Geoglyphology, A New Tool For The Archaeological Disciplines

A scientific paper by

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The function of Geoglyphology, as it relates to Archeology, is to expand both the search area and the knowledge base available to the Archeologist.

Until now the majority of the information available to the Archeologist is gleaned from the information recovered at the dig site. In recent years it has been discovered that a great majority of the ancient architectural, monolithic and geoglyphic structures built around the world had something in common. That commonality is that the structures were aligned in such a manner that the study of their linear alignment unveils a much larger story and immensely expands the data available to the archeologist and the related disciplines.

Data recovered from these studies includes obtaining the geographical range of the culture being studied, the level of sophistication that existed in relation to their understanding of mathematics and geometry, their knowledge of world geography, the discovery of other archeological sites that were unknown prior to the studies, and the dating of the culture itself by the data collected at the offsite locations identified by the alignments at the dig site.

The success of these studies leaves no doubt that Geoglyphology can play a major role in expanding the knowledge base available to the Archeologist.

The word Archeology is derived from the Greek word archaiologia and is the study of past human societies, primarily through the recovery and analysis of the material culture and environmental data which they have left behind, which includes artifacts, architecture, biofacts and cultural landscapes. Archaeology developed out of antiquarianism in Europe during the 19th century, and has since become a discipline practiced across the world. Wikipedia

A geoglyph is a drawing on the ground, or a large motif, or design produced on the ground, either by arranging stones, stone fragments, gravel or earth to create a positive geoglyph (stone arrangement, wall alignments, petroforms and earth mounds) or by removing darker surface stones to expose a lighter surface underneath. (a negative

geoglyph). Wikipedia

For centuries the information available to Archaeologists has been restricted, mainly, to the information available directly from the dig site. Geoglyphology, which has been tested and proven valid at archaeological sites around the world, will allow the archaeologist to expand their exploration away from the site, sometimes hundreds and even thousands of miles.

This study will focus on the newly discovered complex called Caral in the Supa Valley of Peru. Caral is located approximately 85 miles North of Lima, Peru. After carbon dating, Caral is now being called the oldest city in the Americas (Circa 2700 BC).

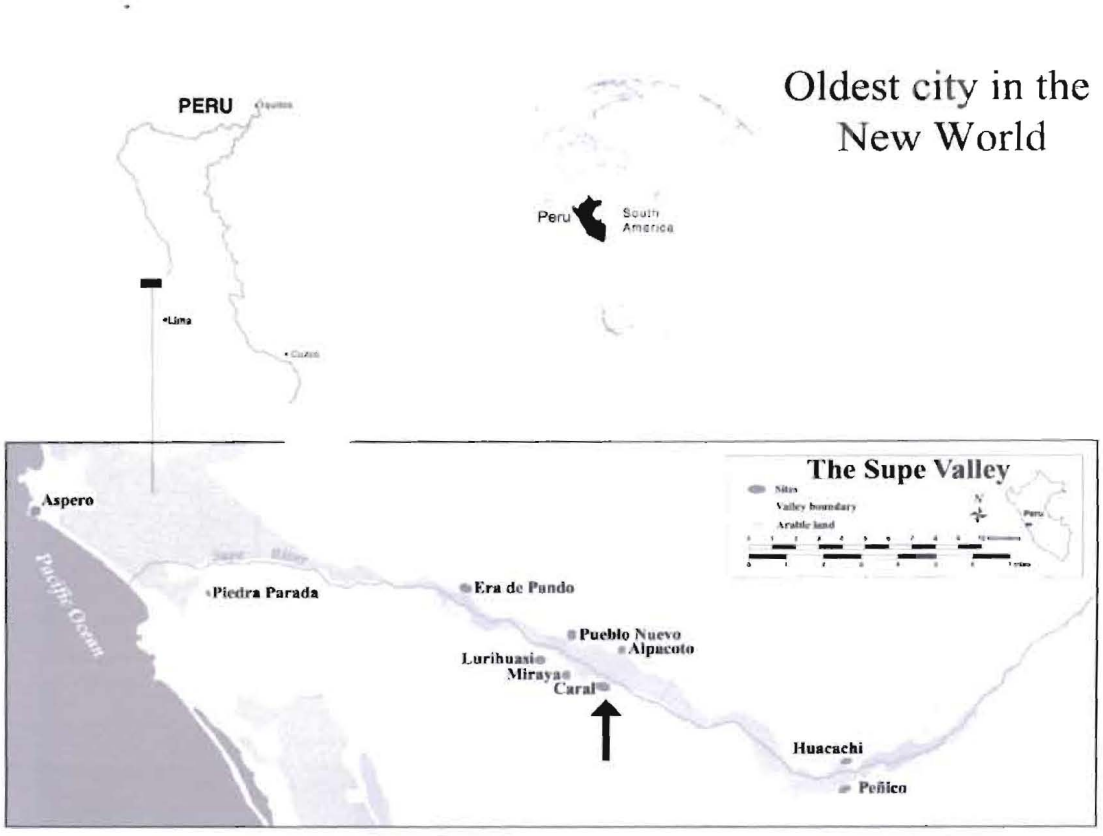
Until now the majority of information obtained at the Architectural Complex at Caral is from objects discovered on site. Although the information gathered from these objects are of immense importance, these discoveries depend on information based on the objects available to be studied from the site. Conversely, the absence of certain objects can lead to speculation. That is the case with the Caral complex in that, to date, no pottery or burial sites have been found. The Ancient Caral archeological site was chosen for this presentation because it offers one of the best demonstrations of Geoglyphology at work.

Data recovered from the study of the Caral site will include obtaining the geographical range of the culture being studied, the level of sophistication that existed in relation to their understanding of mathematics and geometry, their knowledge of world geography, the discovery of other archeological sites that were unknown prior to the studies, and provide other critical information about the culture of the inhabitants.

Caral: The Oldest City in the New World

Dr. Ruth Shady Solis - 2001

On 27 April 2001 came the stunning announcement in the journal Science that the emergence of urban life and complex agriculture in the New World occurred nearly a millennium earlier than previously believed.



Map of Central Zone at Caral - Courtesy of the Field Museum

Radiocarbon dates from the ancient city of Caral, (10* 53' 30.72"S - 77* 31' 18.84"W) in the Supe Valley of Peru, 23 km from the coast, show that monumental architecture there was under construction as early as 2627 B.C. until about 2000 B.C., even before ceramics and maize were introduced to the region. (By comparison, the Great Pyramid of Khufu in Egypt was built between 2480 and 2600 B.C.) Also remarkable is the enormous size of the urban complex: 65 hectares in the central zone itself, encompassing six large platform mounds (or "pyramids"), many smaller platform mounds, two sunken circular plazas, and diverse architectural features including residential districts. Caral is by far the largest recorded site in the Andean region with dates older than 2000 B.C. and appears to be the model for the urban design adopted by Andean civilizations that rose and fell over the span of four millennia.

