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Rock art and archaeoastronomy

research at monte alegre do Pará, Brasil. new art discoveries 2009-2010 field season

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ROCK ART AND ARCHAEOASTRONOMY RESEARCH AT MONTE ALEGRE DO PARÁ, BRAZIL. NEW ART DISCOVERIES 2009-2010 FIELD SEASON

Abstract

This report covers the field season from December 19th, 2009 to March 1st 2010. The objectives were to make archaeoastronomy measurements of the rock art at *Serra da Lua* and *Painel do Pilão* that might coincide with the Winter Solstice on December 21st, to locate and record all the previously recorded and published rock art of the region, and to locate and excavate art-related sites at *Serra da Lua* and *Gruta 15 de Março* in order to produce more dates that coincide with the age of the art. However, during this field season the most surprising results were the discoveries of previously unrecorded rock art. Although dates for the new art have not been determined, they are believed to be authentic and ancient, not recent graffiti or imitations, due to the remote locations and pristine conditions in which they were found.

Keywords: archaeoastronomy, rock art, Amazon.

ARTE RUPESTRE E PESQUISA ARQUEOASTRONÔMICA EM MONTE ALEGRE, PARÁ, BRASIL. DESCOBERTA DE NOVAS PINTURAS NA ETAPA DE 2009-2010

Resumo

Este relatório se refere à pesquisa de campo realizada de 19 de dezembro de 2009 a 1° de março de 2010. Os objetivos eram registrar medições arqueoastronômicas das pinturas rupestres na Serra da Lua e Painel do Pilão, que poderiam coincidir com o solstício de inverno em 21 de dezembro, localizar e registrar todas as pinturas rupestres antes registradas e publicadas na região, e localizar e escavar sítios relacionados à pintura rupestre na Serra da Lua e Gruta 15 de Março, para produzir mais datas que coincidissem com a idade das pinturas. No entanto, durante esta etapa de campo, os resultados mais surpreendentes foram a descoberta de arte rupestre até então desconhecida. Apesar de as datações para a nova arte não serem ainda conhecidas, parecem ser autênticas e antigas, não grafites ou imitações recentes, tendo em vista sua localização remota e condições prístinas nas quais foram encontradas.

Palavras-chave: arqueoastronomia, arte rupestre, Amazônia.

ARQUEOASTRONOMÍA Y LA INVESTIGACIÓN DEL ARTE RUPESTRE EN MONTE ALEGRE, PARÁ, BRASIL. EL DESCUBRIMIENTO DE NUEVAS PINTURAS EN LA ETAPA DE CAMPO DE 2009-2010

Resúmen

Este informe se refiere al trabajo de investigación llevado a cabo del 19 de diciembre de 2009 al 1 de marzo de 2010. Los objetivos eran registrar mediciones de arqueoastronomía de las pinturas rupestres de *Serra da Lua* y *Painel do Pilão*, que podrían coincidir con el solsticio de invierno en 21 de diciembre, localizar y registrar todas las pinturas rupestres ya conocidas publicadas de la región, y localizar y excavar sitios relacionados con las pinturas rupestres de *Serra da Lua* y *Gruta 15 de Marzo*, para producir más fechas para coincidir con la edad de las pinturas. Sin embargo, durante esta etapa del campo, los resultados más sorprendentes fueron el descubrimiento del arte rupestre hasta entonces desconocido. A pesar de que data de la nueva arte no se conoce todavía, parece ser auténtica y antigua, no grafiti reciente o imitación, dada su ubicación remota y condiciones prístinas en el que se encontró.

Palabras-clave: arqueoastronomia, arte rupestre, Amazonía.

FIELD SEASON SUMMARY

Due to the archaeoastronomy objectives of the winter solstice, research began shortly before December 21st, 2009. The crew revisited the sites of *Painel do Pilão* and *Serra da Lua* each day from December 19th until December 23rd to observe the movement and position of the sun in relation to the landscape and art images suspected to depict the same. Measurements were taken with a Brunton compass, video, and camera recordings. These positions were later verified by astronomy software StarryNight™.

The last day before the holiday break, the crew sought to find the art locations published in Edithe Pereira's (2004) book, *Arte Rupuestre na Amazônia*, particularly the locations she labeled as *Abrigo do Irupuá, Gruta da Baixa Fria I and II*, and *Painel da Baixa Fria*. In search of these locations, the crew encountered several caves without art, including *Caverna dos Gêmeos* (also referred to as Caverna do Miritiepé in Milhomens et al. 2008) and *Caverna dos Morcegos*. Finally, we found *Abrigo do Irupuá*. However, we never found the art of the Baixa Frias, as forest overgrowth was too thick to see beyond a few feet.

After the Christmas and New Years holidays the crew went to work immediately with the excavation at *Gruta 15 de Março*. The objective here was to excavate underneath a rock art panel located inches above the ground. The logic was that perhaps we would find rock art that had been subsequently buried by stratigraphic layers that we could date accurately. A 1 x 1 meter unit was opened near the wall in a location relatively flat, dry, and not easily disturbed. However, due to a hole in the ceiling and two large cave openings, much of the cave would not have been ideal for excavation otherwise.

