Abstract: Cahokia was a major Native American city on the east side of the Mississippi River, across from the modern-day city of St. Louis, Missouri. Cahokia flourished from c.1050 AD to c.1250. In this paper archaeoastronomic and ethnohistoric data along with computer simulations are used to explore the idea that the Cahokia site axis and the Rattlesnake Causeway were intentionally aligned to the Milky Way. It is proposed that this alignment accounts for the peculiar 5° offset of the site from the cardinal directions. Following Sarah Baires, it is suggested that Rattlesnake Causeway was a terrestrial metaphor for the Milky Way Path of Souls used by the deceased to cross to the Land of the Dead. Rattlesnake Mound at the end of the Causeway is suggested as a portal to the Path of Souls. According to ethnohistoric accounts, the Land of the Dead was guarded by a Great Serpent – suggested here as visible in the night sky as either the constellation Serpens or that of Scorpius.

Keywords: burial mounds; Cahokia; Milky Way; Mississippian; Path of Souls, Rattlesnake Causeway

Introduction

Cahokia (Figure 1) was a major city of the Native American Mississippian culture. The site is located on the east side of the Mississippi River in present-day Illinois. It flourished between c.1050 AD and c.1250 AD. The site has more than 100 earthen mounds including Monks Mound, the largest earthen mound north of Mexico. It also features an earthen causeway about 1 km in length known as Rattlesnake Causeway (Figure 2, below). This paper explores the hypothesis that the Cahokia site axis and Rattlesnake Causeway were aligned to the Milky Way Path of Souls. The Path of Souls was the celestial path travelled by the deceased to the Land of the Dead.
My investigation proceeds from the position that if we, as archaeologists, are ever to hope to understand the ancient cultures we study, then we need to open our inquiries to what mattered most to the people who constituted those cultures (*sensu* Hall 1976, 363). Indeed, I agree with Susan Alt (2020b, 62):

I suggest that opening up our histories to include other sorts of assemblages that include the unseen powers and forces, or the other-than-human persons that many ancient Native American groups interacted with, and the landscapes and places that created the atmospheres and affects that shaped living not only gets us closer to the people in the past but can help us decolonize our thinking as we consider how to better operationalize Indigenous points of view.
To that end, archaeoastronomy has an important contribution to make, as it brings into play an entire universe of other-than-human entities and relationships that are not typically considered by most archaeologists. A good example is the posited alignment of Cahokia to the Milky Way discussed in this paper.

The idea that Cahokia might be associated with the Milky Way was first introduced by Sarah Baires (2014a, 2014b, 2017). Beyond a few intriguing comments, however, the idea has never been fully investigated; and what little mention that was made (Baires 2017) was not empirically based. Nevertheless, I believe the idea has merit, and in the present paper astronomic, ethnographic, archaeological and iconographic data are offered in support of the hypothesis that the Cahokia site axis and Rattlesnake Causeway were intentionally oriented to the Milky Way at nightfall on the summer solstice.

Background

Ethnologist George Lankford (2007b, 2007c) has found that many Native American tribes believed that to reach the Land of the Dead, souls of the deceased had to proceed along a celestial path known as the Ghost Road, Spirits’ Path or Path of Souls. This path was seen in the night sky as the Milky Way.

Tribes identified by Lankford (2007b, 179–180) as believing in the Path of Souls include the Ojibwa, Fox, Sauk, Menomini, Miami, Delaware, Shawnee, Powhatan, Cheyenne, Huron, Iroquois, Oglala, Osage, Omaha, Quapaw, Saponi, Caddo, Pawnee, Chickasaw and Creek. In addition to the people noted by Lankford, we can add the Apache (Curtis 1907, 134), Paiute (Mooney 1900, 290), Seneca (Wallace 1972, 245), Lakota (Miller 1997, 304) and Shoshone (Curtis 1926, 82). No doubt there are others. As Lankford (2007b, 175) explains:

The mortuary belief complex in question manifests variation in ethnographic details from one tribal group to another, as might be expected, but there is a unifying metaphor which argues for a common core of belief across the Eastern Woodlands and Plains, and probably far beyond that area. That unifying notion is an understanding of the Milky Way as the path on which the souls of the deceased must walk.

He goes on to lay out a general model of how the death journey proceeds. Details vary, but it is generally agreed that after remaining in the vicinity of the grave for a few days the soul begins its journey to the Land of the Dead. Existence in the Land of the Dead is similar to life in This World, but things are reversed. When it is daytime in This World, for example, it is night-time in the Land of the Dead. Mostly, existence in the Land of the Dead is pleasant.

Not everyone, however, is successful in their journey. The Milky Way Path has its dangers. In some traditions the Milky Way Path splits into two. Souls that take the wrong path are forever lost. In other traditions there is an entity along the way that judges the soul (Lankford 2011, table 10.1). Fail the judgment and the journey is ended. In some traditions the soul must negotiate a hazardous log/serpent bridge across an abyss or river. Fall off the bridge and again the soul is lost (Lankford 2007b, 182–183). In some cases, crossing the bridge is made difficult as the bridge is actually a shape-shifting serpent (Lankford 2007c, 208). We will encounter this serpent later in the present discussion, in the context
of how the Land of the Dead is “protected by the Great Serpent” (Lankford 2007b, 178; 2007c, 214).

