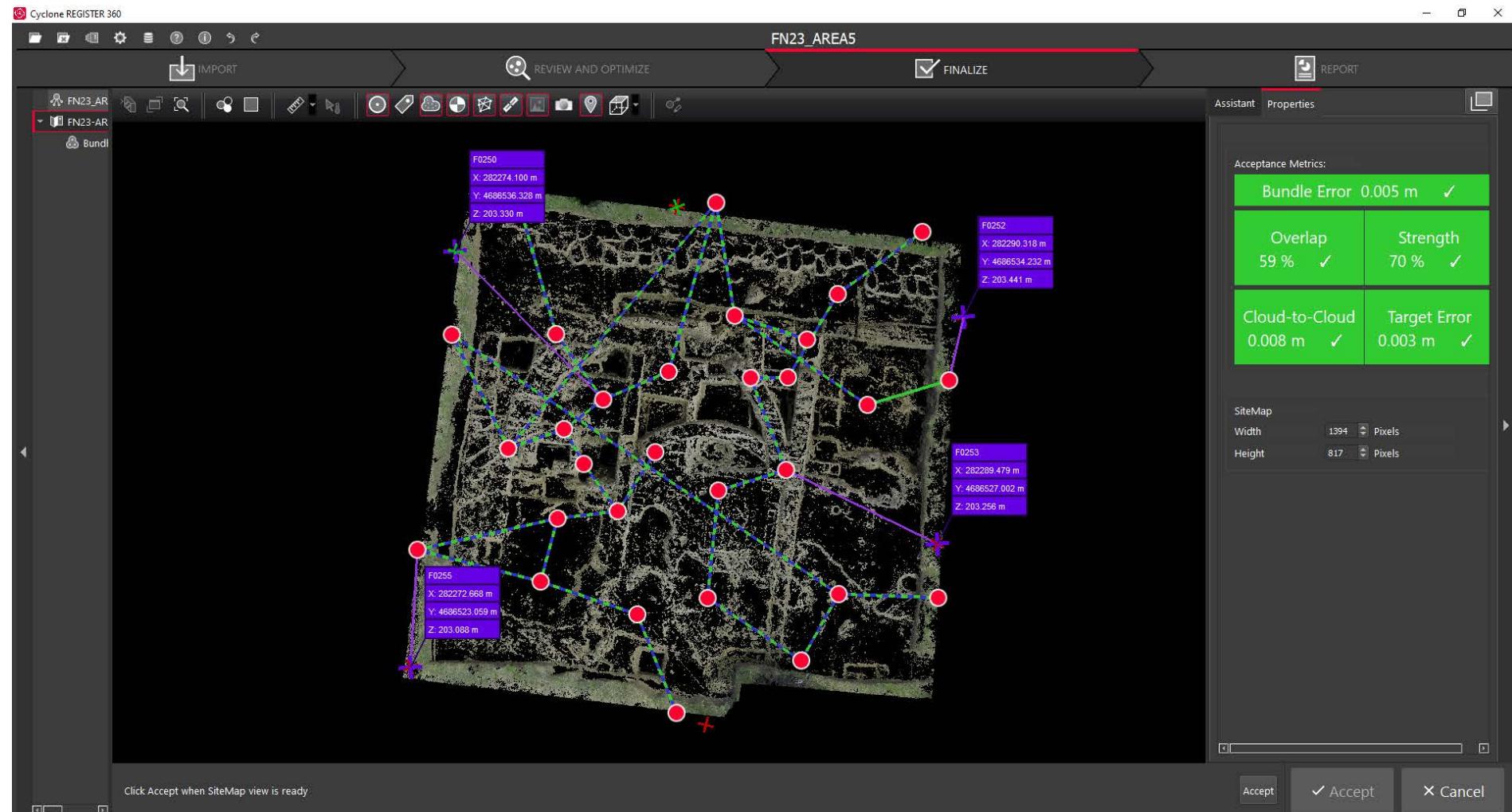


 The picture can't be displayed.

