

Ancient Colorado Rock Art Site Employs Light Animation to Mark Equinoxes: Astronomical Alignments Predate Anasazi Civilization.

by Carl Lehrburger: Part One

Summary

Two distinct calendrical alignments on the equinoxes have been observed at the newly discovered Pathfinder petroglyph site in southeastern Colorado (USA). The calendrical events occur on a 40-foot long rock art panel with a multitude of pecked petroglyphs depicting animals, anthropomorphic figures and symbols. The Pathfinder petroglyphs are of a Pecked Representational style estimated to be 2,000 years old. Both solar alignments are achieved by the interplay of light and shadow cast upon specific and distinctive petroglyphs. The intentional calibration as a calendrical device is demonstrated by observing that the sun/shadow lines strikes specific targets with notable precision on the equinoxes. The apparatus is one of the earliest known calendrical alignments involving sunlight animating petroglyphs reported in North America.

Although there are hundreds of ancient archaeoastronomy sites known to employ many different types of solar alignments, very few have been demonstrated to use sophisticated light animation interplay on petroglyphs related to calendrical events. A well-known North American site is The Fajada Butte (Chaco Canyon, New Mexico), which employs a sundagger light animation for multi-purpose readings including equinox, solstice and lunar observations. Another example of ancient sites employing light animation is Chich'en Itza (Mexico), where light dances on the back of a stone serpent giving the appearance the snake is descending down the pyramid on equinox. Other notable archaeoastronomy sites involving light animations include New Grange (Ireland), other sundagger sites at Chaco Canyon (New Mexico), the Inyo site (California) and the Anubis Cave site (Oklahoma). The Pathfinder (Colorado) belongs in the same elite company as an example of extraordinary advanced archaeoas-



Photo 1. Pathfinder site above the Purgatory River Valley facing northerly in December. Major glyphs highlighted on photo.

tronomy created by ancient peoples.

Site description

The Pathfinder is located in southeastern Colorado in the Purgatory River Canyon where the river flows northeast and eventually into the Arkansas River. The Purgatory River has worn a wide canyon through the Chaquaqua Plateau reaching miles in width at some points. The main canyon and many sub-canyons offered an abundance of game, water and shelter for early hunting peoples. In the main Purgatory Canyon and in some of side canyons, petroglyphs are found on boulders or on vertical sandstone rock surfaces. Many different peoples inhabited the region as suggested by the diverse styles of rock art and the archeological evidence. McGlone, Leonard and Barker (1999) have published a suggestive chart that organiz-

es the ages of the regional styles of Purgatory rock art as Pecked Abstract (2700 BC to AD 850), Pecked Pictorial (1350 BC to AD 1650), and Plains Biographic (AD 1500 to present). The Pathfinder petroglyphs are primarily of a Pecked Pictorial style also referred to as Pecked Representational.

The Pathfinder was discovered by William Tilley in 1996 and first reported by McGlone, Leonard and Barker (1999). Unlike most of the rock art in the area, the Pathfinder is located high on a canyon wall below the capstone.

The Pathfinder petroglyph panel is a flat 40 ft. x 12 ft. vertical sandstone rock with a generally southeastern face. An adjoining boulder creates a tent-like structure. As one approaches the Pathfinder, the full southeastern section of the rock panel can be viewed with the Purgatory River



Photo 2. Pathfinder Panel: Equinox sunrise shadow is cast on outer panel. Glyphs enhanced on photo.

and valley below (Photo 1). As one follows the vertical rock art panel toward the southwest, the area becomes more confined. Between the large rock art panel and the adjoining boulder, the cave-like structure measures no more than several feet wide at some points. From above one observes that openings created by rocks situated between the boulder and the Pathfinder panel allow light to strike the panel around noon.

The floor of the enclosure is inclined with the highest point occurring at the southern end. The floor is rock and compacted fill, covering some of the petroglyphs at the bottom of the panel. From the back of the Pathfinder looking toward the southeast one observes canyon walls, the top being the horizon.

It is not possible to observe the panel completely from any vantage due

to the envelopment of the petroglyphs in the cave-like enclosure. Most of the glyphs toward the inside are quite small and difficult to observe due to the constricted area, light conditions, erosion and water damage. To view the innermost glyphs one must proceed up the incline and place ones face within one foot of the panel to observe the small, finely pecked glyphs. Although the site is pristine and without any historic graffiti or vandalism, water seepage has damaged some glyphs and many glyphs are worn. Apparent spalling within some petroglyphs has resulted in a white, chalky appearance where patina is not present.