The Ancient City of Caral and Its Importance

Excavations at Caral have been undertaken by Jonathan Haas from Chicago's Field Museum, Ruth Shady Solis of the Anthropology Museum at the Universidad Nacional

Mayor de San Marcos and the Field Museum, and Winifred Creamer, Northern Illinois University and the Field. It was featured in a Science article in April 2001, after a long and careful investigation into the radiocarbon dates from the site.

The interesting thing about Caral and the rest of the Supe Valley sites, is that it illustrates the problems archaeologists have dealing with in so-called "urban settlements" and "state societies." Building monumental architecture such as pyramids and irrigation canals and cities takes sophisticated planning. When archaeologists first came upon the cities of our ancient pasts, we began developing our theories of why states rise. One of the most prevalent theories was that it takes a combination of factors to create the political climate that creates public works; and that usually means full scale agriculture, craft specialization, a writing system, ceramic production, social stratification, even metallurgy.

But the Supe Valley sites, and other early urban settlements such as Catalhoyuk in Turkey [6300-5500 BC], apparently arose without all of these elements. Although we can't know the political structure of the people who built Caral, to date no ceramics, evidence of metallurgy or writing has been found.

Dr. Shelia Pozorski, a professor at the University of Texas-Pan American who with her husband, Tom, has studied other Andean sites for 30 years, said the finding helped overturn what has been known as the maritime hypothesis. This is the idea that complex Andean societies, precursors of the Incas, evolved from the coast, where reliance on fishing required some level of social organization, to inland sites, developing fully only when ceramics appeared around 1800 to 1500 B.C.

"It makes it more of a quantum leap, rather than a moderately rapid crawl," Dr. Pozorski said. "Rather than having coastal precursors to inland complexity, the two areas are developing at the same time."

Another expert in Andean anthropology, Dr. Richard L. Burger, director of the Peabody Museum of Natural History at Yale, described the new work as "the nail in the coffin of the maritime hypothesis."

Dr. Haas said, in his paper on Caral published in the journal Science, that before the rise of Caral civilization in the region amounted to a few small coastal villages, with perhaps a hundred people or so in each, and other smaller bands of hunter-gatherers. By 2700 B.C., he said, several larger villages began to appear.

"But then all of a sudden you've got Caral, and probably at least one of its neighbors," Dr. Haas said. "It's bigger by an order of magnitude than anything before." While it is not yet possible to estimate the population of Caral — much more archaeological work remains to be done — Dr. Haas said that the number was in the thousands, not hundreds.

Dr. Haas studied Caral with his wife, Dr. Winifred Creamer, a professor of anthropology at Northern Illinois University, and Dr. Ruth Shady of the Universidad Nacional Mayor

de San Marcos in Peru. Their paper dating and describing the site was published in a previous edition of the journal Science.

Caral was first discovered by archaeologists about 1905, and has been explored only intermittently. Anthropologists have largely ignored Caral, considering it puzzling, Dr. Haas said.

Pottery has never been found at the site, and its absence would ordinarily suggest that the civilization existed before 1800 B.C. But Dr. Haas said that for many experts the sheer size of the place — and the level of societal complexity that it implies — meant that it had to be newer. The consensus, he said, was that "something that big cannot be that early." So the lack of ceramics, by this way of thinking, was only an anomaly. Since those statements the City of Caral has been carbon dated to 2627 B.C. .

The Sacred City of Caral-Supe (Peru), the oldest centre of civilization in the Americas, was inscribed on UNESCO's World Heritage List by the World Heritage Committee, chaired by Maria Jesus San Segundo, the Ambassador and Permanent Delegate of Spain to UNESCO.

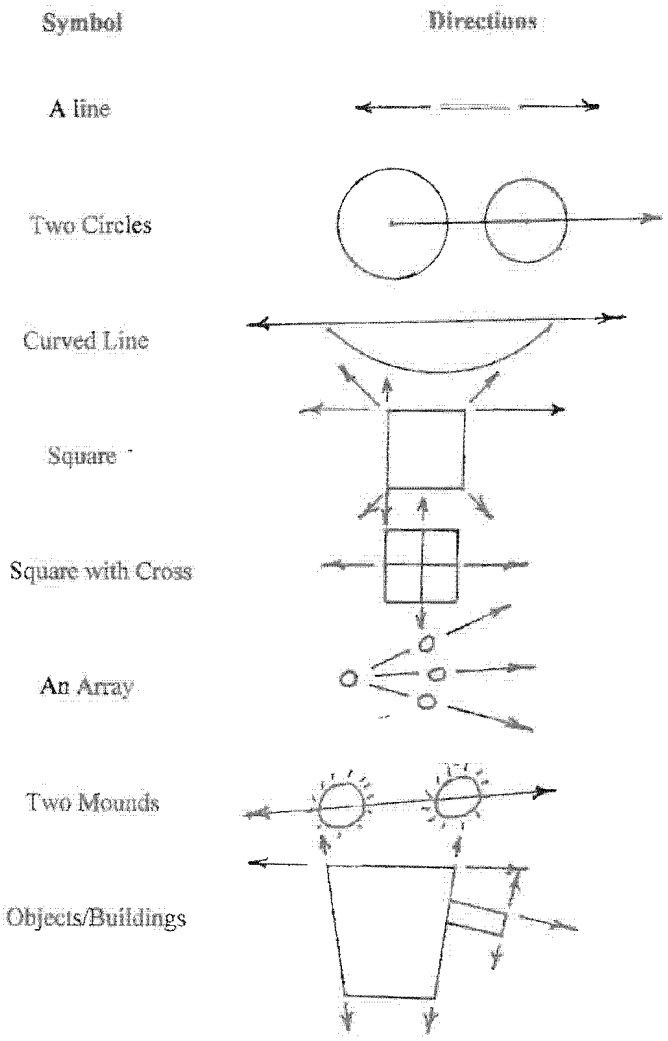
Glyphs and Geoglyphs

In this study you will be exposed to the terms geoglyphs, glyphs, bearings, radials, and survey markers. The following will explain some of the terms used in Geoglyphology.