DJI Air 2s



**Leica RTC360 3D Laser Scanner**  
**Field acquisition: Cyclone Field Register 360**





# Sant' Agostino, San Gimignano (Tuscany): Field Workflow

GPS



Total Station



Laser scan



Photogrammetry



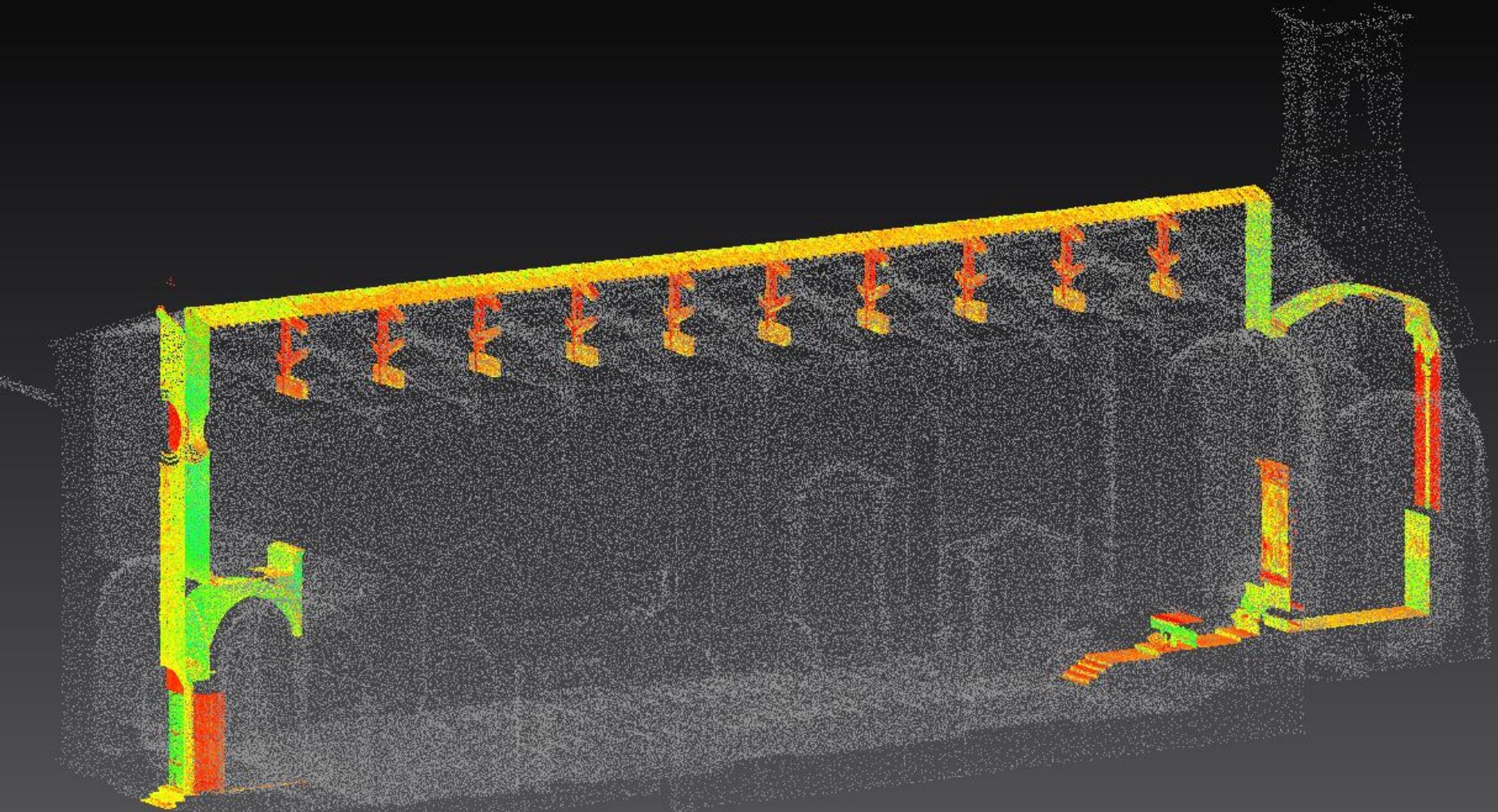
GPR survey



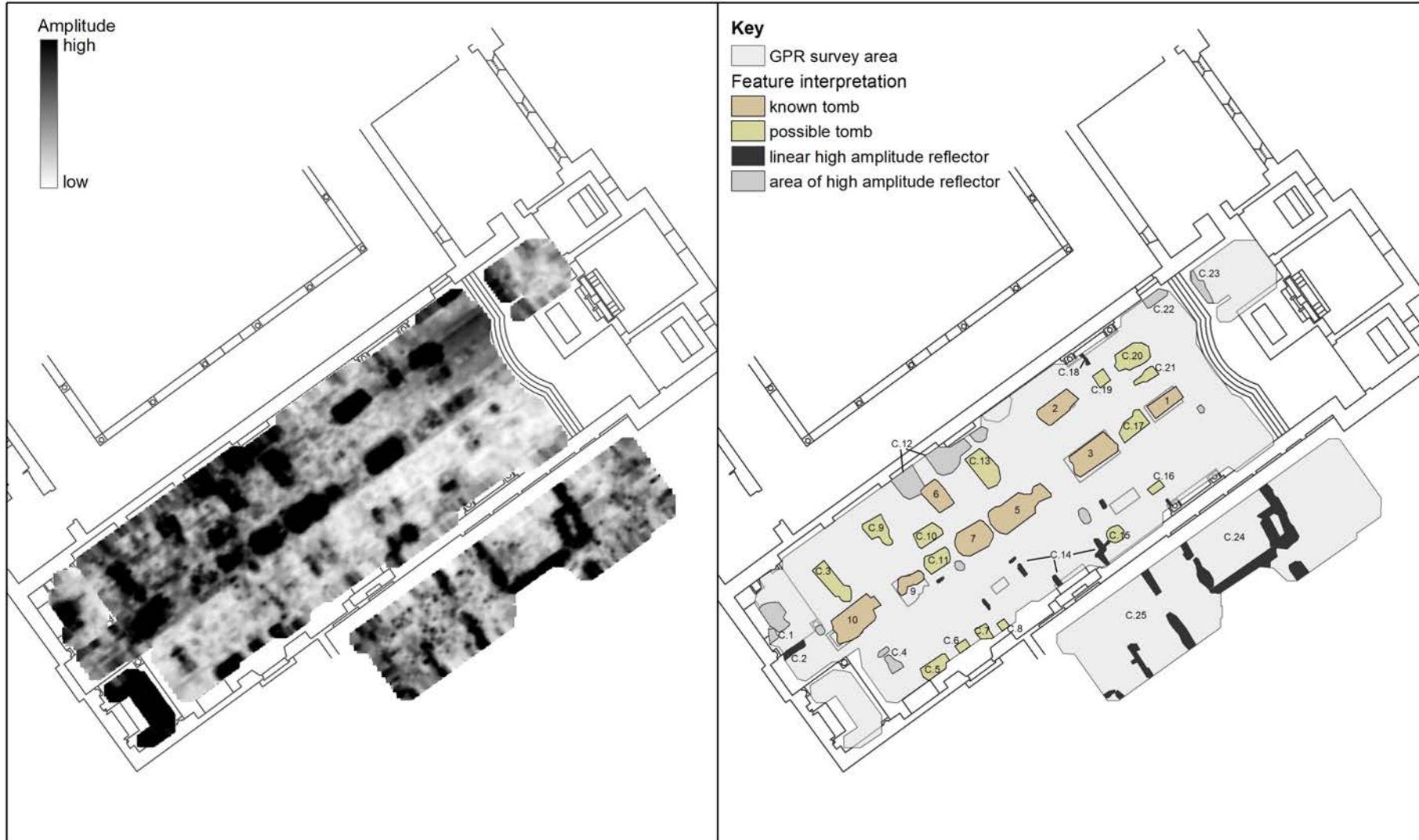


# Sant' Agostino, San Gimignano (Tuscany): Point cloud





# Sant' Agostino, San Gimignano (Tuscany): GPR survey



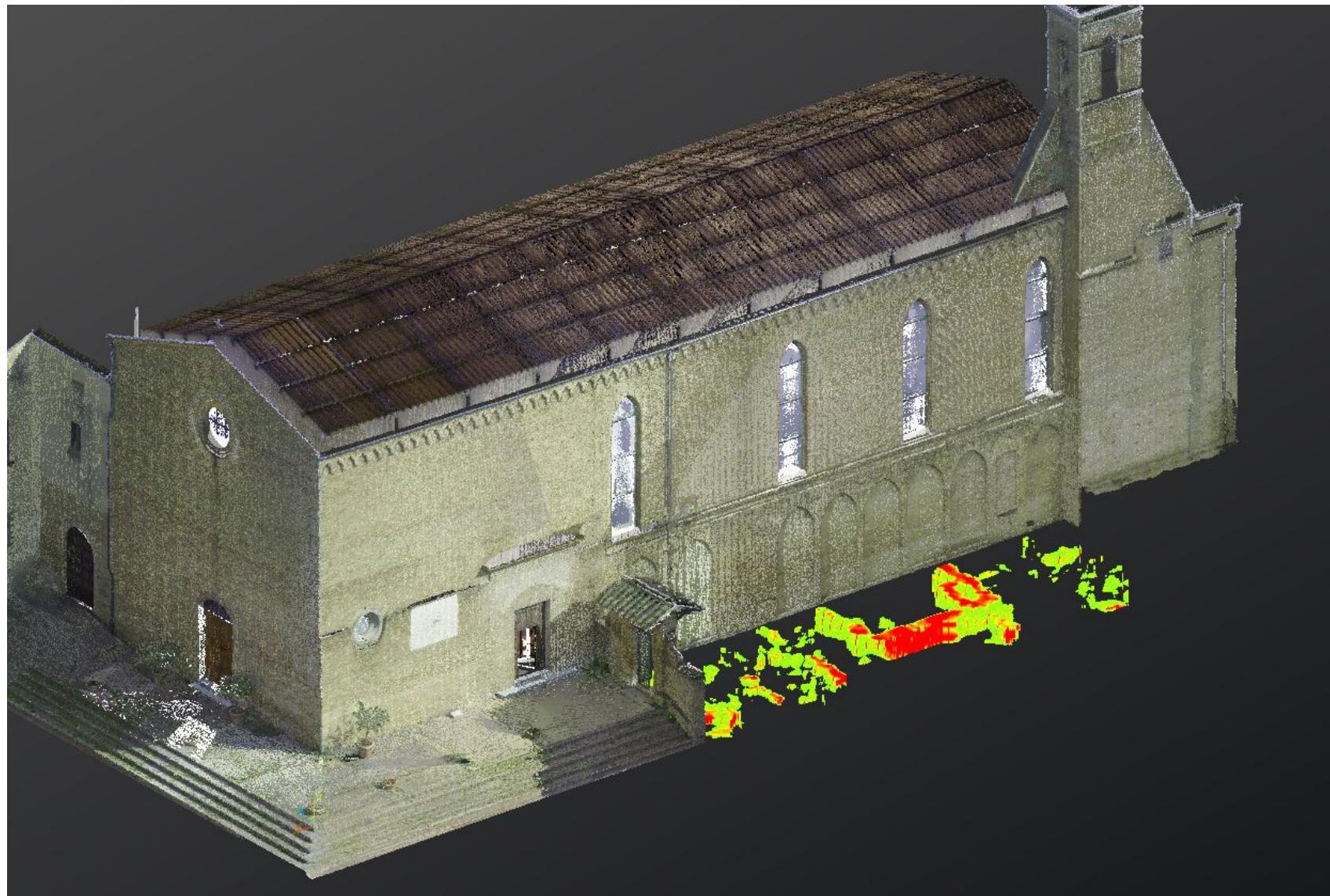
San Gimignano (Siena), 2021

GPR survey results and interpretation

Estimated depth: 0.5-0.7 m below ground level

