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Ten years have passed since I returned to the Oriental Institute as the new director of CAMEL. At the time, CAMEL consisted of two old computers in a small basement room and a folder of CDs containing around 300 satellite images and some field notes. It had served as the incubator for the work of four graduate students working under Tony Wilkinson, each of whom has flourished in the years since graduating. However, CAMEL has always had the potential to reach many, many more people with its unique blending of satellite imagery and other forms of geospatial data together with research into the ancient and modern Near East. Ten years ago I set out to expand upon Tony's vision and to grow CAMEL into the center that it is today.

The cornerstone of my vision for CAMEL is to make the geospatial collections of the Oriental Institute as freely and widely available as is possible within the bounds of copyright law. This includes the legacy of generations of scholars who have come before us, who painstakingly collected and developed important and unique datasets, maps, and aerial photographs. Along the corridors of the Oriental Institute have walked pioneers in aerial photography



Figure 1. A portion of a 1910 map of the Middle East, Map V of Henrici Kiepert's Formae Orbis Antiqui, showing the area of modern Syria, northern Iraq, and southern Turkey that is sadly in the news so frequently today. This map is one of thousands in the CAMEL collections that have been scanned and georectified by our staff and volunteers to match their appropriate coordinates on the earth's surface

CAMEL



Figure 2. A portion of a 1967 US Air Force Operational Navigation Chart from the CAMEL map collections entitled Gulf of Oman. It shows the Strait of Hormuz and bears an interesting warning concerning flights over Iran

and the implementation of satellite images to fieldwork. They worked alongside researchers, architects, and surveyors who spent their careers on the ground in countries across the Middle East, bringing to light its past through world-class field research. To keep their work inaccessible to all but the few who can find it among the paper records of the Oriental Institute would be a great travesty. CAMEL has grown to play a critical role in making their work accessible and available in digital formats to current and future generations of scholars, while at the same time bringing into the Oriental Institute the wealth of new data and geospatial technologies that have exploded over the past two decades. CAMEL serves as a repository for these new data and technologies, as well as a source of expertise and vision in these areas for researchers in the building and our colleagues around the world.

With this vision in mind, and a growing range of expertise imparted through the training of new generations of students, CAMEL has grown its collections of digital data from those 300 images to just under 20,000 items. This includes scanning and georectifying the entire collection of maps from the Research Archives' collections, expanding enormously the scanned collection of declassified US spy satellite images and georectifying them, digitizing collections of current and retiring scholars' geospatial data and notes from within and outside the Oriental Institute, and entering into cooperative agreements with colleagues and government agencies to acquire collections of data and imagery. The sixty-six times growth in the collections, almost all of which we can make freely available to people around

the world who ask and need this data for their research or studies, has massively expanded the outreach of CAMEL. Instead of benefiting a handful of people affiliated with the Oriental Institute, we are annually fielding hundreds of requests from people around the world. At the same time, we are enabling and facilitating research across the Middle East by doing tasks that would be impossible or excessively time consuming for the individuals or teams to have done on their own. CAMEL has become a key center for geospatial data access among scholars of the Near and Middle East.

Over this ten-year period, CAMEL has also taken a lead role in expanding the technological capabilities of the Oriental Institute. The laboratory has grown from two old computers in the small basement room to twelve computers across three rooms, nine of which are available for use by everyone using or visiting CAMEL. Through grants received by CAMEL, we've been able to expand the capabilities of the Oriental Institute by purchasing a large-format scanner and new large-format plotter. The plotter has gone on to see extensive use, not only for field projects, but also by the Museum in printing out most of their exhibit displays and large promotional material. It has led to significant cost savings over outsourcing these printing needs. The scanner has seen enormous use, not only in scanning the maps from the Research Archives, but also in scanning the large-size plans and illustrations from research projects past and present. As the Oriental Institute embarks on the lengthy task of digitizing the archives, this scanner will see many more years of work. In addition, CAMEL, with its need for large amounts of data storage for its digital collections, also took the lead role in bringing terabytes of secure offsite storage space to the Oriental Institute. Prior to this, backups of individual computers were left to each user, and data was lost due to hardware malfunctions. With the Oriental Institute Archive (OIA) space on University servers, we have enjoyed years of secure backups to meet individual users' and projects' needs as well as the expanding data storage needs brought on by digitization efforts across the Oriental Institute.

