

GIACOMO FONTANA, PhD

POSTDOC AT TEXAS TECH UNIVERSITY

PRINCIPAL INVESTIGATOR FOR THE ANCIENT HILLFORTS SURVEY

CONTACTS

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PROFILE

My research explores the dynamics of complex societies and their interactions with the environment, with a particular focus on ecosystem services. I investigate alternative social systems that challenge conventional urban models, especially in regions often considered marginal, such as highland areas. To address the unique challenges presented by archaeological evidence, I employ computational and comparative methods. This interdisciplinary approach integrates remote sensing, geostatistical analysis, landscape modeling, simulation, and fieldwork.

EDUCATION

PhD, UCL Institute of Archaeology. Funded by the London Arts and Humanities Partnership (LAHP). Supervisors: A. Bevan, C. Riva, and T. Stek. Dissertation: "Computational and Landscape Approaches to Samnite Mountain Society in the 1st Millennium BCE Mediterranean." Degree conferred in December 2023. Examiners: Mark Lake and Robert Witcher.

Research Master's in Archaeology, Leiden University. Specialization in Town and Country in the Mediterranean Region and the Near East. Thesis: "Seeking Tombs from Space: Automatic Detection and Extraction of Complex Burial Monuments of Oman in Multispectral Satellite Images." Graduated in August 2018 with a final mark of 8.3, cum laude.

Bachelor's in Cultural Heritage, University of Bologna. Specialization in archaeology. Thesis: "Predictive Model of the Protohistoric Settlement Location Preferences on Vicentine Prealps (VI)." Graduated in August 2015 with a final mark of 110/110, cum laude.

AWARDS AND GRANTS

Nick Ryan Award (2023) – Awarded by the Computer Applications and Quantitative Methods in Archaeology (CAA) for the best student paper, €2,000 prize. Paper titled: "A Quantitative and Transferable Multi-Scale Approach for the Study of Hillfort Communities."

UCL IoA Award (2022) – From UCL Institute of Archaeology for third fieldwork season of Ancient Hillforts Survey, £2,000.

LAHP Research Activities Grant (2022) – From London Arts and Humanities Partnership for the second fieldwork season of Ancient Hillforts Survey, total £1,500.

UofT IDC Grant (2022) – To cover research visit expenses in April 2022 at University of Toronto, CAD 5,350.

LAHP Research Activities Grant (2021) – From London Arts and Humanities Partnership for the first fieldwork season of Ancient Hillforts Survey, total £1,500.

LAHP Research Grant (2021) – For a 3-month visiting period at University of Verona, £4,400.

LAHP Research Grant (2021) – For a 3-month visiting period at Royal Netherlands Institute in Rome, £4,400.

KNIR Scholarship (May-June 2019) – From Royal Netherlands Institute in Rome for project later merged into Ancient Hillforts Survey, €2,400.

Scholarships won for the PhD (2019):

- **LAHP PhD scholarship at UCL** - From London Arts and Humanities Partnership, tuition fees and stipend. Accepted
- **NCB PhD scholarship at Durham University** - From Northern Bridge Doctoral Training Partnership, tuition fees and stipend. Declined
- **NWO PhD scholarship at Leiden University** - From Netherlands Organisation for Scientific Research, tuition fees and stipend. Declined
- **SGSAH PhD scholarship at Glasgow University** - From Scottish Graduate School for Arts & Humanities, tuition fees. Declined

NINO Thesis Prize (Dec 2018) – From Netherlands Institute for Near East for best (R)MA thesis in 2018, €600.

DigitalGlobe Foundation Imagery Grant (Jun 2016) – For MA thesis, commercial value of €35,000 in WorldView-2 satellite images.

Trimble Research License Grant (Sept-Oct 2016) – For MA thesis, license of eCognition developer software.

FAAV Grant (Apr-Oct 2014) – From Federation of Archaeological Associations of Veneto and city of Vicenza for BA thesis, €2,500.

Master's Thesis Prize (Dec 2018) – From the city of Isola Vicentina for MA thesis excellence, €500.