Glyph - A glyph can be any design that is used to convey a message.
Geoglyph - A geoglyph, as described previously, is a glyph that occurs on the ground.
Bearing - The bearings in this study refer to the direction that any line, formed by a geoglyph, points in relation to "Magnetic North". This is important to understand because as soon as you begin tracing a line away from the source, magnetic deviation becomes a factor. Magnetic Deviation exists all over the world and renders a compass useless over long distances because of the error it causes in a magnetic bearing. Magnetic bearings can be taken at the source of a Geoglyph and are correct at the source. However, in order for the bearing to be correct over any distance one must use a "True Heading", a radial. True headings are derived from Celestial Navigation, GPS, and computer software. These methods only produce True Headings which are not distorted by Magnetic Deviation. The computer software (Google Earth Pro) is the method that was used in this study.
Radials - Radials, in this study, refer to the projected "True Heading" after it leaves the source.

Geoglyphs, for the most part, are so large that they can only be recognized from the air. The circle glyph depicted in this study, in the center of South America, was located by projecting radials from the glyphs located at the City of Caral. The circle glyph is 22 miles wide. This is most likely why most geoglyphs have not been discovered before now. The Nazca lines are a good example of large geoglyphs. I have visited some sites on the ground and even knowing they are there I find them difficult to locate. The glyphs take on several forms. Some take the form of a triangle, another might be one or more

circles, and another may be one or more lines touching or crossing each other. No mater what shape a glyph takes, any line can be a pointer to a place important to the creator of that glyph. This study was undertaken after the discovery of several Geoglyphs, the likes of which had never before been reported. The only way that this was made possible was by using the flexibility and accuracy available in the "Google Earth Pro" software program. This software program contains a model of the surface of the Earth made from a composite of actual satellite photos. The program has great flexibility and allows for a host of adjustments, depending upon the operators needs. The one most crucial to this study is the ability to draw a line on the face of the Earth while at the same time reading the magnetic bearing from the source and the true heading of the extend radial, without magnetic deviation being a factor. The program also incorporates a zoom feature which allows a close-up view of the Earth's surface as depicted in the photos that follow.



Above are a few examples of how to read various designs that may comprise a geoglyph.

After some study it was discovered that many mediums were used to construct geoglyphs. These included the arrangement of stones, the planting of different colors of flora, and the sterilizing of the ground, the scraping of the earth to reveal a different color underneath (Nazca), the changing of natural geological features with the features modified or supplemented, the wall alignment of structures (Caral), the alignment of Monoliths (Stonehenge), the alignment of Pyramids (Worldwide), the creation of stone and earth mounds, and more. For instance, the mounds of the Mississippian Indians, in the central United States have been proven to be geoglyph pointers.

Curiously most of the geoglyphs point to other geoglyphs somewhere in the world. In this manner the validity of the study was verified as accurate and over three hundred geoglyphs and ancient archeological locations, many previously unknown, were identified. The accuracy of the calculations of the ancient peoples is incredible. The GPS accuracy of the software program is seldom more accurate than the orientations of the ancients. By calculating the bearing at the source one can follow the extended radial for sometimes thousands of miles and locate a related glyph with little or no error.

The percentage of success in locating a verifiable glyph or ancient location using each of the extended radials of any one glyph was variable, but ran in the range of 75% to 100%. Much of the lack of success was attributed to urbanization, overgrowth, vandalism, etc.. Surprisingly, based on the glyphs that were found, there seems to be an incredible amount of durability built into the geoglyphs. It appears that the meteorological conditions at any given site were considered in determining the materials used. At sites where rain and wind are seldom seen, most glyphs were made of earth. At locations that encountered rain and wind, stones and rock were used.

Geoglyphs of the Ancient City of Caral Peru

As stated before, Caral, Peru was chosen as the centerpiece of this study because of two factors. First, it is a new find and still has many mysterious and unknown aspects. Secondly, it is a large complex that offers many geoglyphical aspects. The findings of the Caral study are described below.

The Caral Peru Complex
(10* 53' 30.72"S - 77* 31' 18.84"W)

Caral was inhabited between roughly 2600 BC and 2000 BC, enclosing an area of more than 60 hectors. Caral was described by its excavators as the oldest urban center in the Americas, a claim that was later challenged as other ancient sites were found nearby. Accommodating more than 3,000 inhabitants, it is the best studied and one of the largest Norte Chico sites known.

There are over 19 other pyramid complexes scattered across the 35 square mile (80 km²) area of the Supe Valley. The date of 2627 BCE is based on carbon dating reed and woven carrying bags that were found in situ. These bags were used to carry the stones that were used for the construction of the pyramids. The material is an excellent candidate for dating, thus allowing for a high precision. The site may date even earlier as samples from the oldest parts of the excavation have yet to be dated. The town had a population of approximately 3000 people. But there are 19 other sites in the area, allowing for a possible total population of 20,000 people for the Supe valley. All of these sites in the Supe valley share similarities with Caral. They had small platforms or stone circles. Dr. Shady believes that Caral was the focus of this civilization, which itself was part of an even vaster complex, trading with the coastal communities and the regions further inland – as far as the Amazon. (Science 27 April 2001: 723-726.)

