

# Solstice Marker Design Variations

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## ABSTRACT

Summer and winter solstice markers produced by ancient artists of the Southwest can be placed in several categories: (one) an interaction between shadows and a pictograph or petroglyph at the time of the solstice event, (two) a depiction of a solstice event with a pictograph or petroglyph as viewed by the artist at or near the site, and (three) the directional indication at a site, i.e., the location on the horizon of a solstice event marked by a pictograph or petroglyph. Other methods have been noted by other authors, but are not a topic of discussion in this presentation.

The artists in placing the markers display considerable ingenuity in coordinating the solstice event and their presentation of a method of marking the timing of the solstice. A previously unreported summer solstice marker has been located on the Courthouse Wash pictograph panel in Arches National Park, near Moab, Utah. Its dual nature in marking the event can be classified as being in both categories one and two.

## INTRODUCTION

The initial purpose of a series of previously published papers was to ascertain the probable meteorological knowledge of the prehistoric inhabitants on the Colorado Plateau region of southeastern Utah, as portrayed in the Barrier Canyon Style pictograph panels (Allee 1992a, b;

Allee et al, 1996). It is assumed the inhabitants were animists—that every natural object, including clouds, had an immortal spirit. These spirits, when not in the sky, were to be found within cliffs, where natural symbols identified their abode. The Barrier Canyon Style pictographs are probably an anthropomorphized representation of an altocumulus lenticularis cloud—a mountain wave cloud, that forecasts a period of rain about one third of the time (Allee 1992a). It is hypothesized that such pictographs are invocations to the rain spirits, painted at the time of the onset of the monsoon season (Allee 1992a, b). Their observations of the seasons of the year would certainly have noted the coincidence of the summer solstice as being the date of the initiation of the monsoon rainy season, necessary for whatever agricultural endeavors were practiced, and to furnish forage for the browsing game animals that were so necessary for their subsistence.

Consequently, in order to time the date of the ritual for the invocation to the rain spirits, it became a practice to mark the summer solstice date by indicating on the cliff, in some manner, the time of the year when sunset or sunrise was farthest north on the horizon. If symbols on the cliffs can be deciphered, it is probable that every pictograph panel with Barrier Canyon Style anthropomorphs has a summer solstice date marker. Some sites appear to be primarily solar observatories (Allee et al, 1996), containing winter, as well as summer solstice

markers. The artists in designing their solstice markers displayed considerable ingenuity in their presentation of a method that marked the date of the solstice.

## DISCUSSION

Summer/Winter solstice markers produced by ancient artists of the Southwest can be placed in several categories.

1. By an interaction between shadows and a pictograph or petroglyph at the time of the solstice event.
2. Depiction of a solstice event as viewed by the artist at or near the site of a pictograph or petroglyph.
3. Directional indication at a site, i.e., the location on the horizon of a solstice event marked by a pictograph or petroglyph.

Most of the major Barrier Canyon pictograph Style panel locations appear to have been chosen to fulfill certain criteria. First, there must be some evidence that the cliff has natural markers indicating that the rain spirits reside within when not up in the sky (Allee 1992b). Second, the panel is exposed to sunlight during a portion the daylight hours. Third, there is an overhang of the cliff above the panel resulting in a shadow of the overhang that moves down the cliff if it faces to the east or up the cliff if it faces to the west. And fourth, the shadow has a notch, or some other distinguishing feature that can be utilized in conjunction with the placement of a pictograph, or petroglyph, to indicate the timing of the solstice.

## CATEGORY 1.

### **An interaction between shadows and a pictograph or petroglyph at the time of the solstice event.**

**Barrier Canyon.** The Great Gallery more than fulfills the above criteria. There are three notches on the descending shadow that react with pictographs in the gallery.

That portion of the Great Gallery titled "Holy Ghost and Attendants" is located within a natural arch that is indented into the cliff surface. An imaginary outline containing the pictographs is framed by the arch in such a manner that the outline is equidistant from the contour of the arch. On the day of the summer solstice, the shadow of the arch on the left side and the shadow of the cliff above and on the right side falls between, and equidistant from, an outline of the figures and the arch (Orozco 1995). The "Holy Ghost and Attendants" is perfectly framed by the shadows and the arch. This event occurs at about 10:30 A.M. MDST.

The shadow of the overhang of the cliff above that moves down the face of the cliff toward the Barrier Canyon pictograph figures has two notches. At the summer solstice each notch frames one of the many pictographs. The first occurs at 11:10 A.M. MDST, and the second at 11:40 MDST. This takes place before the notches have moved down and off of the panel.

