

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

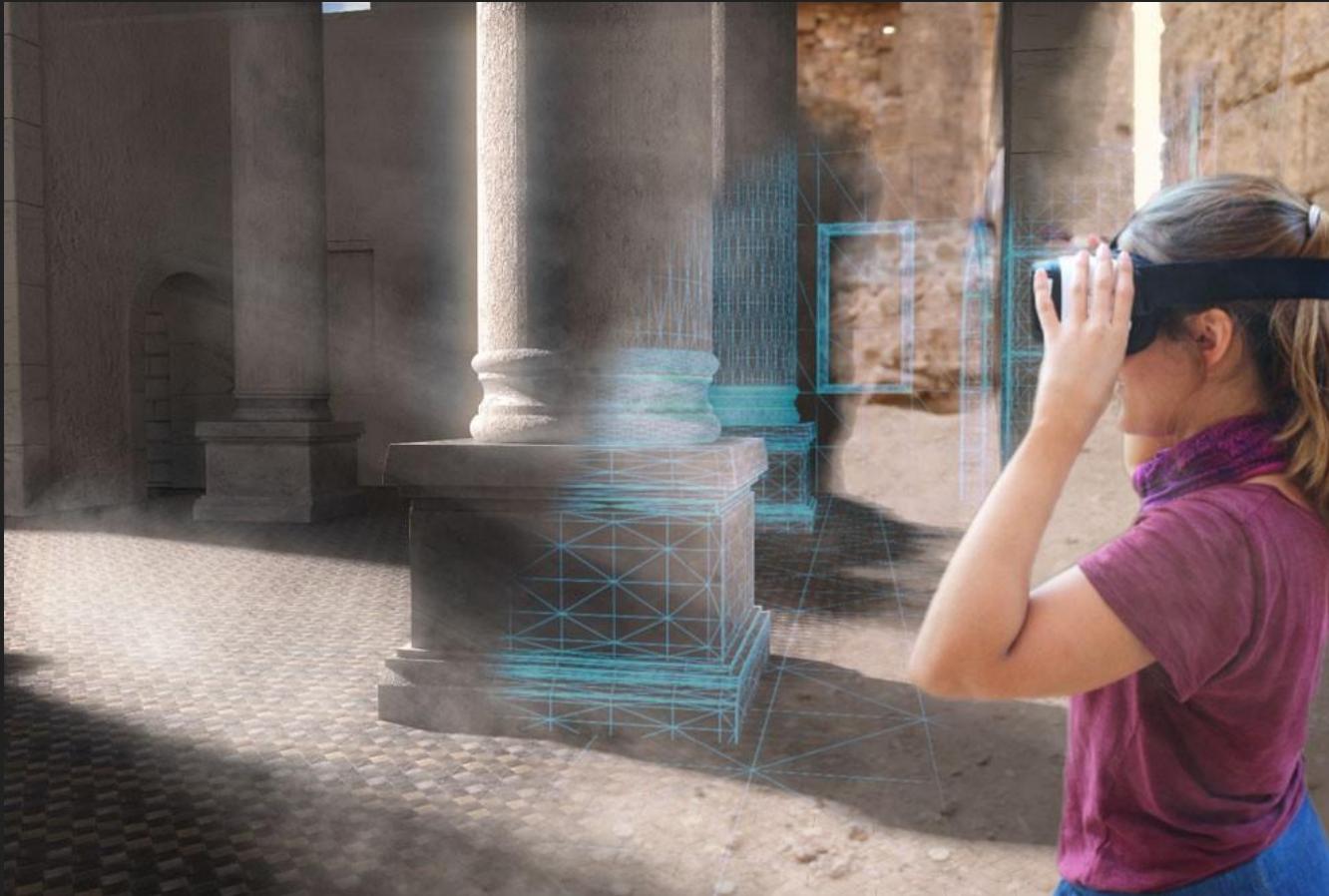
1. 3D imaging or scanning



2. 3D modelling or visualization



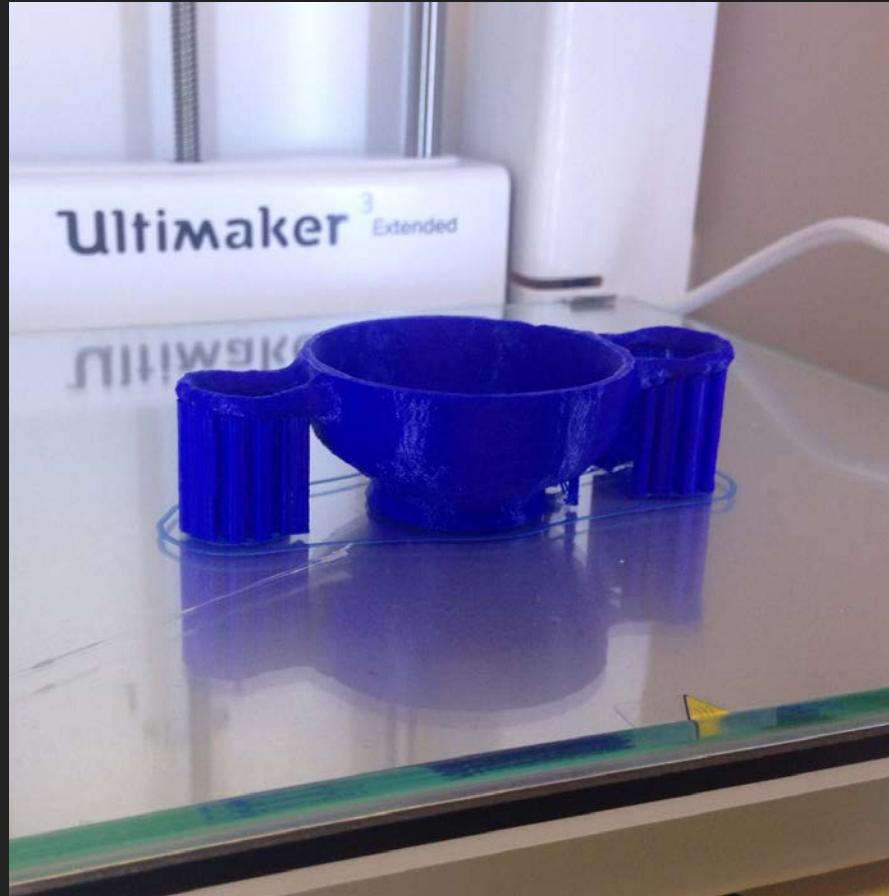
3. Virtual Reality (VR)