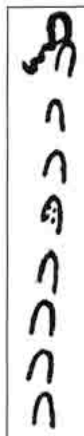


Fig. 1. Detail Series of hoof print shaped glyphs.

Pathfinder petroglyphs

The fine pecking technique, large elaborate mural compositions and expressive petroglyphs accompanied by archaeoastronomical elements makes Pathfinder rock art a quality example of North American Representational style rock art.

The Pathfinder petroglyphs depict diverse anthropomorphic and zoomorphic figures with both curvilinear and rectilinear geometric forms. The Pathfinder rock art is consistent with the Pecked Pictorial style petroglyphs previously identified by McGlone, Leonard and Barker (1994) who place the Purgatory Pecked Pictorial style rock art between 1350 BC and 1650 AD. Although no carbon dating of the Pathfinder petroglyphs has been attempted, the dating of 22 glyphs in the area has been described by Dorn, McGlone, and Leonard (1990), "Age Determination of Petroglyphs in Southeast Colorado" and reported by McGlone et al (1993)". Dorn employed the cation-ratio dating method to test the patina of rock varnish that covers the petroglyphs. Although the cation ratio method of dating is controversial, Dorn's methods and conclusion are supported by comparison with other dating methods. Dorn sampled the varnish of seven petroglyphs from a site located near Pathfinder known as site number 5BN65. This rock art site has petroglyphs very similar in style and appearance to the Pathfinder, including large mural compositions. Dorn estimated six of the seven petroglyphs to range in age from 2,300-1,800 years (+/- 250). In the absence of Pathfinder site-specific tests and based on the two methods described above (comparative age of known glyphs by rock art style and

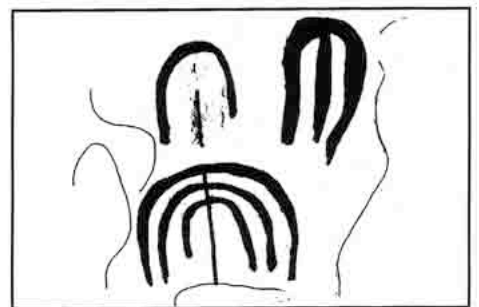


Figure 2. Variations of hoof print-shaped glyph.

cation-ratio dating of a nearby site) it is estimated the Pathfinder was created in the early first millennium (1800 - 2500 years ago +/- 250).

The Pathfinder petroglyphs

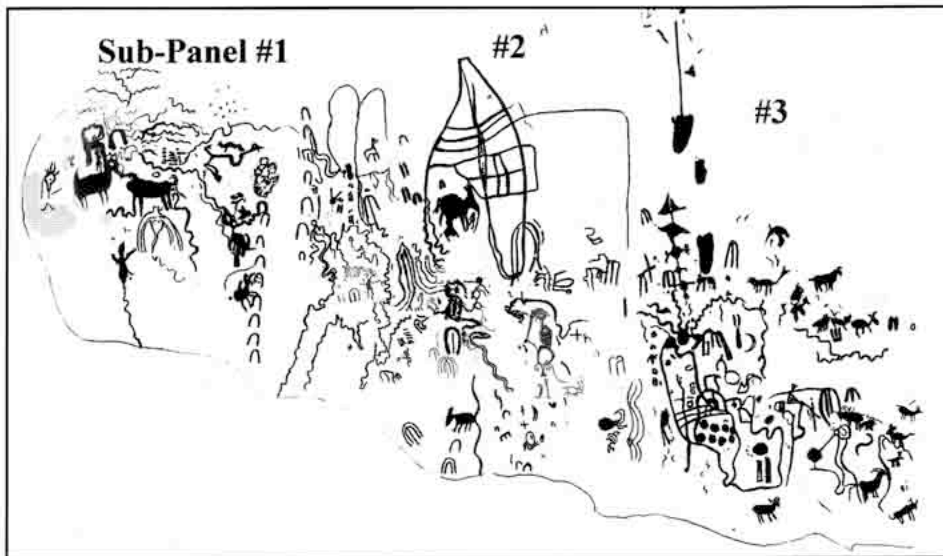


Figure 3. Drawings of Pathfinder panel, approximately 40 feet long.

share similarities with the so-called Hoofprint Tradition, considered to occur primarily in the Late Prehistoric age, although some date to the early Historic period after AD 500. Pathfinder petroglyphs impart fertility and game animal themes consistent with Hoofprint Tradition rock art sites. Comprising approximately 25% of Pathfinder recognizable glyphs, hoof print-style glyphs are the most common appearing in various forms forty times. Following hoof prints in frequency are 26 zoomorphic images which account for about 16% of the recognizable glyphs.