Bachelor's Thesis Prize (Nov 2015) – From the city of Isola Vicentina for BA thesis excellence, €300.

RESEARCH POSITIONS

Postdoc at Texas Tech University (Sept 2024-present): Postdoc at Texas Tech University (50% research, 50% teaching).

Research Fellow at UCL (Aug 2023-Aug 2024): Research Fellow in computational archaeology at UCL Institute of Archaeology for the Empowering Heritage Project. PI is Rachel King. Funded by AHRC.

Associate Researcher at KNIR (Jan 2022-Aug 2024): Associate Researcher at the Royal Netherlands Institute in Rome. Funded by KNIR.

Visiting PhD at University of Toronto (Apr 2022): Visiting PhD for the collaborative work on energetics of pre-Roman polygonal masonry with S. Bernard. Funded by University of Toronto.

Visiting PhD at University of Verona (Aug-Oct 2021): Visiting PhD for the remote sensing analysis of the Venetian Prealps with M. Migliavacca. Funded by LAHP.

Visiting Researcher at KNIR (May-June 2021): Visiting Researcher in the research program on Mountain Archaeology. Funded by LAHP.

Research Assistant in Byzantine Archaeology (Aug 2018-July 2019): At Leiden University, focus was on computational archaeology applied to Byzantine material culture and networks. Directed by J. A. C. Vroom. Funded by NWO.

Research Assistant for Tell Deir Alla Project (May-Oct 2018): At Leiden University and DANS, involved in the digitization of excavation archives. Directed by G. van der Kooij. Funded by NWO.

PUBLICATIONS

Fontana, G. 2024. Issues of sampling and representativeness in large-scale LiDAR-derived archaeological surveys in Mediterranean contexts. **Archaeological Prospections.**

Fontana, G. and W. de Neef, 2024. Italy's empty hillforts: Reassessing urban-centric biases through combined non-invasive prospection methods on a Samnite site (4th-3rd BC). **Antiquity.**

Fontana, G. and S. Bernard, 2023. A new method for the energetics analysis of polygonal masonry in Samnite hillforts, **Journal of Archaeological Science.** DOI: <https://www.sciencedirect.com/science/article/pii/S0305440323000080>.

García Sánchez, J., M. K. Termeer, G. Fontana, R. A.A. Kalkers, T. D. Stek, 2023. New research on two mountainous settlements in Molise, Central Italy: the hillfort of La Romana (Isernia, IS) and the mountain top site of Lo Monaco (Longano, IS), in **Montagne e Archeologie**, Angelucci D., E. Croce, M. Migliavacca, and F. Saggioro (eds). Firenze: All'Insegna del giglio.

Fontana, G., 2022. Italy's hidden hillforts: A large-scale LiDAR-based mapping of Samnium, **Journal of Field Archaeology**, 47:4, 245-261, DOI: <https://doi.org/10.1080/00934690.2022.2031465>.

Fontana, G., 2022. Il dato LiDAR nello studio di paesaggi montani e forestali: i siti fortificati e la centuriazione dei Monti Tifatini, Campania, in **Landscape 2.0: una sintesi di elementi diacronici. Crisi e resilienza nel mondo antico**, Marchi, M. L., G. Forte, D. Gangale Risoleo, and I. Raimondo (eds). Venosa: Osanna Edizioni.

PUBLICATIONS UNDER REVIEW

Landauer, J., S. Maddison, G. Fontana, A. Posluschny (under review). Archaeological Site Detection: Latest Results from a Deep Learning Based Europe Wide Hillfort Search

PUBLICATIONS IN PREPARATION

Fontana, G. Contextualising Samnite hillforts in the global debate on large low-occupation-density settlements.

Fontana, G. Warfare and non-urban political centralization in Mediterranean context: the case of the Samnites

Fontana, G and A. Bevan. Tracing the socio-economic structure of the fortified Samnite landscape through socio-environmental modelling.

Li, Z., G. Fontana, A. Bevan, and R. Li. Frontier walls, labour energetics and Qin imperial collapse.

