KITES IN CONTEXT

YORKE M. ROWAN, AUSTIN "CHAD" HILL, AND MORAG KERSEL

The second season of the Kites in Context (KiC) project, which took place from May 19 to June 16, 2023, continued the multiscalar investigation of desert "kites" in the eastern *badia* region of Jordan, one of the core regions of kite distribution. This project is designed to provide novel insights into the chronology and function of these animal traps through an intensive study incorporating remote sensing with boots-on-the-ground excavation and survey. Several scales of investigation are included: satellite and aerial imagery to investigate the distribution of kites and associated structures throughout the region, drone imagery to map and record the landscape in high resolution around a small subset of kites in the *harra* (basaltic desert), and excavation and terrestrial survey to study individual kites and associated structures at an even smaller scale. Our focus on the area around a wadi known as Wadi el-Mahdath (32°19′35.64″N, 37°59′52.41″E) continued in 2023 because the site appears to be a concentration point for human and animal use of the landscape, containing many structures, and sits along one of the primary kite chains in the *harra*. In 2022 our excavation efforts had focused on the kite that sits immediately north of Wadi el-Mahdath, which we labeled "KiC 1-4." In 2023 we focused our excavation and pedestrian survey efforts on the next kite to the south, KiC 1-5.

AERIAL SURVEY

This project builds on the aerial survey work previously conducted (Hill, Rowan, and Kersel 2014; Hill and Rowan 2017, 2022) as part of the Eastern Badia Archaeological Project at the sites of Wisad Pools and Wadi al-Qattafi (Hill et al. 2020; Rollefson et al. 2018; Rowan et al. 2015, 2017). Using drones to map ancient landscape features at a much higher resolution than satellite imagery can attain provides a level of detail, in 3D, otherwise unavailable. This level of recording is necessary to map smaller Neolithic and prehistoric features. In 2022 we had visited as many of the kites as possible ($n = 15$) in the two easternmost chains, recording high-resolution mapping data sufficient to produce high-resolution, spatially accurate, and undistorted orthophotographs and accurate digital elevation models (DEMs), as well as oblique images that can serve as a visualization of these features for publication and public presentation. In 2023 we continued the mapping project by visiting additional kite enclosures and mapping other ancient features on the landscape.

The 2023 aerial survey was hampered by factors that limited the amount of work we could accomplish. First, the surprising weather for late May and early June—dust and lightning storms, followed by days of rain and eventual flooding of our campsite (figs. 1 and 2)—caused a delay in the drone mapping program and the loss of five flight days, at significant cost. In addition, the logistics of organizing the military representative to be on-site with us for all drone flights created a significant barrier. Despite the weather and logistical issues, the aerial campaign was a success. We photographed and mapped some fourteen so-called "wheels," twelve kite enclosures, and a few other anthropogenic structures, such as tailed tombs and "paths," and recorded images of the flooding (fig. 3). In total we recorded approximately 10,000 images as part of photogrammetry sets that will become orthophotographs and DEMs of the various features visited. An additional 3,800 images were taken with the mini drone for use as illustrations of the landscape and features.

Figure 1. Kites in Context camp near Wadi el-Madath after rain. Photo by Y. M. Rowan.

Figure 2. Flooded camp with forlorn tent. Photo by Y. M. Rowan.

Figure 3. Aerial view of "wheels" surrounded by flooded desert. Photo by A. C. Hill.

EXCAVATIONS

Cells

During the 2023 season we excavated two cells of the next kite in the chain, KiC 1-5. In addition, we excavated two prehistoric structures we hoped would be contemporaneous with the kites. The two cells selected for excavation were undisturbed by later rebuilding, reuse, or looting. Cell 4 was of interest not only because it was intact but also because the wall leading into the cell from the enclosure wall was clearly visible (fig. 4). Cell 4 is approximately 6.0–6.5 m in exterior diameter. We excavated the eastern half of the cell to about 1.0 m below the surface of the cell's interior, removing an enormous amount of stone that did not represent a clear wall. Instead, it appears that after a pit was dug, large stones were deposited around it, and heaps of stone were then piled on top. To make the walls higher, it seems likely that larger basalt boulders ringed the exterior, creating wide walls, on which additional large and medium-sized cobbles could be piled.