Finally, after all the excavations and mappings were done, we made several new discoveries in *Serra da Paituna* and *Serra do Ererê*, which appear on the maps (Figures 1and 2). Those areas include *Pedra Sozinha*, and the geological areas of historical significance, *Pedra dos Seixos*, *Pedra Cruera*, and *Pedra Melado* (see Figure 2). These three geological features are large flat ground formations with peculiar stones. A local informant claimed that *Pedra Cruera* was an area that Indian women like her grandmother used nearly a century earlier to dry out manioc. The other two areas were probably similarly utilized. The rocks in this area have a melted sandstone appearance, as if they were exposed to intense heat. The actual processes that affected the stone, however, might have been some sort of chemical reaction that took place with the manioc juices, sunlight, and prolonged periods of time.

ARCHAEOASTRONOMY

For five days, from December 19th to December 23rd the crew visited *Painel do Pilão* in the afternoon between 3 and 5 PM to try to observe if and when the sun would pass through a rock-window precipice near a panel of art that might have been a calendar demarking such an event (Figures 3a, b). From there,

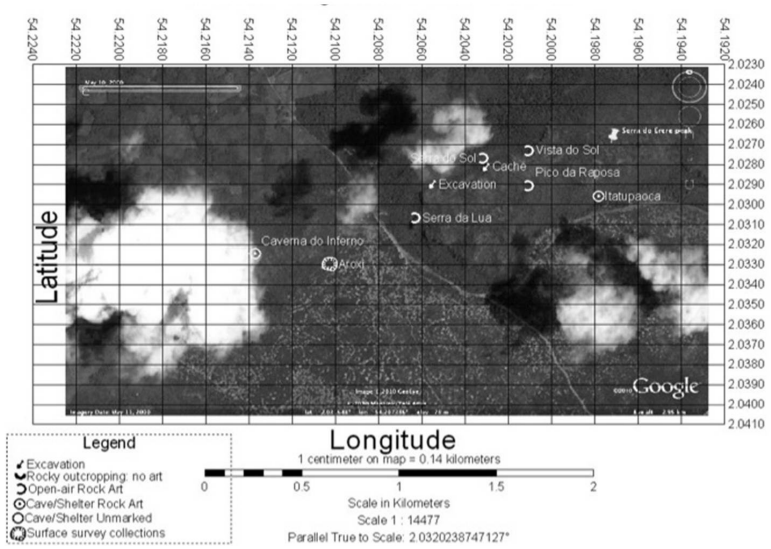

Figure 1 - Google earth view of Serra do Ererê with site locations superimposed.

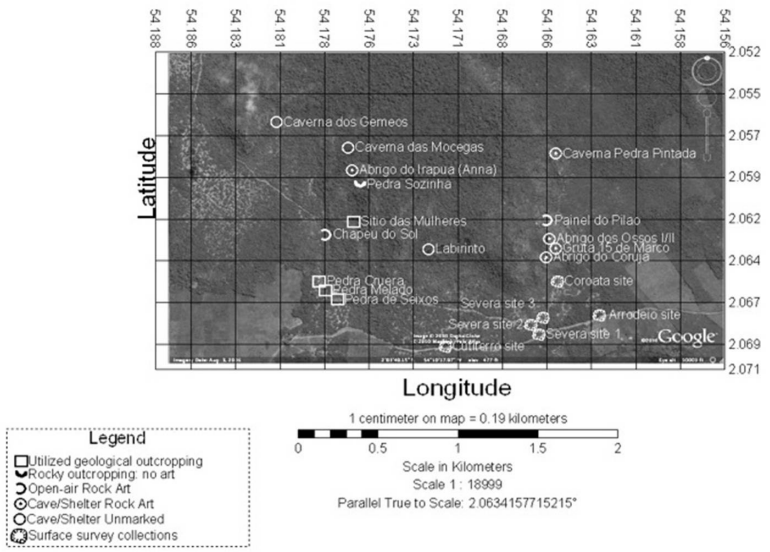

Figure 2 - Google earth view of Serra da Paituna with site locations superimposed.

the crew would then head over to *Serra da Lua* to try to observe the exact location that the sun would set in front of the art panel there (Figure 3c, d). The rationale for both locations is that the winter solstice marks the position furthest south that the sun can set on the horizon (and across the sky). For any ancient culture observing a renewal of a solar cycle (a year), the winter or summer solstice would be the most important dates to physically track the position of the sun. This might be particularly true at Monte Alegre which, at 2° south, is essentially on the equator, and thus cannot rely on a more obvious change of the seasons or shortening of daylight.