REPOSITORIES

Fontana G. 2024. Compendium of the Quarto project with R code and data for the article 'Italy's empty hillforts: Reassessing urban-centric biases through combined non-invasive prospection methods on a Samnite site (4th-3rd BC)'. DOI: 10.5281/zenodo.8388746.

Fontana G. 2023. Compendium of the Quarto project with R code and data for the article 'A new method for the energetics analysis of polygonal masonry in Samnite hillforts (Italy)'. DOI:10.5281/zenodo.7555247.

PRINCIPAL INVESTIGATOR IN FIELDWORK PROJECTS

Ancient Hillforts Survey, Italy (2020 - present): Principal Investigator. Affiliated with UCL and the Royal Netherlands Institute in Rome. Utilizes remote sensing and non-invasive fieldwork techniques to study mountainous regions in south-central Italy. From 2024, the project will expand to include excavation and ethnographic interviews.

- 2023: Non-invasive study of a Samnite hillfort, integrating LiDAR, multispectral drone imagery, geophysics, coring, and intensive pedestrian survey. Collaborated with Wieke de Neef. Funded by UCL, KNIR, and University of Bamberg.
 - 2020-2022: Conducted two ground-truthing and 3D modeling fieldwork campaigns. Funded by LAHP and UCL.
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REPORTS FOR GOVERNMENT ENTITIES

Fontana, G. and de Neef, W. (2023). Report della campagna di indagini non-invasive sul sito fortificato di Monte Santa Croce-Cognolo a Piana di Monte Verna (CE). Submitted to **Soprintendenza Archeologia, Belle Arti e Paesaggio di Caserta e Benevento, Italy.**

Fontana, G. (2022). Ancient Hillforts Survey: Segnalazione del ritrovamento di alcuni siti archeologici di particolare interesse nel comune di Piana di Monte Verna, Campania. Submitted to **Soprintendenza Archeologia, Belle Arti e Paesaggio di Caserta e Benevento, Italy.**

Fontana, G. (2021). Ancient Hillforts Survey: Report della prima campagna Campana di ground-truthing su base lidar. Submitted to **Soprintendenza Archeologia, Belle Arti e Paesaggio di Caserta e Benevento, Italy.**

Fontana, G. and Stek, T.D. (2021). Ancient Hillforts Survey: Report della prima campagna Molisana di ground-truthing su base lidar. Submitted to **Soprintendenza Archeologia, Belle Arti e Paesaggio del Molise, Italy.**

Fontana, G. and Tosi, M. (2011). The Islamic Port of Ras al Hadd. Submitted to the **Ministry of Heritage and Tourism, Sultanate of Oman.**

CONFERENCE SESSIONS AND WORKSHOPS ORGANISED

Bridging the Walls: comparative perspectives on fortified settlements (August 2024) - Session organised with Enrico Lucci, Mara Migliavacca, Matija Črešnar, and Manuel Fernández-Götz at the EAA 2024 conference.

Point Process Models in Archaeology and Heritage: State of the Field and New Directions (April 2024) - Session organised with Marco Nebbia and Eduardo Herrera Malatesta at the CAA 2024 conference.

Re-shaping LiDAR data for Landscape Archaeology research (13 Nov 2023). Workshop in lidar data processing and interpretation. Università degli Studi di Napoli Federico II, Naples (13 Nov 2023).

First Collaborative Workshop UofT-UCL (18 Feb 2021) - Workshop on Mountain Societies, part of the University of Toronto-UCL International Doctoral Cluster in Mediterranean Archaeology.

SELECTION OF CONFERENCE PAPERS

Fontana, G. "Quantifying Monumentality, Labor, and Power Display in Pre-Roman Hillforts through quantitative methods" Presented at the **51th CAA conference, Auckland, 8-12 April 2024.**

Fontana, G. and R. King "A delicate balance: using Point Process Models to explore the intersection of heritage and infrastructure in South Africa" Presented at the **51th CAA conference, Auckland, 8-12 April 2024.**

Fontana, G. "Issues of Representativeness in LiDAR-based Landscape Archaeology in Mediterranean Contexts." Presented at the conference **Lidar and Landscapes in the Archaeology of Greece, American School of Classical Studies in Athens, 15 Mar 2024.**

Fontana, G. "War, mobility and empty hillforts: reshaping narratives on Samnite society beyond urbanism." Presented at the **2024 AIA Annual Meeting, Chicago, 4-7 January**.

