

INDIGENOUS COSMOLOGY & ASTRONOMY

VERDE VALLEY
ARCHAEOLOGY
CENTER



ASU Buseck Center for
Meteorite Studies
Arizona State University

Welcome to the
Indigenous Cosmology and Astronomy Exhibit

Throughout history and across cultures, the sky has been a place of wonder and awe. Anthropological research has confirmed that the regularity of the motions of celestial objects has helped humans to orient themselves in time and space, a critical survival tool. Instances of this knowledge have been documented in the Verde Valley. This exhibit provides a glimpse into some of these discoveries that leads to a greater appreciation of the skills of Hopi ancestors.

Explore the thematic areas of the exhibition and view the accompanying commissioned Katsina artwork. Enjoy!

Monica Buckle
Executive Director

The way the sun impacts the rhythm of our daily lives and the changing seasons has been recognized since time immemorial. We are not so distant from our forebears who first gazed into the cosmos, studied its celestial geometry and applied astronomical wisdom to their lives. Astronomy gave Native American and Indigenous People a new perspective on time – understanding the cycles of the sun and the moon allowed these People to look into the future with confidence, while providing a stable framework. We are fortunate in the Verde Valley to have present-day descendants among the Hopi, Yavapai and Apache, who continue to practice the ancient sky lore through stories or rituals.

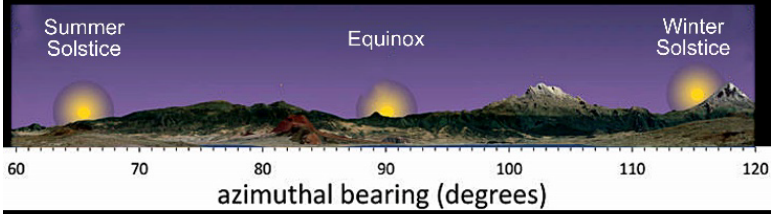
Archaeoastronomy (the study of ancient astronomy) is a multi-disciplinary subject that includes archaeology and

astronomy, as well as subjects as diverse as geology, climatology and engineering, art and religion. Archaeoastronomy opens a window to the past, offering insight into the hopes and aspirations of our predecessors, as well as revealing many of their struggles to survive. The ancient development of complex systems of knowledge, combining astronomy with spiritual values, occurred throughout the world, independently, but all were based on the same key building blocks of the sun, moon, stars and their predictable paths across the sky.

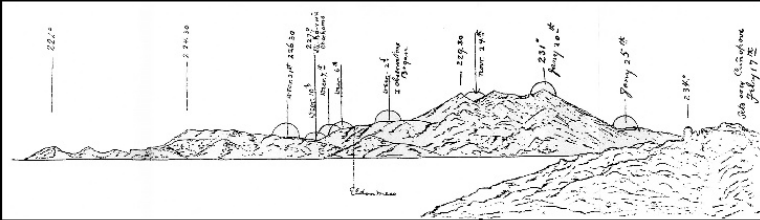
This exhibit on ancient Indigenous cosmology and astronomical practices in the Verde Valley is a picture into the beginnings of the observation of the cosmos using the science of archaeoastronomy. For example, the first farmers noticed the sun's regular cycle of movement and found that they could use it to create a calendar to aid in the planting of various crops. Religious leaders could use the sun or moon to determine the time for specific rituals. This exhibit begins by exploring two basic methods of marking time. The observation of sunrise and/or sunset along a horizon was one of the first methods developed and documented in the Verde Valley. This method was enhanced with the use of specific images, carved or painted onto the landscape, that would interact with sunlight and shadows.

The night sky could also be used to determine time with the phases and passing of the moon, as well as observing various constellations that appear at different times and locations during the year. But mysteries remained for the Ancient ones such as the appearance of a shooting star and the resulting stones falling from the cosmos.