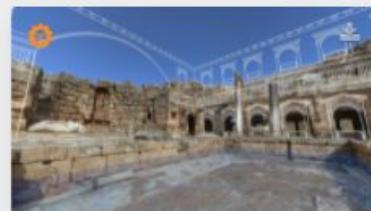


4. Augmented Reality (AR)

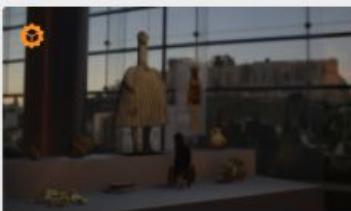


5. 3D printing

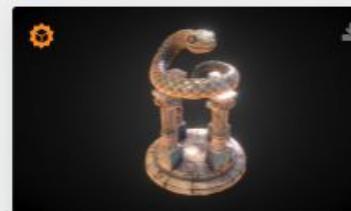




Peirene ... 13.5k 21 367



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



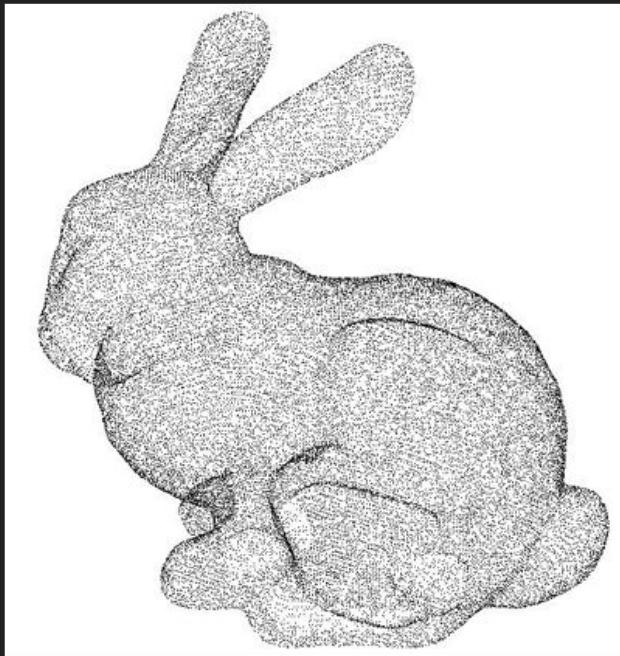
Greek Pott... 1.2k 0 19

3D imaging

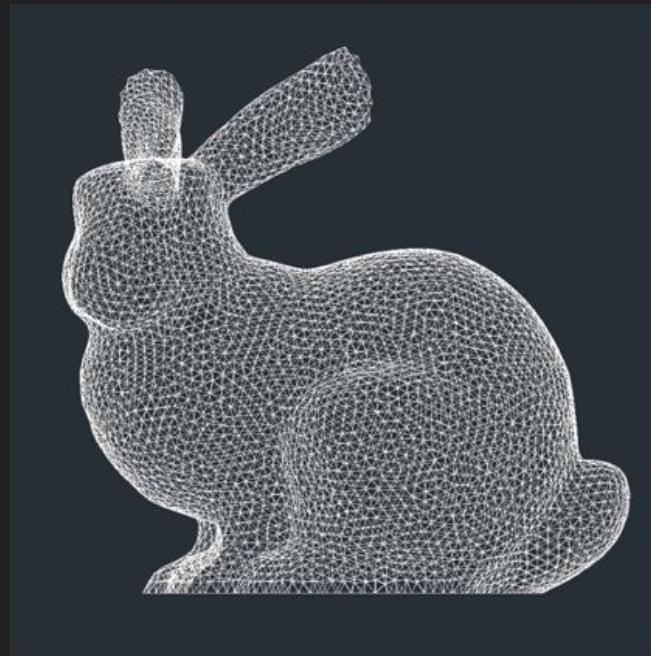
3D technologies and formats

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

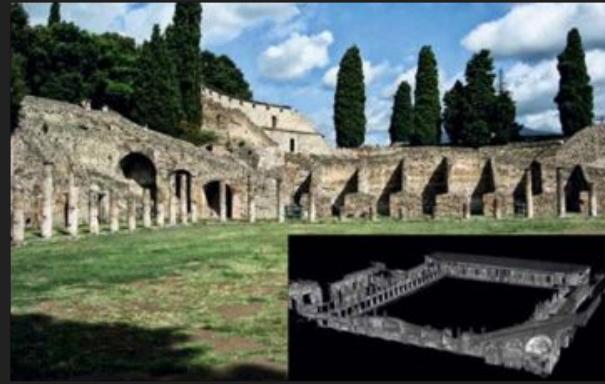
Laser Scanning Time of Flight

PROS

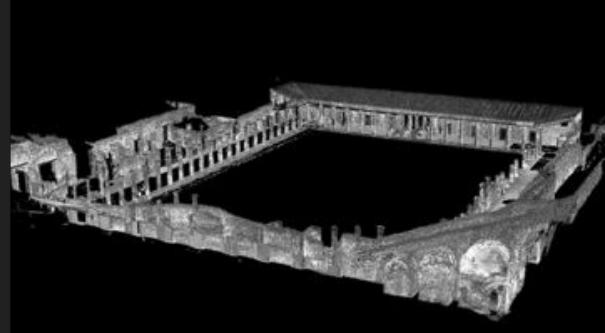
- * Good geometric fidelity
- * Suitable for large areas

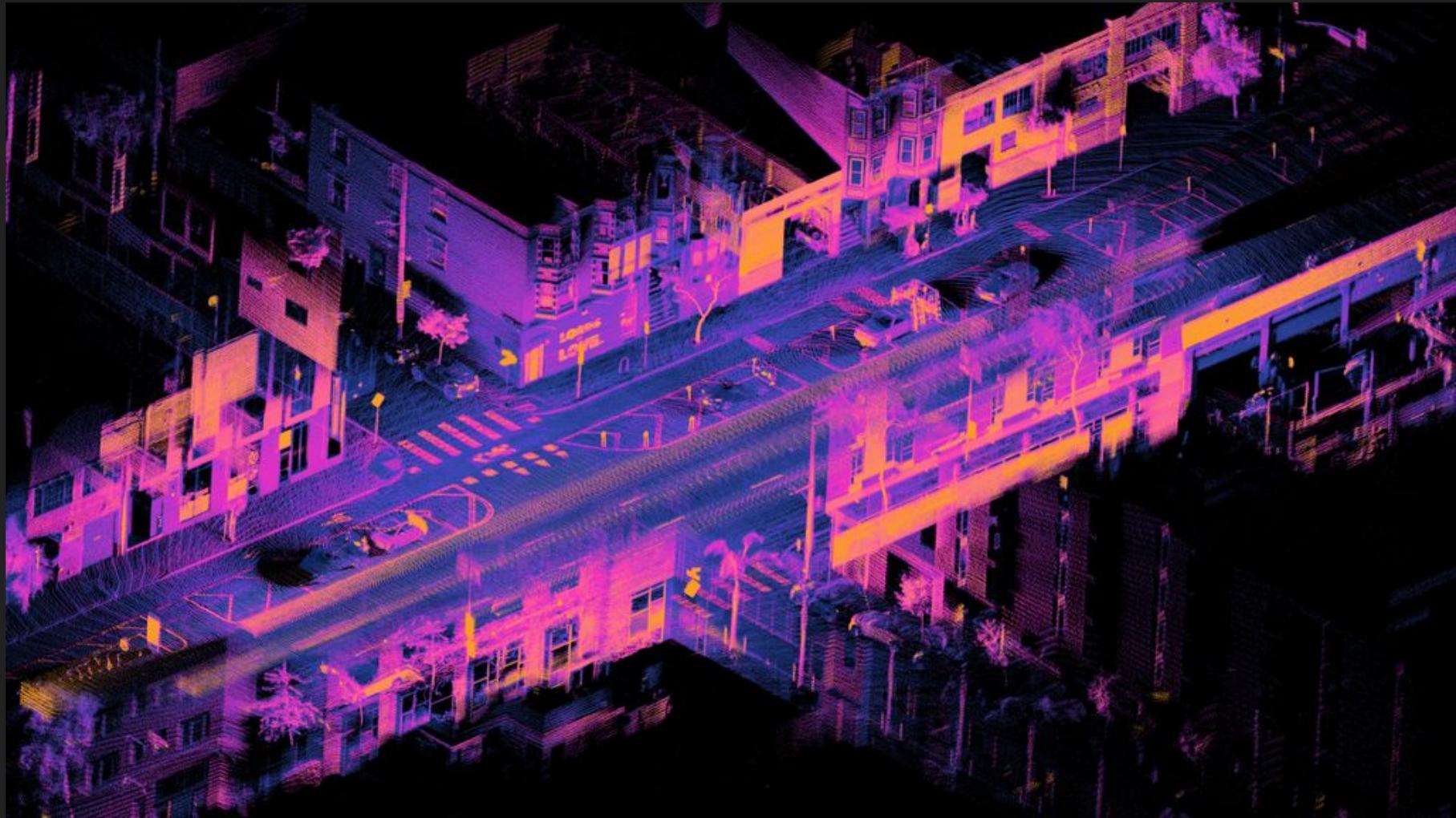
CONS

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



The Pompeii Quadriporticus Project





Laser Scanning Triangulation

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

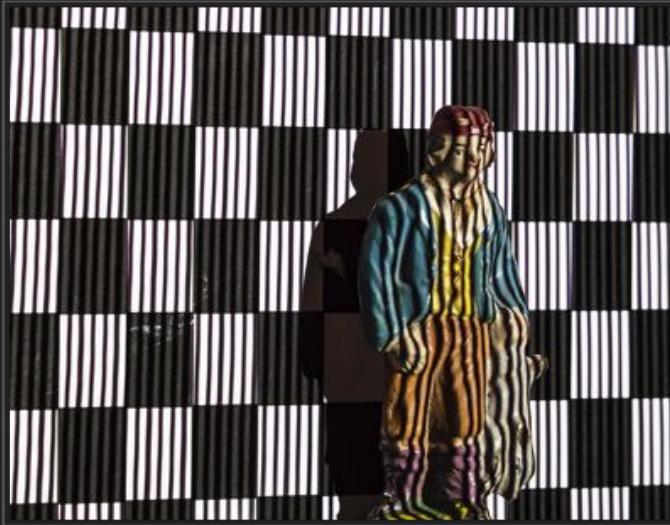


<http://surveyequipment.com/faro-scanner-freestyle-3d/>



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

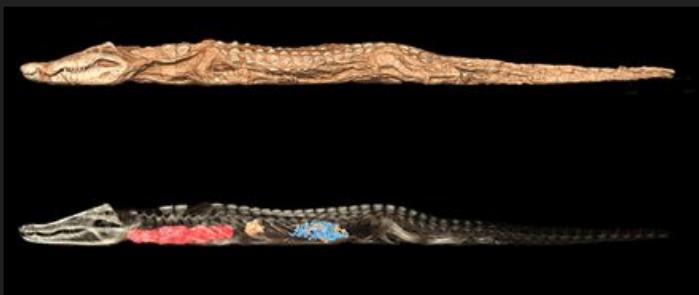
Structured Light



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

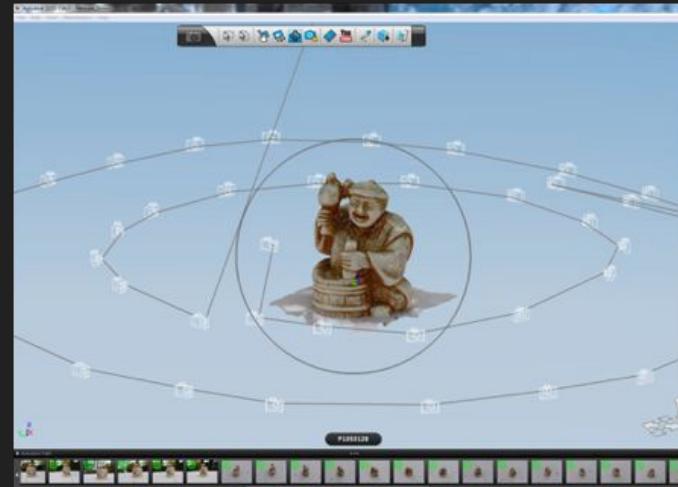
- * Based on triangulation
- * Cheap
- * Easy to learn
- * Portable equipment
- * 3D mesh as an output