Fontana, G. "Integrating lidar and machine learning for archaeological research and heritage management in mountainous and forested landscapes." Presented at the conference **Linking pasts and sharing knowledge, Belfast, Naples, 13-14 Nov 2023**.

Fontana, G. "Modelling hillfort communities in mountain environments." Presented at the **29th EAA Annual Meeting, Belfast, 30 Sep - 2 Aug 2023**.

Fontana, G. "A quantitative and transferable multi-scale approach for the study of hillfort communities." Presented at the **50th CAA conference, Amsterdam, 11-14 April 2023**. Winner of the 2023 Nick Ryan Award.

Landauer, J., Maddison, S., Fontana, G., and Posluschny, A.G. "Site detection across Europe and the HillfortFinderApp: Latest results from a deep learning-based hillfort search." Presented at the **50th CAA conference, Amsterdam, 11-14 April 2023**.

Landauer, J., Fontana, G., and Maddison, S. "Hillforts in Britain and Italy: Countrywide automated search for unknown sites using LiDAR data and deep learning." Presented at the **International Conference on Cultural Heritage and New Technologies, Vienna, 10-12 Nov 2022**.

Fontana, G. "A mountain society seen through hillforts: the Samnites." Presented at the conference **A Blessing and a Curse: Mediterranean mountains between idyll and violence in later prehistory, Cambridge, 9 May 2022**.

Fontana, G., Kalkers, R., and Stek, T.D. "Exploring fortified settlements in ancient Samnium: Remote sensing and intrasite surveys in mountainous landscapes." Presented at the **42nd International Mediterranean Survey, Rome, 31 Mar - 1 Apr 2022**.

Fontana, G. "Understanding a mountain society through hillforts: the Samnite case." Presented at the **27th EAA Annual Meeting, Kiel, 6-11 Sept 2021**.

Fontana, G. "Fixing the picture: a large-scale LiDAR-based study for the detection of hillforts in the mountain area of Samnium (south-central Italy)." Presented at the **40th International Mediterranean Survey, Istanbul, 4-5 Jun 2021**.

Fontana, G. "A success story: the Samnite mountain society." Presented at the **First Collaborative Workshop UCL-UniTOronto: Mountain Societies, London-Toronto, 18 Feb 2021**.

Fontana, G. "Semi-automatic detection and extraction of complex burial monuments in the Arabian Peninsula from high-resolution multispectral satellite imagery." Presented at the **46th CAA conference, Tübingen, 19-23 Mar 2018**.

Fontana, G., and Prioretta, A. "Digital views: a modern approach to the recording, studying and sharing of rock art drawings and graffiti." Presented at the **1st Saudi Archaeology Convention, Riyadh, 7-9 Nov 2017**.

TEACHING POSITIONS

Instructor for the PlaCe-ITN training (PhD and PostDoc). Covering advanced GIS applications for the PlaCe (Pre-modern Plasters and Ceramics) Innovative Training Network at UCL (6-9 Nov 2023).

Instructor for the Computational Clinic at the UCL Institute of Archaeology (MA and PhD). Covering theoretical issues in computational archaeology. Provides practical assistance in R, Python, GIS, aerial and satellite remote sensing (including multispectral imagery and point cloud LiDAR data processing), spatial and non-spatial statistics, and 3D modelling (Oct 2021-Sep 2023).