Cell 7 was selected not only because the surrounding walls appeared to be in good shape but also because we noticed that some cells had an unusual "threshold" stone—a large, flat stone

Figure 4. Cell 4 excavated, with wall connecting it to the kite enclosure. Photo by Y. M. Rowan.

intentionally set at the entrance to the cell (fig. 5). Bisecting the cell, northeast to southwest, across the center of this threshold stone exposed a built wall on the cell's interior. Bedrock lay only 60 cm below the cell's interior sediments, suggesting that the massive amount of stone filling the cell was collapse from the walls built to prevent gazelles from jumping out once inside the cell. On the exterior, below the threshold stone, a short incline was built with large and medium-sized cobbles, creating a ramp up to the cell pit. No artifacts or datable material were found in either cell, but samples were taken from both for optically stimulated luminescence (OSL) dating.

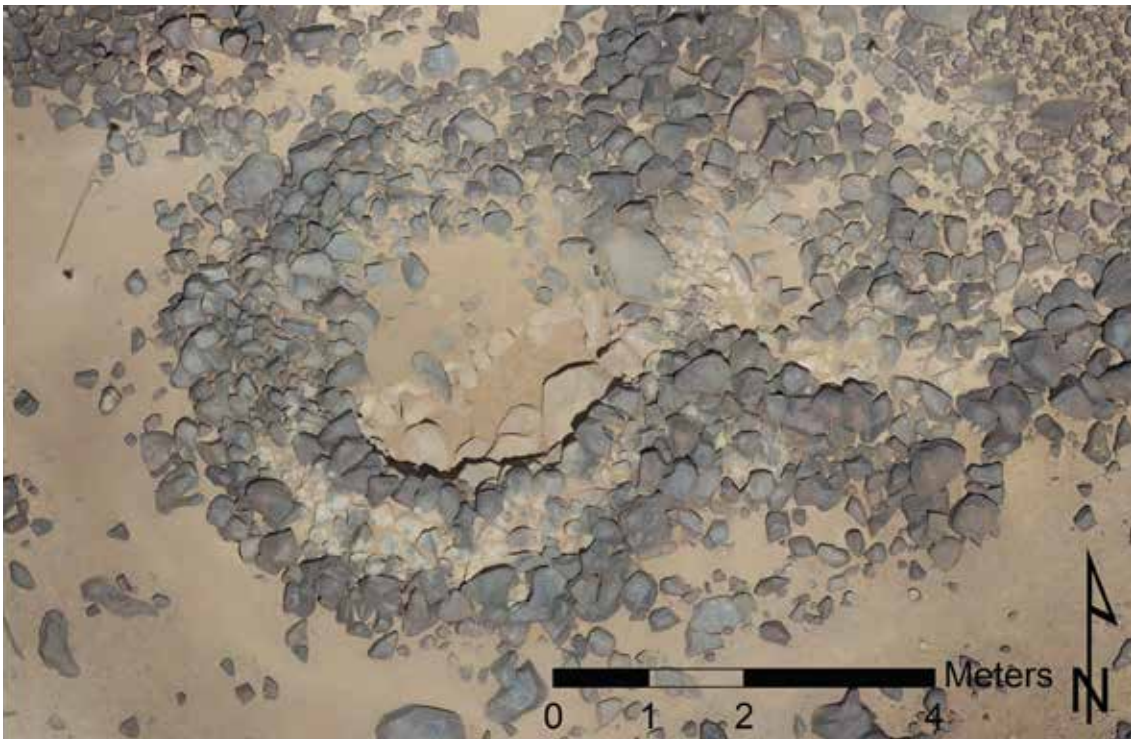

Figure 5. Excavated Cell 7 with "threshold" stone at entrance to cell. Orthophotograph by A. C. Hill.

Structures

In addition to the two cells, two structures were excavated. Structure 1 spanned 8 m across, including a small, circular exterior feature attached to the south end of the structure (fig. 6). The structure was sectioned down the middle, and its eastern half was excavated. The north end of the structure included a petroglyph depicting a kite on a loose large stone. The main structure was defined by an alignment of large, upright stones demarcating a wall. Excavating around the exterior of the large upright stones, we found stones aligned as a foundation or buttressing to the upright stones. These wall supports extended 0.7–1.0 m in width around the upright structure wall. They stopped at the circular feature attached to the south end of Structure 1. Very few diagnostic flint artifacts were found in the shallow deposits of the structure, and no bone or ceramics were recovered.