Given the wide geographic extent of the Milky Way Path of Souls belief, it seems reasonable to infer that it has great time depth. For reasons explained below, I believe the concept was expressed in the design of Cahokia more than a thousand years ago.

**The Milky Way**

Made up of billions of stars, the Milky Way looks like a hazy band of white light stretching across the night sky. Unfortunately, modern-day light pollution has reduced the visibility of the star band to where today the Milky Way “is hidden from more than one-third of humanity, including 60% of Europeans and nearly 80% of North Americans” (Falchi *et al.* 2016, 1). In ancient times, however, the Milky Way was one of the most prominent features in the night sky.

The position of the Milky Way relative to a stationary observer changes over the course of a year and over the course of a single night. As Edwin Krupp (1996, 411) explains, the Milky Way “connects one side of the horizon with another by vaulting over the earth, but the angle it makes with the ground depends on where you are located and how the spinning Earth has lifted the Milky Way into the sky”. Importantly, the Milky Way is at its brightest and most visible during the summer months. During the winter the Milky Way is considerably lower in the night sky and often not visible. Kevin Palmer (2016) gives a useful explanation regarding the view in the Northern Hemisphere:

The core of the Milky Way is only visible about half of the year. The other half it is located beneath the horizon. In the winter months (December–February) it is not visible at all because it’s too close to the sun. In the spring (March–May), it will first become visible a few hours before sunrise. By June it will rise much earlier before midnight. The summer months (June–August) are generally the best viewing time because it will be up most of the night. By fall (September–November) the Milky Way will be best seen in the evening, before it sets. Twilight can brighten the sky up to 2 hours before sunrise and 2 hours after sunset, so you want to avoid those times.

Given that the position of the Milky Way is an ever-changing phenomenon, if Cahokians intended to align the site to the Milky Way, their first task would have been to select a particular time and date. Analysis of the site axis and causeway suggest that the builders chose nightfall on the summer solstice, c.1050 AD (the approximate presumed date when Cahokia was laid out). This was perhaps guided by two considerations. First, as noted, the Milky Way is easily seen during the summer months. Narrowing down further, the summer solstice marks the beginning of the colder and darker half of the year. From summer solstice to winter solstice, the Sun sinks lower in the sky, days become shorter, nights become longer and temperatures drop. For many plant and animal species this half of the year marks the time of their maturity, followed by hibernation or death. Beginning with the summer solstice, the summer-to-winter solstice season can therefore be understood as the appropriate time for souls to begin their journey to the Land of the Dead.
Although somewhat removed from Cahokia, the timing of mortuary rituals to the summer solstice also finds explanatory power in an interview by Edwin Krupp with Floyd Buckskin, a member of the Ajumawi tribal council. The Ajumawi Indians of northeast California believe that souls of the dead make the transition to the Milky Way Path of Souls at the time of the summer solstice. Krupp (1996, 417) reports as follows:

[The shadow heads north and soars to the summit of Mount Shasta. From the mountain top, the shadow transfers to the Milky Way. The Ajumawi call the Milky Way “the pathway of spirits.” When the Milky Way arcs over Mount Shasta, the shadow is able to travel east and join Hewisi the Creator at sunrise. This itinerary has a seasonal aspect, for the Milky Way climbs out of the northeast before dawn at summer solstice. The Ajumawi say the Milky Way is aligned at this time with the trail followed on the Earth by the dead and aligned with the Sun as well. Because these celestial and terrestrial routes are all so congruent, it is easier for those who die at this time to travel to the Creator.

Second, as regards the specific timing on the summer solstice, it should be noted that nightfall is not the same as sunset. Nightfall occurs after sunset and after twilight, and is when night actually begins. Nightfall occurs when the Sun drops to about −18° below the horizon (Figure 2a). It is at this time that all the stars that can be seen with the naked eye from any particular location become visible. This includes the Milky Way.

**FIGURE 2.** (a) Illustration showing the relationship between sunset and nightfall (redrawn after https://www.timeanddate.com/astronomy/nautical-twilight.html); (b) Stellarium (ver. 0.19.3) data referencing the Sun’s altitude of −18° at nightfall.

**Cahokia Site Axis and Rattlesnake Causeway**

In earlier work I suggested that Cahokia was designed using squares and rectangles (Romain 2017a, 2017b, 2018). Figure 3 shows the general idea. While other design plans are possible, Figure 3 demonstrates how the overall orientation of the site is along a trajectory of 5° in one direction and 185° in the other (see also Reed 1969, 33). This is the site axis, which in the northern half of the site runs through Monks Mound and bisects the Grand

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Plaza (Figure 3), and in the southern half shifts to the east where the aforementioned 185° azimuth is established by Rattlesnake Causeway (Moorehead 1929, 104–106; Reed 2009; Baires 2014a, 2014b, 2017). The Causeway bisects the large design square that outlines the southern half of the site (Figure 3). As an aside, in this design, the mounds did not need to be built all at the same time, so long as the presumed master plan was known and more or less followed by later builders. Nor did every mound need to be precisely situated on an ideal design quadrilateral in order to convey the idea of a planned and symmetrical layout.

