

CENTER FOR ANCIENT MIDDLE EASTERN LANDSCAPES

MEHRNOUSH SOROUGH

In 2023–24—thanks to all the foundational work of the previous year—the administrative and intellectual potential of the Center for Ancient Middle Eastern Landscapes (CAMEL) began to bloom. Except for me in my role as the director, CAMEL is a fully student-run lab. A cohort of undergraduate and graduate students collaborate on various projects, assist the community with various geographic information system (GIS) and landscape research needs, and, more importantly, mentor and support each other.

CAMEL's aim is to maintain and strengthen its reputation as a support center for the archaeological geospatial research community. We finished the CAMEL database search improvement project that had started the previous year and now allows spatial map-based searches of CAMEL's 10,000 digitized and geo-referenced historic maps and satellite images through the Big Ten Academic Alliance (BTAA) Geoportal project (<https://geo.btaa.org/>). This initiative was carried out by Dominik Lukas and former staff assistant Murphy (Ruoyang) Tu, supported by Foy Scalf, the head of ISAC's Research Archives and its Integrated Database Project; Rose Pezzuti Dyer, a University of Chicago software developer; and Karen Majewicz, the BTAA Geoportal project manager. Christian Borgen and Ruijie Yao began a multiyear project of examining CAMEL's nonpublic records and adding additional records to CAMEL's digital database. Furthermore, in collaboration with Prof. James Osborne, Dominik Lukas and Jiayue Wang resumed work this year on CAMEL's Anatolian Atlas project (<https://isac.uchicago.edu/research/camel/anatolian-atlas>), aiming to update the database and redesign its public interface. CAMEL also officially started its paid digital cartography service, which assists researchers, authors, and producers with a variety of mapping, analysis, and digitization projects. Finally, Çağlayan Bal designed and developed an administrative system for official equipment requests and rentals, allowing CAMEL to act as the management center for the borrowing of ISAC field equipment by University of Chicago projects.

CAMEL tested a new program, the CAMEL Fellowship, aimed at focused GIS training, professional development, and public engagement. The program is open to all advanced PhD students and postgraduate scholars across campus and in the greater Chicago area. Anna Berlekamp was the 2023–24 CAMEL Fellow, with a project on movement analysis in south-central Anatolia that contributes to her PhD dissertation on territoriality in Middle Bronze Age Anatolia. As a part of this fellowship, she presented her work-in-progress at CAMEL's monthly brown-bag meetings and received feedback from the CAMEL community as well as from two specialists in movement analysis: Prof. Scott Branting, from the University of Central Florida, and Dr. Adrian Chase, postdoctoral fellow at the University of Chicago's Mansueto Institute for Urban Innovation. CAMEL Fellows receive a modest monetary award for presenting their polished work at a relevant University of Chicago workshop and as a public talk at ISAC, as well as for writing up their results as a draft book or dissertation chapter or as a journal article.

In addition to providing research support, CAMEL strives to maintain its reputation for research innovation. One of the areas in which CAMEL has started to focus heavily is the application of artificial intelligence (AI) in archaeological mapping. While AI and deep learning have revolutionized many industries, they have not been systematically adopted in archaeology because of technical, infrastructural, and financial barriers. Despite many publications advocating the feasibility of this application of AI, archaeology and

cultural heritage management still rely heavily on the visual inspection and manual detection of remains on satellite and aerial imagery because teams in these fields typically lack the intricate skills required for integrating AI into their remote-sensing workflows.

To contribute to solving this problem, CAMEL launched a collaborative project, AI-Assisted Archaeological Remains Detection (A3RD), that aspires to create a breakthrough in the application of AI in everyday archaeological remote-sensing tasks. The project's present partners are the University of Chicago's Research and Computing Center (RCC); Rémi Cresson, a remote-sensing engineer from France's National Research Institute for Agriculture, Food, and the Environment; and Dr. Emad Khazraee, vice president of data science and AI at Xometry. Seed money from ISAC enabled us to implement the first phase of the project. Several workshops and hackathons were held at CAMEL to introduce student research assistants to machine-learning and deep-learning topics in preparation for a final hackathon between April 29 and May 6, 2024, which was taught and led by Cresson, supported by Khazraee and Parmanand Sinha of the RCC (figs. 1–3). The team succeeded in implementing a proof of concept for the project's long-term vision. We trained a simple AI model to detect Erbil Plain qanats (underground water extraction and transportation systems) on CORONA Mission 1039 images in a transparent, unbroken software workflow that integrated data annotation, model training, and model evaluation into the archaeological workflow using open-source data.