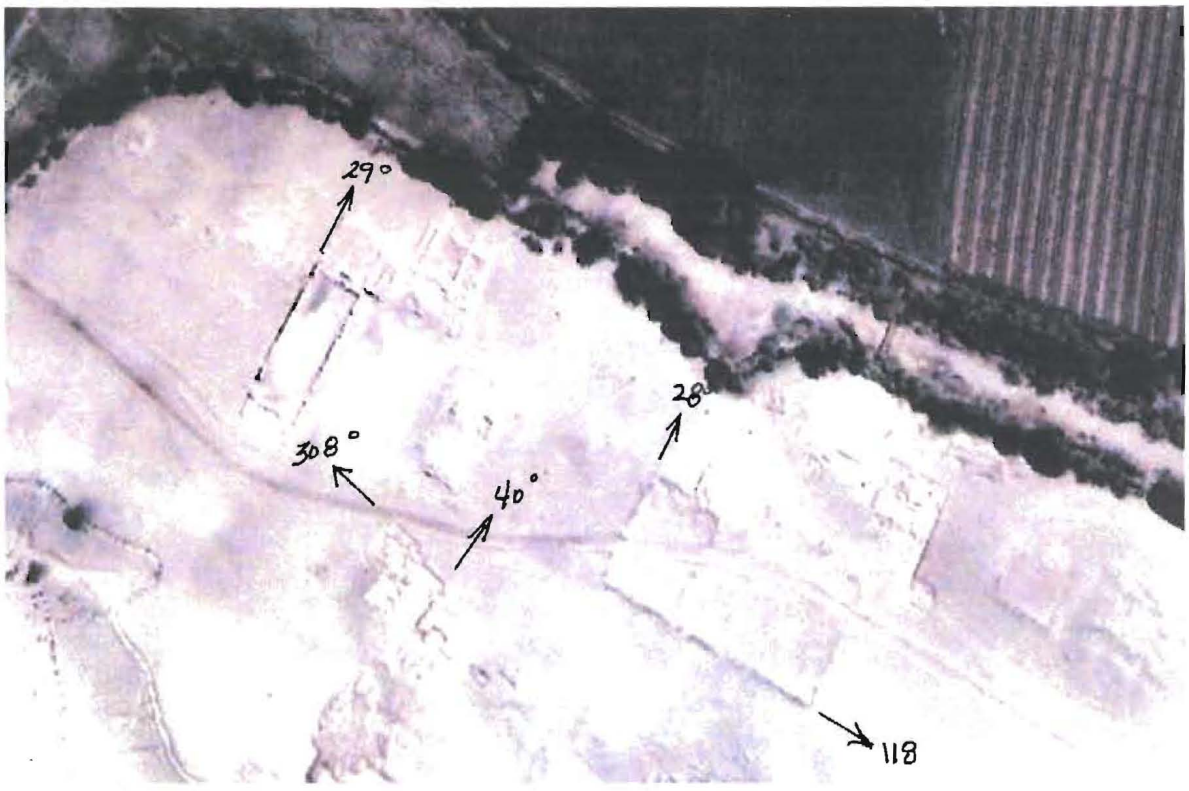
Dr. Shady's belief in a civilization stretching East to the mouth of the Amazon River is substantiated in this study. Other studies confirm that the civilization, of which Caral was part, used the Amazon River for transportation from it's headwaters to the mouth of the river. Headlines have been appearing recently about geoglyphs being found all through the Amazon Jungle as land is cleared for farming.

The Caral complex was split into the five main sections addressed in the photos below. This was done to allow for close-up photos and a more detailed description. The radials described below the photos are the endpoints for the given radial. A logical question would be to ask; how do you know that these are the true endpoints for the given radials? To answer that fully would require documenting two years of study on the subject. However, I will attempt to provide a short but satisfactory answer. First of all we do not consider a point as an endpoint unless there have been other geoglyphs pointing to that same location. This is not unusual because most of the geoglyphs around the world form a linier network. On occasion, an endpoint will be accepted if the location fits into the apparent theme of the geoglyph.

That leads us to the second reason an endpoint might be accepted. Most geoglyphs follow a pattern. Some geoglyphs will have been made to show seaports that are important to the originator. Other geoglyphs may have been constructed to outline a specific territory that is important to the originator. Some geoglyphs are constructed to verify that the other geoglyph was interpreted correctly.

That leads to the third reason endpoints might be accepted independently of other considerations. There may be present some geometric pattern that includes a previously unidentified endpoint. That endpoint may be accepted if it is a part of a geometric pattern that confirms, without question, that the information gathered from the source glyph is valid. It is our experience that the creators of these geoglyphs will present some sign that verifies that the purpose of a geoglyph was solved correctly. In the case of the Caral glyphs that verification is the 360/180 degree line that begins in the center of the meteor crater, as defined by the Antilles Islands, and proceeds South in a line that passes through the circle glyph, identified by the Caral 116 and 117 degree radials, and terminates precisely at the tip of South America. By outlining the crater with the Antilles Islands endpoints the originators demonstrated not only their accuracy but their knowledge of the topography. Another confirmation is the Equilateral Triangle formed by the Galapagos Islands, the center of the Columbian meteor crater, and the man made circle glyph identified by the Caral 116 and 117 degree radials.

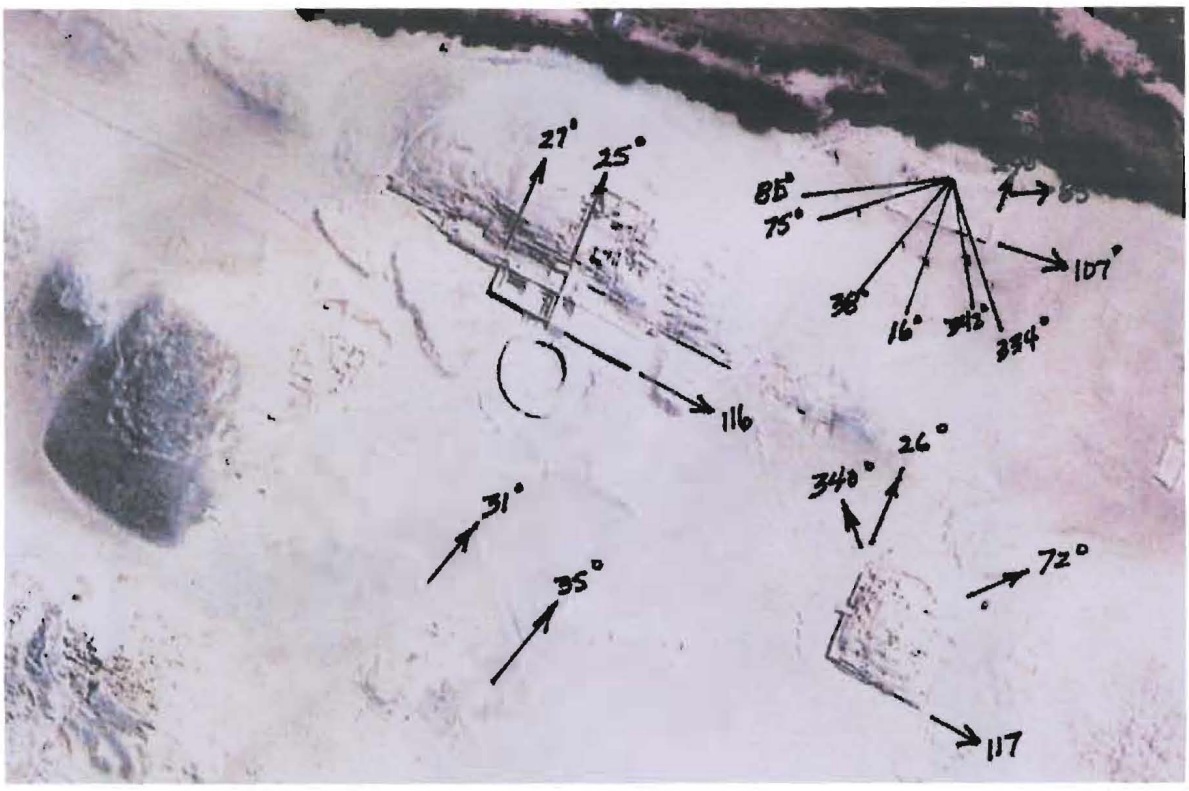
The following photo array is a presentation of our findings.