The number of pictographs on the panel leads to the speculation that with the passage of time the notches may frame other pictographs at the time of the winter solstice, the equinoxes and possibly cross quarter dates.

As at Buckhorn Draw (Allee 1992b), there are 273 large dots at the left end of the panel. But, unlike Buckhorn Draw, there is no apparent site where the additional 90 dots might be or are located to make up a 360-day calendar such as is found at Buckhorn Draw, and the Black Dragon sites.

**Sego Canyon.** During the summer solstice, at 11:00 A.M. MDST, a small notch in the shadow moves down over the panel and centers on the upper body of the uppermost pictograph on the panel, before passing down and off the bottom of the panel (Allee 1992b).

**Buckhorn Draw.** A very large notch in the shadow of the cliff moving down over the panel comes to what is possibly the pictograph image of a shaman wearing a belt that has a medicine pouch attached. As the upper shadow moves down, a lower shadow comes up from below, and the final bit of light on the pictograph is the illumination of only the belt. This occurs at 1:17 P.M. MDST (Allee 1992b).

**Courthouse Wash.** A notch in the cliff shadow moves up from the base of the west-facing panel, creating what appears to be an upward moving shaft of light. At one point in its upward movement it becomes a base of light, upon which is balanced a Barrier Canyon Style rain-spirit petroglyph. This event is discussed further in the next section.

## CATEGORY 2.

### **The depiction of a solstice event as viewed by the artist at or near the site of a pictograph or petroglyph.**

One of the innovative methods the artists have used to portray a solstice event is to

replicate a view of the horizon, or some other nearby event.

**Black Dragon.** The artist here depicted two events — summer and winter solstice (Allee 1992b). The summer solstice event is portrayed as a pictograph on the panel that replicates a mountain peak on the western horizon. In addition there is a barbed line that indicates the exact path of the sun as it passes down in the western sky and disappears behind the mountain peak. The winter solstice sun shines into the depth of a nearby cave only at the time of the winter solstice. This event is portrayed as a pictograph on the panel that shows a ray of light passing down into the nearby cave.

On the overhang above the solstice markers is the representation of a sun ray that points across the canyon in a  $225^\circ$  azimuth direction. The canyon rim is at angle of  $30^\circ$  when viewed from the panel, standing below the sun ray. At this location the sun would set below the canyon rim 11 days after the cross quarter date between the winter solstice and the vernal equinox (or 11 days before the cross quarter date between the autumnal equinox and the winter solstice). There could have once been a marker below the panel where an observer would stand to place the canyon rim at an elevation of  $45^\circ$  and mark the dates of the equinoxes.

**Courthouse Wash.** Figure 1 is a sketch of the northwest skyline as viewed from near the south end of the pictograph panel. On Figure 1 is shown (in exaggerated form) the location of a block of sandstone that extends slightly above the skyline. An arrow points to the location of the last spark of sunset when the observer stands on the fallen block at the

base of the panel, just below a petroglyph that represents a drawing of the skyline to the northwest of the site.

On that panel, in the Impressionistic Style of modern artwork, is a petroglyph representing the outline of the skyline to the northwest of the panel (Figure 2). On that representation is an agglomeration of painted dots that probably symbolize the location of the position of the sun as its last spark disappears behind the skyline. Above the representation of the skyline is a single deeply petroglyphed mark that may represent the sandstone block noted on Figure 1. Connecting the two marks with a straight line crosses the "skyline" at what may be the location of the last spark of sunlight. This point on the skyline does not exactly match the summer solstice sunset of Figure 1. The angle of the skyline, and the angle of approach of the sun to the skyline, is such that the observer must be standing somewhere below the petroglyph in order to get the sunset to match the petroglyph's portrayal. Further examination at the time of the summer solstice sunset may provide a clue as to where the observer stood when viewing the last spark of sunlight on the northwestern horizon.

The uncomfortably intense summer heat up against the western exposure of the sunlit cliff, and the ambiguity of the location of the sun at the exact moment of sunset experienced by an observer at this site, may have led another artist to place the Barrier Canyon figure partially overlaying the northwestern skyline petroglyph. In late morning a notch in the shadow of the cliff rises from the base of the panel, and touches the base of the Barrier Canyon petroglyph figure, as shown by the strongly dashed line on

Figure 3. The solstice event can then be watched in the relative coolness of the morning shadow of the cliff, until the light of the sun reached the base of the cliff, and the shaft of light progressed upward to the Barrier Canyon figure. The skyline petroglyph is made with a number of deep, bold, indentations. The Barrier Canyon figure is made with a less deep, more continuous line style of drawing. The Barrier Canyon figure also appears to be more recent in execution than the skyline petroglyph, considering the difference in development of desert varnish on the two petroglyphs.