At *Serra da Lua* the crew discovered that indeed the southernmost sun image on the wall was positioned to face the sunset on the winter solstice, and even appears to be physically representative of the sun dipping below a rocky platform (Figure 3d). At *Painel do Pilão* the crew was less successful. On the solstice, the sun dipped too far below the mountain before it reached the rock-window. However, the observations taken at *Painel do Pilão* allowed the crew to better understand the movements of the sun there, and by using StarryNight™ astronomy software I subsequently was able to determine that the sun passes through the rock-window approximately from November 1st to November 17th ± 1 to 3 days, and as the sun moves north across the sky again from January 24th to February 10th ± 1 to 3 days. Although those days don't seem in-sync with the "calendar" art, those days do roughly cor-

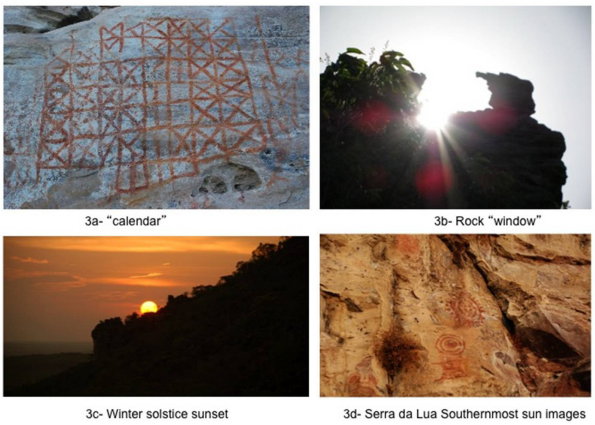

Figure 3 – (3a) Photo of "calendar" image at Painel do Pilão em Serra da Paituna; (3b) Photo of sun intersecting with rock window above Painel do Pilão em Serra da Paituna; (3c) Photo of sunset on December 21st 2009. Sun descends below the edge of Serra do Bode; (3d) Painted sun image facing the setting winter solstice sun in Figure 3. Image is in red and appears to be a sun image setting on a pedestal, above this image is a higher "daytime-sun" image. Image at Serra da Lua on Serra do Ererê (Photographs by Christopher Davis).

relate with the coming rainy season (at least in recent years) in this region. Many streams and rivers begin to fill up shortly after this time frame.

Finally, the sun halo meteorological effect was observed in 2008, but it wasn't until this field season on the days around New Years that a moon halo was observed. The sun halos are dramatic but the sun usually outshines the visibility of the halo. However, the moon halos were incredibly large and awe-inspiring. These halos (Figure 4a, b) are a meteorological effect caused by ice crystals refracting light in the upper atmosphere. They typically appear at a 22° arc around the sun or moon, but sometimes they can also occur at 44° arc. I believe that this effect occurs more commonly around the winter solstice at Monte Alegre, when the rainy season produces more moisture in the upper atmosphere. In the period between the Winter Solstice until the end of January we observed four moon halo nights. Those meteorological/astronomical effects probably inspired many of the concentric circle images at Serra da Lua (Figure 4c).

Figure 4 – (4a) A 44° Moon halo, formed from ice crystals high in the atmosphere reflecting the light of the moon. Note the halo dwarfs the constellation of Orion to the right of the photo. Photo contrast was enhanced to show the halo but the real event was more visible than this enhanced photo (Photograph by Christopher Davis); (4b) A 22° Sun halo observed over Painel do Pilão (misstated in a previous publication to be over Mirante). A sun halo is formed by the same meteorological effect as a Moon halo. (Photograph by Carmen Silvia Viana Trindade); (4c) A painted concentric circle image now believed to depict sun and moon halos. Images like this are dispersed throughout Serra da Lua and Serra do Sol. Most are just painted red but some use alternating red and yellow concentric circles. (Photograph by Christopher Davis).

THE EXCAVATIONS

GRUTA 15 DE MARÇO

The excavation at *Gruta 15 de Março* was carried out in natural layers, the uppermost of which consisted of extremely fine charcoal that flowed as easily as sugar. This fine layer of charcoal continued to a depth of about 50 cm, though it can be divided into three sublayers. From 30 to 50 cm, the last sublayer was a jet-black layer with a brilliant sparkle. The charcoal smelled like gunpowder, perhaps due to the fact that bat guano from the small bat population mixes with charcoal blown in from brush fires outside the cave. However, *Serra da Paituna* (where *Gruta 15 de Março* is located) currently seems consistently wet, unlike *Serra do Ererê* (where *Serra da Lua* is located), which has seen brush fires in recent years. Therefore, until I can get C^{14} dates on the charcoal, I'm not sure how recent the layers are.

Below the charcoal layers was a muddy, dull, pale brown layer with small pebbles that extended for another 20 cm. This layer changed into a more reddish sandy clay layer from about 80 cm to 110 cm depth. The next layer was a distinct mud-concretion layer about 10 cm thick. Below that layer was a moist orange to smooth yellowish-tan sand layer somewhat reminiscent of beach sand. This layer extended for another 25 cm to a depth of 150 cm, which was the beginning of a wetter, smoother, pale-tan beach sand layer with lots of small roots. After 13 levels, the excavation unit terminated at 170 cm, mostly due to the wall steadily curving inward at greater depth.