An important variation of the

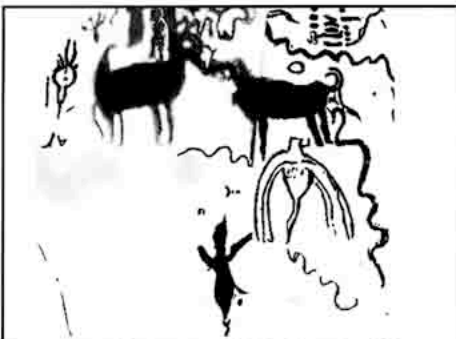


Figure 4. Sub-panel #1 detail. Hunter, deer, and a buffalo on top "tree of life" glyph.

hoof print glyph is a vertical line in the middle. These split-hoof print glyphs (Figure 2) appear 13 times. One of the largest split-hoof print is positioned below the anthropomorph who is the target for the noontime sundagger event.

Compositional arrangements

Because of the size of the panel and viewing constraints, the entire panel cannot be seen as a whole at the

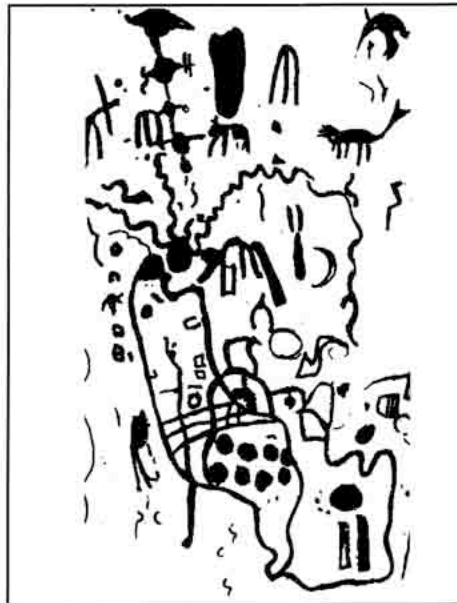


Figure 5. Sub-panel #3 detail. "8 dog" glyph.

site. By assembling individual photographs of the petroglyphs, a full composite drawing was achieved. The Pathfinder panel can be divided into three sub-panels (Figure 3). Sub-panel #1 is most inaccessible, beginning at the back of the enclosure. Sub-panel #2 is positioned in the middle: the two solar alignments occur here. The outward section, sub-panel #3, is dominated by a large dog-like petroglyph that is immediately apparent when approaching the site.

The compositional arrangements of sub-panel #1 are suggestive of both hunting and fertility themes. Although the upper petroglyphs are damaged from seepage, the author has identified a large anthropomorph giving birth. Figure 4 shows the place-

ment of anthropomorphs, animals (zoomorphs) and other images from the bottom half of sub-panel #1.

Sub-panel #2 is dominated by the equinox morning target glyph, the largest petroglyph at Pathfinder (33 inches high x 22 inches at the widest point). Coined a "leaf-shaped" glyph by McGlone, Leonard and Baker (1999) the author believes this to be a vulva-form based on investigations conducted after McGlone's initial investigations revealed the second alignment and a potential cultural context for interpretations. This petroglyph is the target for the sunrise equinox alignment. There are at least three anthropomorphs below the equinox morning target glyph. In Figure 6 and 8, major details of sub-panel #2 equinox alignments are shown.

Sub-panel #3 is dominated by the "8-Dog" glyph (named for the eight dots on back), the second largest petroglyph at Pathfinder. This sub-panel contains 12 zoomorphs, 11 being quadrupeds and one a bird in with no apparent anthropomorphs. The petroglyphs are finely



Figure 6. Sub-panel #2 detail. Morning equinox alignment follows right edge of shadow.

pecked and include different zoomorphic images amidst abstract and pictorial designs (Figure 5).

Equinox Morning light and petroglyph alignment

After its discovery in 1996, William McGlone and colleagues suspected the Pathfinder to have an archaeoastronomical alignment.