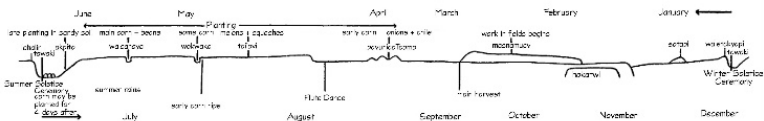
Horizon Calendars



Above is a depiction of the location of sunrise at different times of the year. Tracking this seasonal motion is at the core of calendrical practices. Some cultures also tracked sunsets.

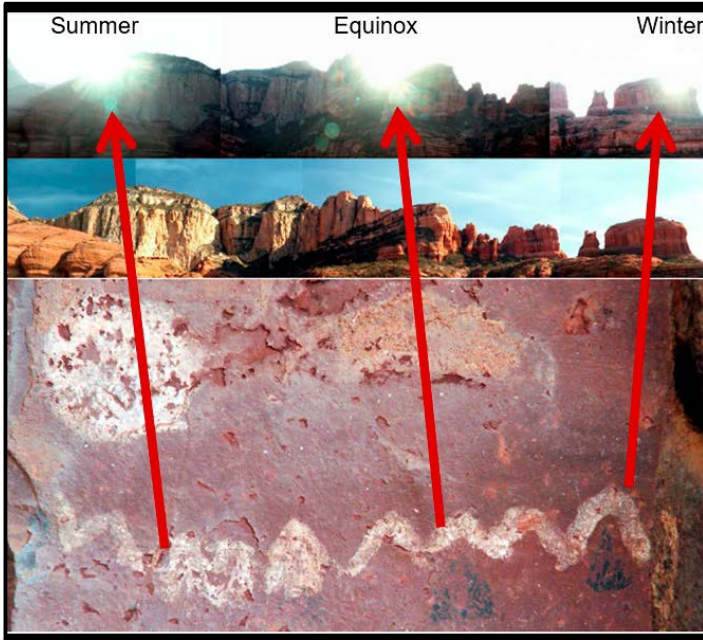


The above drawing, in the *Hopi Journal of Alexander M. Stephen* (1891-93), was from the Sun Watcher position “from the roof of Bear clan house.” To avoid errors, observations must be made daily from the same location.



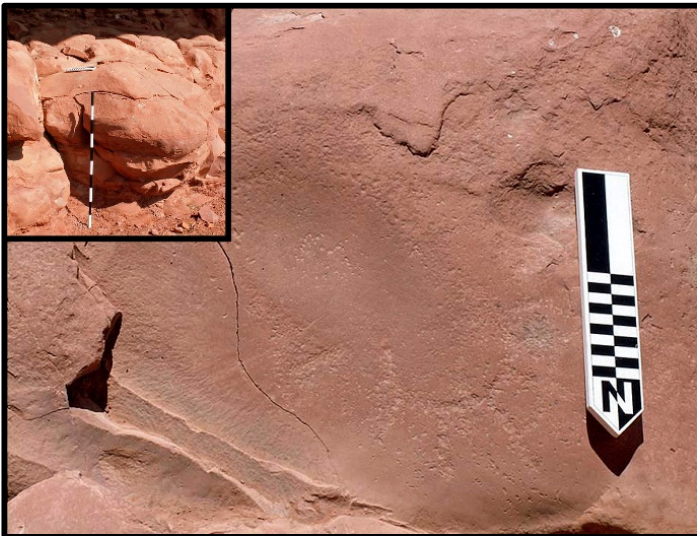
Historically, the agricultural season begins in February with the clearing of fields, and ends in September when the last corn and beans are gathered. The above map from Hano, on the southern end of First Mesa, shows the solstices and ceremonies and planting times based on the sun’s rising position.

Adapted from C. Daryll Forde, “Hopi Agriculture and Land Ownership,” 1931.