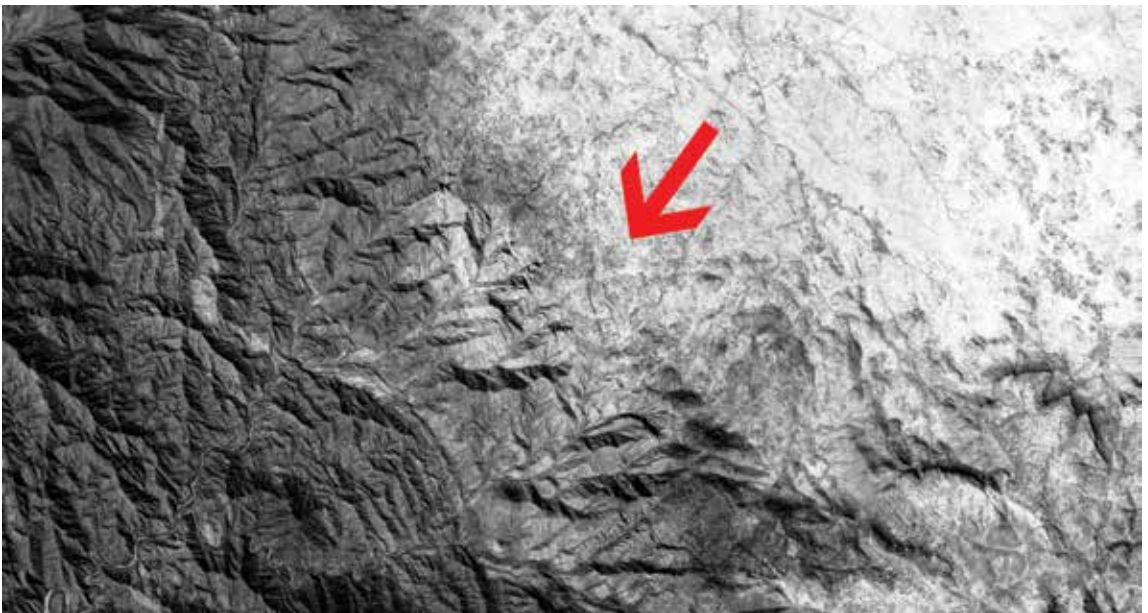


Figure 3. A portion of one of the thousands of declassified US spy satellite images in the CAMEL collections taken over Al Fara in Saudi Arabia in December 1967. The city is marked by the arrow