Caral Peru, Plate 1, Western Complex

Endpoints for the bearings displayed in the above photo.

028 Degree Radial - Saint Kitts Island, Antilles
029 Degree Radial - Montserrat Island, Antilles
040 Degree Radial - Entrance to Orinoco River, Venezuela
118 Degree Radial - Headwaters of the Amazon
308 Degree Radial - Galapagos Islands

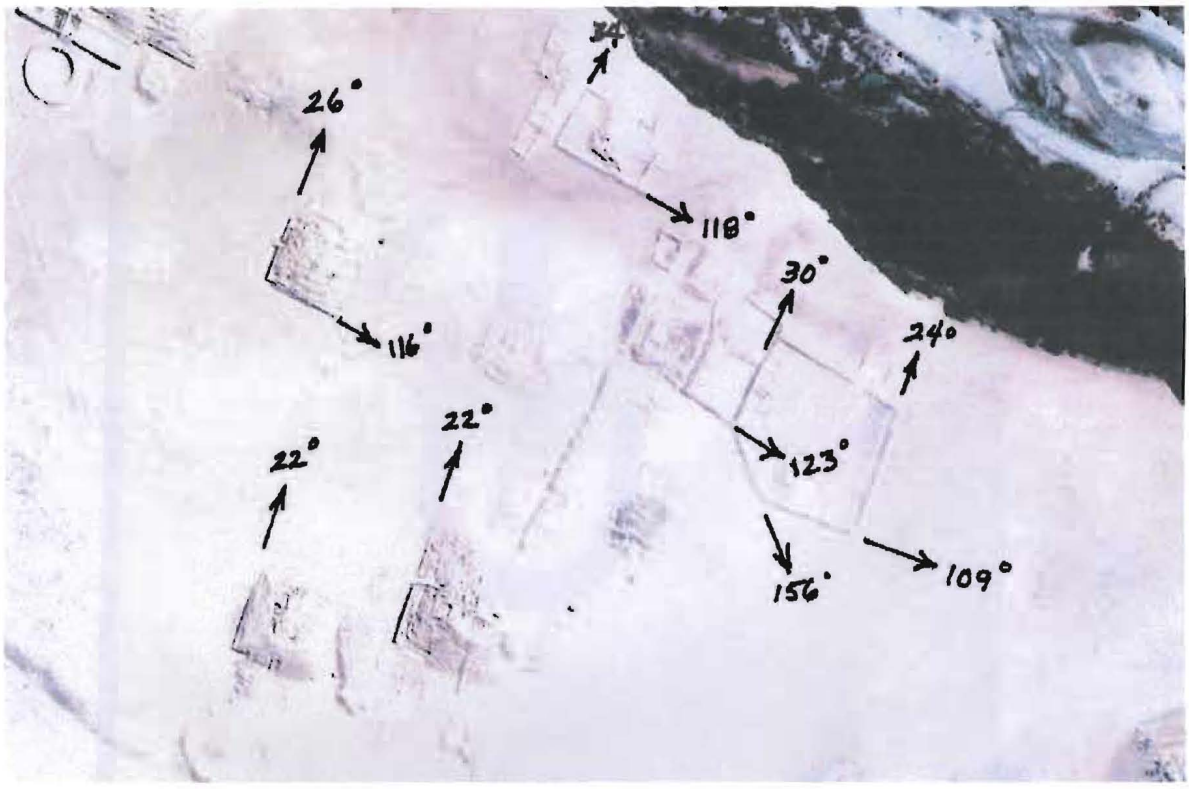


Caral Peru, Plate 2, Western Center Complex

Endpoints for the bearings displayed in the above photo.

016 Degree Radial - Dominican Republic
025 Degree Radial - Roques Island, Venezuela
026 Degree Radial - Anquilla Island, Antilles
027 Degree Radial - Saint Kits Island, Antilles
029 Degree Radial - Montserrat Island, Antilles
031 Degree Radial - Dominica Island, Antilles
035 Degree Radial - Granada Island, Antilles
038 Degree Radial - Trinidad Island, Antilles
072 Degree Radial - Entrance to Amazon River, Brazil
075 Degree Radial - The Ancient Altamera Canals, Amazon, Brazil, (3* 14' 21.74"S - 51* 39' 06.42'W)
085 Degree Radial - East Tip of South America
107 Degree Radial - Largest Open Pit Gold Mine in the World. (13* 00' 36"S - 70* 32' 34"W)
116 Degree Radial - North Rim of Santa Rosa Geoglyph, Bolivia, (17* 10.04' 48"S - 63*

43' 20.57'W)
117 Degree Radial - South Rim of Santa Rosa Geoglyph, Bolivia, (17* 10.04' 48"S - 63* 43' 20.57'W)
334 Degree Radial - Entrance to Gulf of Guayaquil, Ecuador
340 Degree Radial - Chichin Itza, Mexico
342 Degree Radial - Puna Island, Gulf of Guayaquil, Ecuador



Caral Peru, Plate 3, Eastern Center Complex

Endpoints for the bearings displayed in the above photo.

022 Degree Radial - East End of Puerto Rico
024 Degree Radial - East End of Virgin Islands, Antilles
026 Degree Radial - Anguilla Island, Antilles
030 Degree Radial - Guadalupe Island, Antilles
034 Degree Radial - Santa Lucia Island, Antilles