Rattlesnake Causeway is a raised earthen feature roughly 800 m (2625 ft) in length, 18 m (59 ft) wide and between 0.5–1.5 m (1.5–5.0 ft) high (Baires 2014b, 6). It extends from just south of the Grand Plaza to Mound 66 (also known as Rattlesnake Mound) (Figures 3–5). In the late nineteenth century a railroad spur was built on the causeway, remnants of which are visible today in LiDAR DTMs (Figure 5, below). Radiocarbon dating shows that “the causeway was constructed at the onset of Cahokia’s ‘Big Bang’” (Baires 2014b, 9).

As mentioned, the idea that Rattlesnake Causeway might be associated with the Milky Way Path of Souls originated with Sarah Baires (2014a, 196–197; 2014b, 13; 2017). Specifically, Baires (2014a, 197) argues that “the causeway and Rattlesnake Mound were constructed to cite a possible Path of Souls (which is oriented slightly east of north), directing the dead along the Rattlesnake Causeway, through the marshy, watery realm […] and ultimately to the Realm of the Dead”. She repeated this interpretation nearly verbatim a few years later (Baires 2017, 113), but did not add any empirical or new data. Expanding on Baires’s idea, Timothy Pauketat (2017, 13) commented that

> it is possible that the circular mound atop the site’s main pyramid [Monks Mound], if not the entire pyramid itself, was an earthly bundle of the moon itself, perhaps intended to depict the full moon passing through the Milky Way/causeway, with the burial mound at its southern terminus being the point of articulation between earth and sky and living and dead.

More recently, Pauketat’s work has been discussed in a news item that was published by the University of Illinois news bureau (Yates 2020). Pauketat is quoted as stating that it “turns out that on the days of the solstices, when the Milky Way is most vertical, if you stand on Monk’s Mound right before sunrise, the Milky Way arises out of the end of the causeway and kind of arcs across the sky and then taps back into a line that the causeway marks”. The same article appeared on the websites of the Archaeology News Network and the archaeology section of Science X’s Phys.Org (see the reference list for links). Baires was well-positioned to draw conclusions about Rattlesnake Causeway given that she conducted limited excavations into the structure (Baires 2014b). Archaeoastronomy, however, was not a focus of her work (Baires 2014a, 2014b, 2017), and no real data documenting how Cahokia or the Causeway might be connected to the Milky Way has been provided by either her or Pauketat. Nor did they cite other Mississippian sites (or earlier Hopewell sites [e.g. Romain 2015a]) that have Milky Way alignments.

Nevertheless, their comments were prescient. As shown below, the Cahokia site axis and Rattlesnake Causeway are indeed aligned to the Milky Way. However, neither the site axis nor Causeway are aligned to the Milky Way “right before sunrise” on either the winter or summer solstices. In the representations shown below, the night sky at Cahokia is simulated.
FIGURE 3. LiDAR DTM (Digital Terrain Model) for central Cahokia with numbered mounds showing how the site axis, Rattlesnake Causeway, and posited design squares and rectangles are all oriented to the azimuth of 185° (annotation by the author; LiDAR data from the Illinois State Geological Survey at Prairie Research Institute; see https://www.arcgis.com/apps/webappviewer/index.html?id=44eb65c92c944f3e8b231eb1e2814f4d).

FIGURE 5. LiDAR contour map showing Rattlesnake Causeway. Highest elevation in red, followed by green and blue (LiDAR data from the Illinois State Geological Survey at Prairie Research Institute; see https://www.arcgis.com/apps/webappviewer/index.html?id=44eb65c92c944f3e8b231eb1e2814f4d).
FIGURE 6. Computer planetarium view at Cahokia about one hour before sunrise on winter solstice 1050 AD (Stellarium 2020). Atmospheric visualisation is turned off for illustration purposes. If atmospheric visualisation is turned on, the Milky Way essentially disappears due to the effects of atmospheric extinction.
using the computer planetarium Stellarium (ver. 0.19.3). Figure 6 shows the Milky Way one hour before sunrise on the date of the 1050 AD winter solstice (solstice sunrise was on 16th December at 07:21 am LMST). In this figure, in order to better see the Milky Way, the atmospheric effects function for the planetarium simulation have been turned off. In reality, due to atmospheric extinction the Milky Way would have been even less visible. In any case, there was no alignment of the Cahokia site axis or Rattlesnake Causeway to the Milky Way at this time.

Figure 7 shows the Milky Way about one hour before sunrise six months earlier, on the summer solstice of 1050 AD (solstice sunrise was on 16th June at 04:36 am LMST; see Stellafane [2021] for date determinations, Stellarium for times). As shown, the Milky Way extends from an azimuth of about 60° in the northeast to about 240° in the southwest. Again, there is no alignment of the site axis or causeway to the Milky Way.