CAMEL

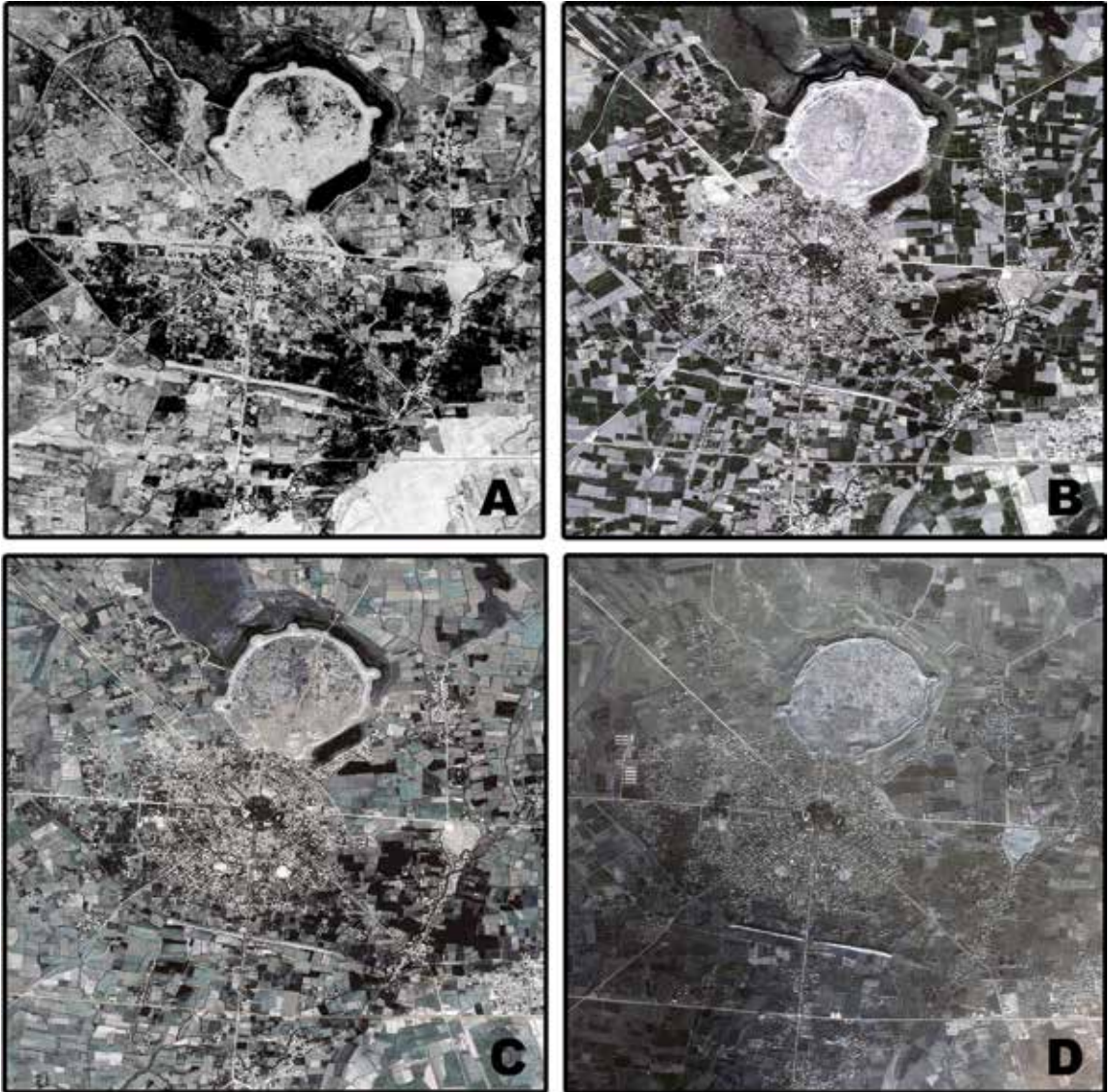


Figure 4. A crucial time series of images taken over Balkh (ancient Bactra) in northern Afghanistan between 1968 and 2012 that formed part of the inaugural year of the cultural heritage automated monitoring project. The city was an important center of both Buddhism and Zoroastrianism and became a capital of Greco-Bactria after its conquest by Alexander the Great. During the medieval period, Balkh was destroyed by Gengis Khan and was expanded under the Timurids. The round citadel (in the upper part of the imagery) and segments of the city wall (to the south of the town) are visible in each image. Image A is a portion of a declassified spy satellite (CORONA KH-4a) taken July 1968, B is a Digital Globe Quickbird satellite image taken April 2006, C is a Digital Globe WorldView 2 satellite image taken June 2010, and D is a WorldView 2 satellite image taken January 2012