# Sant' Agostino, San Gimignano (Tuscany): Point cloud GPR + Laser Scan







Stephen Kay

Email: [s.kay@bsrome.it](mailto:s.kay@bsrome.it)



[www.bsr.ac.uk](http://www.bsr.ac.uk)



[britishschoolatrome](https://www.instagram.com/britishschoolatrome)



[@the\\_bsr](https://twitter.com/the_bsr)



British School at Rome

# 3D Imaging

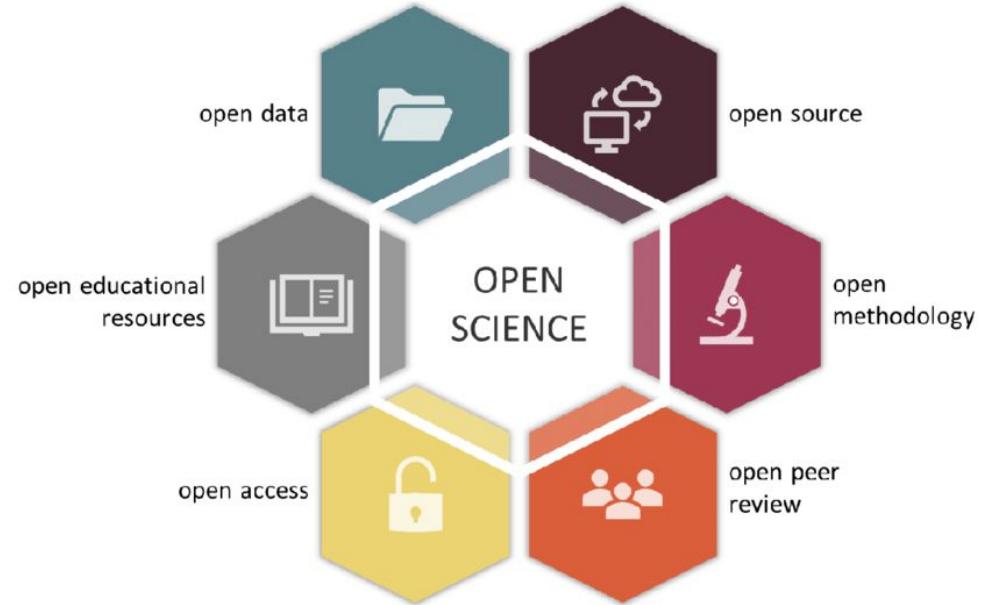
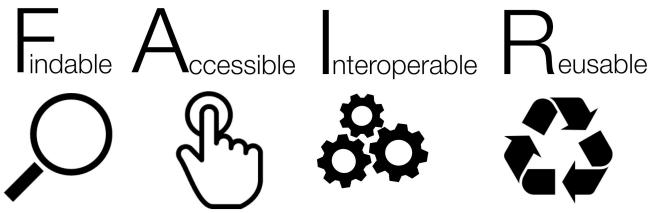
## From remote sensing to photogrammetry

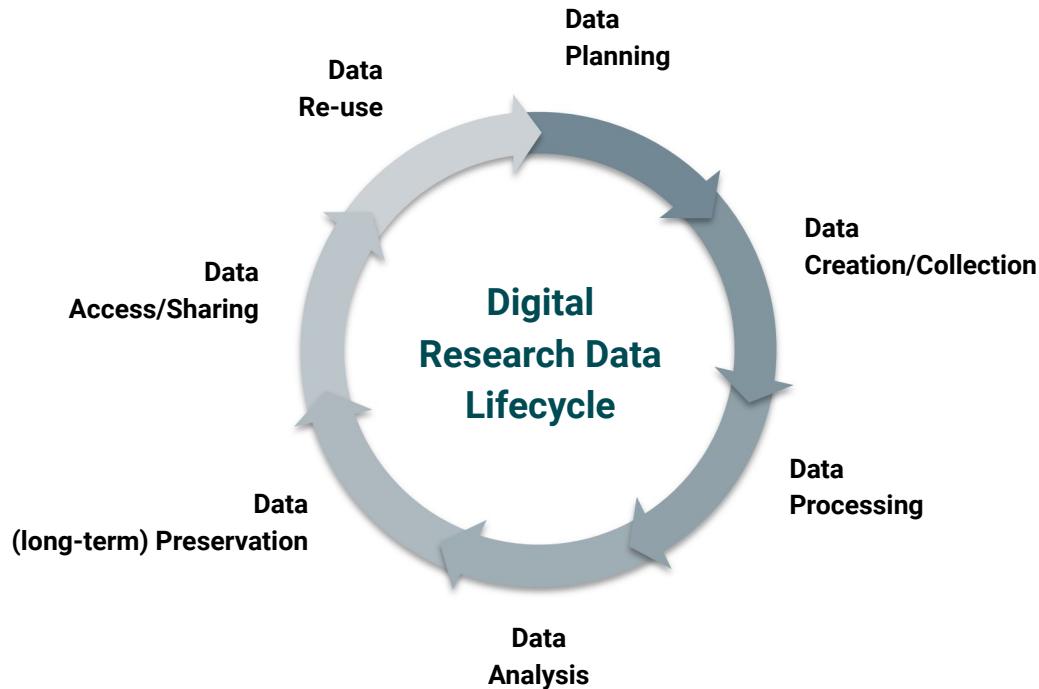
Vera Moitinho de Almeida, PhD  
[vmoitinho@letras.up.pt](mailto:vmoitinho@letras.up.pt)