Structure 2 was composed of a circular structure; an L-shaped feature attached to the east edge of the circular structure; a "courtyard" or open-air space; and a separate, U-shaped structure attached to the southeast side of the patio (fig. 7). After initially removing tumble, we identified the separation of the circular structure and the L-shaped feature. The circular structure is defined by an alignment of large, upright

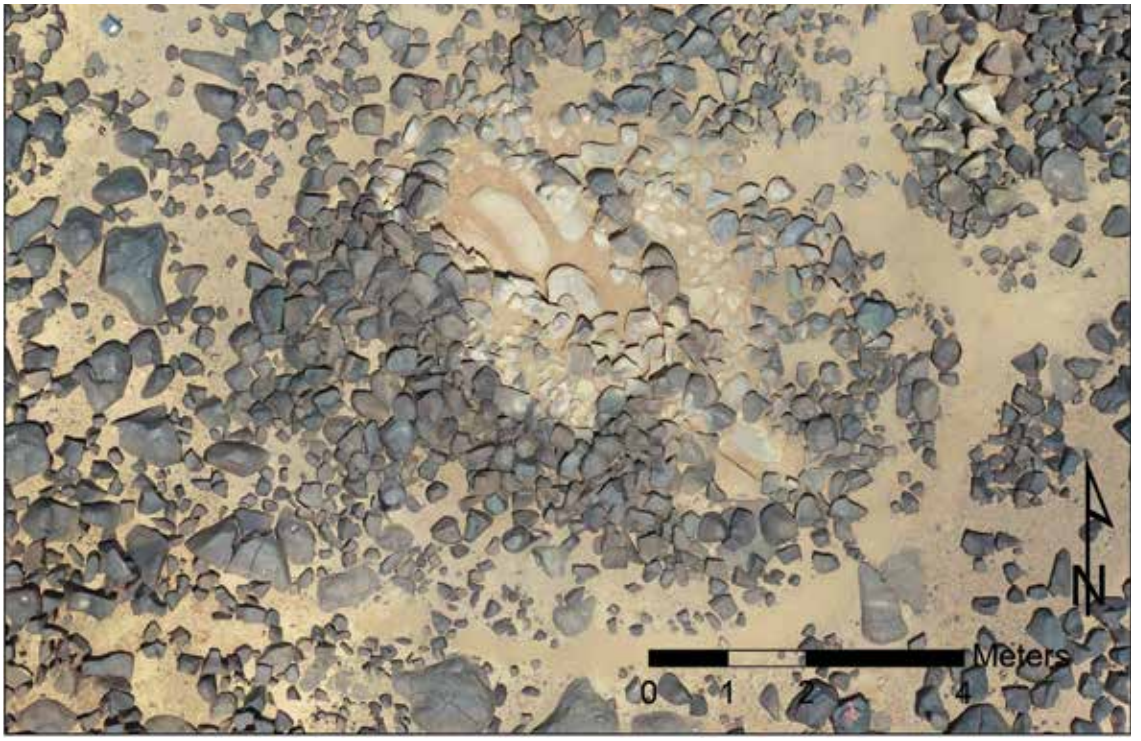

Figure 6. Excavated Structure 1. Orthophotograph by A. C. Hill.

stones and some stacked stones that make up the wall of the upper tier of construction. Near the center of the circular structure's interior was a large stone with a flat top, probably a central work "table," around which a probable floor included flint flakes and small, flat basalt pebbles.

The connection of the L-shaped construction and the circular structure seems to be a slightly later addition. The courtyard or open-air space southeast of the circular structure contained many lithic artifacts, particularly drills, suggesting its use as a workspace.

PEDESTRIAN SURVEY

In 2022 we had surveyed the hundreds of petroglyphs around the "Roman Pool" of Wadi el-Mahdath, where the density of structures and petroglyphs appeared highest. In 2023 we expanded this survey to understand more about the distribution of archaeological materials around this landscape. Morag Kersel conducted two complementary surveys: a large, transect-based survey of the region

Figure 7. Structure 2 with central work "table." Photo by B. Heidkamp.