Teaching assistant at UCL Institute of Archaeology for the courses:

- Archaeological Surveying (BA), coordinated by M. Lake (Jan-Apr 2023);
- Spatial Statistics, Network Analysis and Human History (MA), taught in R, coordinated by A. Bevan (Jan-Mar 2022);
- GIS in Archaeology and History (MA), taught in QGIS, ArcGIS, and Python, coordinated by A. Bevan and M. Nebbia (Oct-Dec 2021);

Instructor at the Royal Netherlands Institute in Rome for the courses:

- Exploring mountain society in ancient Samnium (2020, 2021, 2022) (BA, MA and PhD), organised by T. Stek (Sep-Oct 2020, 2021 and 2022);
- Mountain archaeology: survey, aerial, remote sensing (BA, MA and PhD), organised by T. Stek (Jun-Jul 2021);
- Integrating aerial remote sensing in Mediterranean landscape archaeology (BA, MA and PhD), organised by T. Stek (May-Jun 2019).

Instructor at Digital Archaeology Workshop Netherlands-Flanders (Apr 2019) (BA and MA). Organized by the Digital Archaeology Group of Leiden University. Instructor in Image-Based Modelling.

Teaching-research assistant at the Faculty of Archaeology, Leiden University for the courses:

- Field Techniques (BA), coordinated by A. Louwen (Feb-Mar 2019);
- The Classical World (BA), coordinated by M. J. Versluys (Jan-Mar 2019);
- Introduction of Heritage Studies (BA), coordinated by I. R. Simpson (Sept 2018 - Jan 2019);
- Past and Future (BA) (introduction to archaeological theory and practices), coordinated by M.J. Driessen and M.S. de Waal (Sept-Dec 2018)

Teaching assistant at the Faculty of Archaeology, Leiden University for the courses:

- World Archaeology (BA), coordinated by J.A. Mol (Sept-Oct 2016);

- Death and burial in the ancient Near East and Egypt (MA), coordinated by B. S. Düring (Feb-Mar 2016).
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INVITED GUEST LECTURES IN SEMINAR SERIES

Durham University Seminar Series (6 March 2024) - War, Heterarchy and Empty Hillforts: Computational Approaches to Samnite Landscape and Political Organisation (5th-3rd Century BC, Italy).

University of Verona, Ciclo di Seminari Quaternario, Preistoria e Archeologia (31 Oct 2023) - Seminar titled 'Guerra, Eterarchia e Siti Fortificati Vuoti: Comprendere la Società Non-Urbana dei Sanniti attraverso Metodi di Archeologia Digitale'.

University of Cambridge, African Archaeology Group (24 Oct 2023) - Seminar titled 'Re-defining risk and impact in developer-led archaeology: new quantitative and qualitative approaches to large digital datasets, southern Africa'. Co-authored with Rachel King.

UCL Institute of Archaeology, IoA/ASE Seminar Series (23 Oct 2023) - Seminar titled 'Computational and landscape approaches to non-urban political centralisation in the 1st millennium BCE Mediterranean: the Samnites'.

AIA Lubbock Lectures (19 Oct 2023) - Seminar titled 'Warfare, heterarchy, and empty hillforts: Understanding the Samnites' non-urban society through digital archaeology methods.'

Incontri AIAC at the Escuela Española de Historia y Arqueología en Roma (20 Feb 2023) - Seminar titled 'A quantitative approach to the Samnite landscape.'

University of Cambridge, Computational and Digital Archaeology Lab Seminar Series (14 Nov 2022) - Seminar titled 'Layering computational techniques for the analysis of non-urban communities in hillfort sites.'

University of Oxford, Ancient Architecture Discussion Group (18 Nov 2022) - Seminar titled 'Towards a comparative energetics of wall-building in Hellenistic Italy.' Co-authored with Seth Bernard.

Incontri AIAC at the Pontificio Istituto di Archeologia Cristiana in Rome (21 Feb 2022) - Seminar titled 'Italy's hidden hillforts: uncovering the fortification systems of south-central Italy through lidar.'

EAA Community on Fortification Research (COMFORT) Seminar Series (2 Dec 2022) - Seminar titled 'Towards a transferable quantitative approach to study hillfort communities.'

PUBLIC OUTREACH

Since 2016, I have served as a coordinator at the **Centro Didattico Internazionale di Studi Archeologici di Jelsi**. In this role, I collaborate with local stakeholders and deliver educational talks to schools and municipal bodies on how archaeology can benefit local communities and contribute to research.