# data

lifecycle

artefact instrument  
video public museum archive  
database re-use persistent dmp  
science plan long-term processing immaterial  
planning analysis research ch heritage  
photo identifier academy  
documentation access method license  
university digital material open architecture  
cultural creation db institution  
map preservation management legacy  
audio repository collection metadata sharing gis  
db structure lab technique





*case study*

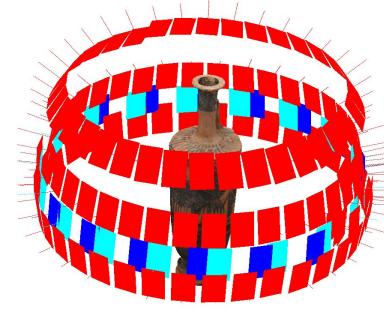
# Greek and Cypriot pottery, 10<sup>th</sup>-4<sup>th</sup> c. BCE, EU collections

- . Shape classification and patterns
- . Capacity standards
- . Production and manufacture
- . Use-wear analysis
- . Chronological and geographical variability
- . Network analysis
- . Conservation monitoring

# 2D/3D Digital Data Capture



Structured Light Scanner (SLS)



Photogrammetry (SfM) + UV



Helical CT Scanner



Colour calibration

# 2D/3D Digital Data Post-processing & Documentation



3D raw data  
(SLS, LS, CT scan, SfM)



High resolution,  
noise data  
removed



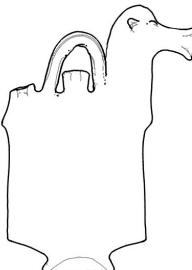
Mesh fixed,  
inner  
surface  
reconstruct  
ed



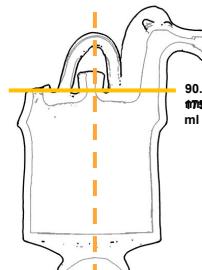
Low  
resolution



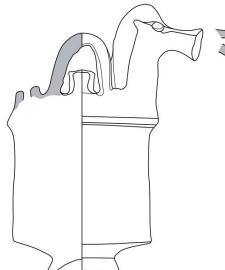
Photogra  
ph



Automatic vector graphic from 3D  
Known interior

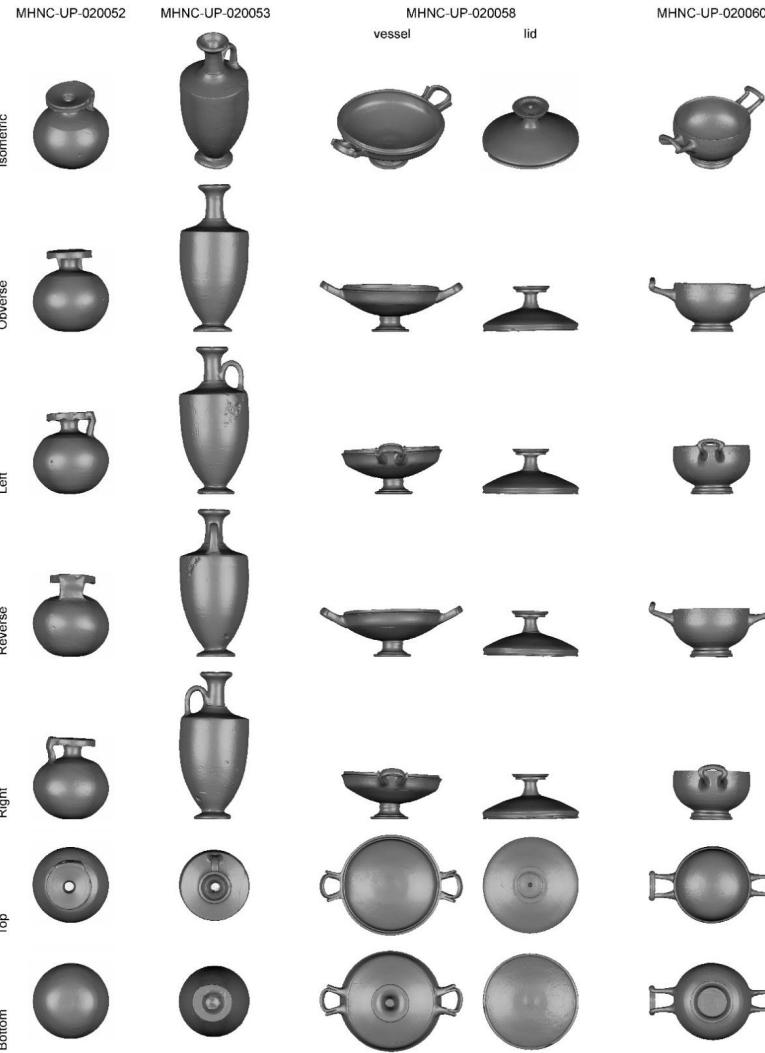


Reconstructed interior;  
Capacity automatically  
calculated



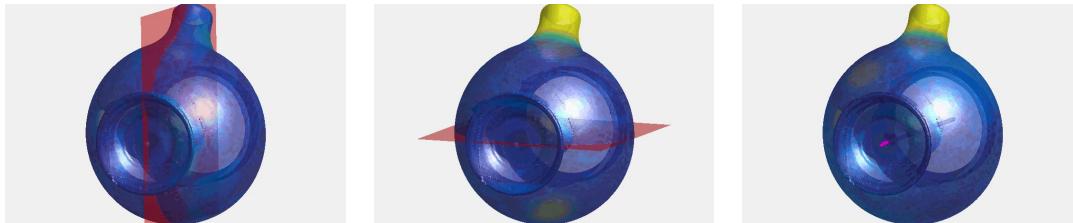
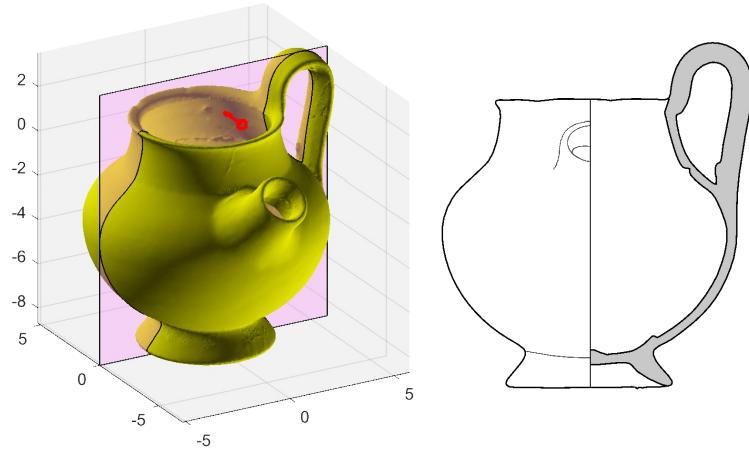
Manual illustration  
(after 3D and photo)