There is, however, a temporal window when the Cahokia site axis and Rattlesnake Causeway do point to the Milky Way. That time is just after sunset, at nightfall, on the summer solstice. At that time, the Milky Way rises out of the northeast horizon, arcs across the eastern and southern sky and plunges to the horizon at an azimuth of c.185°. Given that, as noted above, the Cahokia site axis and Rattlesnake Causeway extend along a trajectory of 185°, it follows that the site axis and causeway point to where the Milky Way meets the horizon. Figure 8 shows a Stellarium computer simulation of the night sky.
as viewed from Cahokia, looking to the south, at nightfall on the night of the 1050 AD summer solstice. Sunset was at 7.21 pm (LMST) and nightfall at 9.24 pm (LMST) (Figure 2b, above). The same view would apply for several hundred years preceding and following.

**FIGURE 8.** Computer simulation combined with LiDAR DTM showing the Milky Way relative to Rattlesnake Causeway at nightfall on summer solstice, 1050 AD (Stellarium 2020, with atmospheric visualisation turned off; LiDAR data from the Illinois State Geological Survey at Prairie Research Institute; see https://www.arcgis.com/apps/webappviewer/index.html?id=44eb65c92c944f3e8b231eb1e2814f4d). What appears to be a notch in Mound 66 is a 1920s trench that Warren K. Moorhead left unfilled after excavation (Fowler 1997, 133).

The simulation in Figure 8 shows how the trajectory of the causeway intersected the Milky Way near the centre of the star band (Assessment of LiDAR imagery finds that as measured from the north end of Rattlesnake Causeway the lateral spread of Rattlesnake Mound is about 10°). Interestingly, Rattlesnake Mound extends in an orthogonal manner to the Causeway. As Figure 3 above shows, Rattlesnake Mound is one of the very few mounds situated in this manner. One explanation may be that its east–west length was intended to reference the width of the Milky Way.

Several points need to be made with reference to Figure 8. First, what is shown is a computer simulation. Representing the Milky Way using computer graphics is difficult. How does one adequately show a diffuse band of light comprised of tiny stars of differing...
magnitudes on a two-dimensional computer screen having resolution constraints? Second, it is impossible to know how bright the Milky Way appeared to ancient observers a thousand years ago. Figure 8 shows the Milky Way with computerised atmospheric simulation effects turned off to better illustrate the alignment, whereas Figure 9 shows a similar view but with atmospheric effects turned on. One of the more noticeable changes that occurs when atmospheric effects are turned on is that due to atmospheric extinction, stars that are close to the horizon are “extinguished”, or at least very difficult to see. Figure 9 is therefore a closer approximation to the visible sky; but both simulations suggest that the Milky Way alignment would have been readily apparent to Cahokia observers. Additionally, if observers were relying at least in part on individual stars or asterisms to assess when and where the Milky Way intersected the horizon, as Figure 9 shows and as discussed later, several stars and asterisms (e.g. Antares and Scorpius) would have facilitated those assessments.

![Figure 9](image-url)

**Figure 9.** Computer simulation for 1050 AD at Cahokia summer solstice nightfall +30 mins. Atmospheric visualisation effects turned on (Stellarium 2020, annotation by the author).

In any case, in the real world the apparent brightness and clarity of the Milky Way is dependent on the observer’s visual acuity, atmospheric conditions and the presence and/
or extent of moonlight and light pollution. As mentioned earlier, due to light pollution, few people today have an opportunity to see the Milky Way as it might have been seen a thousand years ago in the heartland of North America. We can be certain, however, that the Milky Way was a prominent feature in the night sky at that time – hence the many tribes in North America that have stories about it.

It is also important to note that the Milky Way alignment did not occur at a single instant in time, although Figures 8 and 9 show snapshots in time. In actuality, however, whereas the Milky Way alignment would have become visible at nightfall, over the course of the next half hour or so the Milky Way would actually come into better alignment with the causeway as the star band moved west and rotated so it appeared at a steeper angle. Thus, there was a significant window of opportunity to view the alignment. To illustrate this, Figure 9 shows the Milky Way alignment 30 mins after nightfall. As the arrow in the figure shows, the Milky Way trajectory aims directly toward the 185° azimuth at the centre of Rattlesnake Mound. Further, the Milky Way would have moved into alignment with Rattlesnake Mound at or near nightfall for several days before and after the precise solstice date. What would have changed over several days is the exact time of the alignment and again, the angle of the Milky Way relative to the horizon.

At Cahokia, the direction of south and the Milky Way terminus are emphasised in a couple of ways. As discussed and as shown by Figure 3 above, it is clear that the entire site was oriented to the 185° azimuth. Also, the design of Monks Mound is such that its terrace levels align with this azimuth. As such, the terraces would have been ideal for watching and for enacting rituals relating to the Milky Way. Next, Rattlesnake Causeway not only points to the Milky Way terminus – it is also situated south of Monks Mound. No similar or corresponding feature is found north of Monks Mound. At Cahokia, the direction of south or southwest appears emphasised, and as discussed below it was in that direction that the Land of the Dead was located.