The art at the base of the wall did not continue below depth. The wall itself had a dark linear feature that became less visible as the freshly exposed surface dried; therefore it probably was a geologic feature, not paint. Along the wall from levels 2a to 3a, there was a feature that consisted of a difference in soil color associated with a stone "alcove". A few large stones were positioned near the wall and upright, as if to enclose an area within the darker soil region.

In this region we found a ceramic border with red paint on it, as well as a large orange sherd, a few polished red stones, and a few bifacial fragments, some of which seemed to be groundstone. The base of this feature in level 3a near 34 cm depth contained bone fragments perhaps from a *Tracajá* turtle (see Figure 5a). Other artifacts in level 3 included a ceramic sherd with yellow paint, a ceramic sherd that had a buff-colored interior and a white exterior, and an abstract star-shaped object (Figure 5b). Also, there were 5 different concentrations of bone in the rest of the unit. The bones appear to be from a larger sized mammal, but one collection had the resemblance of human teeth. In retrospect, many "bones" were probably misidentified because the excavation was conducted in a cave with poor lighting, but also many of the pebbles resembled teeth in the subsequent levels.

Some bones and tooth-like pebbles continued through level 4, but ceramic artifacts were no longer found, and more lithics and ground-stone-like fragments continued throughout, to a

depth of about 85 cm in level 8. It is important to note that many of the lower lithic and stone artifacts were found in the muddy-concretion layer between 60 to 80 cm depths. The consistency of the soil at this layer was such a concretion that I considered the possibility that it was either a floor or several mud-formed vessels (Figure 5c). No objects of significance were found from levels 9 to 13, and their chemistry drastically changed to that of sterile sand. Once the materials can be analyzed in a laboratory and dated, a more official report will be published.

SERRA DA LUA

The excavations above *Serra da Lua* included two units, both excavated to bedrock. The soil remained relatively consistent throughout (Munsel 5yr/2.5/1 black), with the exception of the slightly darker top layer. The units were adjacent, running north south, and their depths to bedrock were both roughly 80 cm. What initially seemed like stone tools when taking auger samples were probably just rock fragments, as most of the pit contained rock fragments. However, the excavations did encounter some curious fragmented rocks (Figures 6a, b) from levels 4 through 7 (33cm to 77 cm). These levels were marked by large roots, particularly of a bright red and yellow color, much like the color of the art. Also, some of the rocks were red or white, and at level 8 there were many rocks that had orange interiors when chipped into them. I considered the possibility that some of the smaller fragments were rocks used

5b - Abstract pink-colored artifact

5c - Mud-like Concretion


5a - Possible Tracajá (turtle) bones

Figura 5 – (5a) Potencial turtle bones found during excavation of Gruta 15 de Março on Serra da Paituna (Photographed by Christopher Davis); (5b) Pink-colored abstract found during excavation of Gruta 15 de Março on Serra da Paituna (Photographed by Christopher Davis); (5c) Mud-like concretion from layer of similar consistency found during excavation of Gruta 15 de Março on Serra da Paituna (Photographed by Christopher Davis).

for paint, but the rocks were very hard, like sandstone.

Upon excavating the two units above *Serra da Lua*, my crew visited *Serra do Sol* to test the depth of the soil directly below the large sun image there. The ledge there, like the ledge at *Serra da Lua*, was not deep enough for excavation. However while there, I discovered a hole in the rock that turned out to be a cache for lithic tools (Figure 7). From the hole - that was only as big as my fist- I extracted about 23 lithics that had the initial appearance of stone tools. Although they cannot be dated, I took them as samples for further laboratory analysis as well.

DISCUSSION

Although no ceramics were found on *Serra do Ererê*, several things became apparent while excavating there. The red and yellow roots in the ground further strengthen the connection of these same colors in the art, to that of the landscape. In researching this area we've discovered that the lichen form bright red and yellow circles on the rocks and trees, the vegetation turns red and yellow only when fires pass through the region, and now the roots in the ground, as well as many of the deeply buried rocks are red and yellow (or orange as a mix of the two).

Another note that became apparent after excavating here is that *Serra do Ererê*, and particularly the side that *Serra da Lua* is on, has an abundant source of pre-form lithics. The rocks here have naturally fragmented (perhaps from fires) to the degree that many of the stones I encountered while excavating appeared to be lithics. Some of the oldest ones probably could have been the debitage of humans, but many natural fragments had a sharp edge. Any ancient population could simply grab a handful of rocks to carry back to their camp for use. *Serra da Paituna*, on the other hand, has many inhabitable caves, and the excavation at *Gruta 15 de Março* adds further evidence to the

