

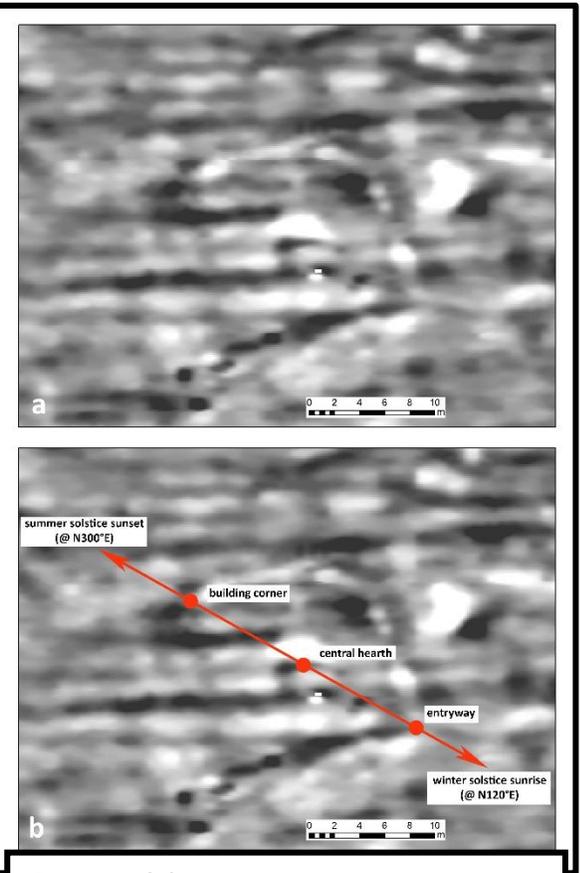
## WESTERN CAROLINA FIELD SCHOOL REPORT FROM WATAUGA

Dr. Jane Eastman & Dr. Brett Riggs  
(Western Carolina University)

Drs. Jane Eastman and Brett Riggs returned to the former Cherokee town site of Watauga for a second summer field season in June 2022, following up on a successful field school in July 2021. The emphasis of both field schools was the use of non- or minimally-intrusive technologies to explore the site's structure. The initial results illustrate the overall organization of the site and provided detailed information about the public architecture on the two mounds there. Gradiometer surveys of the site produced a georeferenced image of the presumed council house on Mound A that indicates a structure position and alignment that appear to reference important celestial events. This work presented an opportunity to explore aspects of Cherokee astronomy during this summer's field season. We'll briefly describe the results of a simulation that our students conducted on the evening of the summer solstice (June 21, 2022) to demonstrate the effects of the building's alignment.

Gradiometer survey of Mound A revealed key architectural details about the building at the center of the mound's top surface. It was square with rounded corners and the corner with the entryway appeared to be oriented to face the rising sun on the winter solstice (N120°E [aka S60°E]) (**Figure 1a**). Gradiometry also revealed the location of the central hearth in line between the southeastern corner entry and the northwestern back corner (**Figure 1b**). That configuration would allow the light from the rising sun on and around December 21<sup>st</sup> to enter the building through the entrance tunnel and doorway and, if unimpeded, cross over the hearth to illuminate the back corner of the structure. During our June field school this year, we tested the building's solstitial alignment during the summer solstice.

At this latitude, the summer solstice sun sets on the horizon at N300°E (aka N60°W), exactly opposite the winter solstice sunrise (N120°E [aka S60°E]); these two annual events are marked by a single axis (**Figure 1b**). Given that correspondence, we formulated a simple simulation to test how closely the main axis of the building aligned to the solstitial axis. Our students built a framework that approximated the dimensions of the doorway and entrance



**Figure 1: (a) gradiometry-generated image of Mound A structure, (b) annotated image indicating the central axis of the Watauga Mound A moundtop council house.**