# 2D/3D Digital Data Analysis



Moitinho de Almeida, V. (2023). "Contributions of 3D digital methods and techniques to the study of ancient pottery". In *Myths, Gods, and Heroes. Greek vase collections in Portugal / Mitos, Deuses e Heróis. As coleções de vasos gregos em Portugal* (vol.2). R. Morais, R. Centeno, D. Ferreira (eds.). Câmara Municipal de Santa Maria da Feira - Museu Convento dos Lóios; Reitoria da Universidade do Porto; Faculdade de Letras da Universidade do Porto; Imprensa da Universidade de Coimbra. Pp.269-291.

Automatic illustrations & symmetries

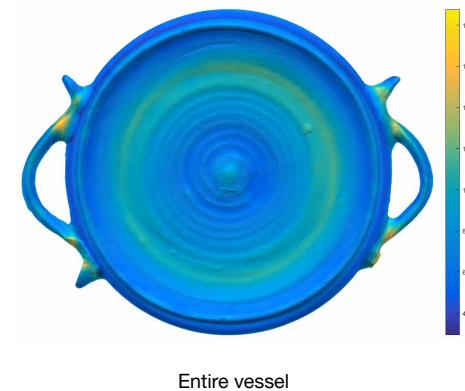


Reflective  
through spout

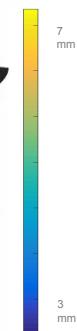
Reflective  
through handle

Rotational

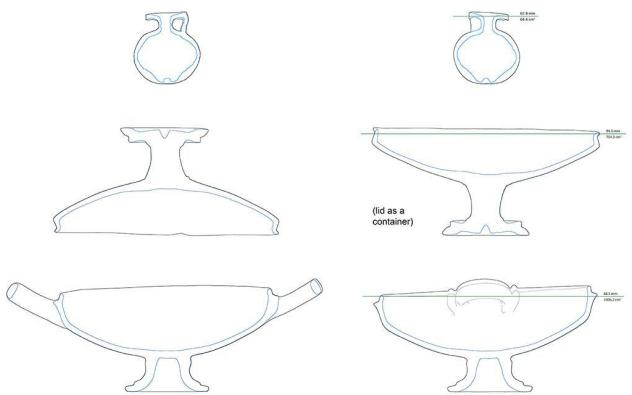
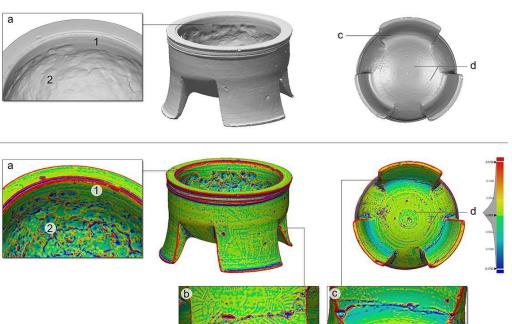
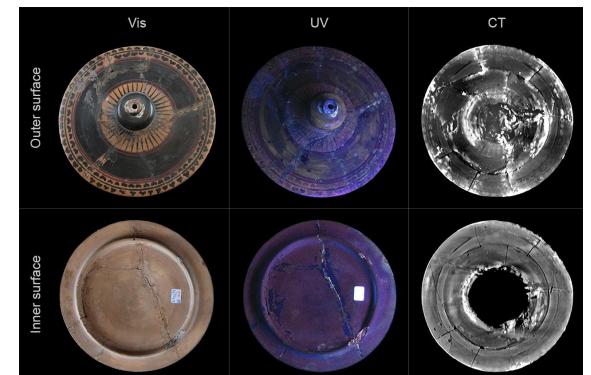
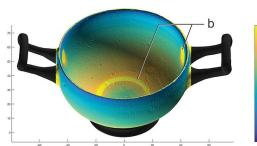
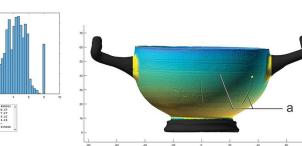
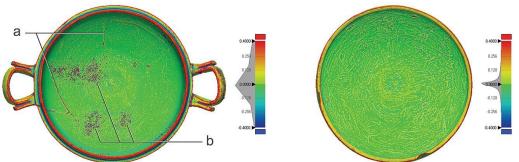
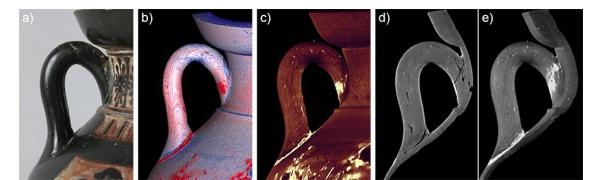
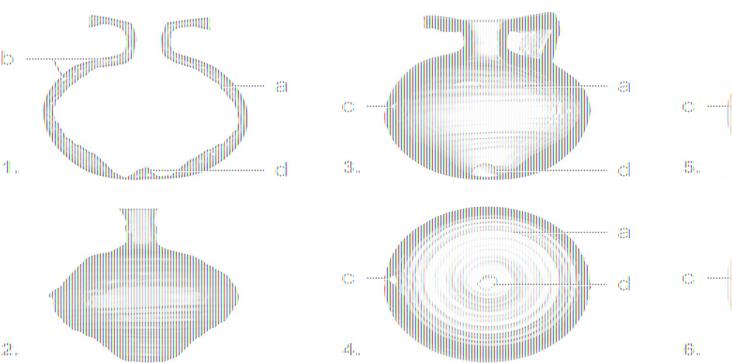
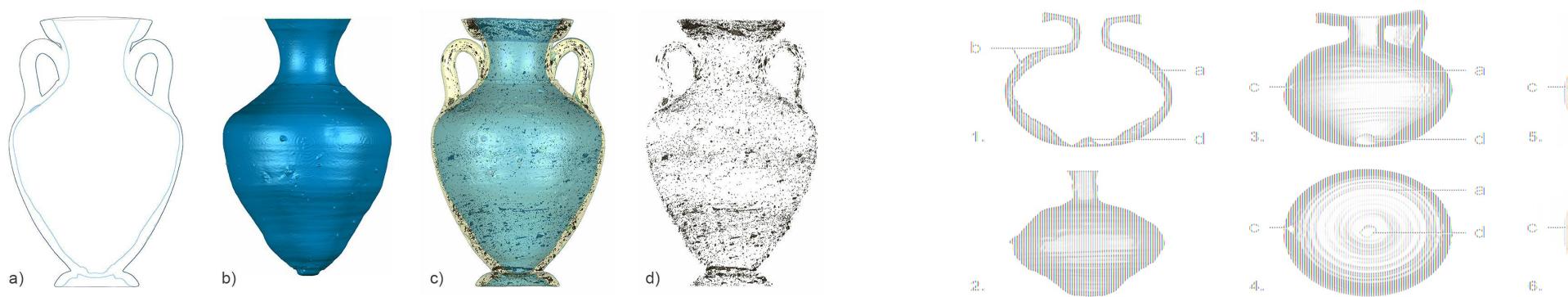
Computed Thickness colourmap