We know that the solstices were associated with the dead, based on findings relevant to Mound 72 (also a ridge-top mound), situated on the main site axis (see Figure 3, above). As indicated by Fowler and colleagues (1999, 29), the longitudinal axis of Mound 72 was oriented to the summer solstice sunset in one direction and winter solstice sunrise in the other direction. Within Mound 72, 10 graves were laid out in a line parallel to the mound axis and therefore to the solstices (Fowler et al. 1999, 180), and within these graves dozens of individuals were themselves positioned either parallel or perpendicular to the solstice axis (Fowler et al. 1999, figs. 6.7., 6.8).

**Cahokia and the Land of the Dead**

In many Native American traditions the Land of the Dead is in the south, west or southwest (Lankford 2007b, 176; 2007c, 207, 240). If the same was true at Cahokia then it is appropriate that as the soul moves toward the south or southwest, it also moves deeper into the Land of the Dead. Correspondingly, Rattlesnake Causeway proceeds from a relatively dry area at its north end to a lower and wetter elevation further south. As Baires (2014a, 22) explains:
Some areas, like where Monks Mound, part of the Grand Plaza and Mounds 42 and 41 are located, remain relatively dry as they sit on land higher than the surrounding floodplain, the areas directly south and north of Cahokia’s central core, consistently marshy and swampy were home to neighborhoods, other mounds, and the Rattlesnake Causeway in particular. The area south of the Grand Plaza is one of the lowest in elevation and marshiest landscapes at Cahokia and home to the majority of identified ridge-top mounds (Rattlesnake Mound, Mound 72, Mound 64, Mound 65).

In Native American cosmologies where it is believed there is an Upperworld, This World and Below World, the Land of the Dead is often associated with the Below World (aka Beneath World or Underworld). Theresa A. Smith (1995, 46) explains it as follows:

The underworld in this scheme consisted of several layers including a layer in which earthly rhythms were reversed: “In this [lower] world it is day when it is night on [the] earth and vice versa, for the sun travels above the earth during the day and under it during the [night]” (Hallowell 1942, 6). This mirror world was often understood as the final destination for the dead […]. Also below was the realm of the Underwater and Underground creatures, sometimes said to lie between the earth and the land of the dead.

From a cosmological perspective, the southern half of Cahokia, or what might be termed the “Swamp Zone”, corresponds with the underwater region that Smith describes as situated between This World and the Land of the Dead. As Baires (2014a, 157) points out, Rattlesnake Causeway bridges the watery realm.

 Appropriately enough, a considerable number of burials are found in the Swamp Zone. Burial mounds located in this area include Mound 72, as well as Rattlesnake Mound (Mound 66). Iseminger (2010, 80) estimates that at least 300 people were buried in Mound 72. Jay L. B. Taylor, the chief project engineer of the 1927 excavation of the site, estimated that at least 150 burials were found in Rattlesnake Mound (in Moorehead 1929, 74). Indeed, sufficient numbers of burials were found in the Swamp Zone that Dalan and co-authors (2003, 155) referred to the area as a “mortuary precinct”.

**Portal to the Otherworld**

Rattlesnake Mound is one of several at Cahokia that are classified as ridge-top mounds. Its dimensions are impressive: Fowler (1997, 133) records it as 132 m (433.1 ft) long, 51 m (167.3 ft) wide and 7.4 m (24.3 ft) high. As noted above, it is situated at the south end of Rattlesnake Causeway. Moreover, it is positioned so that its minor axis extends along the 185° azimuth (Figure 3, above). This places the mound on the Milky Way Path and in alignment with it. Together, the special location and orientation of Rattlesnake Mound suggest that the mound was a portal to the Otherworld (sensu Knight 1989) and in particular, a portal to the Path of Souls.

Most mounds at Cahokia are square, rectangular or conical. In plan view, however, Rattlesnake Mound is oval-shaped at its base. As Taylor stated (fieldnotes quoted in Moorehead 1929, 68): “attention is called to the fact that […] the mound’s peripheral outline is almost a perfect ellipse”. Deviations from an ideal ellipse resulted from damage

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caused by a farm building foundation at the west end and an “old barn foundation, eighty feet long at the south end of the line through Stn.1” (Taylor’s fieldnotes in Moorehead 1929, 67).