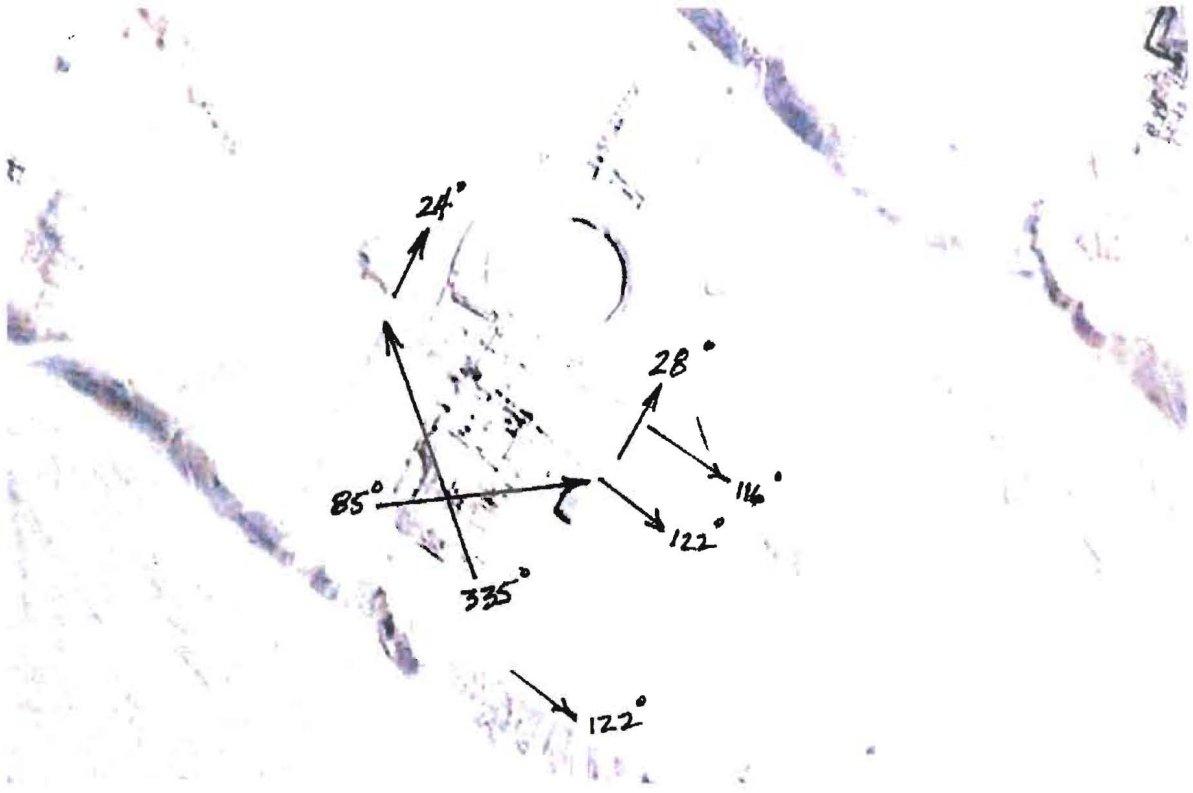
109 Degree Radial - Largest Open Pit Gold Mine in The World. (13* 00' 36"S - 70* 32' 34"W)
116 Degree Radial - Machu Pichu
123 Degree Radial - Lake Titicaca, Peru/Bolivia
156 Degree Radial - Bahia Blanca, Argentina with Geoglyphs

Caral Peru, Plate 4, Eastern Complex

Endpoints for the bearings displayed in the above photo.

020 Degree Radial - Puerto Rico
023 Degree Radial - Saint Thomas Island, Antilles
026 Degree Radial - Saint Martin Island, Antilles
031 Degree Radial - Guadalupe Island, Antilles
292 Degree Radial - Reciprocal 112 - 10000 year old mining site called La Oroya. (11* 31' 25"S - 75* 54' 29"W)

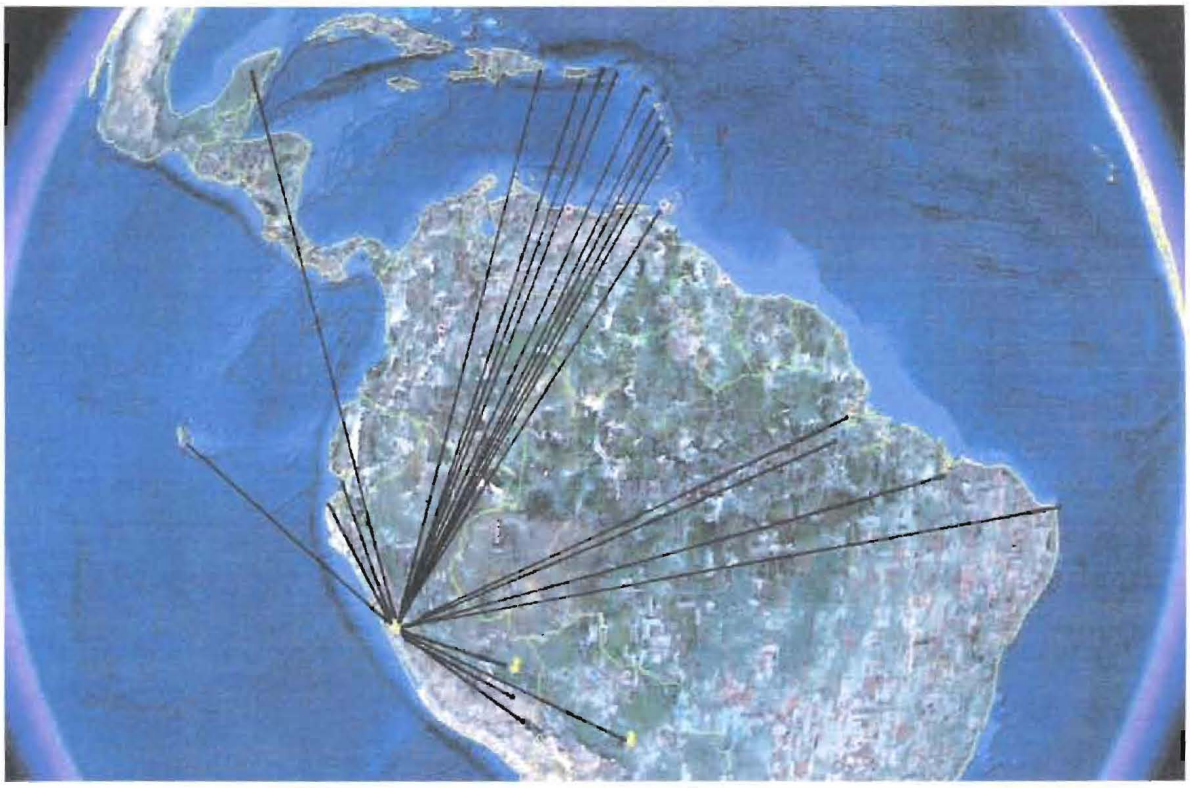
304 Degree Radial - Ancient City of Barranca, Peru, Possibly earlier than Caral. (10* 44' 35"S - 77* 44' 53")



Caral Peru, Plate 5, South Eastern Complex

Endpoints for the bearings displayed in the above photo.

024 Degree Radial - East End of Virgin Islands
028 Degree Radial - Saint Kitts Island, Antilles
085 Degree Radial - East Tip of South America
116 Degree Radial - Machu Pichu, Peru
122 Degree Radial - Lake Titicaca, Peru/Bolivia
335 Degree Radial - Entrance to Gulf of Guayaquil, Ecuador. (3* 44' 55"S - 80* 41' 42"W)



The Radials Defined by the Glyphs in the City of Caral

The question has been asked, "How do you know where the endpoint of the radial lies"? All I can say is that it relates directly to the experience we have gained over the past few years. Several factors exist that let us know, within a reasonable certainty, where to terminate the radial.