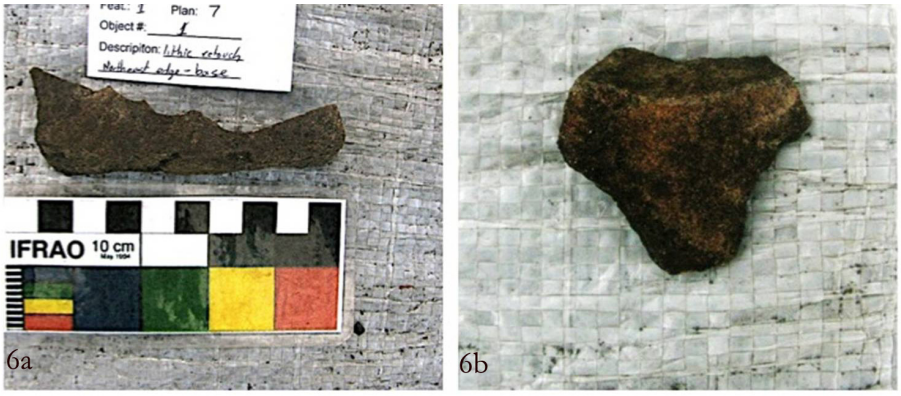

Figure 6 – (6a) Lithic artifacts found during excavation above Serra da Lua on Serra do Ererê (Photographed by Christopher Davis); (6b) Lithic artifacts with orange-ish interiors, found during excavation above Serra da Lua on Serra do Ererê (Photographed by Christopher Davis).

Figure 7 - Cache of lithic artifacts found below the large sun image at Serra do Sol (visible in Figure 5) on Serra do Ererê (Photographed by Christopher Davis).

excavations at *Pedra Pintada* (Roosevelt, et al. 2002; Roosevelt, et al. 1996), that prove the mountain range was indeed inhabited in antiquity.

THE NEW FINDINGS

SERRA DO ERERÊ

Transportation to and from the excavation sites remained a concern of mine so I planned on camping at the excavation site on top of *Serra do Ererê*. On the first day, I set my tent up at the proposed excavation site and as my transportation left, it occurred to me that finding a cell phone signal would be helpful for my survival. So with a handheld GPS unit and cell phone in hand, I set out before sunset for the other side of the mountain peak - the side of the mountain that faced the city of Monte Alegre and its cell phone tower.

I hiked further into the center of the mountain and sought the higher peaks. The plateau level on the other side of a peak where my tent was pitched seemed to be a wide grassy valley with soft sandy soil gouged from centuries of water drainage. Fortuitously, a fire had passed through the area a few months earlier, acting as nature's lawn mower to make the grass low. Higher grass would have made it impossible to see snakes, a risk that no doubt struck fear in the rest of the crew who refused to camp there.

I reached a new summit but my cell phone still had not picked up a signal, so I continued further to a new interior peak that was previously not visible from the lower valley. The new peak was particularly rocky with sharp and angled rocks making every step precarious. This second peak was open to the intense rays of the sun even as the sun was setting in the distance. And yet it was at that low sun angle that one of the vertical surfaces on the peak seemed to

be bathed by the sun's red glow, revealing a red design on its smooth surface. I went closer to investigate.

I arrived at that vertical surface, which was erected perhaps eight to 10 feet high and seemed to have a top slab acting as a roof. The vertical wall was rounded and had a smooth sheen. On its surface was the faint but unmistakable design of a human stick figure identical to the stick figures at *Serra da Lua* and throughout *Ererê* and *Paituna* – with just one exception. This stick figure had two rows of circles along its torso, as if to represent buttons, perhaps denoting some sort of higher rank (Figure 8). I named this area *Pico da Raposa* (Peak of the Fox) for the sum total of three foxes I encountered here.

While the other known rock art at *Ererê* was along the cliff-face perimeter of the mountain, this lone image was erected on a slab near the top of the mountain. None of the previous explorers and researchers in the past 200 years reported coming across any art on top of the mountain. Unfortunately, the only camera with me was the camera of my cell phone, which I then used to take a few snapshots. Luckily the GPS unit I was already using to prevent myself from getting lost was already with me, so I meticulously recorded the location and returned later to take better pictures. When I returned with my crew, we also discovered some more rock art images at *Vista do Sol* (View of the Sun, Figures 9-11).

SERRA DA PAITUNA

After the excavation at *Serra da Lua,* a *Paituna* crew member and I returned to *Gruta 15 de Março* to map the locations of the paintings and to take a panoramic picture of the cave (posted at http://share.gigapan.org/gigapans/45488/). After completing that last task, my companion wanted to visit the nearby *Abrigo da Coruja* cave that he had never seen. I had been there before so I agreed to escort him.

We arrived at *Abrigo da Coruja* perhaps after 30 minutes of wrong turns, but it was during the return to *Gruta 15 de Março* where we truly got lost. Our destination was at a lower elevation and yet we bizarrely chose every path that took us to a higher elevation. Perhaps subconsciously I wanted to explore a bit, but I truly could not find our way back. Instead we arrived at a large boulder wall that had two peculiar ovals carved into its side. The ovals appeared to be more like feet but could also be interpreted as eyes. Either way, they were the first unmistakably carved-stone designs discovered in the region and they seemed to beckon a wandering traveler to investigate further, and so we did.