Finally, CAMEL has significantly expanded its outreach and training programs during the past ten years. We've hosted dozens of scholars from around the world: from faculty members on leave from other universities, to postdoctoral scholars and predoctoral students. They were drawn to CAMEL by the opportunity to work with its collections, beyond the usual requests for our data that we freely deliver to people remotely, as well as to receive specialized training in the application of geospatial technologies to their research. Some

stayed for a day or two, others for months or even years. We were delighted to meet each of them and to enable their unique research. At the same time, CAMEL partnered on several occasions with the Public Education and Outreach Department of the Oriental Institute to expand our knowledge and expertise into outreach with the Chicago Public Schools. We successfully received grants for developing and implementing outreach programs and curriculums combining STEM subjects and technologies with archaeology as a powerful tool to reach elementary and junior high school students. We are very grateful for the opportunities that this collaboration with the excellent staff and volunteers in the Public Education and Outreach Department afforded. It has both broadened CAMEL's impact and outreach while also exciting new generations of future university students.

This past year has been a continuation of this ten-year trajectory of development in CAMEL. We expanded the CAMEL collections by over 400 images, including the purchase of 252 declassified US spy satellite images from the 1960s and 1970s that together cover the entirety of Afghanistan. These, along with an additional 1,420 of these declassified images, comprised the corpus of 1,672 spy satellite images that were painstakingly georectified by our loyal students and volunteers. This work is a continuation of our efforts to make these important images freely available to researchers and students in an already georectified form, one where the images are stretched to match the coordinates on the earth over which they were originally taken. Researchers can then forgo days of preparatory work by directly importing the images into GIS software and immediately comparing them against more modern satellite images or data that they have just collected in the field.

By acquiring declassified imagery for the entirety of Afghanistan this year, we were also able to begin a project by which CAMEL will monitor the state of cultural heritage in the country. Complementing this work, CAMEL took advantage of a sale on modern Digital Globe satellite data to purchase 167 images, many of them from Afghanistan. We were then able to make use of a time series of satellite images, starting with the 1960s' spy satellites and continuing through successive Digital Globe images from the last decade, in order to start to catalog damage to sites across Afghanistan from warfare or looting. CAMEL even began the process of developing a new protocol for automating the monitoring of this destruction of archaeological sites across the Near East, a significant advance that will yield important benefits to monitoring cultural heritage not just in the region but also around the world.

A final accomplishment in this busy year was my writing of the next IMLS grant for the Integrated Database Project, which will, among other tasks, see the importation of all of CAMEL's data into this online database that links the diverse collections of the Oriental Institute. Making CAMEL's collections available online for immediate download by individuals around the world has always been an ultimate goal of my vision of CAMEL. Time was also spent this year undertaking all the preparatory work necessary for this important transition. Detailed schemas of the existing database, which we started creating just over nine years ago and have been using ever since, were developed. Screenshots of each portion of the existing database were collected. We also spent time discussing the specifics of the transition with the IDB project manager, Angela Spinazze, and making decisions on the tables and fields to bring across and the look and feel of the new interface. All this hard work should set up a relatively easy transition for the new CAMEL director to be able bring to fruition, over the next two years, this vision for the new CAMEL portion of the online Integrated Database.

Acknowledgments

As I have said every year for the past ten years, CAMEL would never have been able to achieve all that it has without the dedicated hard work of our team of staff, students, and volunteers. The accomplishments of CAMEL are a tribute to their dedication and efforts. This year, Elise MacArthur and Susan Penacho continued to serve in their capacities as associate directors of CAMEL. Adam Zeidan served as the student supervisor, while Karl Kuehner served as our volunteer supervisor. Student assistants this year were: Neil Backus, Jessica Jarvinen, Caroline Quinn, and Edward Fernandez. Anthony Lauricella and Josh Cannon worked with us as assistants on the Afghanistan cultural heritage monitoring project. Our dedicated CAMEL volunteers this year were: Larry Lissak, Emilie Sarrazin, Sasha Rohret, and Nicole Herzog. Thank you all. It has been a pleasure to work alongside you, and all of your predecessors, during these ten years of such remarkable achievement.