Entire vessel



Selected region



Collection	Inventory ID	Shape/Style	Period	Provenance	References
Archaeological Museum D. Diogo de Sousa, Braga	MDDS-2017- 0299	Attic red-figure trefoil <i>omnochie</i> , Class N, The Cook Class	c. 500-475 BCE	unknown	Moitinho de Almeida, V. (2021a). Morais, R. (ARF 15, in this catalogue). Fundação Buehler Brockhaus / Museu D. Diogo de Sousa (eds.) (2020). Pp.70-71.
Natural History and Science Museum of the University of Porto	MHNC-UP- 020052	Corinthian globular <i>aryballos</i>	c. 575-550 BCE	unknown	Moitinho de Almeida, V. (2021b). Morais, R. (C0 18, in this catalogue). Morais, R. (2019). Pp.120-129, 285. Rocha Pereira, M. H., Morais, R. (2007). Pp.10, 20.
Natural History and Science Museum of the University of Porto	MHNC-UP- 020053	Attic black-figure shoulder <i>lekythos</i> , Group of Vatican G 52	c. 550-500 BCE	unknown	Moitinho de Almeida, V. (2021). Morais, R. (ABF 26, in this catalogue). Morais, R. (2019). Pp.120-129, 286-287. Rocha Pereira, M. H., Morais, R. (2007). Pp.10-11, 21.
Natural History and Science Museum of the University of Porto	MHNC-UP- 020058	Apulian red-figure <i>lekane</i> , Circle of the Painter and the Baltimore Painter	c. 350-300 BCE	unknown	Moitinho de Almeida, V. (2021). Morais, R. (ApRE 43, in this catalogue). Morais, R. (2019). Pp.120-129, 289-290. Rocha Pereira, M. H., Morais, R. (2007). Pp.13-14, 26.
Natural History and Science Museum of the University of Porto	MHNC-UP- 020060	Gnathian cup- <i>skyphos</i> , Laurel Spray Group	c. 330 BCE	unknown	Moitinho de Almeida, V. (2021e). Morais, R. (GN 12, in this catalogue). Morais, R. (2019). Pp.120-129, 288-291. Rocha Pereira, M. H., Morais, R. (2007). Pp.14-15, 28.
Private collection, Porto	Athens-1814	Attic white ground <i>lekythos</i> , Sappho Painter	c. 490 BCE	Necropolis of Piraeus, Athens (Edward Dodwell, before 1805)	Moitinho de Almeida, V. (2021f). Morais, R. (AWG 04, in this catalogue).
Private collection, Porto	BAPD 9041833	Athenian black-figure tripod <i>pyxis</i> , Amasis Painter	c. 575-525 BCE	unknown	Moitinho de Almeida, V. (2021g). Morais, R. (ABF 39, in this catalogue). <a href="http://www.beazley.ox.ac.uk/record/092532D8-8D5D-48DE-8701-4D85EBC203A7">http://www.beazley.ox.ac.uk/record/092532D8-8D5D-48DE-8701-4D85EBC203A7</a>

Inventory ID	Weight (g)	Width (mm)	Height (mm)	Length (mm)	Mesh volume (mm <sup>3</sup> )	Material density (g/cm <sup>3</sup> )	Max. filling height (mm)	Max. filling volume (cm <sup>3</sup> )	Centre of mass [x,z] (mm)
MHNC-UP-020052	82.25	61.65	67.1	61.4	45,279.26 <sup>(4)</sup>	1.82 <sup>(4)</sup>	62.75	64.4 <sup>(4)</sup>	-1.46 <sup>(4)</sup> 29.17 0.25
MHNC-UP-020053	130	66.85	141.29	66.32	— <sup>(3)</sup>	— <sup>(3)</sup>	140.5	— <sup>(3)</sup>	— <sup>(3)</sup>
MHNC-UP-020058 (vessel)	587.4	293.45	104.8	207.35	330,490.93	1.78	88.55	1,006.15	1.9 55.91 2.71
MHNC-UP-020058 (lid)	502.65	209.78	100.1	211.43	292,038.37	1.72	94.3	754.29	0.98 57.31 -0.31
MHNC-UP-020060	148.7	156.22	68.54	95.83	82,812.06	1.8	58.4	211.9	-1.06 30.89 0.34

# Digital Data Preservation, Access & Reuse

3D Model



```
<div>
  <div id="3dhop" class="tdhop" onmousedown="if (event.preventDefault) event.preventDefault()">
    <div id="toolbar">
      <br/>
      <br/>
      <br/>
      
      <br/>
      
      
    </div>
    <!-- be sure to delete width and height setting from 3dhop.css #draw-canvas -->
    <canvas id="draw-canvas" style="min-height: 350px;"/>
  </div>
</div>
```

[https://arche.acdh.oeaw.ac.at/services/thumbnails/ODeeg/Collections/AT-Vienna-KHM/KHM-ANSA-IV1000/3D-data/3Dscan\\_lowRes-data/KHM-ANSA-IV1000\\_3D02.ply](https://arche.acdh.oeaw.ac.at/services/thumbnails/ODeeg/Collections/AT-Vienna-KHM/KHM-ANSA-IV1000/3D-data/3Dscan_lowRes-data/KHM-ANSA-IV1000_3D02.ply)