My companion entered the shelter first, which was a cliff shelter that opened up to a grand vista of the Amazon River valley below and the southwestern horizon beyond. However the expansive view was not the most impressive find. At his feet lay the cleaned, sun-bleached bones of a large animal. The bones were mostly plate-like and robust, likely belonging to a large Amazonian turtle. Certainly the animal, whether dead or alive, had to have been carried to this shelter

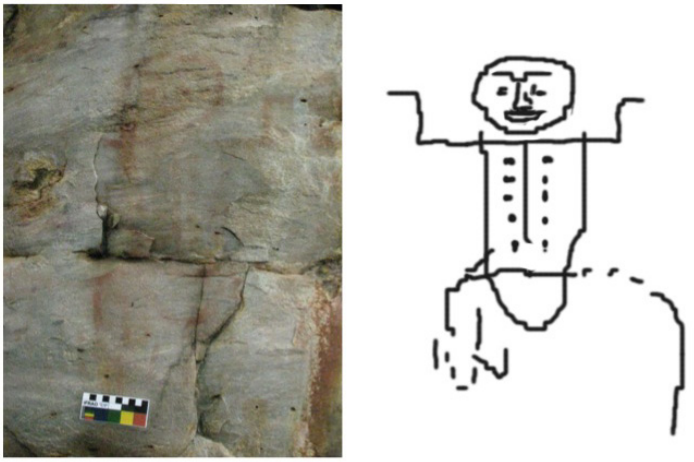

Figure 8 – Smiling figure with "buttons" in red paint, although teh "buttons" are unique, the posture of the body is in a style common throughout these mountains. Total height and width ~46 cm. Pico da Raposa on Serra do Ererê. Digital sketch (right) of "Figure with buttons"; sketch details are more visible in reality than in the photo (left). Pico da Raposa on Serra do Ererê (Photographed by Christopher Davis).

Figure 9 – Concentric red circles facing 290°, radius to outer circle is 12 cm (left). Digital sketch clarifies pattern. Vista do Sol on Serra do Ererê (right) (Photographed by Christopher Davis).

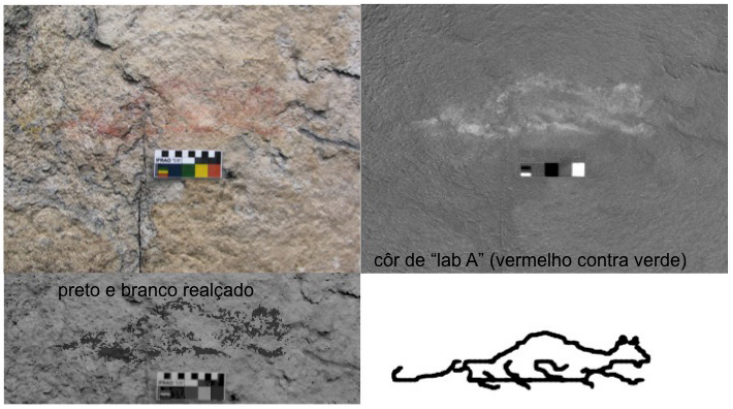

Figure 10 – Interpreted as a crouching jaguar, but the red image (with signs of once having been yellow) was very faint; the red in the image is enhanced to maintain the features (bottom left). Image was made using photoshop "lab-a" of the original chromatic image, which contrasts red with green colors (top right). Digital sketch of the same image. Vista do Sol on Serra do Ererê (bottom rigth) (Photographed by Christopher Davis).

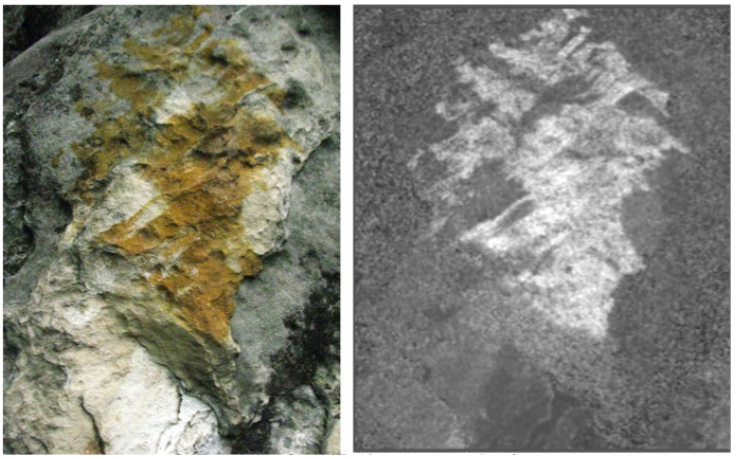

Figure 11 – This all-yellow image is positioned high on a stone tower and the left edge appears more like rays of the sun (left). Photoshop "lab-b" contrast of yellow seems to show a seated figure in an unconventional chair (right). Vista do Sol on Serra do Ererê (Photographed by Christopher Davis).

nearly 200 meters above the river.