**CATEGORY 3. Directional indication at a site, i.e., The location on the horizon of a solstice event marked by a pictograph or petroglyph.**

**Shaw Butte Hilltop Site.** On a trip to Phoenix, Arizona, there was an opportunity to visit the Shaw Butte Hilltop Site, a prehistoric Hohokam solar observatory within the city limits of Phoenix. Solar solstices are noted by alignment of a "center stone" with opening in the walls of now ruined rooms, and circular petroglyphs with a diameter extended beyond the circle on one side, pointing to the solstices. Curiously, one of the circular petroglyphs with an extended diameter points to Polaris, the North Star. On the east side of the butte is a small cave with marks on the walls of a cave that record solar events. A presentation at one of the URARA symposium on the subject of scratched lines in conjunction with petroglyph markings was an alert to examine such sites for scratch marks (reference unavailable.) On the hillside, south of the observatory, is a flat rock. Inscribed on the surface of the rock are two sets of eight to ten scratched lines, about twelve centimeters

long. One set of lines in one direction points to the horizon where the summer solstice sun sets, and in the other direction to the point on the horizon where the winter solstice sun rises. The second set of scratched lines points to Polaris, the North Star.

## CONCLUSION

The quest to understand the probable archeometeorological knowledge of the prehistoric inhabitants of the Southwest has led to additional assessment of their capabilities. They probably had knowledge of short term meteorological forecasting, and of the climatology of the area (Allee 1992b). They knew that the monsoon season, with its seasonal summer thunderstorm showers with their welcome rainfall, followed the summer solstice. And so, they developed at most sites (maybe all, if we could but understand their inscriptions) summer solstice markers to indicate the time for the performance of their rituals of invocations to the rain spirits for rain.

Their dot calendars indicate they were also interested in measuring the year, dividing it into some sort of time periods that represented the seasons of the year. Their probable purpose was to give their shamans the knowledge to predict the time of arrival of the various seasons, i.e., when to plant their crops (Allee 1992b), when to expect the rainy monsoon season to start (marked by the summer solstice), the harvest season, when to store food and prepare for the winter to come, and when the sun would start its return from the far south to reju-

venate the earth and its growing season. The purpose of the markers then was to enable a forecast to be made to time the progression of the seasons, with their attendant weather phenomena. Each season having an identifiable climatology described by its temperature, humidity, cloud forms (or lack of clouds), precipitation amounts and the weather elements such as rain, hail, snow, frost, all vital information for planning for their future activities.

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## FIGURES



Figure 1. A sketch of the northwest skyline as viewed from near the south end of the pictograph panel. Shown (in exaggerated form) is the location of a block of sandstone that extends slightly above the skyline. An arrow points to the location of the last spark of sunset when the observer stands on the fallen block at the base of the panel, and just below the petroglyph that represents a drawing of the skyline to the northwest of the site.