**Figure 2: Views of the summer solstice simulation at Watauga.**

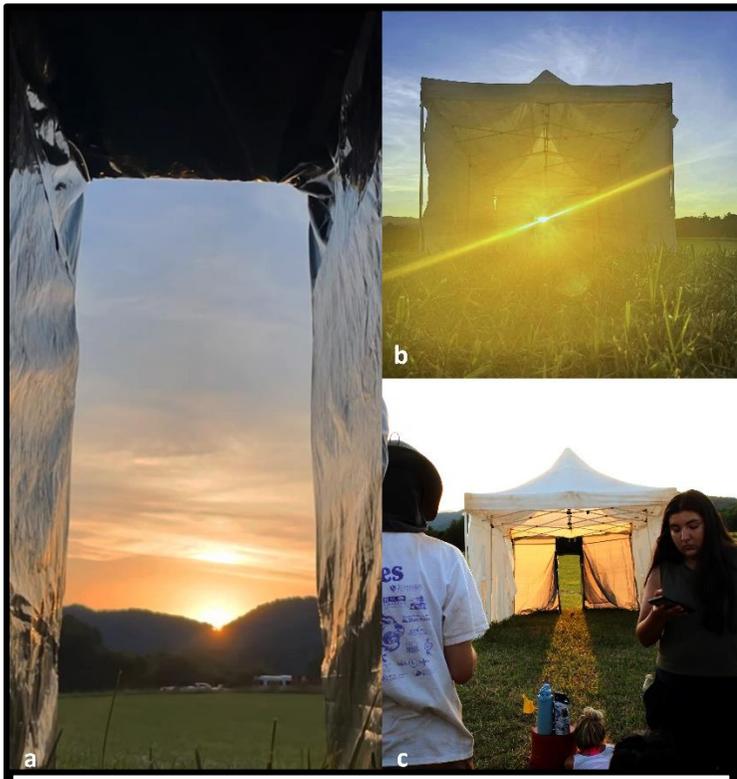
axis of the building and extended across the position of the hearth. Within 2 minutes of aligning with the structure's axis and illuminating the hearth area, the sun fell below the western horizon and the beam of light abruptly disappeared (**Figures 3a and 3b**). This dramatic effect indicated that the entryway and central axis of the Cherokee structure on Mound A was perfectly aligned to the solstitial axis.

Another aspect of the building position and alignment was also evident that evening. The sun set in a distinct notch on the western horizon, created by two ridges on the south and west slopes of Roper Knob, just over 3 km from Watauga (**Figure 3**). This strongly suggests that the Cherokee people who built Mound A and the moundtop structure not only aligned the axis of the building very carefully but selected a place for the mound to see the sun set directly in a landmark notch on the western horizon (**Figure 3c**). This notch on the horizon creates conditions for an unforeseen phenomenon that we witnessed nine days after the solstice on June 30. We went out to the site that evening to observe the sunset with a group of Native students who were participating in a summer MedCat program at Western Carolina University. We did not have the simulated structure there but simply went to stand on the mound and describe what had happened on the solstice. Just as the sun was setting, it broke through a cloud bank and created an anticrepuscular ray on the opposite (eastern) horizon. These optical phenomena are most common at sunrise and sunset and, under correct conditions, rays of light arc across the sky from horizon to horizon – radiating out fan-like from the sun and then converging at the vanishing point on the opposite horizon. As observed from Mound A at Watauga, however, the sun sets in a notch and, therefore, projects only a single vertical ray ascending from the eastern horizon rather than a fan-like array (**Figures 4a and 4b**). Had this ray

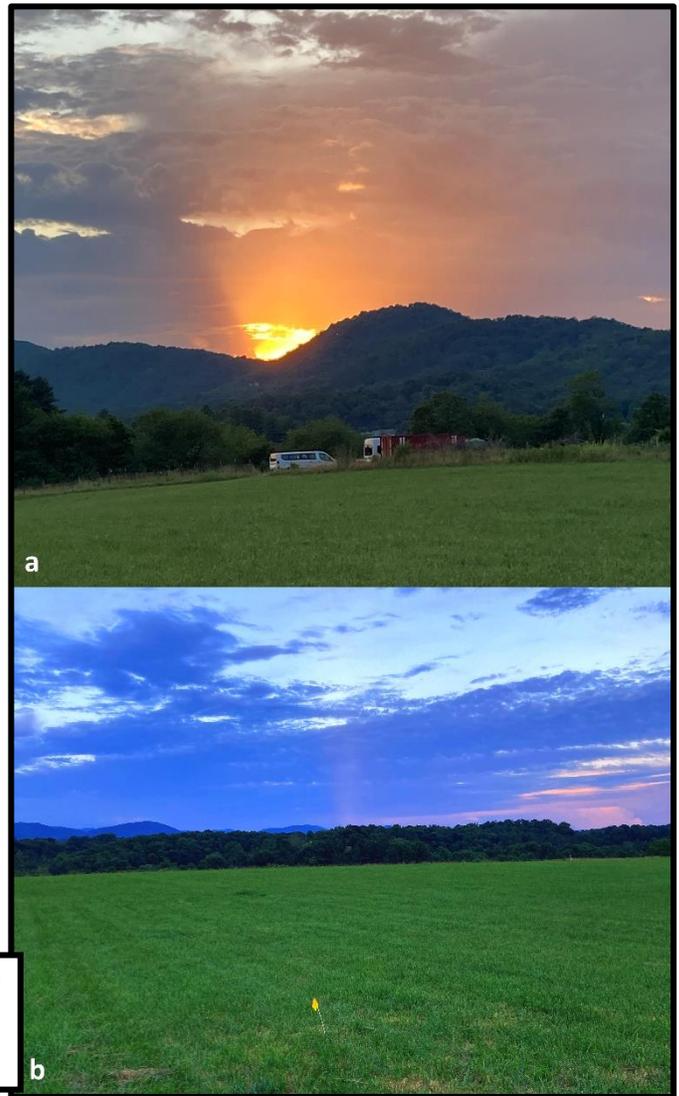
tunnel for a Cherokee Council House, and we attached that framework to the end of one of our field tents. We then covered the entrance tunnel framework and walls of the tent with tarps in order to create a shaded interior and entryway to approximate the lighting conditions when the Mound A building was standing (**Figure 2**). We positioned this facsimile building so that the entrance tunnel and main axis of the tent aligned with the axis of the building as revealed by magnetometry. That is, the experimental tent building was aligned with the axis formed by the line intercepting the center of the Cherokee structure's entrance, the center of the building's hearth, and the back corner of the building. We also positioned the tent's doorway at the back corner of the building to maintain the appropriate distance between the entrance and the hearth.