Agisoft Photoscan

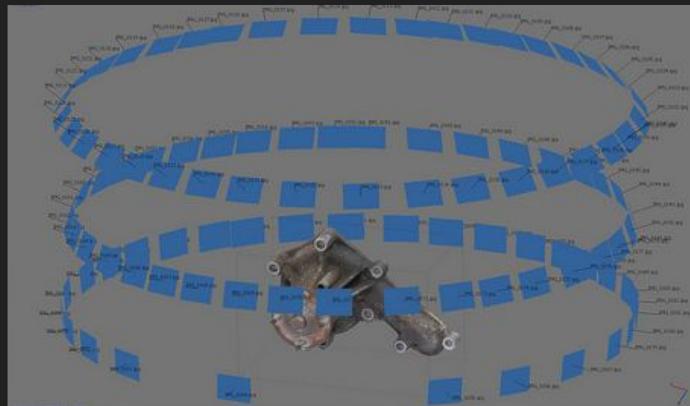
<http://www.agisoft.com/>

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

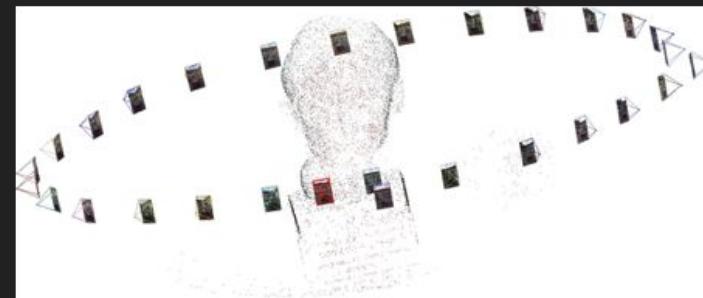
- * Similar to Photogrammetry

Visual SfM

- * Cheap

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

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



- * Accurate colour information



- * Long processing time

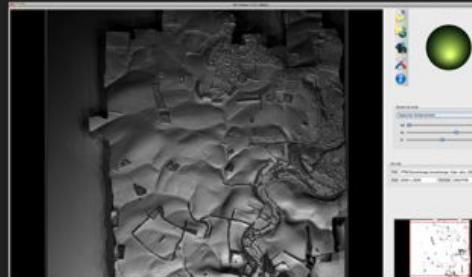
- * Output in point cloud

Reflectance Transformation Imaging (RTI)

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



www.topoi.org



<http://www.wessexsearch.co.uk>

Photogrammetry exercise



FALERI NOVI PROJECT



UNIVERSITY
OF LONDON



UNIVERSITY OF
TORONTO

B_S_R
BRITISH SCHOOL
AT ROME

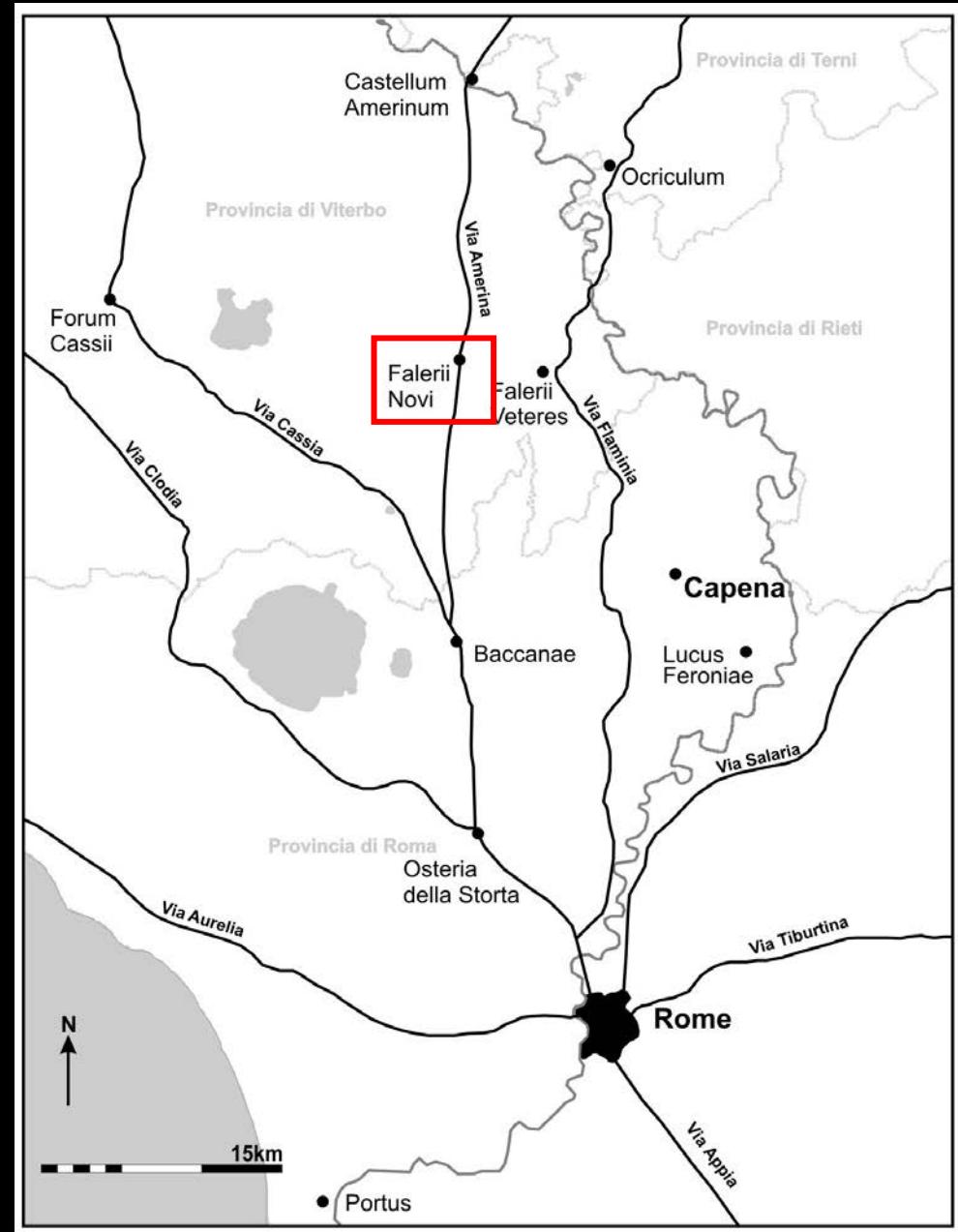


UNIVERSITÀ
DEGLI STUDI
FIRENZE



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
Clamping: www.ngdc.noaa.gov/mgg/clamp.html
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)