From its oval base, Rattlesnake Mound rises to a narrow ridge at its top. Figure 10a shows this ridge highlighted in yellow. With its oval base rising to a narrow ridge, I suggest that Rattlesnake Mound and others like it were intended as three-dimensional ogee or barred-oval symbols. In plan view, the base of Rattlesnake Mound closely resembles the centre ogee design shown in Figure 10c, while the ridge along the top of the mound recalls the barred oval design in Figure 10b. The ogee symbol is generally considered a symbol for a portal to the Otherworld (Lankford 2007b, 202; Reilly 2004, 130; 2011, 125; King 2011, 288), and the barred oval likely represents the same concept. The barred oval design is often found on creatures such as the serpents shown in Figure 10d. Here, as suggested by Reilly (2011, 122), wings on the serpents likely serve as “symbolic locatives” – meaning they situate the serpents in the celestial realm. Similarly, barred oval symbols identify the serpents with the Otherworld portal they circle around. Diaz-Granados (2011, 90) suggests that “depictions of the ogee bring to mind a version of the vulva form and might serve as a metaphor for a portal”. This would seem to apply to the ogee and barred oval designs in Figures 10b, 10c and 10d. Specifically, new life comes into This World through female genitalia symbolised by ogee or barred ovals. Correspondingly, it seems appropriate that if a soul is transitioning in the opposite direction – i.e. from This World to the next through death – then the portal to that world or realm might likewise be represented by ogee and barred oval symbols. The shape of Rattlesnake Mound is consistent with these notions. Further support is found in the book *D(L)akota Star Map Constellation Guide*. The writers are Native American and the stories they tell are intended to explain Lakota star constellations. Here is part of one story about the Sacred Hoop or Womb constellation (Lee et al. 2014, 26):

> The buffalo embryo emerges from the Sacred Hoop or Womb constellation – Winter Circle. Notice how the *Wanagi Tacanku* – Road of the Spirits/Ghost Trail, or Milky Way goes directly through the center of the womb. The teaching is that the spirit comes from the Star World through the Wanagi Tacanku – Road of Spirits/Ghost Trail and then emerges from the Womb going to Oceti/Peta – Fireplace in Leo.

Adding to the idea that Rattlesnake Mound is a portal to other realms, Taylor (fieldnotes published in Moorehead 1929, 72) found in the mound “an almost continuous bed of human skulls, humeri, ulnae, radii, femora, tibiae, and fibulae […] but no other bones appeared”. Taylor (fieldnotes quoted in Moorehead 1929, 73) goes on to note that “femora and other limb bones accompanying skulls usually lay parallel with the minor axis of the mound, although a few bundles were found lying almost at right angles to this”. As already pointed-out and as shown by Figures 3 and 10a, the minor axis of Rattlesnake Mound extends along the 185° azimuth. If this azimuth points to the Milky Way, it follows that the minor axis-aligned bundle burials were also aligned to the Milky Way. If the bone bundles were to stand up, they would appear to be walking through the ogee mound symbol, onto the Milky Way Path of Souls.
Serpents and Serpent Constellations

Perhaps relevant is that the Cahokia Swamp Zone is sometimes infested with snakes – hence the names Rattlesnake Mound and Rattlesnake Causeway. Taylor (fieldnotes in Moorehead 1929, 70) reported that as the result of rainstorms, the area was “so completely inundated
that numbers of blue racers and rattlesnakes sought refuge on the mound where they finally became so annoying that we postponed work in the trench long enough to mow and burn all vegetation on such parts of the mound as we were camped on or working over”.

There are a significant number of snake species in the Cahokia area. The most detailed data come from the Shawnee National Forest, roughly 160 km (100 miles) southeast of Cahokia. In that area, Palis (2016, Table 1) identified 17 species including copperheads, cottonmouths and rattlesnakes. In Illinois both the timber rattlesnake and eastern massasauga rattlesnake are found. The eastern massasauga is also known as the “swamp rattler” because it favours wet prairies, swamps and bogs. The massasauga was likely the rattlesnake that Taylor encountered. Given the swampy lowland area occupied by Cahokia, real snakes were probably a common sight for inhabitants, particularly due to fields of maize surrounding the city: maize attracts rodents; rodents attract snakes.

Snakes were an important feature of Mississippian cosmology and belief. Serpents were Underworld creatures associated with women, horticulture, fertility, night and water (Emerson 1989; 1997, 205–207; Lankford 2007c). Indeed, Reilly (2011, 119) makes it clear that “The Great Serpent not only dwelt in the Beneath World as the master of beneath and underwater creatures but reigned as Lord of the Realm of the Dead”. Serpent representations are found on Mississippian pottery, shell gorgets and sculpted stone figurines. The Birger figurine (Figure 11a–11c), for example, was found at the BBB Motor site, about 3.5 km (2 miles) northeast of Cahokia (Emerson 1982, 1989). The front view shows a woman using a hoe to till the back of a serpent, while the side view shows its head. Vines and gourds are growing from the tail of the serpent. Thus, the serpent is shown providing plant resources for humans. However, the serpent’s potentially deadly aspect is also revealed by its impressive fangs and teeth. Indeed, as discussed below, it is the serpent’s deadly potential that makes it ideally suited as a guardian of the Milky Way portal.

FIGURE 11. Front, side and back views of Birger figurine replica (on display Illinois State Museum, Dickson Mounds Museum, photographs by author).

