

Nov.20: Chapter Meeting – Al Dart of Archaeology Southwest presented *Southwestern Rock Calendars and Ancient Time Pieces*. Al started out with a summary of dating and calendrical terms. Modern archaeologists frequently use the abbreviation BCE (Before Current Era) where previously BC was used and CE (Current Era) where AD was formerly used. Pre-contact and Post-Contact depends on what part of the Americas it is applied to, referring to when contact with western Europeans first occurred. In the US Southwest Pre-Contact basically means after the year 1539 when Marcos de Niza and his companion Esteban first set foot there and “contacted” Native Peoples living there.

Currently, we use the Gregorian Calendar, introduced by Pope Gregory XIII in 1582 to replace the Julian Calendar, introduced by Julius Caesar in 45 BCE. The Julian Calendar had presumed that the year is 365.25 days long, and so introduced a Leap Year extra day every four years (year numbers divisible by 4). This makes the average length of a Calendar Year 365.25 days long, when it is actually more like 365.2422 days. After over 1600 years this discrepancy added up to about 10 days, making some seasonal holy days come in the wrong season. The Gregorian Calendar adjusted for this discrepancy and then eliminated future drift by omitting the extra day in would-be Leap Years divisible by 100, unless it was also divisible by 400. You may not have noticed this since none of us were alive in the year 1900, not a leap year, but many of us were alive in the year 2000, which was a leap year.

But Al Dart pointed out that this is all sort of academic. How did people originally track time? The obvious unit is a day cycle. The other obvious time markers are the seasons, during which the sun rises and sets at different points in the summer and winter, which changes the proportion of light and dark in day cycles. This seasonal cycle we call a year. This yearly solar cycle can be marked by where the sun rises and sets, the extremes north and south events being called solstices, which are marked by the shortest daylight of the year (winter solstice) and the longest daylight of the year (summer solstice). Also notable are the midway rises and sets, which are due east and west and with equal time daylight and nighttime. We call these occurrences equinoxes. Modern humans have another cycle which we call a month, which was originally based on the lunar cycle as it runs through its full moon to new moon and back to full moon states as visible from earth. The lunar cycle is about 29.5 days.

We know from written sources that Eurasian peoples have been marking these times units and events for millennia. But what about Prehistoric Americans? How could we tell if they marked these time changes? Al suggested that the alignment orientation of buildings would be evidence. In particular, if buildings were aligned with the cardinal directions, that indicates that the people were paying attention to these solar events. At an Equinox the sun rises and sets at points east and west of an observer. Perpendicular to the east-west line is the north-south line. These four are the cardinal directions. There are several ways to determine these directions quite accurately by looking at the sun rises and setting, shadows, and so forth.

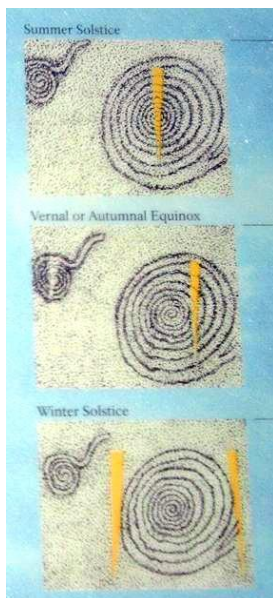
Al went on to list case after case where the axis of a prehistoric Southwest building or wall or alignment with a prominent natural feature are very close to a north-south line. These included quite a few cases in Chaco Canyon in New Mexico, Casa Grande here in Arizona, structures at Mesa Verde in Colorado, and others that are aligned north-south. Great Kivas in Chaco have their internal features aligned north-south.

Perhaps more remarkable are that many buildings have notches or view holes that line up with solstices. He described several cases where a building had a “view hole” where the sun would shine through it making a spot of light on the opposite wall or floor. But on one of the solstices, that spot of light would pass right to the bottom room corner opposite it. At Chaco Pueblo Bonito there are several rooms with odd corner “windows.” On one of the solstices sunlight coming through will illuminate the opposite floor corner. In one case at a Hovenweep site tower in Utah, there were two holes, one for a solstice to shine a spot in the opposite corner and another to shine an equinox onto the same corner. At Pueblo Grande here in Arizona, there are two holes in the top story aligned exactly east and west. So, on equinox sunrise or sunset the sun shines into one hole and out the other.

Phoenix municipal park Papago Park has a red stone hill called Hole-in-Rock that has a large hole worn through it by eons of weather, making sort of a cave, with a hole in the ceiling. Where the sun light coming through the ceiling hole strikes the rock inside on equinoxes and solstices is marked on the stone, perhaps by Hohokam people.

The most famous solar time tracking site is atop Fajada Butte in Chaco Canyon. This site had a lot to do with acquainting archaeologists with Southwest Prehistoric American archaeoastronomy. By a fortuitous accident in 1977 an archaeologist was looking at some petroglyphs atop the butte on a summer solstice day and observed a sliver of sunlight making a “sun dagger” passing through the center of a spiral petroglyph over a 14 minute period. The sunlight shone through a slit between two naturally placed boulders. It turned out that on winter solstice there were two such sun daggers framing the same spiral petroglyph. And the Equinoxes are also marked with another spiral.

Al Dart went through one case after another, many at famous named sites around the Southwest, where there are now known solar event alignments, so many it was hard to keep track of them listening to Al go through them.



Fajada Butte Sun Dagger Diagram and Chimney Rock Major Lunar Standstill Moon Rise

What about lunar events? While the view of the sun takes a year for the earth to go through its orbit, the moon orbital cycle is 29.5 days. Like the view of the sun, moon rises and moon sets move through a cycle to go through between two extremes. These extremes are analogous to solstices. They are called standstills as the moon seems to stop and linger before going back the other way. However, each month the two extremes move. These movements follow an 18.6 year cycle! The moon will rise and set in the most northerly direction every 18.6 years. This is called a Major Lunar Standstill. Al said that there are a number of prehistoric sites in Ohio where mound alignments mark the direction of the Major Lunar Standstill rising moon. However, Al Dart says there is no ethnographic evidence of Post-Contact Indian awareness of Lunar Standstills. Is there any evidence that Prehistoric Americans in the Southwest were aware of this 18.6 year cycle? Al said that there are three sites in the Southwest that indicate Prehistoric Americans may have been aware of the Major Lunar Standstill.

Pueblo Grande has a wall hole aligned with the rising Major Lunar Standstill. Mesa Verde "Sun Temple" is aligned with Cliff Palace toward the Lunar Standstill. And most famously, Chimney Rocks and a nearby Chaco-style Outlier pueblo site have a Lunar Standstill alignment.