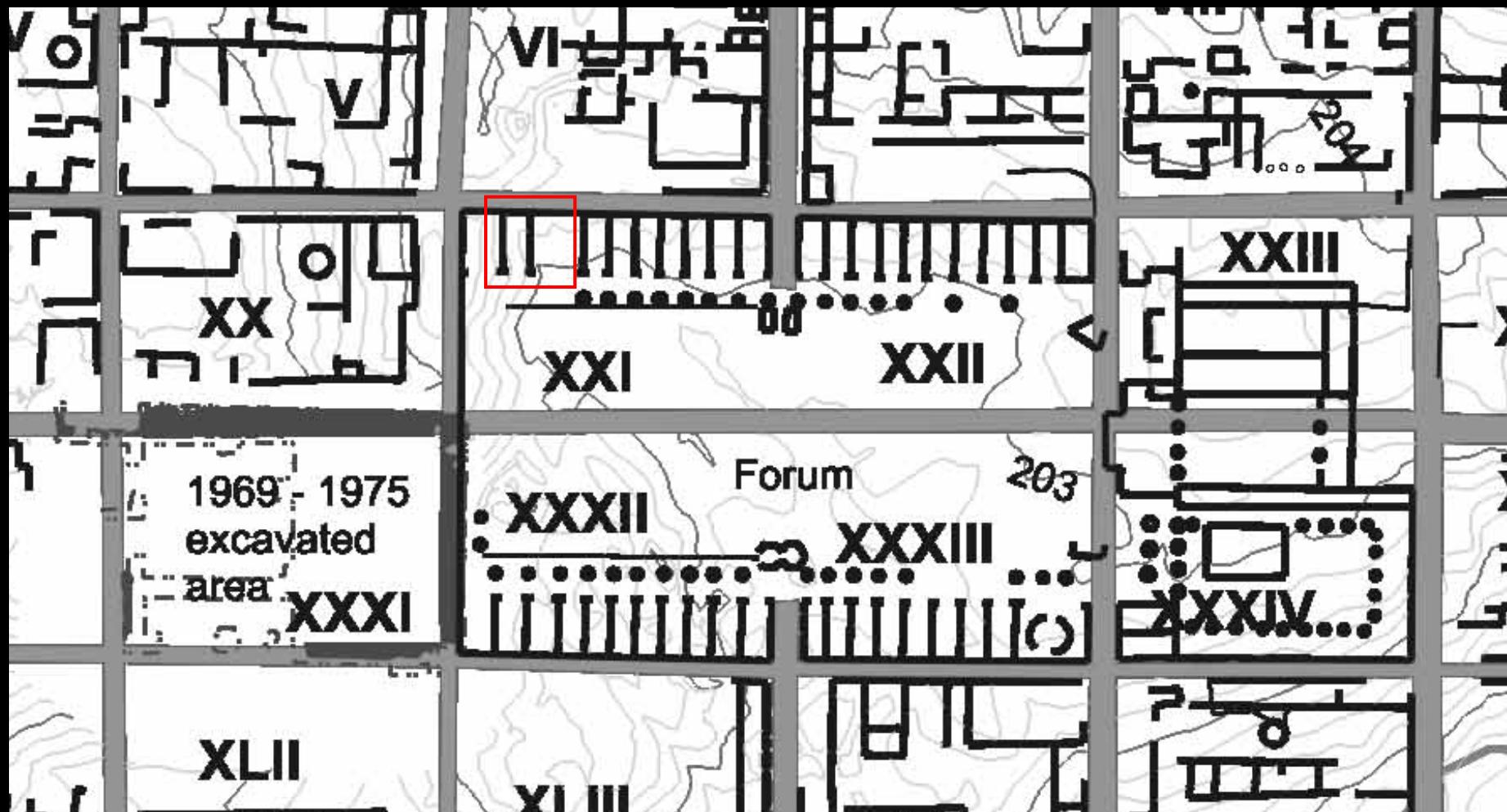


0 80 160 240 320 400 m

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

Geophysical Prospection



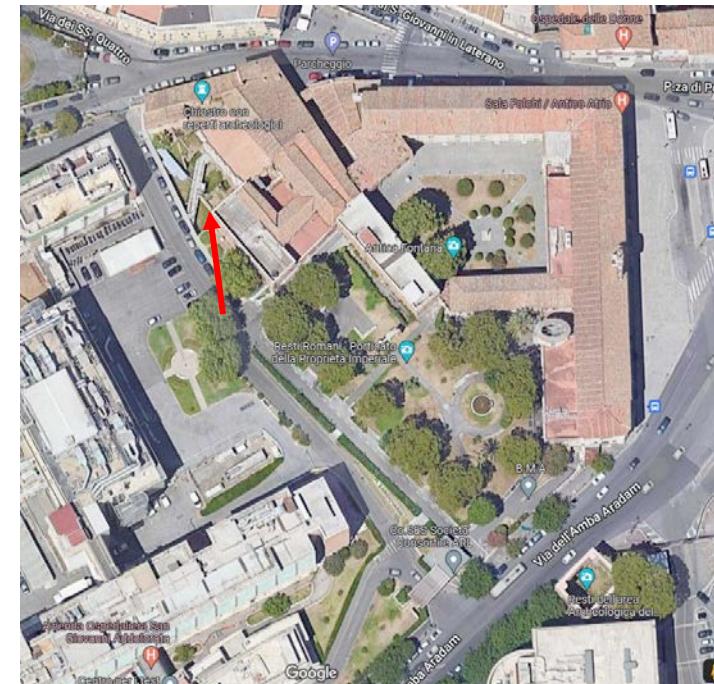
GPR survey. Piazza Venezia, Rome

3D recording



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

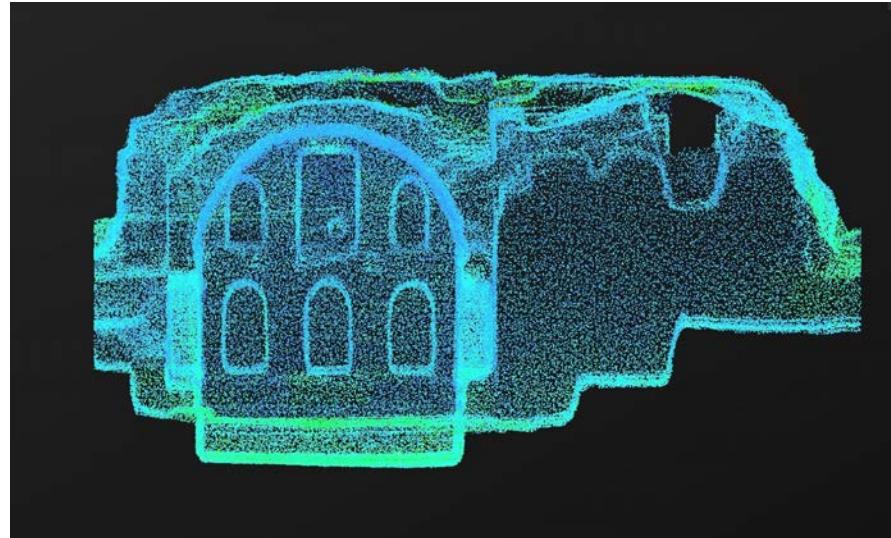
Non-invasive techniques: Photogrammetry. Some examples (1)



San Giovanni in Laterano Hospital, Rome

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

*Nymphaeum
Q.Mutius,
Segni, Lazio*

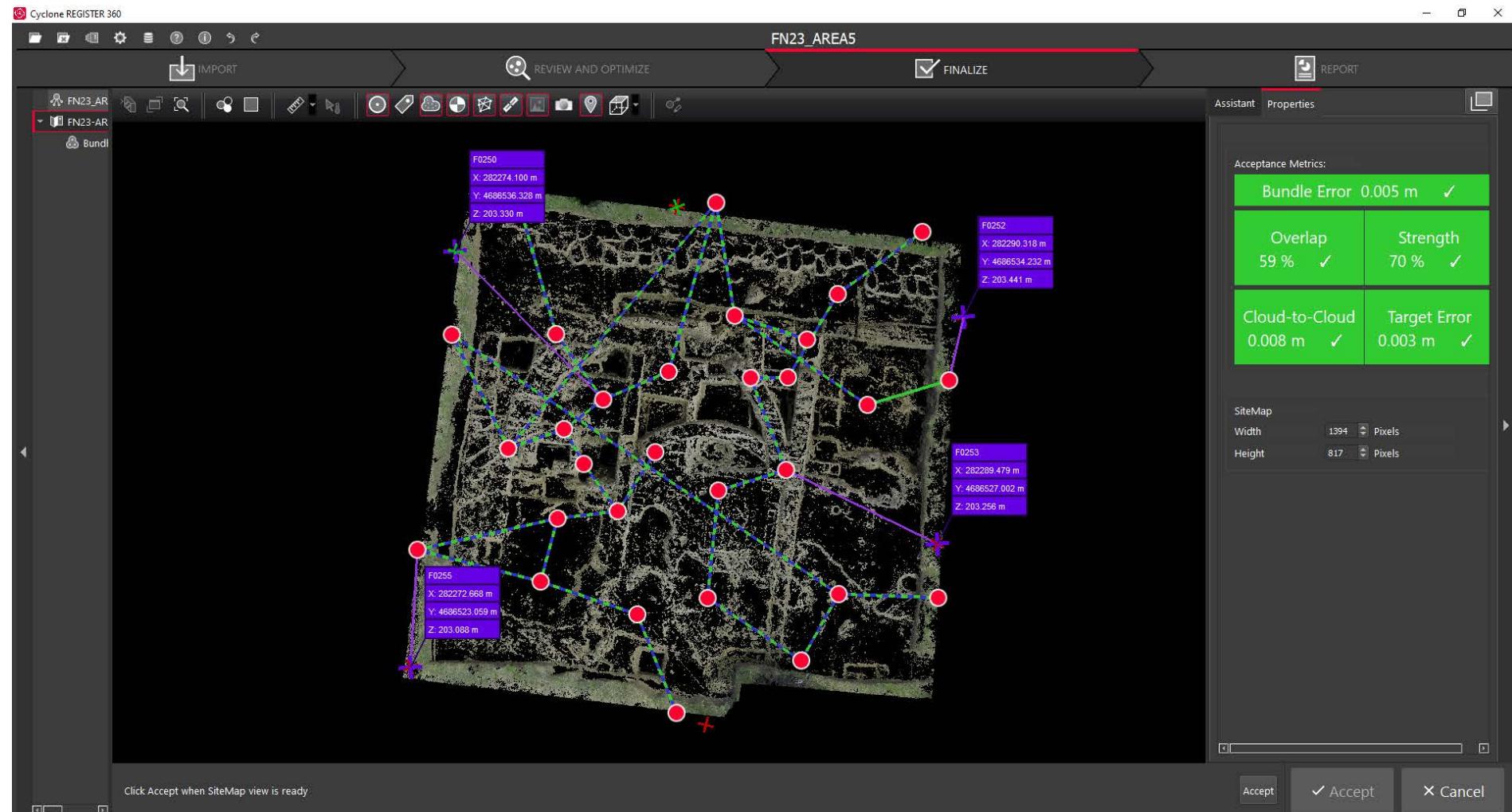


 The picture can't be displayed.