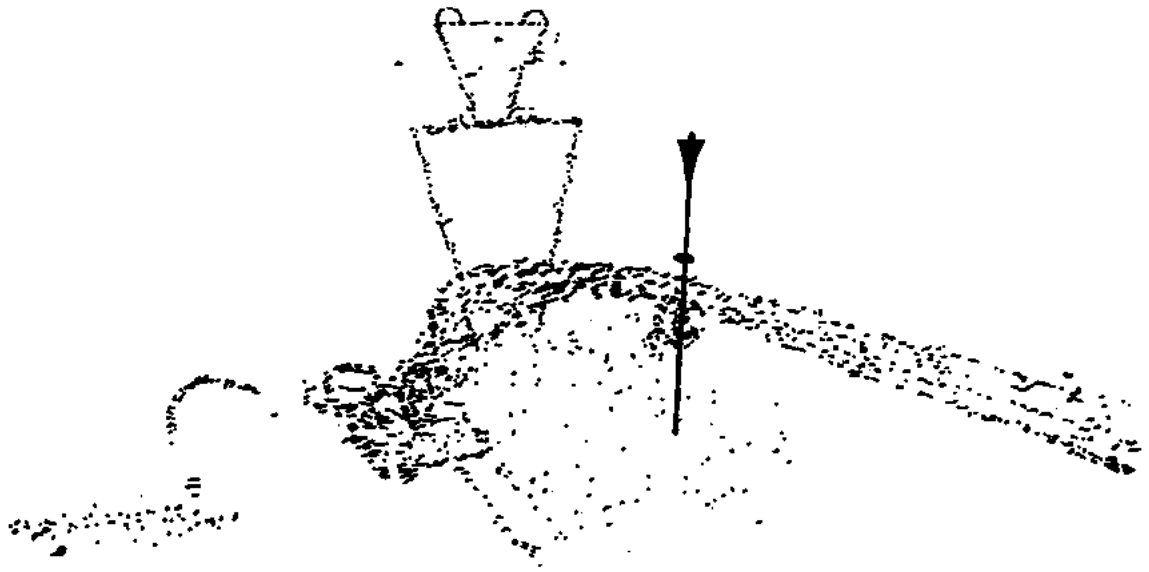


Figure 2. On the pictograph panel, in the Impressionistic Style of modern artwork, is a petroglyph representing the outline of the skyline to the northwest of the panel. On that representation is an agglomeration of petroglyphed dots that probably are the location of the position of the sun as its last spark disappears behind the skyline. Above the representation of the skyline is a single deeply petroglyphed mark that may represent the sandstone block noted on Figure 1. Connecting the two marks with a straight line crosses the "skyline" at what may be the location of the last spark of sunlight. This point on the skyline does not exactly match the summer solstice sunset of Figure 1. The angle of the skyline, and the angle of approach of the sun to the skyline, is such that the observer must be standing somewhere below the petroglyph in order to get the sunset to match the petroglyph's portrayal.

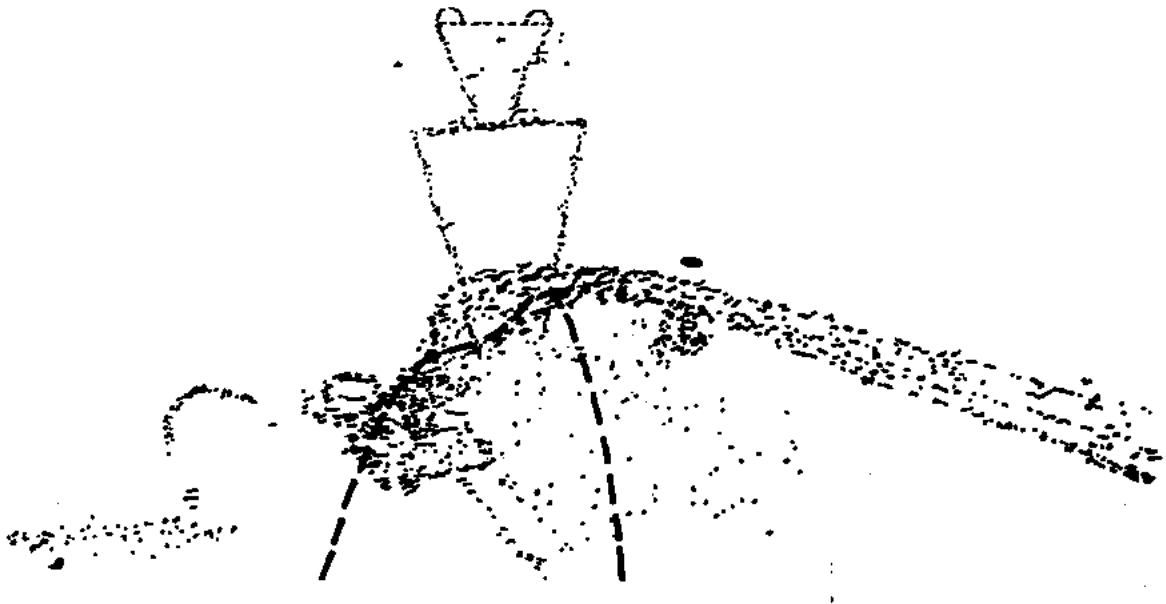


Figure 3. In late morning a notch in the shadow of the cliff rises from the base of the panel, and touches the base of the Barrier Canyon petroglyph figure, as shown by the strongly dashed line. The skyline petroglyph is made with a number of deep, bold, indentations. The Barrier Canyon figure is made with a less deep, more continuous line style of drawing. The Barrier Canyon figure also appears to be younger in execution than the skyline petroglyph, considering the difference in development of desert varnish on the two sections of the petroglyph.