The morning equinox alignment discovery was described by McGlone, Leonard, Barker (1999):

One large, leaf-shaped petroglyph on the long boulder, just opposite the end of the shorter rock forming the cave, caught our attention as a possible target for shadow play in a solar alignment. Compass readings indicated that the edge of the shorter boulder would align with the glyph at the time of the equinox sunrise ... a group of local Boy Scouts was enlisted to camp near the site and record any involvement of the leaf-like glyph with the sunrise on equinox morning. They found that at the moment of the sunrise the shadow of the end of the shorter boulder closely fit the petroglyph and other pecked lines continuing from it down to ground level. (Page 26)

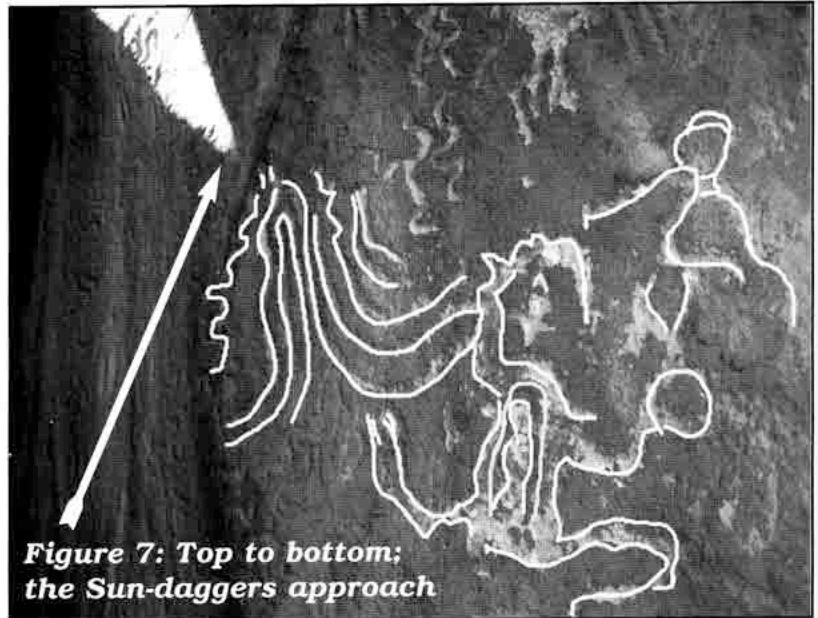
After more careful study of the video taken of the event by the Boy Scouts, it became apparent that the shadow fit rather precisely into the equinox morning target glyph except in two sections. Toward the top the sunlight penetrates into the equinox morning target glyph, crossing the petroglyph outline. McGlone noted:

...At one portion of the leaf-like petroglyph, the shadow does not precisely follow the entire contour of the glyph, possibly due to spalling of the short boulder's end, incomplete initial marking of the shadow, or deliberate fairing in the outline of the glyph to form a symmetrical shape. We do not know what may be depicted in the motif. Nevertheless, the shadow does so closely follow elements of the entire petroglyph complex, repeatedly reversing direction to match the glyphs that we consider the alignment deliberately made to operate on the equinox. The alignment works indirectly and also directly when the sunrise is viewed from the petroglyph. (Page 27)

The irregularity of the fit of the light shadow line and glyph outline at the top is puzzling. McGlone, Leonard, Barker (1999) offer several explanations for why sunlight penetrates the petroglyph on equinox at the top while remaining outside the target glyph (Figure 6). The idea that spalling or erosion would affect the shadow is plausible. More likely in the author's view is that the creators intended the light to enter the petroglyph at the top, thus creating the effect of the sun barely penetrating the top of the equinox morning target glyph.

The bottom of the glyph is the second area where the sun's shadow does not fit the outline of the equinox morning target glyph. Here the shadow line follows what might be described as a large version of the split-Hoof print glyph described above. Although the shadow leaves the main glyph, intentionality continues as the shadow fits into the split-hoof print glyph and continues down the panel following what appears to be the outline of a buffalo.