My work gained visibility in the September-October 2022 issue of **Archaeology Magazine**, highlighting its broader impact and relevance.

In 2021, I had the opportunity to discuss my research on **UCL's podcast 'Parkaeology Physically Distanced,'** further disseminating my work to an engaged audience.

OTHER ACADEMIC ACTIVITIES AND AFFILIATIONS

Member of the **Scientific Committee for Computer Applications and Quantitative Methods in Archaeology International (CAA)** (June 2024 - present).

Board member of the **Computer Applications and Quantitative Methods in Archaeology International North America Chapter (CAA-NA)**. Membership Secretary. (April 2024 - present).

Board member of the **EAA Community on Fortification Research (COMFORT)** (2021 - present, in the board from Jan 2024).

Member of the **European Archaeological Council (EAC) working group for drafting guidelines on the use of lidar in archaeology** (2022 - present).

Member of the **EAA Community on Fieldwalking Documentation (FIDO)** (2022 - present).

Member of the **Computer Applications and Quantitative Methods in Archaeology International (CAA)** (2018 - present).

Member of the **UCL Research Network 'The End of the Spectrum: Towards an Archaeology of Marginality Network'** (2021 - present).

PhD representative for the University of Toronto-UCL International Doctoral Cluster on Mediterranean Archaeology (Oct 2020 - Sept 2022).

PhD representative at the UCL Institute of Archaeology - Member of the Research Committee, Teaching Committee, and Staff/Student Consultative Committee (Sept 2019 - Sept 2022).

Co-organizer of the **Digital Archaeology Group (DAG)** at Leiden University (Aug 2018 - Sept 2019).

SELECTION OF FIELDWORK EXPERIENCES

Tappino Valley Survey and Landscapes of Early Roman Colonization, Italy (2016 - 2022) - Directed by T. Stek, Royal Netherlands Institute in Rome and Leiden University.

- 2020-2022: Field co-director (2 fieldwork campaigns annually).
- 2018-2019: Field coordinator and specialist in remote sensing (2 fieldwork campaigns).
- 2016-2017: Staff member in charge of LIDAR analysis and field leader (2 fieldwork campaigns).

Materials Study Fieldwork Campaign at Gortyn, Crete, Greece (Jul 2019) - Directed by Prof. J. Vroom and E. Zanini, Leiden University and University of Siena. Staff member in charge of logistics and materials photography.

Impero Archaeological Project, Italy (May 2019) - Directed by A. Sebastiani and Michelle Hobart, University at Buffalo and The Cooper Union for the Advancement of the Science and Arts. Specialist in LIDAR analysis

Survey of the Hill-fort of Icedo, Spain (Aug 2018) - Directed by J. García Sánchez. Staff member in charge of LIDAR analysis.

Marzuolo Archaeological Project, Italy (Jun - Jul 2018) - Directed by A. van Oyen, R. Vennarucci, and G. Tol, Cornell University, University of Arkansas, and Melbourne University. Head field surveyor.

Saudi-French Archaeological-Epigraphic Mission to Najrān (Feb-Mar 2017 / Nov 2018) - Directed by C. J. Robin, French National Centre for Scientific Research (CNRS - UMR 8167 - Orient & Méditerranée) and Saudi Commission for Tourism and National Heritage. Staff member in charge of satellite remote sensing, survey organization, and 3D modeling.

Wadi al Jizzi Archaeological Project, Oman (Dec-Jan 2015 / Dec-Jan 2016) - Directed by B. S. Düring, Leiden University and the Ministry of Heritage and Culture of Oman. Person in charge of satellite and aerial remote sensing (drone).

The Paths of the Veneti (Apr-Oct 2014) - Federation of the Archaeological Association of Veneto. Coordinator of activities and person in charge of aerial remote sensing and spatial analysis

DEVELOPMENT-LED ARCHAEOLOGY

Archaeological Rescue Excavation of the Planned Route of the Batinah Expressway, Segment 5, Oman (Jun-Dec 2014) - Directed by M. Tosi, Ministry of Heritage and Culture and Ministry of Transport and Communication of Oman.