## Overview

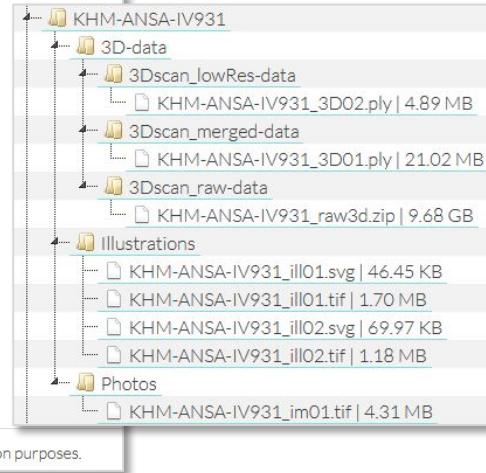
### KHM-ANSA-IV1000\_3D02.ply

Type:	Resource
Contact(s):	Claudia Lang-Auinger
Available Date:	2019-11-25
Binary Size:	4.89 MB
Category:	<a href="https://vocab.acdh.oeaw.ac.at/archecategory/3dData">https://vocab.acdh.oeaw.ac.at/archecategory/3dData</a>
Licensor:	Kunsthistorisches Museum Wien
License:	<a href="https://creativecommons.org/licenses/by-nc-sa/4.0/">https://creativecommons.org/licenses/by-nc-sa/4.0/</a>
Access Restriction:	public
PID:	<a href="http://hdl.handle.net/21.11115/0000-000C-2318-2">http://hdl.handle.net/21.11115/0000-000C-2318-2</a>
Part of:	3Dscan_lowRes-data
Curator(s):	Martina Trognitz

[3D viewer](#) [Download](#) [GUI access](#) [RDF access](#) [Thumbnail service](#) [Turtle File](#)

## Summary

Description: 3D low resolution model available, mainly for fast visualization and dissemination purposes.



Property	Value(s)
acdh:hasAccessRestriction	<a href="https://vocab.acdh.oeaw.ac.at/archeaccessrestrictions/public">https://vocab.acdh.oeaw.ac.at/archeaccessrestrictions/public</a>
acdh:hasAppliedMethod	3D scanning
acdh:hasAvailableDate	2019-11-25
acdh:hasBinarySize	4.89 MB
acdh:hasCategory	<a href="https://vocab.acdh.oeaw.ac.at/archecategory/3dData">https://vocab.acdh.oeaw.ac.at/archecategory/3dData</a>
acdh:hasCompleteness	The resource is finished and the file is final.
acdh:hasContact	Claudia Lang-Auinger
acdh:hasCurator	Martina Trognitz
acdh:hasDepositor	Vera Moitinho de Almeida, Claudia Lang-Auinger
acdh:hasDescription	3D low resolution model available, mainly for fast visualization and dissemination purposes.
acdh:hasFormat	application/octet-stream
acdh:hasHosting	ARCHE
acdh:hasIdentifier	<a href="https://id.acdh.oeaw.ac.at/ODeeg/Collections/AT-Vienna-KHM/KHM-ANSA-IV1000/3D-data/3Dscan_lowRes-data/KHM-ANSA-IV1000_3D02.ply">https://id.acdh.oeaw.ac.at/ODeeg/Collections/AT-Vienna-KHM/KHM-ANSA-IV1000/3D-data/3Dscan_lowRes-data/KHM-ANSA-IV1000_3D02.ply</a>

**Kunsthistorisches Museum ca. 194 m**  
Bécsi Szépművészeti Múzeum Kunsthistorisches ...  
Austria » Vienna » Vienna » Inner city  
museum  
N 48° 12' 13" E 16° 21' 40"  
48.20371 / 16.35126  
GeoNamesID: 6554990

**Alternate Names or Name Variants**

Name	Language Code	p	s	h	c	Action
빈 미술사 박물관	ko	Korean				<a href="#">edit/delete</a>
ක්‍රිංතීය ප්‍රතිචාලන මූළම	th	Thai				<a href="#">edit/delete</a>
Bécsi Szépművészeti Múzeum	hu	Hungarian				<a href="#">edit/delete</a>
<a href="http://en.wikipedia.org/wiki/Kunsthistorisches_Museum">http://en.wikipedia.org/wiki/Kunsthistorisches_Museum</a>	link	link to website				<a href="#">edit/delete</a>
<a href="http://ru.wikipedia.org/wiki/%D0%9C%D1%83%D0%B7%D0%95%D0%9B%D0%89%D0%88%D1%81%D1%82%D0%BE%D1%80%D0%BB%D0%9B%D0%88%D0%81%D1%81%D0%BA%D1%83%D1%81%D1%81%D1%82%D0%9B_2%D0%8D%D0%95%D0%9D%D0%80%29">http://ru.wikipedia.org/wiki/%D0%9C%D1%83%D0%B7%D0%95%D0%9B%D0%89%D0%88%D1%81%D1%82%D0%BE%D1%80%D0%BB%D0%9B%D0%88%D0%81%D1%81%D0%BA%D1%83%D1%81%D1%81%D1%82%D0%9B_2%D0%8D%D0%95%D0%9D%D0%80%29</a>	link	link to website			<a href="#">edit/delete</a>	
Kunsthistorisches Museum Wien	nl	Dutch				<a href="#">edit/delete</a>
Kunsthistorik Museum Wien	da	Danish				<a href="#">edit/delete</a>
Meno istorijos muziejus	lt	Lithuanian				<a href="#">edit/delete</a>
Musée d'histoire de l'art de Vienne	fr	French				<a href="#">edit/delete</a>
Museo de Historia del Arte de Viena	es	Spanish				<a href="#">edit/delete</a>
Museu de História da Arte em Viena	pt	Portuguese				<a href="#">edit/delete</a>

**Research**

Research Home > Tools > Art & Architecture Thesaurus > Full Record Display

**Art & Architecture Thesaurus® Online**

Full Record Display

(New Search) < Previous Page Help

Click the icon to view the hierarchy.

Semantic View (JSON, RDF, N3/Turtle, N-Triples)

Representative Images 1

ID: 3001988666

Page Link: <http://vocab.getty.edu/page/ab/3001988666>

**inochoai** (vessels (containers), <containers by form>, ... Furnishings and Equipment (hierarchy name))

Note: Ancient Greek one-handed vessels used for ladling and pouring wine or water; made in a variety of jug- and pitcherlike forms.

Terms:

- inochoai ([preferred](#) C.U English-P.D.U.PN) ([Dutch-P.D.UU](#))
- inochoai (C.U English-U.S.N) ([Dutch AD-U.U](#)) ([German-U.U.SN](#))
- inochoai (C.U English-U.F.U.N)
- inochoes (C.U.L.C English-U.F.U.N)
- oinochee (C.U Spanish-AD-U.SN)
- enochoa (C.U Spanish-AD-U.SN)

Facet/Hierarchy Code: V.I.O

Hierarchical Position:

- Objects Facet
- ... Furnishings and Equipment (hierarchy name) (G)
- .... Containers (hierarchy name) (G)
- ..... containers (recipients) (G)
- ..... <containers by form> (G)
- ..... vessels (containers) (G)
- ..... inochoai (G)

Additional Notes:

Dit zijn klassieke Griekse vaten met één handvat, die werden gebruikt voor het scheppen en schenken van wijn of water. Gebruikt in een grote variëteit van vormen, vaak niet uiterlijk van kruiken en kratten.