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



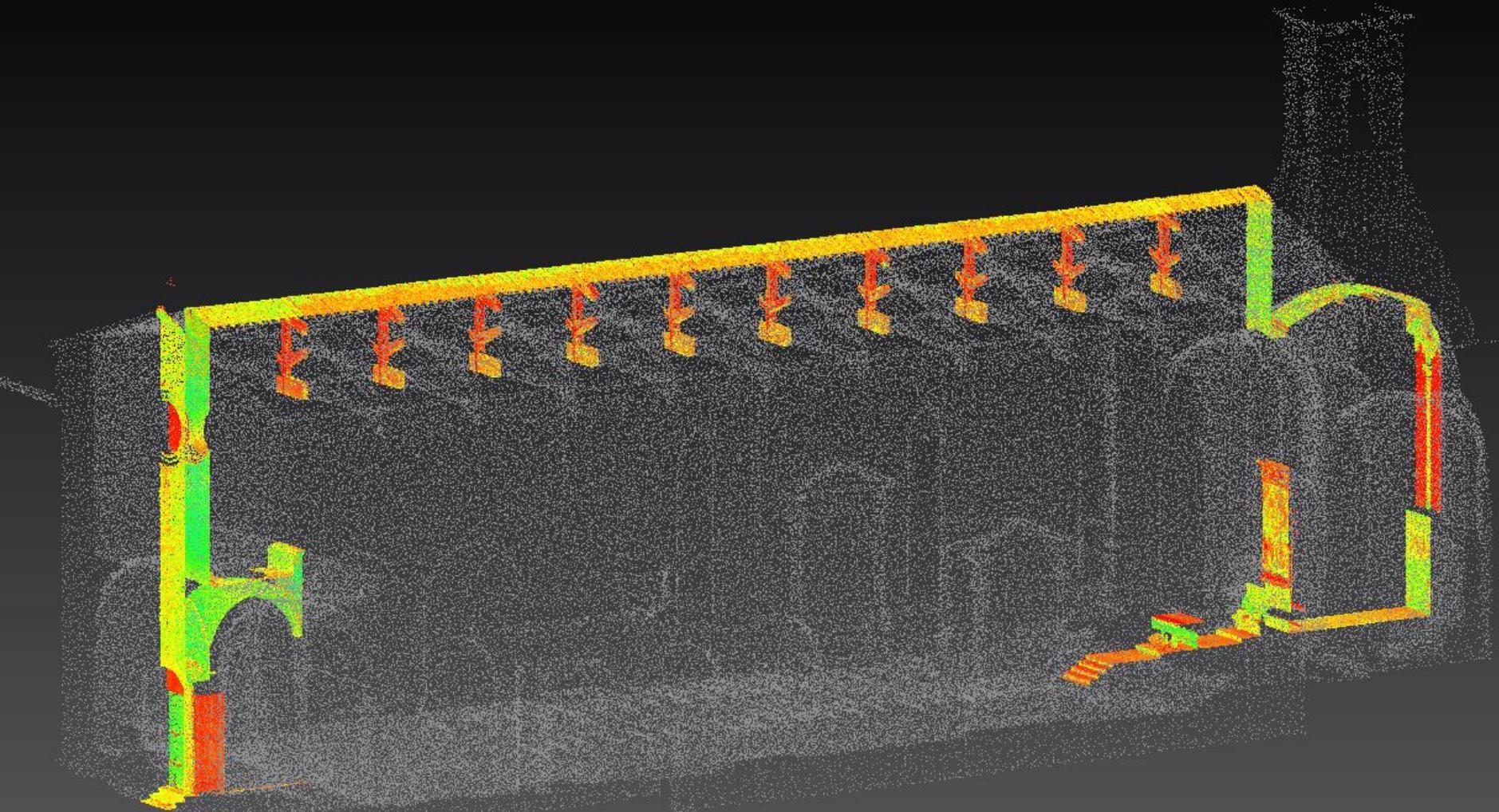
GPR survey



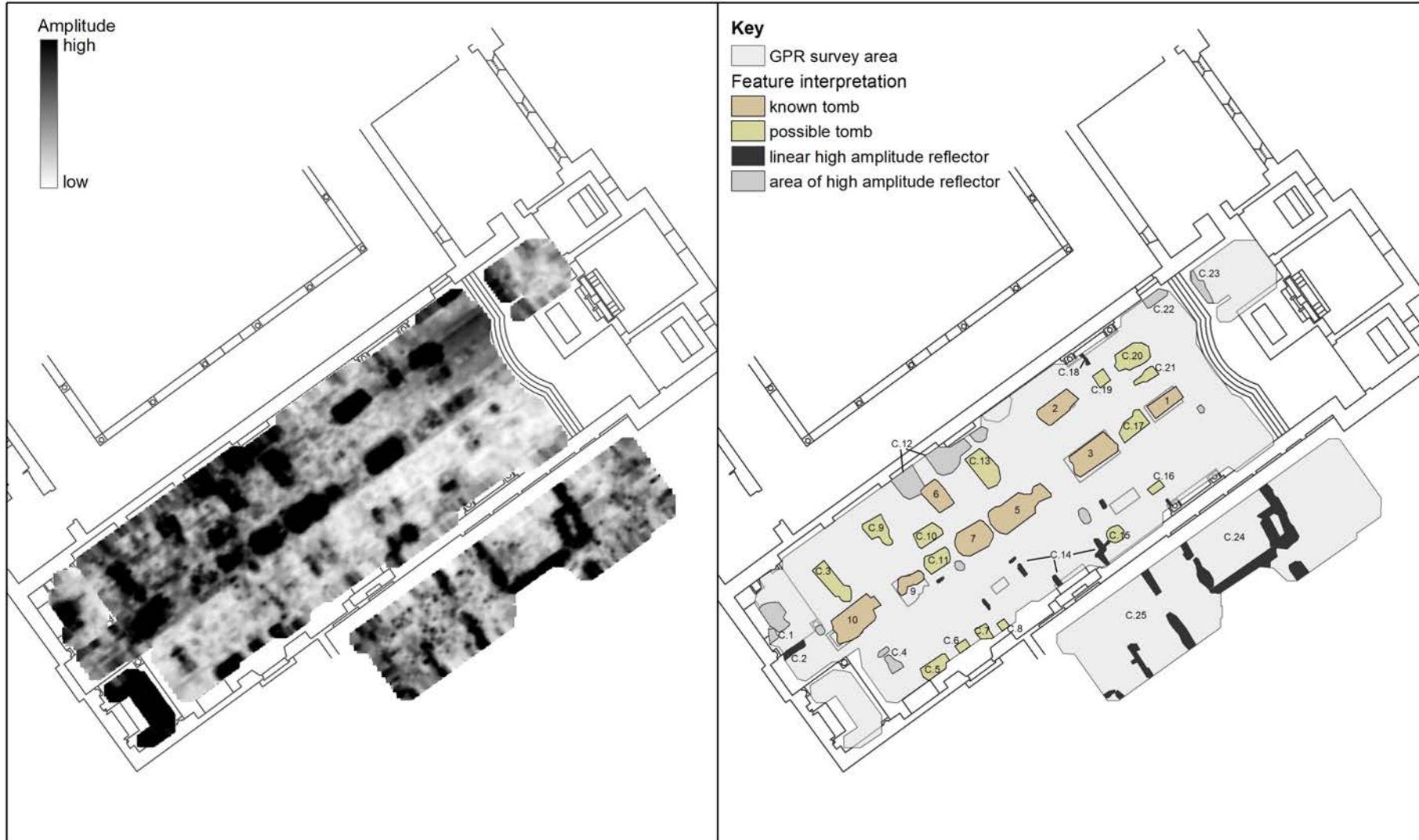


Sant' Agostino, San Gimignano (Tuscany): Point cloud





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



San Gimignano (Siena), 2021

GPR survey results and interpretation

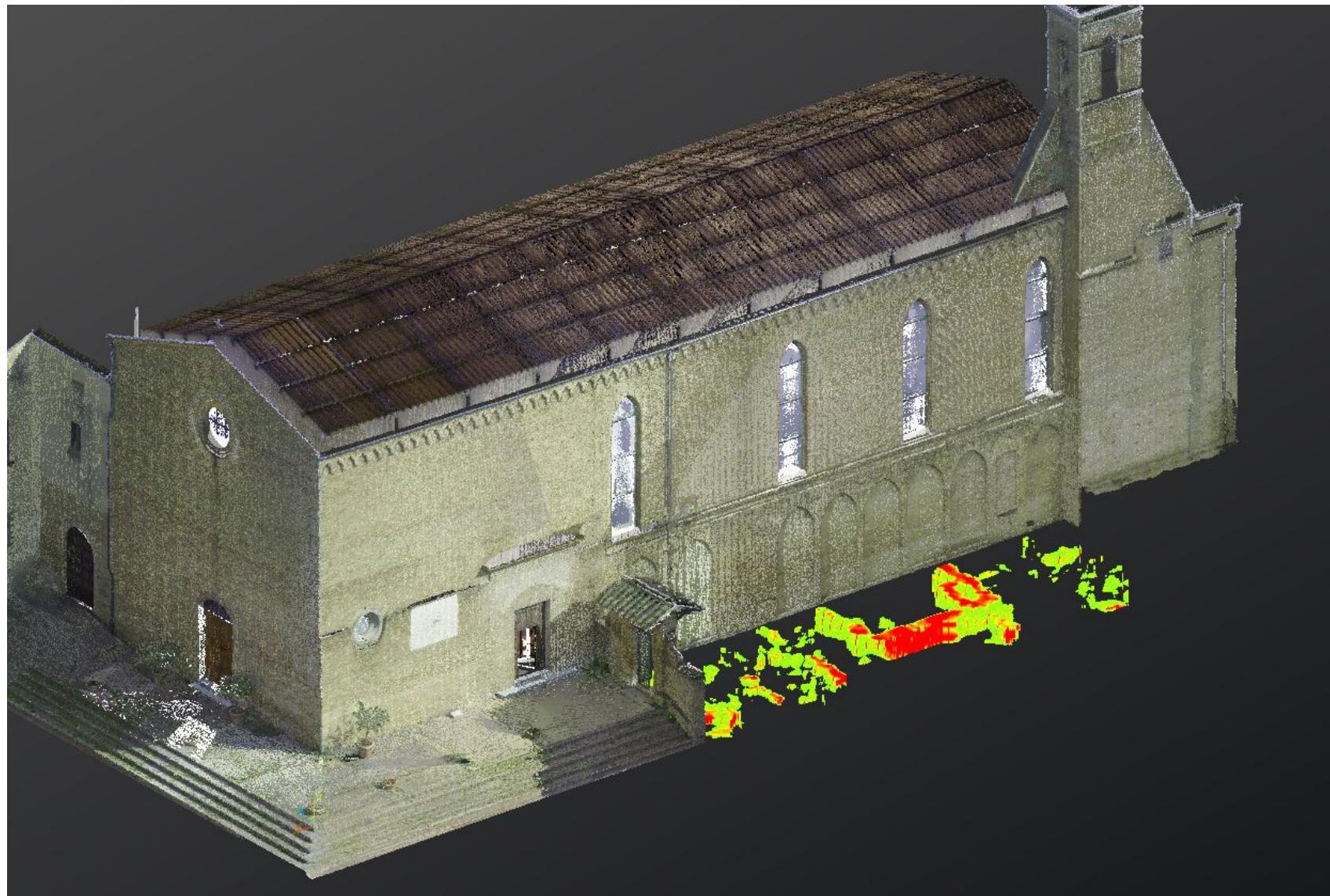
Estimated depth: 0.5-0.7 m below ground level