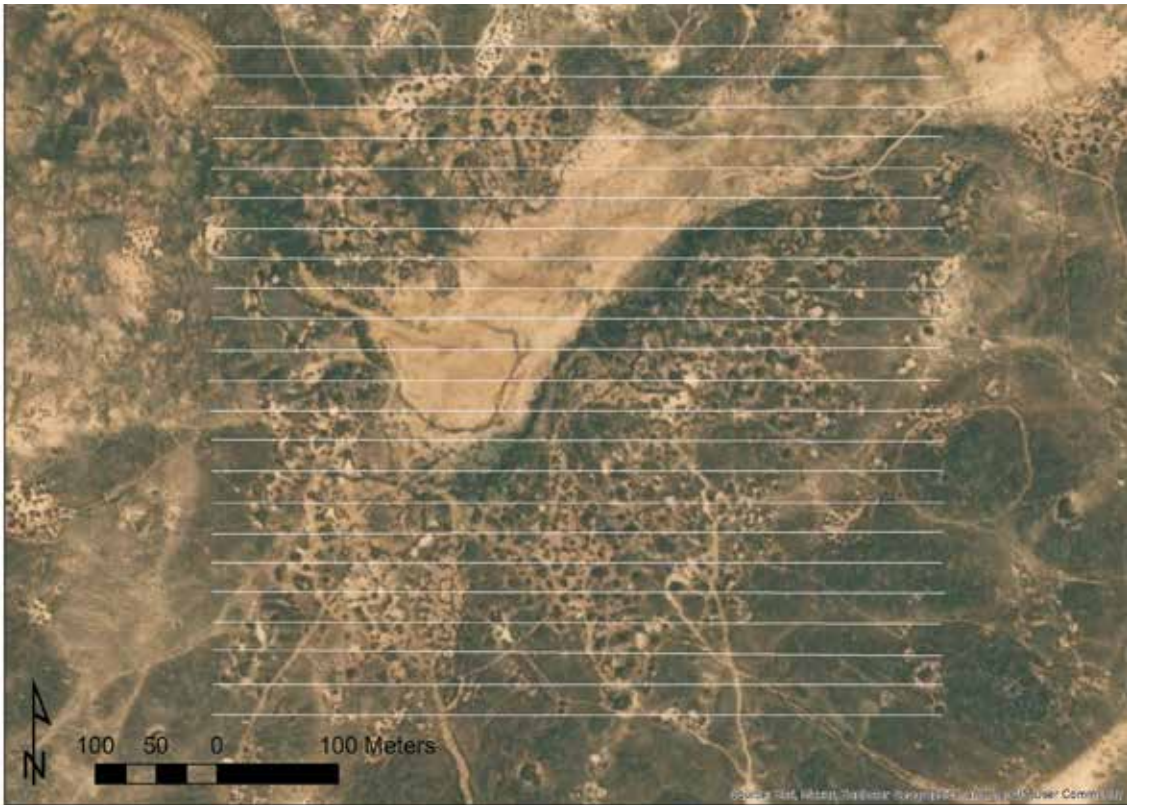

Figure 8. Transects of pedestrian survey around the Roman Pool of Wadi al-Mahdath. Orthophotograph by A. C. Hill.

around KiC 1-5 (fig. 8), and a more intensive pickup of surface materials around individual structures. Kersel walked twenty-three transects of 600 m each, stopping every 50 m to record data (GPS coordinates, environment, artifacts, landscape, looting, and site disturbance). Between 50 m points, any surface artifacts were recorded using counters, and the counts were added to the form at the 50 m mark. Kersel also noted points of interest (POIs) along the transects, including structures, petroglyphs, standing stones, enclosures, kite walls, and cells. The second element of her work was an intensive survey of forty-nine visible surface structures (tombs, kite cells, and oval piles of stones) in the area southwest of the Roman Pool. Recording the GPS coordinates around identified structures, she then conducted a surface pickup in a 2 m radius (a methodology known as a "dog-leash pickup"). For each structure, photographs were taken, its description given, counts of any artifacts made, and any petroglyphs and evidence of looting recorded. The survey was successful at recovering a sample of material culture from a range of structures; the samples should provide insight into the range of functions of the individual structures. Similarly, the transect survey will help visualize the overall distribution of artifacts and POIs across the area.

CONCLUSION

From the aerial and pedestrian surveys to the excavations of kite cells and buildings, 2022–23 saw a successful archaeological season for the Kites in Context project. Processing the 14,000 images into orthophotographic maps and DEMs will take many more months of work, but initial testing demonstrates that this data will produce maps with superb accuracy and excellent coverage. Crucially, we hope that OSL and radiocarbon dating, from this season and future seasons, will also help answer some of the ongoing questions

about the timing of the construction and abandonment of these kites and other structures. There remain very few good, published dates for the kites, and we hope that our work will help build a comprehensive picture of kite development and operation. Future seasons of research will focus on additional mapping of kites and their associated features, as well as on expanded excavation of the kites and associated structures that have been surveyed and mapped via drone.

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