The many vertical and horizontal lines inside the equinox morning target glyph could mark alignments at other times of year although to date none have been observed. Originally and after its discovery, this morning alignment was interpreted only as an equinox calendrical apparatus. It wasn't until the



**Figure 7: Top to bottom:
the Sun-daggers approach**

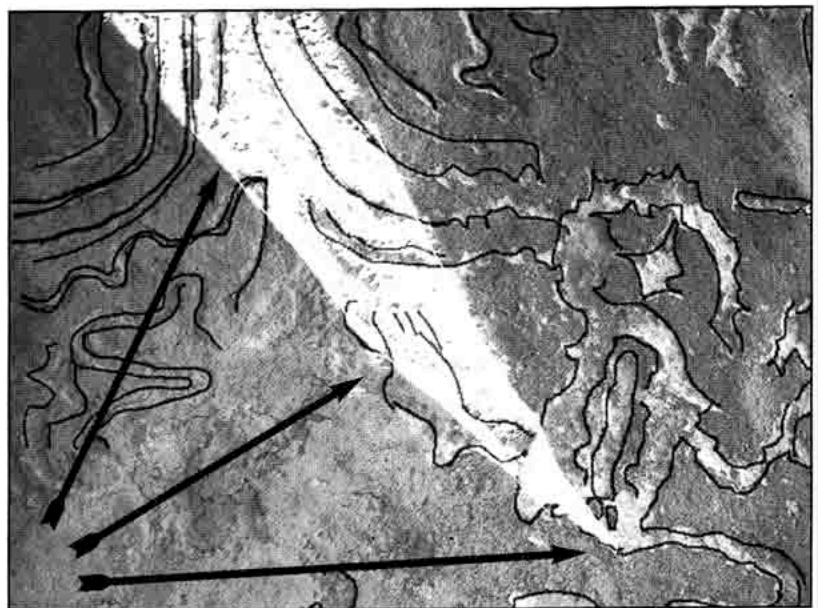


Figure 7. Detail sun-dagger approaching "Sun-catcher" glyph one-half day after true equinox in the spring.



Figure 8a.

discovery of the second noon time alignment did a broader mythological story and cultural context emerge.

Equinox noontime sundagger alignment

Although light emerging from the top of the enclosure in the shape of a sundagger had been seen previously, it was not until 2004 that intentional placement on target petroglyphs was observed and photographed. On the equinox at about 12:30 pm a small sundagger moves across the panel from the rear and disappears after about ten minutes. This is followed by a much larger sundagger that enters from the back and moves downward across the panel toward the outside.

To verify intentionality and to calibrate the occurrence for the equinox the target petroglyphs must be considered. On the equinox there are three apparent target glyphs the sundagger strikes over the 45-minute descent across the panel around noon. The first target glyph (referred to as the "Suncatcher") is an elaborate series of lines in the shape of a phallus that comes to a point where the sundagger strikes on equinox. This first "target" can be seen in Figure 7 as the sundagger approaches the point of the "Suncatcher" 12 hours after the spring equinox.

The second target glyph, an anthropomorphic figure, is below the Suncatcher and connected to it at the head. It has unique features including a face with a diamond-shaped interior. The elements of the anthropomorph

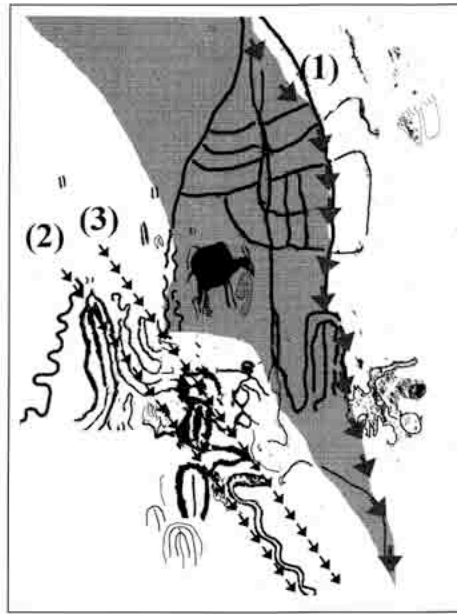


Figure 8b.

are difficult to discern, but by using digital photographs and making computer enhancements, the details of the anthropomorph are revealed to be a spread-legged figure with a protrusion inside the body cavity. The left foot rests near the head of the snake. A large split-hoof print glyph is situated below the anthropomorph (Figure 7). As the sundagger engulfs the anthropomorph, the light point proceeds to strike the serpent glyph below the anthropomorph's left foot. The serpent's body appears to be the third target (Figure 8a, lower center) in the series.