The association of serpents with the Cahokia Swamp Zone is not a trivial matter. Earlier it was mentioned how various Native American oral traditions tell of a serpent/log bridge that the soul must cross in order to reach the Land of the Dead. This shape-shifting serpent is situated on the Milky Way Path.
We do not know if Cahokians believed that the Great Serpent was a shape-shifting serpent on the Milky Way Path, or a celestial guardian to the Land of the Dead. Walking along Rattlesnake Causeway, however, might easily bring one into contact with a serpent; and according to Lankford (2007c, 256), the location of the Great Serpent “at the foot of the Milky Way makes him the guardian of the entry into the Realm of Souls”.

In this regard, at Cahokia, on the night of the summer solstice, Rattlesnake Causeway not only points to the Milky Way Path of Souls; it also points to what may have been cognates for the Great Serpent – i.e. the star constellations Ophiuchus-Serpens and Scorpius (Figure 12). Although these names are Western in origin, their serpent forms were recognised in the southern summer sky by certain Native Americans.

**FIGURE 12.** (a) Stellarium planetarium simulation for summer solstice nightfall 1050 AD showing constellations Scorpius and Ophiuchus, the latter with Serpens Caput and Serpens Cauda (Stellarium 2020, annotation by the author); (b) Mississippian serpent design on shell from the Spiro site, Oklahoma – note the resemblance between the Spiro design and constellation Ophiuchus (drawing by the author after Hamilton 1952, pl. 111). Rattlesnake wings are locative celestial elements. Multiple barred oval symbols on the serpent’s body identify the serpent with the portal concept; if dots on face symbolise the ability to cause disease, then this serpent has double death-dealing poison.
In particular, the Skidi Pawnee of the Great Plains recognised Serpens and Scorpius as celestial serpents. Summarising interview data collected by Fletcher (1903, 15), a 1906 letter by the astronomer Forest Ray Moulton (published in Chamberlain 1982, Appendix 2) concluded that “the Skidi recognized two serpent constellations”. These constellations were “Real Snake” and “Snake-not-Real”. Real Snake referred to Scorpius; Snake-not-Real was Serpens (Chamberlain 1982, 133, 134; see also Weltfish 1977, 329). Lankford (2007b, 2007c) proposes that in Mississippian iconography, the Great Serpent (e.g. Figure 12a) was seen in the night sky as Scorpius: “The stars comprising the constellation make a clear serpentine shape, and the constellation stretches across the southern end of the Milky Way” (Lankford 2007a, 129).

What is interesting about the above ethnohistoric data is that the Pawnee are Caddoan speakers. During the Mississippian culture period Caddoan sites (e.g. Spiro in Oklahoma) are known to have had contact with Cahokia (Brown 2004, 120), and Caddoan and Middle Mississippian sites shared many cultural traits. Assuming that the Pawnee serpent constellations have temporal depth, it seems entirely possible that Cahokians were familiar with the celestial Caddo-Pawnee serpents. Indeed, it is likely that these serpents were well-known throughout the Mississippian world.

![Figure 13](image1.jpg)

**FIGURE 13.** (a) Rattlesnake disk found in the nineteenth century, Hale County, Alabama. Sandstone, 31.9 cm (12.56 in) diameter (drawing by the author based on photograph in Steponaitis and Knight 2004, 166). (b) Stone disk found at Moundville, 31.6 cm (12.5 in) diameter (drawing by the author based on photograph in Steponaitis and Knight 2004, 173).

It may be that the seasonal appearance of the Great Serpent is reflected in Mississippian-era designs. In Figures 13a and 13b, for example, both designs include opposed serpents. With reference to the Rattlesnake disk found in Alabama and another piece known as the Kersey beaker, Reilly (2011, 124) suggests that the negative space in the centre, formed by the two serpents, “may very well designate portals”. To this I would add that perhaps the surrounding serpents represent summer and winter manifestations of the Great Serpent as it rotates around a central portal. As Scorpius, for example, the Great

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Serpent is visible in the summer night sky, at the southern end of the Milky Way. Slowly the serpent rotates through the night sky until the fall and winter months when the constellation disappears as it moves below the horizon. Notably, the winter-time period of invisibility for Scorpius corresponds to the period of dormancy for real snakes.

One of the interesting things about the Mississippian serpent representations is that they portray rattlesnakes, with designs invariably showing the rattlesnake’s characteristic rattles. It is easy to understand why the rattlesnake might be considered the guardian to the Land of the Dead. Although rattlesnake bites are usually not fatal in humans (even without modern medical treatment [Klauber 1982, 173–179]) there is nevertheless a risk that a bite could speed one along on a journey to the Land of the Dead. It is also happens that one of the characteristic features of rattlesnakes is that they coil before striking. This characteristic coiling is perhaps seen in the way the tail end of Scorpius begins to coil.

Other Native American groups in addition to the Pawnee also recognised serpents in the night sky. One of the best known is the Cherokee Uktena (Figure 14). This deadly serpent was placed in the sky by the Little People (Mooney 1900, 297–298). Further to the north, the Iroquois (Hewitt 1891, 384) believed “fire dragons” sometimes seen in the night sky were huge serpents having the head of a panther and the wings and claws of...
an eagle. They lived in large lakes and flew through the night as they crossed from one lake to another. The Kiowa of the Great Plains (Marriott and Rachlin 1975, 131) believed that solar eclipses were caused by a great serpent that swallowed the Sun (Marriott and Rachlin 1975, 131), and the Lakota tell of a great serpent constellation known as Zuzeca in the southern winter sky (Lee et al. 2014, 26).