Our simulation was designed to illustrate how the sun's light would interact with the Cherokee architecture during sunrise on the winter solstice and tested the building's alignment to that of the solstitial axis at sunset on June 21<sup>st</sup> (**Figure 2**). It is expected that the movement of light through the entry tunnel and building interior during the winter solstice sunrise would mirror (but occur in reverse timing) the light's movement during the summer solstice sunset.

Beginning at 7:49 pm on June 21, 2022, we observed that the sunbeam that first entered through the entrance tunnel and doorway was short and deviated to the north of the building's central axis (**Figure 2**). Over the next 43 minutes as the sun set, the ray extended in length and arced toward the south until it aligned with the central



**Figure 3: (a) View of June 21 sunset through the simulated entry tunnel, (b) June 21 sunset as it appeared through the tunnel aperture, (c) directed ray at sunset, illuminating hearth location and central axis.**



**Figure 4: (a) view of June 30 sunset from Watauga Mound A hearth location, (b) anti-crepuscular ray projected on the horizon 180° opposite the June 30 sunset at Watauga.**

appeared in the sky during the summer solstice sunset, this apparent pillar of light would mark the position of sunrise on the winter solstice. If the proper (but likely rare) conditions presented on June 21, we not only would have observed the sun setting in a notch, the shaft of light on the floor of the building that aligned with the building axis and hearth, but also a single ray of light going across the sky from horizon to horizon, marking the solstitial axis and the alignment of the Mound A structure.

In traditional Cherokee worldview, the hearth-altar at the center of the council house held sacred fire regarded as the sun on the earthly plane. As demonstrated by our students' simulation at Watauga, the Mound A structure was positioned and aligned to unite the sun's rays with that fire at dawn on the winter solstice. This simulation gave us the opportunity to witness a dramatic sequence in which living, moving sunlight swept the council house floor area before it found the altar. That demonstration brought home to us, our students and visitors at the site, the sophistication of Cherokee astronomy and Native science more generally.



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You may ask yourself, “Well, how did I get here?” In place of the traditional crossword puzzle or word search and in keeping with the theme of American Indian Heritage Month, the Talking Heads would like to know what historic site is pictured above (a North Carolina version of *Carmen San Diego*).



How Well Do You Know Steve?

*Answer Key for Summer Issue Crossword*

**NEW NCAS BOARD MEMBERS**

Please extend a warm welcome to the society’s newest board members: **Kelly Darden** and **Emily Sussman**. We would also like to offer our appreciation to not only **Nicholas Henderson** and **Celeste Purvis** for their service as they rotate off the board, but also **David Cranford** and **Paul J. Mohler** for their continued efforts as our organization’s engaging Journal and Newsletter Editors, respectively.

**THANK YOU!**



**NCAS MEMBERS OUT AND ABOUT – (L-R):** Alan May during the poster presentation at SEAC in Little Rock, AR; David Cranford and Linda Carnes-McNaughton et al. enjoying a rock art tour, also as part of SEAC; Yours truly right before my presentation with Melissa Timo on documenting historic cemeteries during a symposium at Clemson University.



In 1990, President George H.W. Bush signed a joint congressional resolution designating the month of November as “National American Indian Heritage Month.” President Joe Biden became the first U.S. president [to proclaim](#) the second Monday of October as “Indigenous Peoples’ Day” – what was formerly recognized as “Columbus Day” in the United States. Read more about what this important change means for [Native American communities](#) and particularly from those working to [uplift and center Indigenous voices](#).

To learn more about the upcoming American Indian Heritage Month Celebration, [visit the North Carolina Museum of History website](#).

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#### NCAS Newsletter

##### Publication Schedule

All NCAS members should submit articles and news items to Paul J. Mohler ([pjmohler@ncdot.gov](mailto:pjmohler@ncdot.gov)) for inclusion in the Newsletter. Please use the following cut-off dates as guides for your submissions:

Winter Issue – January 31      Summer Issue – July 31  
Spring Issue – April 30      Fall Issue – October 31

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