Spanish .... Vasijas en una sola asa de la Antigua Grecia usadas para servir y verter el vino o el agua; hechas en una variedad de formas similares a jarras o cántaros.

Related concepts:

meaning/usage overlaps with .... [jugs \(vessels\)](#) (vessels (containers), <containers by form>, ... Furnishings and Equipment

# Bracara Augusta

a Pleiades place resource

Creators: E. Haley  
Contributors: DARMC, R. Talbert, Brady Kiesling, Sean Gillies, Johan Åhlfeldt, Jeffrey Becker, Tom Elliott  
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Last modified: Jun 07, 2018 05:11 PM — [History](#)

tags: dare:ancient=1, dare:major=1, dare:feature=major settlement

With settlement from the Neolithic onwards, Bracara Augusta was established as a civitas in 20 B.C. In the third century A.D. Diocletian advanced the settlement to the capital of the administrative area known as Conventus Bracarensis, forming part of the Roman province of Gallaecia.

Canonical URI for this page:

<https://pleiades.stoa.org/places/236377>



Representative Point (Latitude, Longitude):

41.550875, -8.424973



Locations:

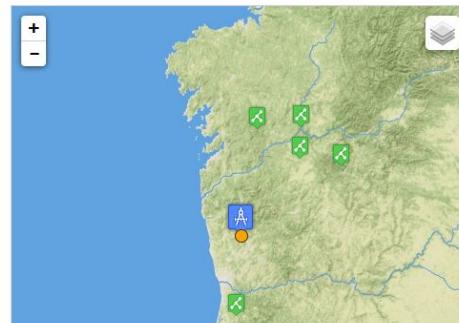
- DARMC location 20067 (30 BC - AD 640)
- DARE Location (30 BC - AD 640)

Names:

- Bracara Augusta** (30 BC - AD 640)
- Bracari** (30 BC - AD 640)

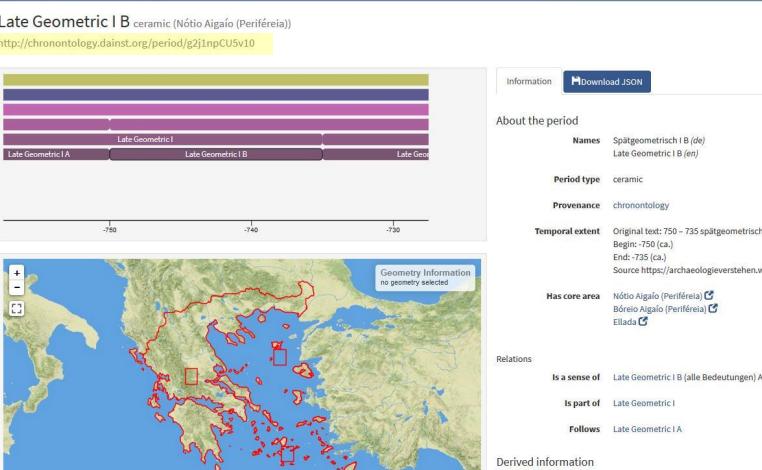
Bracara Augusta makes connections with:

- Bracara Augusta → connection → [Callicea](#) (unspecified date range)



Late Geometric I B ceramic (Nótió Alagio (Perífeira))

<http://chronontology.dainst.org/period/g2j1npCu5v10>





East Greek bird cup

3D Model

Digitized by the Institute for Digital Humanities PRO

16 53 10

[Download 3D Model](#) + Add To </> Embed Share Report

Triangles: 12.7k Vertices: 6.3k [More model information](#)

Bird Cup in the Academic Art Museum Bonn (Inv. Nr. 3198)

- Object: Cup with geometric motifs and a bird on each side.
- Find spot: unknown
- Place of production: East Greece
- Dating: 675 - 610 BC
- Hardware: Nikon D7500, Nikon 40 mm macro
- Software: RealityCapture, Substance Designer, Blender

License: CC Attribution Learn more

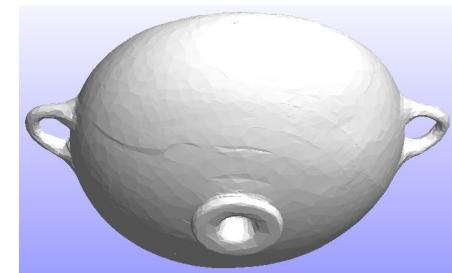
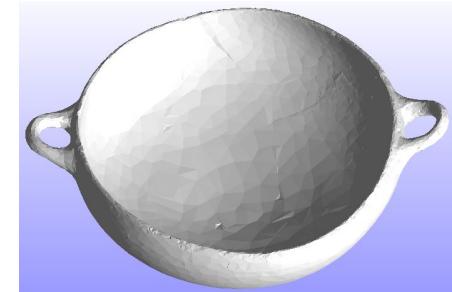
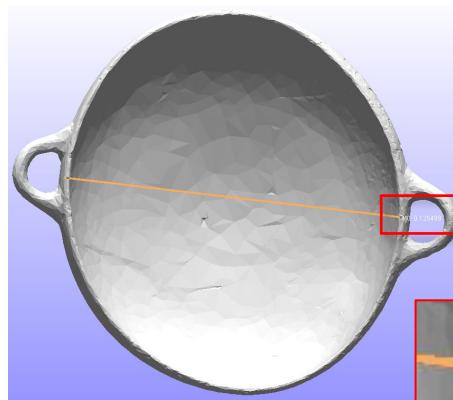
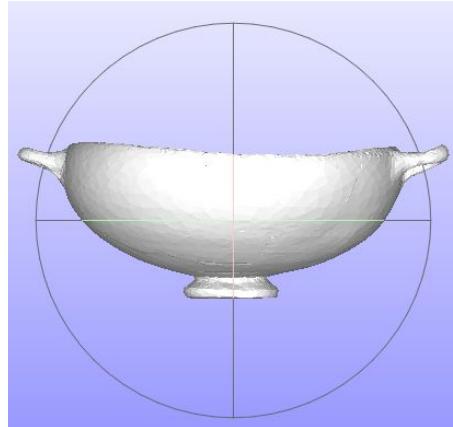
Published 3 months ago

Cultural Heritage & History 3D Models

pottery realitycapture archaeology

All files

3D files	Format	Extension	Size	From
Vogelschale_3198	Blender	blend	2MB	Source archive
Processed Textures	Resolution	Extension	Size	From
vogelschale_3198_lip_Am...	8192x8192	jpg	1MB	Source archive
vogelschale_3198_lip_Nor...	8192x8192	jpg	1MB	Source archive
vogelschale_3198_lip_Tran...	8192x8192	jpg	3MB	Source archive



Mesh Bounding Box Size:  
0.165195 0.059822 0.143103 mm



# ThanksObrigada!

Vera Moitinho de Almeida, PhD  
[vmoitinho@letras.up.pt](mailto:vmoitinho@letras.up.pt)