The large bones lay on top of a platform boulder that seemed prepared on one side. There was another group of bones, probably from the same animal, located a short distance away in some shrubby weeds to our right side. The left side was the major structure of the rock shelter, which had a slanted ceiling similar to a lean-to.

Before I entered the shelter I noticed the dust on the ground had no impressions from previous visitors. There were no human or animal footprints, not even bird tracks. The dust was possibly half an inch thick and even-coated throughout. There were no visible signs of erosion from the ceiling and no vegetation, which suggested to me that the dust had been laid down and undisturbed over the course of a very long period of time.

Lying in the dust were scattered artifacts mostly of well preserved but utilized stone tools. One ceramic flake was discovered. The tools included blades, flakes, scrapers, choppers, and hammer stones. All of the tools were lying within the dust and dull with no sharp edges. No tools were found next to the bones, but the bones had marks on some of the edges. Those marks were almost certainly caused from rodent nibbles some time in the past.

As interesting as the ground was, there was also rock art on the slanted ceiling (Figure 12). The art was red paint in the design of a meandering line. Immediately the art seemed to me like more of a directional mark than an artistic design. Because the design was on a slanted ceiling I gained the sense that it was referring to a location above the rock shelter.

On the far sidewall was more red paint. It was in the form of a simple red line encircling the side of an orifice in the wall, but that wall contained several orifices like a catacomb. There was no apparent reason why the one orifice was encircled with red paint while others were not. Perhaps the hole was used as a cache to stash something important in the past. However, I did not find anything in the hole that day.

We returned a few days later with the rest of our research team to take more pictures and samples. While there, I again considered the ceiling design as directional. I went to the edge of the rock shelter cliff and tried to look above it. There seemed to be a chamber above the shelter so we returned to the trail and followed it further up. We continued climbing another 30 meters higher and came upon another shelter. This shelter had a level ceiling but was smaller and circular. There was a hole through an entire wall making the shelter appear more like a column. Here we did not find stone tools or bones but there was a rocky alcove with a wooden "club", and more rock art.

The rock art at this columnar shelter was of an artistic nature. There were two designs along the base wall (Figure 13) and one very interesting design near the ceiling (Figure 14). Of the two images below, one resembled three teardrop shapes arranged in a pattern that to me resembled a crown. The other base design was a sideways

face with streaks that made the overall appearance similar to that of a comet. Both basal designs were in red paint.

The ceiling design was two ovals perpendicular to each other, giving the overall shape of a cross or plus sign (Figure 14). However, the ovals were filled in with a grid pattern. The image was polychromatic, seeming yellowish in some areas and reddish in others. The difference in color was gradual as though the paint itself was turning colors, such as is common for yellow iron oxides to turn red over the course of thousands of years. The grid pattern was somewhat reminiscent of the calendar-like pattern found at *Painel do Pilão* and a small but checkered pattern at *Mirante*.

While the meaning of these patterns is still unknown, I contend that they are all positioned where the open-sky cannot only be observed but the passage of the sun or moon can be marked. This newly discovered image appears close to the ceiling of a shelter located at the top of that side of the mountain. Unlike the shelter below it, no other features lay above it. Additionally the "window" feature of this shelter, which faces in an eastern direction, can easily be used to "capture" the sun at a certain time of day or day of the year. The comet-like feature at the base of the "window" further strengthens the theory of a sky association.

While only the lower rock shelter had bones discovered within it so far, the rock art on its slanted ceiling indeed served, in our experience, to be a directional mark or rather a landscape map for the rock shelter above it. The lower rock shelter was named *Caverna dos Ossos 1* and the higher rock shelter was named *Caverna dos Ossos 2* to reflect their probable association.

THE BAT-EATING FROG

On the day that I returned to *Gruta 15 de Março* to map the images, during the process I heard a thud right behind me. When I turned around I saw a frog on the ground with a bat in its mouth. The frog had entered the cave through a crevice in the ceiling and leaped in mid-air to catch the bat, which had been dangling upside down on the ceiling. The frog, having leapt to catch its prey, fell to the ground with its meal. I was completely surprised by the incredulity of the event and I reached for the only camera I had handy at the time, my cell phone camera. With that camera I took these low-grade photos of this bat-eating frog with a dark torso and bumpy red sides. The significance of this event is that for me it removed all doubt that the "patron" image of *Gruta 15 de Março* is an image depicting a climbing frog.

CONCLUSION

In summary, ancient people were probably drawn to the mountains of Monte Alegre while navigating the Amazon River. Once in the region, they could have made use of the natural caves and animals inhabiting *Serra da Paituna,* which is closest to the river. The longer they remained in the region and explored, they perhaps also

would have learned and made use of the edged rocks on the western side of *Serra do Ererê*. Those early inhabitants would have observed several natural and astronomical events the longer they remained in the region.