Returning to Cahokia, it seems appropriate that as one moves along Rattlesnake Causeway from north to south and deeper into the Swamp Zone, one also moves into an area infested with rattlesnakes and other serpents – i.e. living cognates for the Great Serpent at the end of the Milky Way Path. Add to that the occurrence of swamp mists and ground fogs (Alt 2020a, 28) and it is easy to imagine the Swamp Zone as a metaphor for the Lowerworld, or Otherworld – i.e. a place where things are not always as they seem; a place where a log lying in the weeds might, in the blink of an eye, transform into a deadly rattlesnake; a place where shape-shifting serpents are real.

Discussion

Given the foregoing, I believe the evidence supports the idea that Rattlesnake Causeway invokes the Milky Way Path of Souls. In this understanding, the Cahokia site axis established a directional corridor, while Rattlesnake Causeway was a terrestrial metaphor for the Path of Souls. The Path of Souls led to the final destination for the soul, which was the Land of the Dead. The portal to that land was guarded by the Great Serpent, visible in the night sky as a constellation, either Serpens or Scorpius. At Cahokia, the main site axis, Rattlesnake Causeway, the Rattlesnake Mound ogee, Swamp Zone, the Milky Way and real serpents comprised a web of relationships that provided an experientially grounded metaphor for the journey to the Land of the Dead.

That said, I would be remiss if I did not point out that there are other explanations supposedly accounting for Cahokia’s orientation. John Kelly, for example (in Pawlaczyk 2018), has proposed that the 1006 AD supernova may in some way account for the layout of Cahokia. Pauketat (2013, 82) briefly mentions the 1054 AD supernova, although he does not attribute any alignments to the event. While these events were likely noticed by Cahokian skywatchers, supernovae events present moving targets. Like any star (exploding or not), the supernovae moved across the sky and did not stop along the way at an azimuth coincident with the Cahokia site axis.

Alternatively, and prior to his Milky Way solstice endorsement, Pauketat (2013, 100) proposed that “Cahokia’s 5-degree offset grid might have been an intentional alignment to sunrise just before the vernal equinox (March 20) or just after the autumnal equinox (September 23)”. The posited alignment, he argued, would occur either ten days before the vernal equinox or ten days after the autumnal equinox coinciding with a presumed harvest festival for the autumn alignment. Among the problems with this scenario, however, is that without corroborating ethnohistoric data, the dates are arbitrary; and the idea fails to account for Rattlesnake Causeway.

More recently, I proposed that Cahokia was laid out with reference to solar and lunar azimuths expressed in the proportions of root-two rectangles (Romain 2017a, 2017b, 2018). The arguments are too detailed to present here. Suffice it to say that although
these early hypotheses likely have valid elements in their formulation, it is the Milky Way data presented herein that explains the actual orientation of the site.

Specifically, I suggest that the Milky Way hypothesis is supported by the following lines of evidence:

1. astronomic analyses show that the Cahokia site axis and Rattlesnake Causeway were aligned to the Milky Way at the time of the summer solstice c.1050 AD;
2. ethnohistoric data document that the Milky Way was traditionally considered a Path to the Land of the Dead;
3. landscape analyses find that consistent with descriptions of the Lower World (where the Land of the Dead is often believed located) Rattlesnake Causeway proceeds from higher to lower elevations and a wetter area;
4. iconographic evidence supports the notion that Rattlesnake Mound was a three-dimensional representation of the Mississippian ogee – generally understood as a symbol for a portal to the Otherworld;
5. ethnohistoric evidence shows that serpent constellations were associated with the Milky Way and that the Great Serpent was the Guardian of the Land of the Dead;
6. biological data find the prevalence of real serpents in the Cahokia area, a context further supported by a historic account of snakes in direct association with Rattlesnake Mound; and lastly
7. archaeological data in the form of human burials excavated from Rattlesnake Mound document that dead people were in fact placed in the ogee portal, on the presumed Path of Souls.

Concluding Remarks

In this paper, LiDAR data, archaeoastronomic analyses and computer planetarium simulations were used to show how the major site axis of Cahokia and Rattlesnake Causeway were aligned to the Milky Way. These data were supplemented by ethnohistoric, iconographic and archaeological data. The triangulation of these independent and multiple data sets supports the idea that Cahokia was intentionally aligned to the Milky Way and the Milky Way Path of Souls. Further, the Milky Way hypothesis successfully accounts for the otherwise anomalous 5° skew of the site from the cardinal directions.

Of wider interest, the findings presented here provide support for the notion of a continuity of belief in the Milky Way Path of Souls extending from the Mississippian period back more than one thousand years into the Early Woodland period (e.g. Romain 2005, 2009, 2015a, 2015b, 2016, 2018, 2019).

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