Palatki Sunwatcher

The Grotto pictograph area includes an image of the opposite horizon. Black triangles at the bottom mark the winter solstice and equinox sunrises. The white “ball” marks the summer solstice



Honanki Sunwatcher

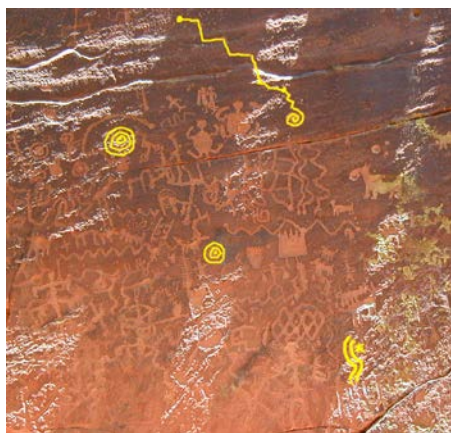
Near the Honanki Heritage Site is a rock outcropping. On the top is a petroglyph of the rising sun within a “smooth-out” depression on which the sunwatcher would sit to make their observations of the opposite horizon.

Light/Shadow Calendars

Hisatsinom sunwatchers took notice of important times when sunlight entered their rooms or illuminated specific images. This observation technique, called ***imaging***, involved the casting of shadows. Several sites within the Verde Valley have been found to use this observation technique.

Crane Petroglyph Heritage Site Seasons at the V-V Historic Ranch

The Crane Petroglyph Heritage Site at the V-V Historic Ranch contains 1,032 petroglyphs on several panels. Only one panel, referred to as the **Solar Panel**, contains seven concentric circle petroglyphs, said to represent Father Sun. The light and shadow effect on the Solar Panel was created by a trilogy of boulders wedged in a crevice in the rock face above the Solar Panel. When the sun crested the bluff at mid-day, sunlight would strike the protruding boulders, resulting in a shaft of sunlight between two lines of shadow, producing a shadow effect on the Solar Panel. In its most basic form, the stones acted as dual sundials, or gnomons. The direction of the shadows provided the time of the year. Some of the effects are shown here.

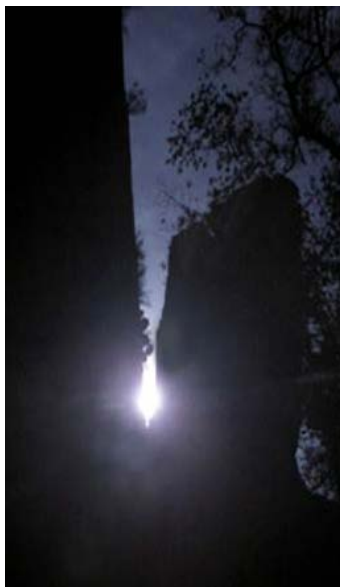


At summer solstice, two concentric circles frame the edges of the left stone's shadow. The right stone's edge grazes a glyph of two dancing figures with the sun (asterisk).



At the equinoxes, three concentric circles are tangent to the edges of the shadow produced by the lower stone.

Crane Petroglyph Heritage Site Seasons at the V-V Historic Ranch



At winter solstice, a sun dagger is projected at the foot of the Solar Panel. Later, a sun dagger points to a concentric circle (below).



Meteorites and Indigenous Cultures

These stones from outer space are referred to as **meteors** as they flash across the sky. The fragments that manage to make it to the Earth before burning up in the atmosphere are called **meteorites**. Even in this day and age, the sight of a meteor streaking across the sky is awe inspiring. It was even more so for Indigenous cultures, as they did not have science to explain these mysterious events. A bright flash of light, perhaps accompanied by a loud boom or thunder, could only be explained as a religious or spiritual occurrence. Meteorites were sacred and may have been used in religious and healing ceremonies.



In 1935, an “artifact hunter” found the 135 lb Camp Verde Meteorite in a dwelling east of Camp Verde, buried in a cist and wrapped in a turkey feather blanket. ASU determined it was part of the Canyon Diablo Meteorite.



In 1955, campers found the 11 lb Bloody Basin Meteorite in a dwelling known as the Red Creek Ruin on the Tonto National Forest. It was also part of the Canyon Diablo Meteorite.