The Santa Rosa Circular Glyph (17* 10.04' 48"S - 63* 43' 20.57"W)

The Santa Rosa Geoglyph is 22 miles across and was defined by the Caral 116 degree radial touching Northeast side and the 117 degree radial touching the Southwest side The topography of the Glyph does not seem to lend it self to volcanic or meteorite action but appears to be manmade. Farming and the river have divided the glyph on the West side. Therefore part of the glyph is West of the river. This glyph was strategically placed to form the geometric designs that are depicted in the following photos.

The Columbian Triangle, as Outlined by the Endpoints of the Caral Radials.

The triangle is composed of the Galapagos Islands, the Santa Rosa Geoglyph, and the center of the Colombian Impact Craters' final resting point. The center of the crater was defined by the Caral radials pointing out the islands forming the half circle around the crater. The vertexes of the triangle form a perfect equilateral triangle.

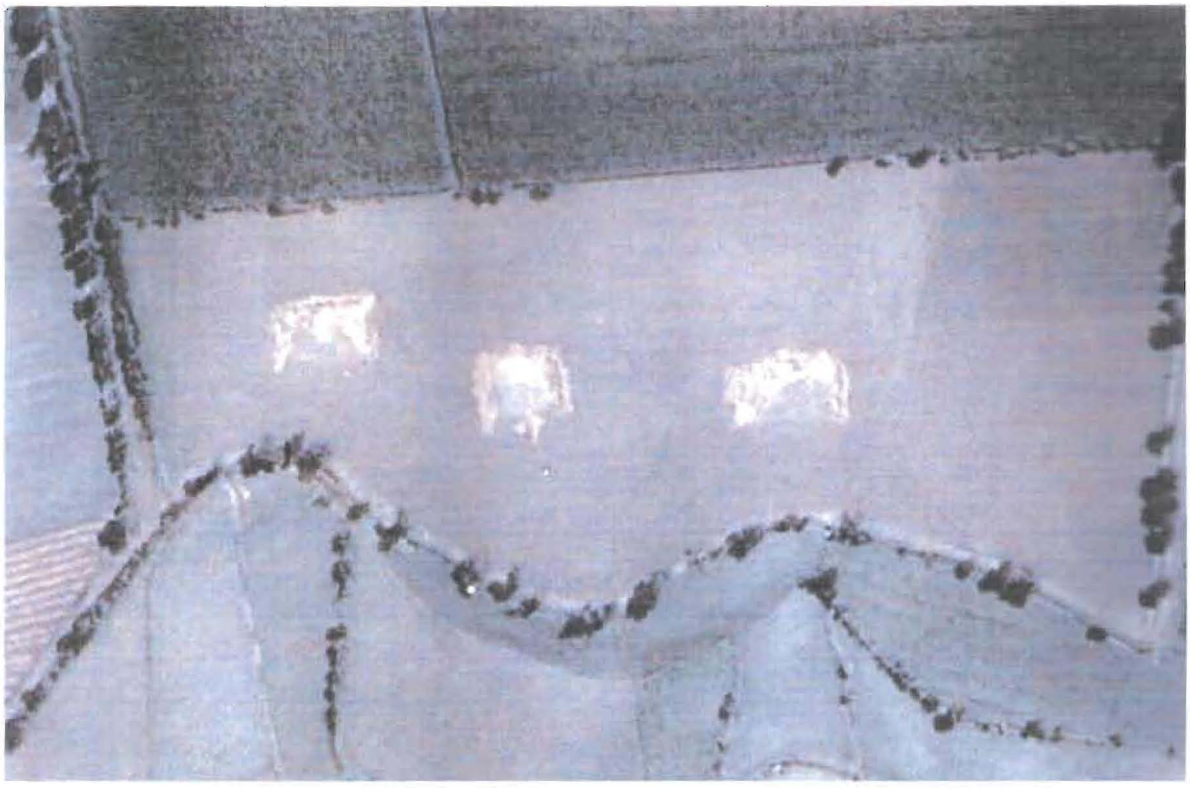
The 360/180 Degree line and Colombian Triangle as they relate to the Santa Rosa Geoglyph.

The Equilateral Triangle and the perfectly placed North/South line that crosses South America is the validation, mentioned previously, that the puzzle was completed as intended by the originator. In addition, it is most likely a land claim on South America.

An Outline of the Colombian Crater

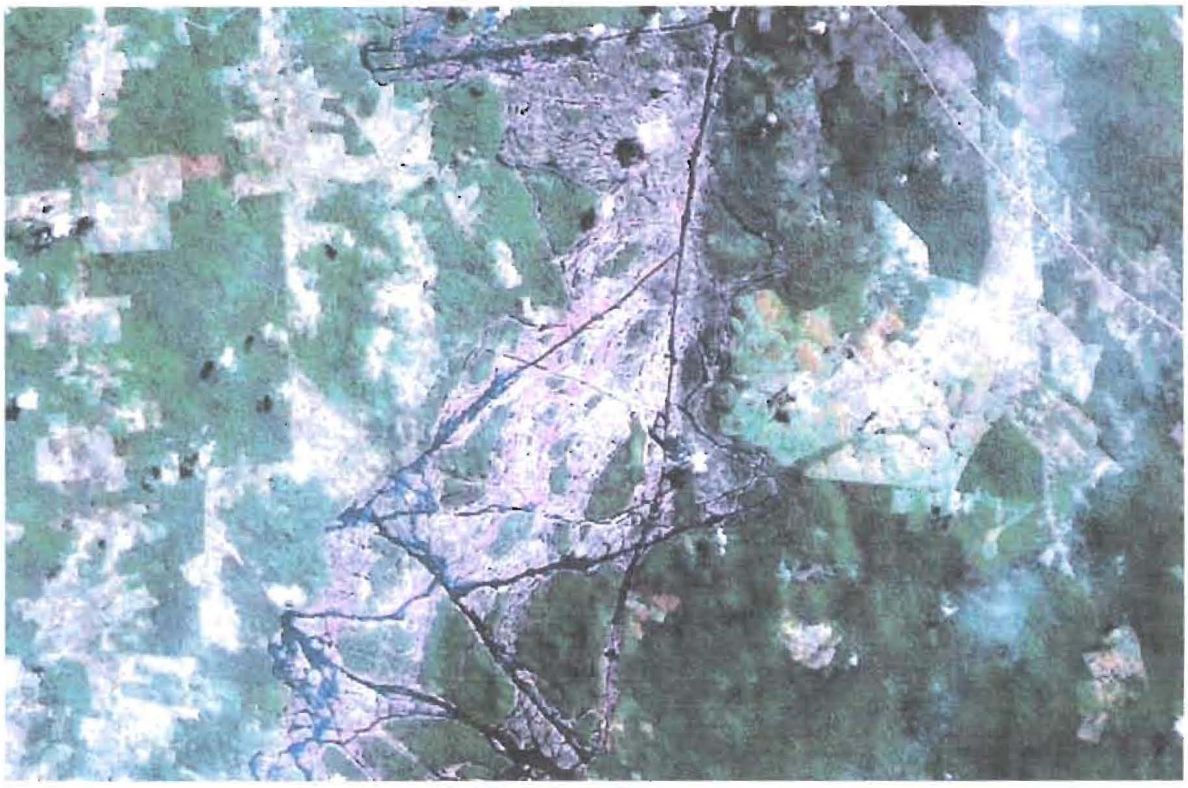
The Columbian Crater is defined in the above photo by the arrows that appear around the perimeter. The Tectonic plate which runs along Mesoamerica has since caused the rift to rise, thereby reconnecting North And South America. This is illustrated by the two different colors of earth that exist along the crater edge.