0 5 10 20 m

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







Stephen Kay

Email: s.kay@bsrome.it



www.bsr.ac.uk



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



British School at Rome

3D Imaging

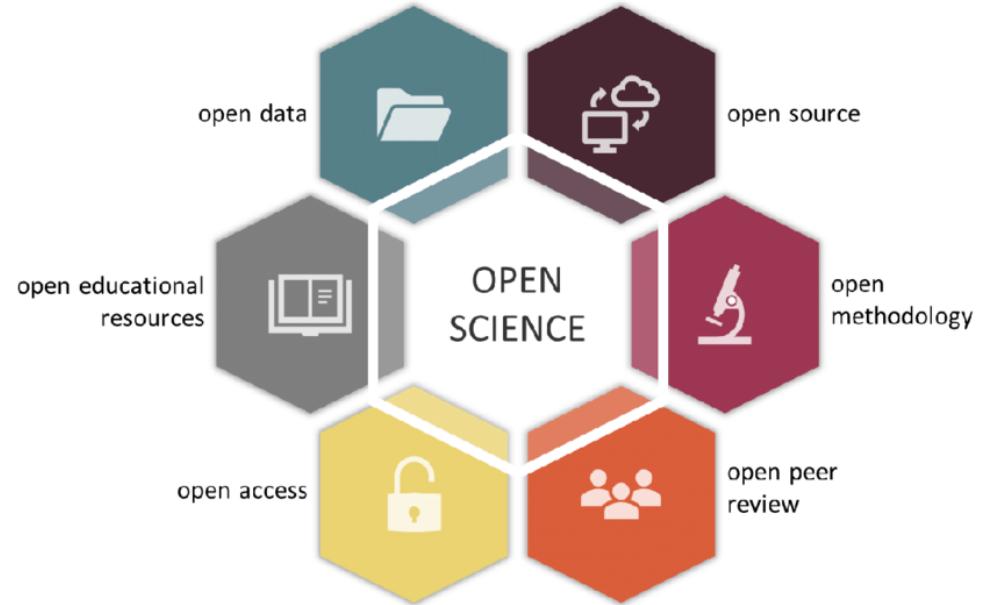
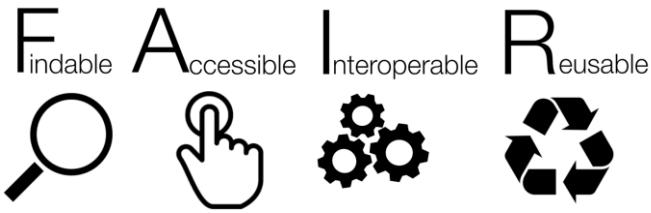
From remote sensing to photogrammetry

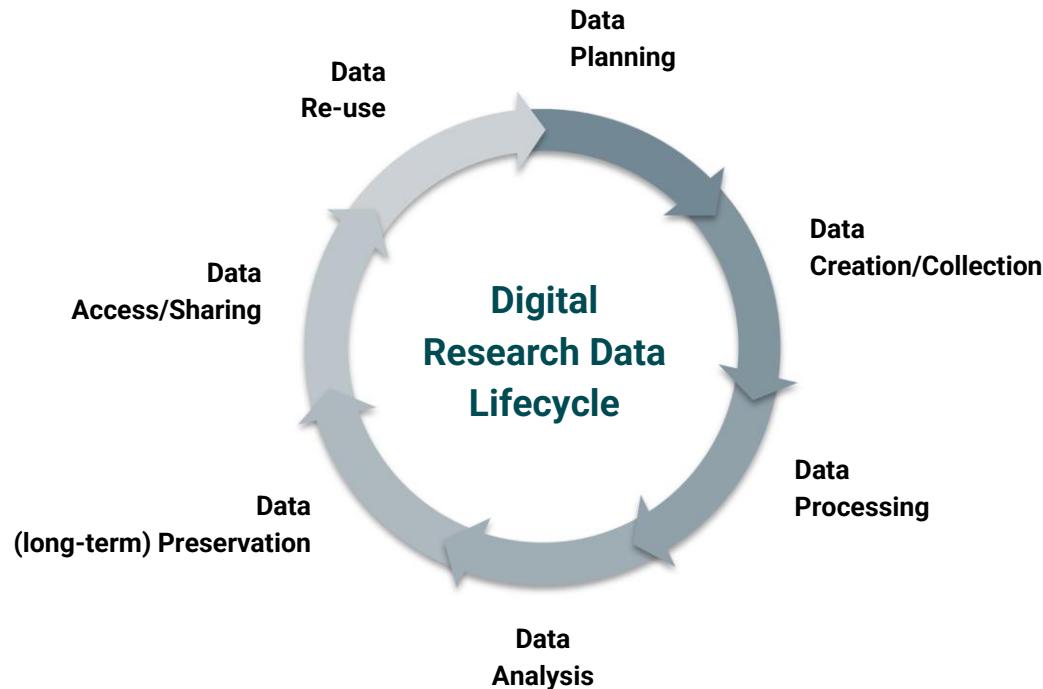
Vera Moitinho de Almeida, PhD
vmoitinho@letras.up.pt

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

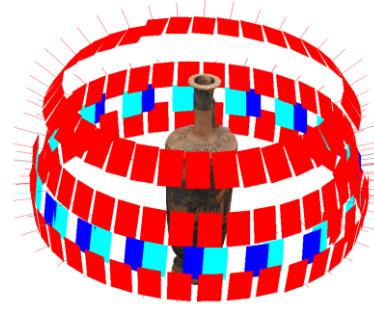
Greek and Cypriot pottery, 10th-4th c. BCE, EU collections

- . 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 & Documentation



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, SiM)



High resolution,
noise data removed



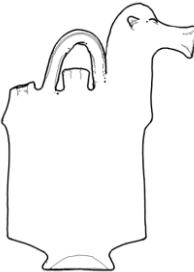
Mesh fixed,
inner surface
reconstructed



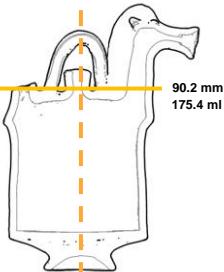
Low resolution



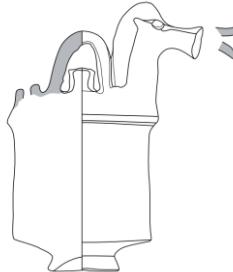
Photograph



Known interior

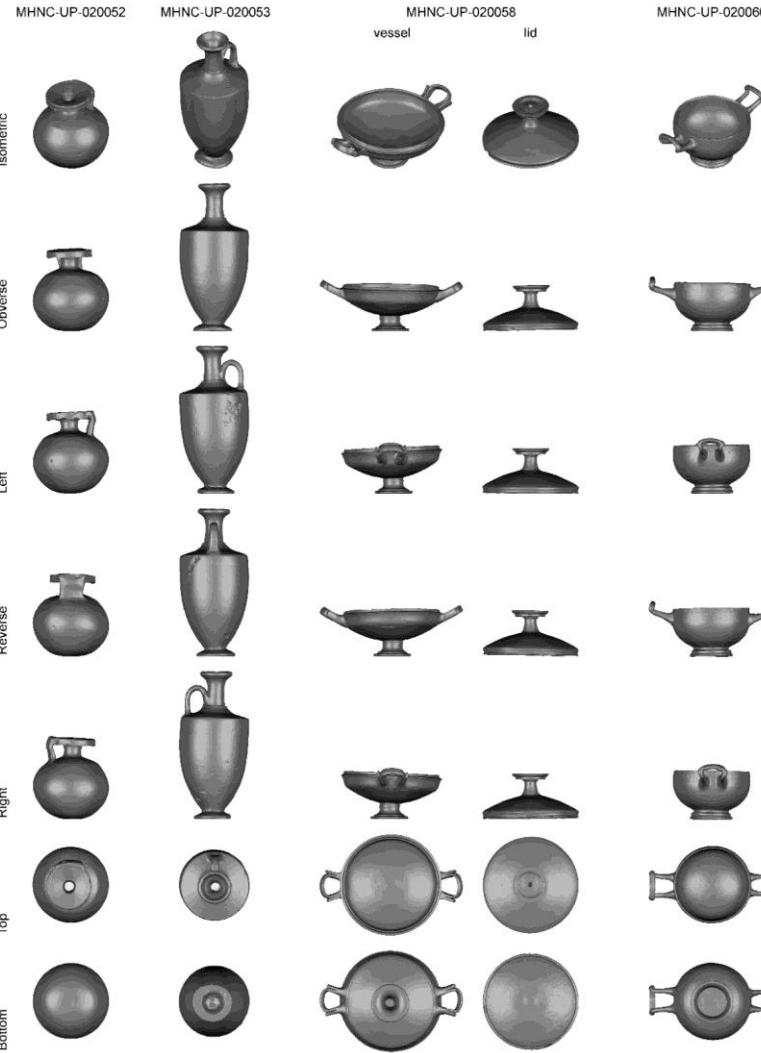


Reconstructed interior;
Capacity automatically
calculated



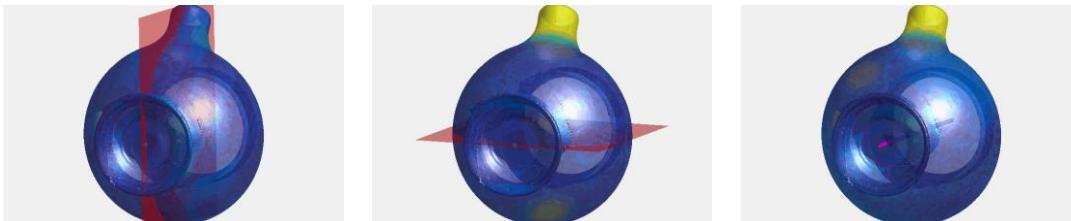
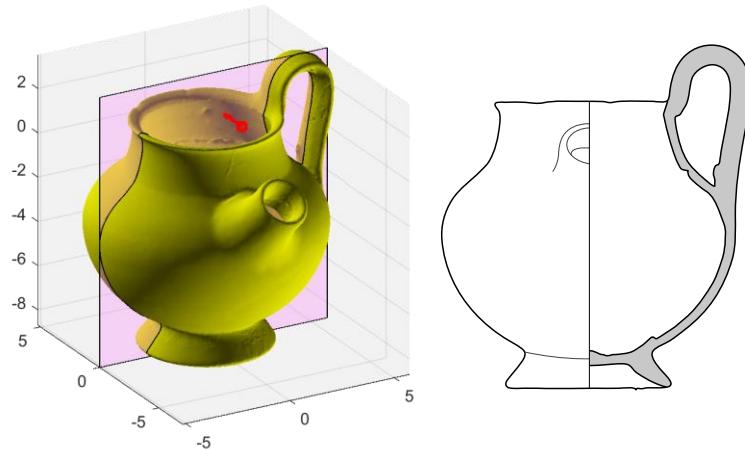
Manual illustration
(after 3D and photo)