The success of these projects and of many other activities not described here is a testimony to the talent and dedication of the 2023–24 cohort of CAMEL research assistants, who go above and beyond my expectations every day. Three members of our staff continued to support CAMEL while taking their PhD candidacy exams and defending their proposals. I thank Dominik Lukas for his masterful supervision of the CAMEL lab's many projects; Çağlayan Bal for assisting Dominik in planning and programming, for her meticulous management of finances and equipment rentals, and for her laborious work in creating many



Figure 1. AI and machine-learning workshop taught by Emad Khazraee.



Figure 2. CAMEL's first deep-learning hackathon, led by Emad Khazraee (standing). Participants (left to right), front row: Parmanand Sinha (RCC staff), Yuwei Zhou, Jiayue Wang, Joseph Harris; back row: Dominik Lukas, Çağlayan Bal, Harrison Morin.

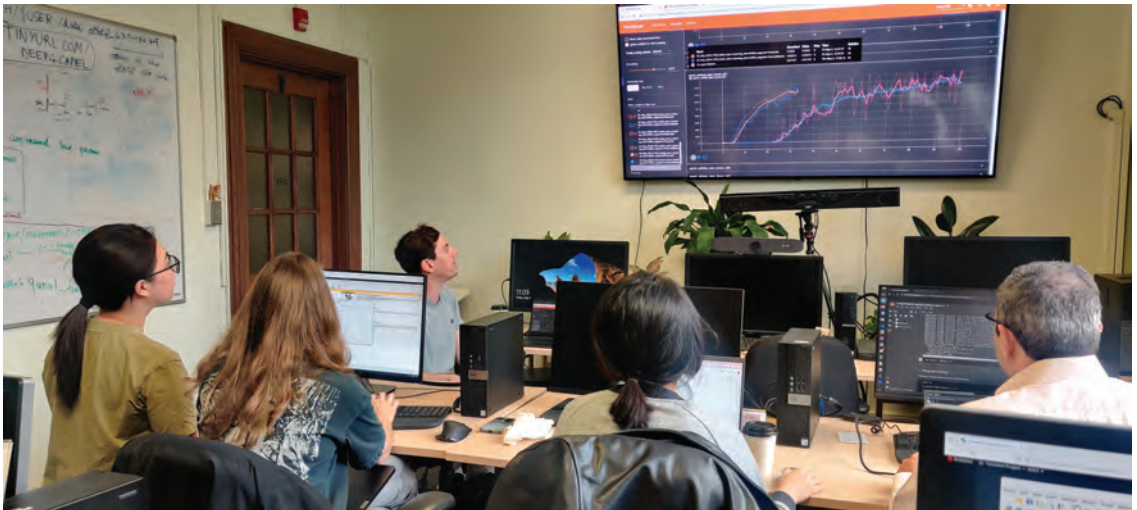


Figure 3. AI-assisted archaeological detection hackathon led and taught by Rémi Cresson. Participants (left to right): Yuwei Zhou, Breanna Maestas, Jiayue Wang, Emad Khazraee.

user manuals and other forms of documentation to make the lab's operation consistent and reliable; Yuwei Zhou for leading the AI detection project and for daring to be the first one to figure out many puzzling tasks; Harrison Morin for regularly lending his technical expertise to solve information technology (IT) and GIS problems and for cracking seemingly unsolvable research questions; Christian Borgen for bringing the remarkable patience and thoroughness of an Assyriologist to CAMEL database management tasks; Joseph Harris for his willingness to help with any project that needed support, as well as for designing all of CAMEL's visual and communication templates and content; Jiayue Wang for passionately bringing her computer science and GIS skills to several GIS research and database projects; and Breanna Maestas for her short but meaningful contribution to the AI initiative as a part of her Quad Undergraduate Research Scholars award.

As always, I would like to conclude by extending my gratitude to the generous individuals who helped us with their time, thoughts, and expertise. Special thanks go to ISAC's administration for funding and for providing immense administrative support—in particular, ISAC director Tim Harrison, Sheheryar Hasnain, Marianna Capeles, and Matt Perley; Josh Tulisak for redesigning CAMEL's beautiful new logo; Vick Cruz and Logan Conley for logistics and IT support; and CAMEL's steering committee—James Osborne, Hervé Reculeau, and Yorke Rowan—for serving as a sounding board for CAMEL's strategic planning.

CAMEL's strength and vision are defined by its community. That community includes not only CAMEL's talented and dedicated staff but also all our supporters and collaborators within the University and internationally. If you would like to keep abreast of important CAMEL news, please email your contact information to us at camel@uchicago.edu to be added to our mailing list. If you are interested in receiving support for your project, collaborating with us, or funding one of our many projects, please write to me at mehrnoush@uchicago.edu. We would love for our community to grow, as our connections make us stronger.