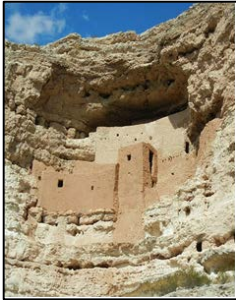
The 10.5 lb Fossil Springs Meteorite was found in 1945 below ancient dwellings along the flume in Fossil Creek that brought water to the Childs hydroelectric plant. It was also part of the Canyon Diablo Meteorite.

The Canyon Diablo Meteorite, that created Meteor Crater east of Flagstaff, was composed of many fragments, referred to as a “swarm” meteorite. These meteorites likely detached from the main mass during atmospheric passage before reaching the crater. The meteorite approached the earth from the southwest and likely passed over the Verde Valley.

Special thanks to the Buseck Center for Meteorite Studies for the loan of the meteorites on display

Pueblo Architecture and the Sun

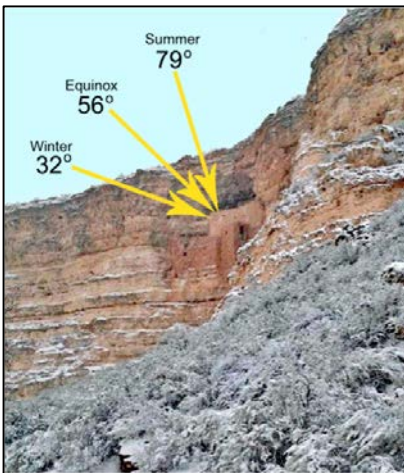
For today's architects, the predictable nature of seasonal daylight geometry makes it one of the first topics to be considered in any design project. But they were not the first to consider the sun in their architectural plans. The Hisatisinom were doing this as far back as the 12th Century at Montezuma Castle, Palatki, Honanki, Clear Creek and other locations. The location to build Montezuma Castle, as with other sites, was selected to consider the sun's effect on the dwelling.



Each of these sites are located in a natural recess in a cliff face, under an overhang. In addition, they are all facing south. As an example, the bottom image shows the sun's angles on the solstices and equinoxes at the Castle. The sun is at its highest angle to the Castle at summer and at the lowest at winter.



The effect of the various angles of the sun is to provide the most shade during the summer. Summer daytime indoor temperatures are substantially cooler than the outside air. For example, if outside temperature at the Castle is 104, some interior rooms may be in the low to mid 80s.



During winter, the dwelling acts as a passively heated building by collecting the more direct solar energy at its lowest angle during the day and dispersing that stored energy into room spaces at night.

Hopi Ceremonial Calendar

The Hopi people have their own unique calendar which coincides with their extensive ceremonial schedule. The ceremonial calendar is divided into two sections—Katsina Season and non-Katsina Season. The seasons are planned according to the position of the Sun and the Moon, and ceremonies line up fairly close to the months of the year.

The spiritual aspect of Katsinas is similar to a European culture's saints and angels. Katsinas carry messages to the Creator and intercede to bring rain, fertility, and abundance. In their visible form, men wear regalia to represent Katsinas in ceremonies. In February, the katsinam arrive to help the Hopi prepare for the next growing season and to initiate children into the Katsina Society



Graphics courtesy of katchinahouse.com

Hopi Katsinas

Darence Mak'wesa Chimera



Sun Katsina



Star Katsinam



Darance Mak'wesa Chimerica resides on Third Mesa in the village of Hotevila *"I have been carving going on 17 years. I have been influenced and taught by family members and friends. All my paints are natural earth mineral paints that I hand collect, crushed to a fine powder, adding water and juniper sap as an adhesive. My tools are all hand wood tools, files, knives, saws, and razors. I try to stick to the traditional method of carving; at times it can be a challenge. I try to carve katsinas as how I see them in physical form; some I carve through word of mouth."* Darence Mak'wesa Chimera

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