2D/3D Digital Data Analysis & Documentation



Motinho 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

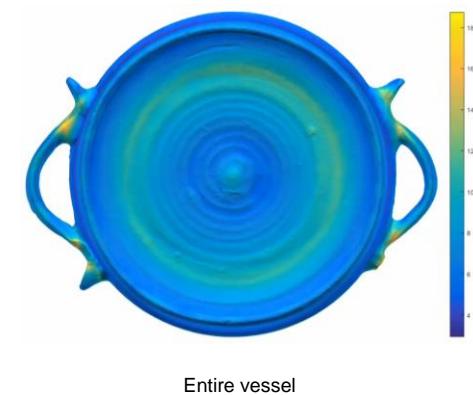


Reflective
through spout

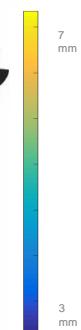
Reflective
through handle

Rotational

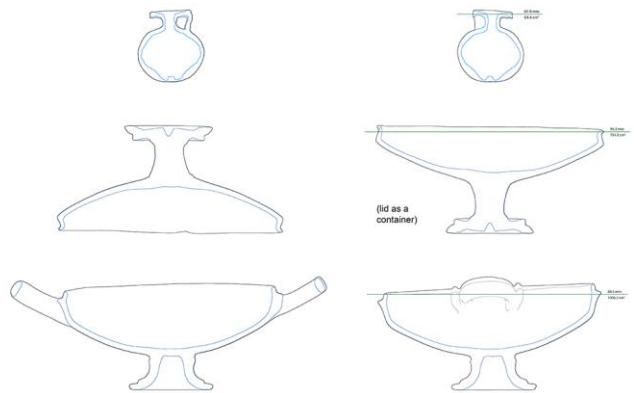
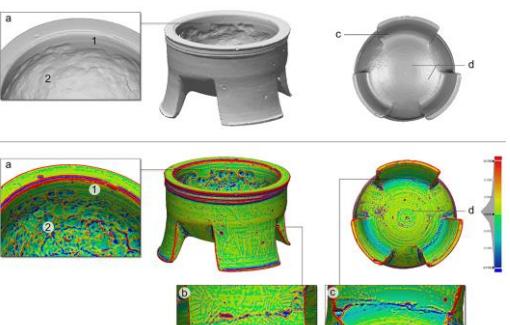
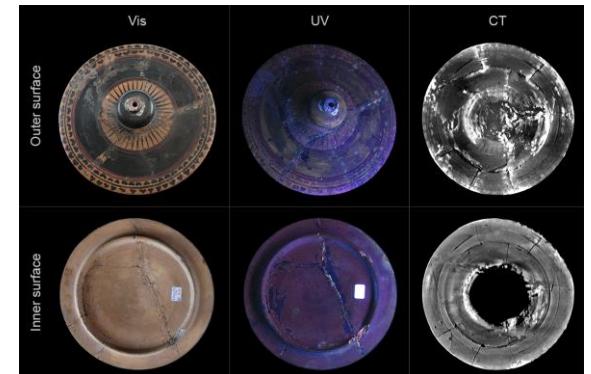
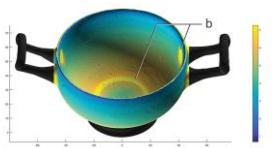
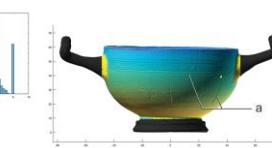
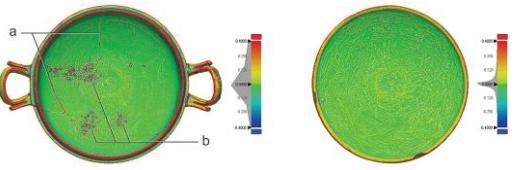
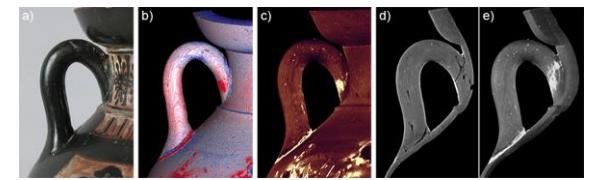
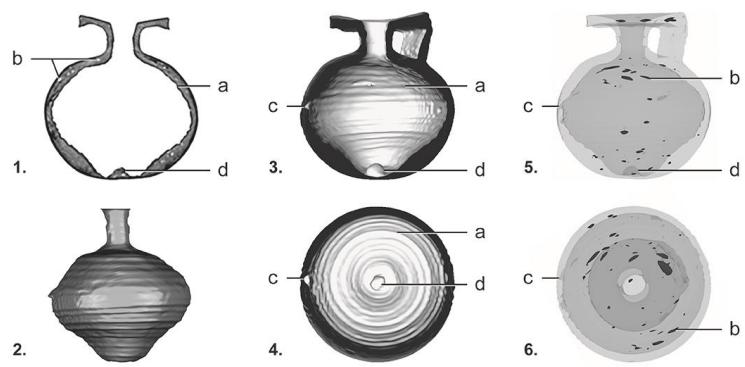
Computed Thickness colourmap



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>oinochoe</i> , Class N, The Cook Class	c. 500-475 BCE	unknown	Moitinho de Almeida, V. (2021a). Morais, R. (ARF 15, in this catalogue). Fundação Buchalter 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. (2021c). 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>lekants</i> , Circle of the Patera and the Baltimore Painter	c. 350-300 BCE	unknown	Moitinho de Almeida, V. (2021d). Morais, R. (APRF 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>pysxis</i> , Amasis Painter	c. 575-525 BCE	unknown	Moitinho de Almeida, V. (2021g). Morais, R. (ABF 39, in this catalogue). http://www.beazley.ox.ac.uk/record/092532D8-8D5D-48DE-8701-4D85EBC203A7

Inventory ID	Imaging system	Number of scans/slices	High-resolution 3D model (KB)	Number of vertices	Number of faces
MDDS-2017-0299	SL	29	8,988	224,516*	448,843*
MHNC-UP-020052	SL	23	3,661	91,426*	182,789*
	CT	560	10,999	295,215	590,430
MHNC-UP-020053	SL	35	8,038	200,766*	401,456*
MHNC-UP-020058 (vessel)	SL	41	47,927	1,196,641	2,393,286
MHNC-UP-020058 (lid)	SL	44	28,121	702,267	1,404,530

Inventory ID	Weight (g)	Width (mm)	Height (mm)	Length (mm)	Mesh volume (mm ³)	Material density (g/cm ³)	Max. filling height (mm)	Max. filling volume (cm ³)	Centre of mass [xyz] (mm)
MHNC-UP-020052	82.25	61.65	67.1	61.4	45,279.26 ⁽⁴⁾	1.82 ⁽⁴⁾	62.75	64.4 ⁽⁴⁾	-1.46 ⁽⁴⁾ 29.17 0.25
MHNC-UP-020053	130	66.85	141.29	66.32	— ⁽³⁾	— ⁽³⁾	140.5	— ⁽³⁾	— ⁽³⁾
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

Alternate Names or Name Variants

Name	Language Code	p	s	h	c	Action
빈 미술사 박물관	ko	Korean	edit	delete		
બેચી સ્પેમ્યુઝેટી મુઝેન્સ	th	Thai	edit	delete		
Bécsi Szépművészeti Múzeum	hu	Hungarian	edit	delete		
http://en.wikipedia.org/wiki/Kunsthistorisches_Museum	link	link to website	edit	delete		
http://ru.wikipedia.org/wiki/%D0%9C%D1%83%D0%B7%D0%85%D0%9B%D0%88%D0%81%D1%82%D0%BE%D1%80%D0%88%D0%9B%D0%82%D0%8B%D1%81%D0%8A%D0%83%D1%81%D1%81%D0%82%D0%9B%D2%92%D0%85%D0%8D%D0%80%29	link	link to website	edit	delete		
Kunsthistorisches Museum Wien	nl	Dutch	edit	delete		
Kunsthistorik Museum Wien	da	Danish	edit	delete		
Meno istoriosų muziejus	lt	Lithuanian	edit	delete		
Musée d'histoire de l'art de Vienne	fr	French	edit	delete		
Museo de Historia del Arte de Viena	es	Spanish	edit	delete		
Museu de História da Arte em Viena	pt	Portuguese	edit	delete		

Bracara Augusta

a Pleiades place resource

Creators: E. Haley
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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:

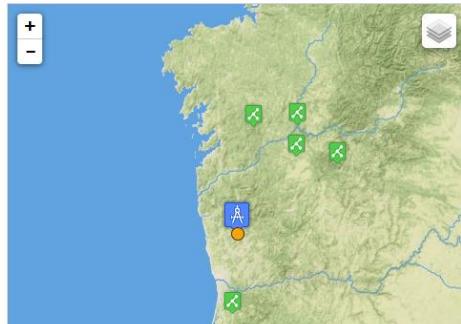
- DARMC location 20067 (30 BC - AD 640)
- DARE Location (30 BC - AD 640)

Names:

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

Bracara Augusta makes connections with:

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



Research

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Art & Architecture Thesaurus® Online

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(View)

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Help

Click the icon to view the hierarchy.