The serpent's role in the equinox animation is not without precedent. Although there are only a handful of known equinox light animations comparable to Pathfinder worldwide, three involve the serpent. The most well known in North American is Fajada Butte (New Mexico), where an Anasazi-built calendrical apparatus at Chaco Canyon circa 1100 AD employs a sundagger for multi-purpose readings including equinox, solstice and lunar observations. A serpent is one of the three target glyphs pecked at Fajada Butte. At Chich'en Itza (Mexico), light dances on the back of a stone serpent on equinox, giving the appearance the snake is descending down the pyramid. A third example of light animation involving a serpent on equinox occurs at the Inyo site (California), where a sundagger with the appearance of a serpent consumes a petroglyph identified as eggs in a basin.



Figure 8c.

In Figure 8b, (1) represents the equinox morning shadow line. The 2004 Spring and Fall equinox observations of the noontime sundagger event are shown as line (2) and (3). Line (2) shows the sundagger path one-half day north of the equator (twelve hours after true equinox in the Spring) and line (3) is the movement of the sundagger observed one day south of the equator (one day after true equinox in the Fall). Based on these two observations, it is estimated that the sundagger will engulf the main body of the snake within approximately eight to ten hours of true equinox. Figure 8c highlights both the morning and noontime equinox alignments. This light animation takes place over a period of 15 minutes, beginning when the dagger strikes the point of the Suncatcher and ending as all three elements are engulfed in light.

Conclusion to Part I

The two archaeoastronomical alignments observed at Pathfinder employ sophisticated light animation to coincide with the equinox. An unnarrated video of the Pathfinder equinox alignments filmed and edited by Scott Monahan can be viewed via the internet.

The petroglyphs appear to be of an early Native American origin based on the strong connection to the Hoofprint Tradition noted above and the observation that several petroglyphs and the noontime equinox animation are suggestive of common early Native American origin myths (further

elaboration in Part II). However, the complexity of the Pathfinder alignment begs the question of where the knowledge came from to construct a calibrated heliolithic animation approximately 2,000 years ago.

Within the Purgatory River area of southeast Colorado and throughout the southwest U.S., petroglyphs are often accompanied by archaeoastronomical alignments. The author has observed several dozen in the Purgatory River region employing light and shadow to highlight a target glyph or composition on equinox or other important celestial days. However, none of these demonstrates the sophistication of using a light animation over a series of glyphs at a designated time of year as employed at Pathfinder.

One explanation is the proximity of Pathfinder to Anubis Cave, Oklahoma, less than 80 miles as the crow flies. Anubis Cave is perhaps the best example of an archaeoastronomical light animation involving a recognizable mythology. The Anubis Cave animation has been identified by Fell, Farley and McGlone (1993) as of Old World origin employing an equinox light animation involving Mythic symbolism, accompanied by Ogam inscriptions in the Gaelic language and Libyan writing. It may be that the creators of Pathfinder were inspired by the Anubis Cave animation and, after learning and observing the workings of Anubis Cave, they returned to the Purgatory area and applied the techniques to their own mythologies and world view.

Amidst the speculation over possible Pathfinder ethnographic connections to later peoples, what is clearly discernable is the equinox light animation that occurs. This phenomenon is a rare example of advanced archaeoastronomy from thousands of years ago, employing sophisticated light animation on target petroglyphs. Only a handful of ancient sites employ comparable intentional interplay of light and petroglyphs. Additional investigations may lead to new insights into early Native American cultures of the Great Plains and the southwestern United States. ■

Author

Carl Lehrburger, founder and executive vice president of PureVision Technology, Inc. (Fort Lupton, CO) has worked in the renewable energy indus-

try since 1974. For the past ten years he has made regular visits to the Purgatory River Valley and throughout the American Southwest to study archaeoastronomy and petroglyphs. All drawings and photos by author.

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Sofaer, cit ob.

Krupp, cit ob.

Roderick L. Schmidt, "An Analysis of the Inyo Equinox Display," www.equinox-project.com/analy.htm.

Scott Monahan, creator or www.archaeoastronomy.com, includes valuable information on his site including the availability of videos of many alignments.

www.archaeoastronomy.com/. The unnarrated video of the Pathfinder equinox alignments can be viewed at: <http://homepage.mac.com/transvision/iMovieTheater8.html>

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Other examples of archaeoastronomical light animations on petroglyphs: New Grange (Ireland), Fajada Butte (Chaco Canyon, New Mexico), the Anubis Cave site (Oklahoma) and the Inyo site (California). At Chich'en Itza (Mexico), equinox light interplay involves monumental architecture.

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