Simply by trying to make sense of these peculiarities, they would have made cognitive associations relating one observation to another, or grouping several coincidences together by time of occurrence. Some of their

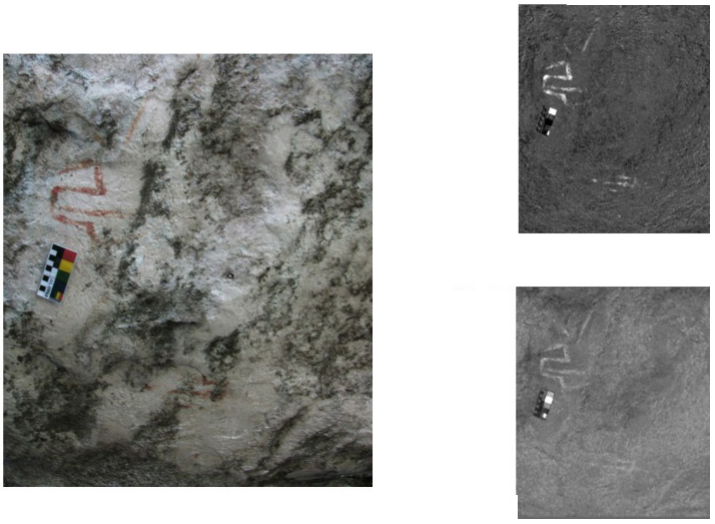

Figure 12 – This red design on the slanted ceiling encouraged us to search above this shelter (left). Photoshop "lab-a" contrasts red with green (right top). Photoshop "lab-b" contrasts yellow with blue (right bottom). Abrigo dos Ossos on Serra da Paituna (Photographed by Christopher Davis).

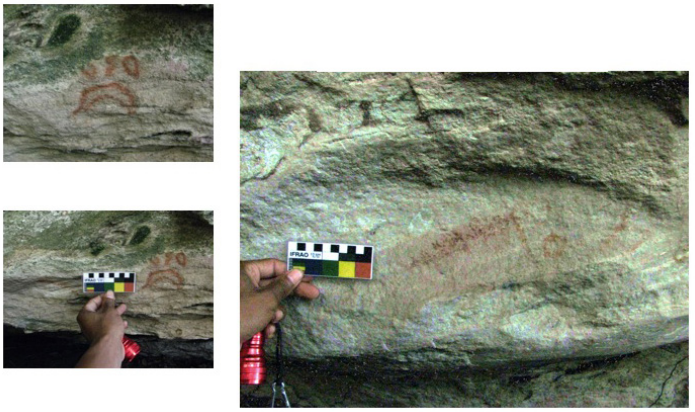

Figure 13 – Red painted tear drop shapes; all these photos are located low on the same wall as tehe croosshatch (top). Comet-shape with two faint eyes (bottom). Abrigo dos Ossos II on Serra da Paituna (Photographed by Christopher Davis).

Figure 14 – This crosshatch pattern appears near the ceiling of the shelter, to the right of the "janela leste". Its red and yellow colors blend throughout, probably chemically transformed, not intentional. Abrigo dos Ossos II on Serra da Paituna (Photographed by Christopher Davis).

art, presumably the earliest, were recordings of observations marked at specific places, particularly the sun and moon halo effects. Since some of these events are related to natural cycles, the time-of-year probably became a significant correlation as well. The summer and winter solstice would have been the most consistent marker for the annual cycle renewal. Hence, some of the art images are records connecting time, place, and event.

However, not all the art satisfies an astronomical purpose. Some of the cave art seems to be more closely associated with the biota of those specific caves. Our unusual encounter with a frog that fell from the ceiling with a bat in its mouth in *Gruta 15 de Março* is evidence of how a peculiar event can inspire someone to mark where the event occurred. Before witnessing the unusual frog event, I was not certain that the prominent cave image was a frog.

Before we discovered the new art locations I also was uncertain how much of the land had been investigated by earlier people. The heat, altitude, and difficulty of the terrain naturally discourages people from surmounting *Serra do Ererê* but we now know that at least one of the peaks had been visited and commemorated by an anthropomorphic rock painting (Figure 8) at *Pico da Raposa*. Similarly, the possible jaguar (*onça*) image (Figure 10) at *Vista do Sol* now provides potential graphic evidence that jaguars once roamed these mountains - to my knowledge, jaguars no longer exist there today. At the *Grutas dos Ossos* we have a new site

with ceramic, lithic, and bone artifacts, as well as potential graphic impressions of a comet (Figure 13), possible evidence of human masonry that formed the *buraco com pau* feature, and the peculiar cross-pattern whose colors are in the process of chemically transforming between yellow and red (Figure 14).

Our research has led us to further discoveries that answer some questions but raise new ones. We hoped to rediscover all that had already been written about, but instead we come away realizing that there is even more to be discovered here in Monte Alegre. The 2009-2010 field season has revealed to us that humans not only visited this area, but also explored it, altered it, and inhabited the region for a long enough time to gain an understanding of its natural characteristics.

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