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

* Representative Images: 1

ID: 300198866

Page Link: <http://vocab.getty.edu/page/aj/300198866>

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

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

Terms:

oinochoai ([preferred](#) [C-U English-P-D-U-PN](#))

[oinochoai](#) ([C-U English-U-SN](#))

[oinochoai](#) ([C-U English-U-FU-N](#))

[oinochoes](#) ([C-U LC English-U-FU-N](#))

[oinoche](#) ([C-U Spanish-U-FU-SN](#))

[oinoche](#) ([C-U Spanish-U-FU-SN](#))

Facet/Hierarchy Code: VTO

Hierarchical Position:

- Objects Facet
- Furnishings and Equipment (hierarchy name) (G)
- Containers (hierarchy name) (G)
- <containers (recipitates) (G)
- <containers by form> (G)
- vessels (containers) (G)
- oinochoai (G)

Additional Notes:

Datum: Klassische Griechen verwendeten einen Handgriff, der werden gebraucht für das schöpfen und schenken von Wein. Gebräuchlich in der Antike. Sie wurden ebenfalls später tatsächlich von Krügen.

Spanish Vasijas de una sola asa de la Antigua Grecia usadas para servir y vertir 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

Getty Vocabularies: LOD

SPARQL Queries Any Search Brief

oinochoai

Source: <http://vocab.getty.edu/aj/300198866>

Record Type: concept

Subject (62) Predicate Object All Website Hierarchy Download in: JSON | JSONLD | RDF | NS/Turtle | N-Triples

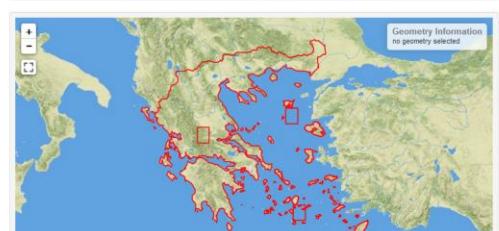
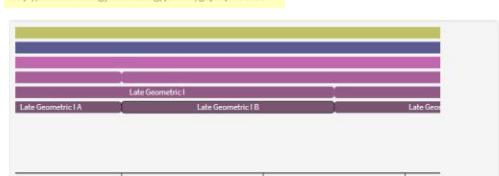
Inference: Explicit only

Statements in which the resource exists as a subject.

Predicate	Object
rdf:type	gvp:Concept
rdfs:seeAlso	http://www.getty.edu/vow/AAT#Display?find=&logic=AND&text=&subjectid=300198866
dc:terms:created	1991-10-02T00:00:00
dc:terms:modified	2001-07-26T22:03:39, 2001-07-26T22:15:13, 2007-06-14T13:59:41, 2007-07-06T16:01:01, 2009-06-02T14:44:23, 2010-04-23T06:54:20, 2010-04-23T06:54:30, 2011-01-07T12:19:15, 2011-11-14T13:24:15, 2012-07-20T16:18:05
skos:changeNote	aat_rev_500057238 , aat_rev_5001145989 , aat_rev_5001145991 , aat_rev_5001145992 , aat_rev_5001175467 , aat_rev_5001175468 , aat_rev_5001665918 , aat_rev_5001670469 , aat_rev_5002345439 , aat_rev_5002912511 , aat_rev_5002512512 , aat_rev_500235222 , aat_rev_500238566 , aat_rev_500304443 , aat_rev_500350112
gvp:parentString	vessels (containers), <containers by form>, containers (recipitates), Containers (hierarchy name), Furnishings and Equipment (hierarchy name), Objects Facet
gvp:parentStringAltive	vessels (containers), <containers by form>, ... Objects Facet
gvp:displayOrder	46
xlt:prefLabel	aat_term_1000198866-en , aat_term_1000198866-en , aat_term_100296919-es
xlt:altLabel	aat_term_100019937-en , aat_term_100234621-en , aat_term_100296919-en , aat_term_100296919-en , aat_term_100444990-es , aat_term_100444990-es

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

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



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 -->
    <div>
      <div id="draw-canvas" style="min-height: 350px;">
        <script type="text/javascript">
          var presenter = null;
          function setup3dhop() {
            presenter = new Presenter("draw-canvas");
            var meshUrl = "https://id.acdh.oeaw.ac.at/ODeeg/Collections/AT-Vienna-KHM/KHM-ANSA-IV1000/3D-data/3Dscan_lowRes-data/KHM-ANSA-IV1000_3D02.ply";
            presenter.setScene({
              meshes: {
                "3dmodel" : { url: meshUrl }
              }
            });
          }
        </script>
      </div>
    </div>
  </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

Overview

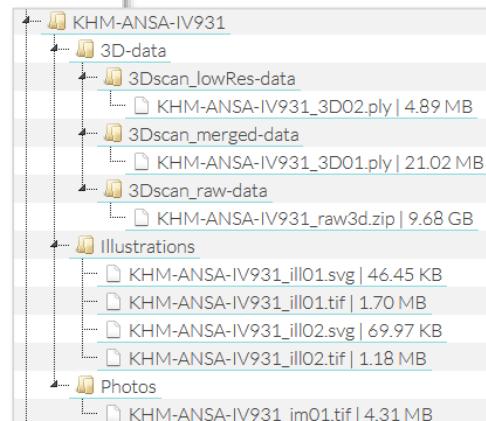
KHM-ANSA-IV1000_3D02.ply

Type:	Resource
Contact(s):	Claudia Lang-Auinger
Available Date:	2019-11-25
Binary Size:	4.89 MB
Category:	https://vocab.acdh.oeaw.ac.at/archecategory/3dData
Licensor:	Kunsthistorisches Museum Wien
License:	https://creativecommons.org/licenses/by-nc-sa/4.0/
Access Restriction:	public
PID:	http://hdl.handle.net/21.11115/0000-000C-2318-2
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	https://vocab.acdh.oeaw.ac.at/archeaccessrestrictions/public
acdh:hasAppliedMethod	3D scanning
acdh:hasAvailableDate	2019-11-25
acdh:hasBinarySize	4.89 MB
acdh:hasCategory	https://vocab.acdh.oeaw.ac.at/archecategory/3dData
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	https://id.acdh.oeaw.ac.at/ODeeg/Collections/AT-Vienna-KHM/KHM-ANSA-IV1000/3D-data/3Dscan_lowRes-data/KHM-ANSA-IV1000_3D02.ply

into the wild...



East Greek bird cup

3D Model

FOLLOW PRO 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](#)

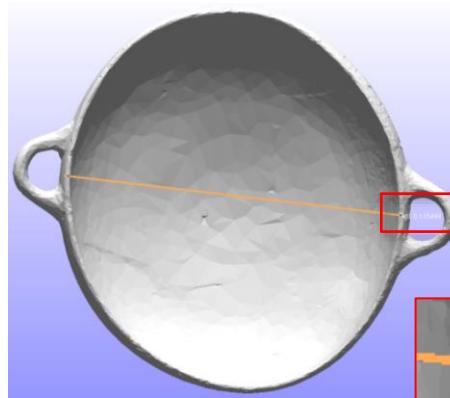
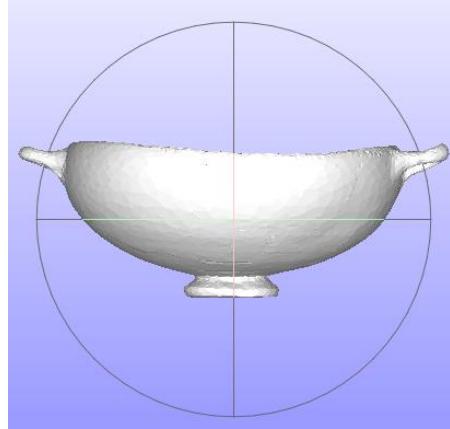
Published 3 months ago

Cultural Heritage & History 3D Models

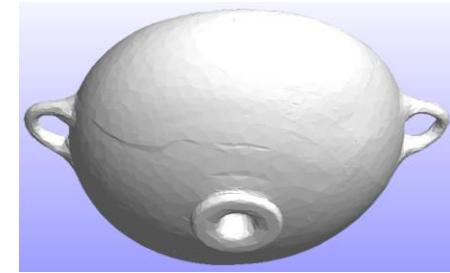
pottery realitycapture archaeology

All files

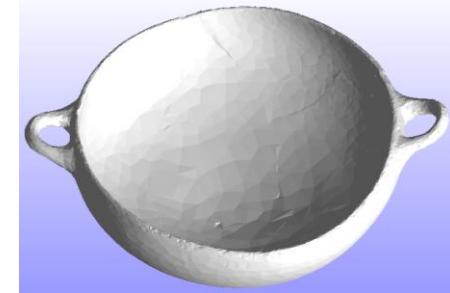
3D files	Format	Extension	Size	From
Vogelschale_3198	Blender	blend	2MB	Source archive
Processed Textures	Resolution	Extension	Size	From
vogelschale_3198_ip_Am...	8192x8192	jpg	1MB	Source archive
vogelschale_3198_ip_Nor...	8192x8192	jpg	1MB	Source archive
vogelschale_3198_ip_Tran...	8192x8192	jpg	3MB	Source archive



MO: 0.125499



Mesh Bounding Box Size:
0.165195 0.059822 0.143103 mm



ThanksObrigada!

Vera Moitinho de Almeida, PhD
vmoitinho@letras.up.pt