Ancient Locations



The Ruins at Barranca, Peru (10* 44' 35"S - 77* 44' 53"W)

Above are a few of the ruins at the ancient city of Barranca, Peru. This location is identified by the Caral 304 degree radial. This city could be older than Caral by the fact that it is closer to the ocean.

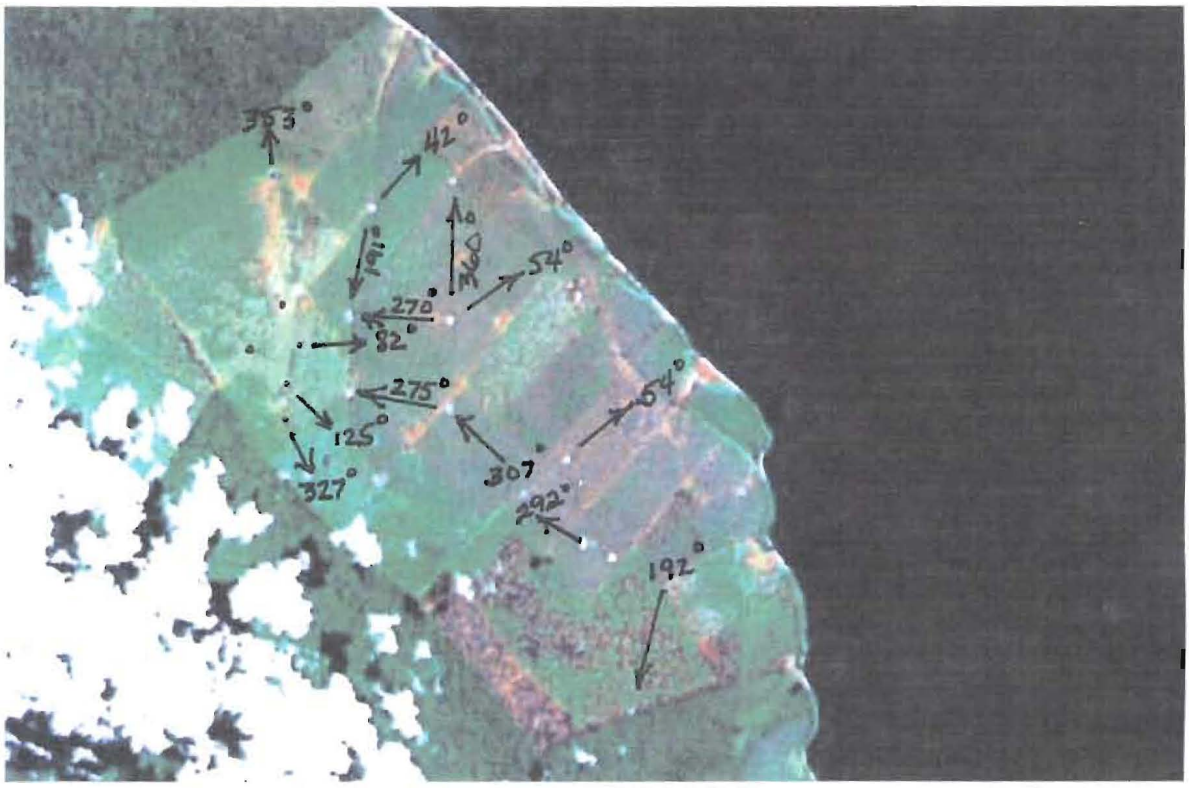


The Ancient Altamera Canals (3* 14' 21.74"S - 51* 39' 06.42'W)

This geoglyph, identified by the Caral 075 degree radial, is actually a series of man made canals designed in the shape of a star. The Altamera geoglyph mirrors the territory depicted in the Caral Geoglyph. This would tend to place habitation of the area in the same time period as Caral.

Endpoints for the bearings displayed in the above photo.

033 Degree Radial - Isla Mexiana, Brazil. Entrance to the Amazon River
059 Degree Radial - Belem, Brazil. Entrance to Bay of Maraho, Brazil
087 Degree Radial - Bay of Sao Marcos, Sao Luis, Brazil
188 Degree Radial - Montevideo, Rio de la Plata, Uruguay
195 Degree Radial - Southern Tip of South America
295 Degree Radial - Shortest Way Across Panama
298 Degree Radial - Mexico City
324 Degree Radial - Trinidad Island, Venezuela



The Altamera Dot Glyphs (2* 32' 26.71"S - 52* 03' 53.65"W)

This glyph is a few miles north of the Altamera Canal glyphs and West of the mouth of the Amazon River. The glyph is most likely of later origin. First of all it is comprised of light colored objects and lines placed in a strategic order on the ground. Secondly, it speaks of places not mentioned in the Caral and Altamera glyphs. By the time this glyph was made the originators were aware of the African Continent.

Endpoints for the bearings displayed in the above photo.

042 Degree Radial - Isla de Mexiana, Entrance to Amazon River, Brazil
054 Degree Radial - Cape Verde Islands, West Africa
093 Degree Radial - Bahia de Sao Marcos, Sao Luis, Brazil
125 Degree Radial - South Tip of Africa
191 Degree Radial - Southern Tip of South America
192 Degree Radial - Beginning of the Antarctic Meteor Trench. (41* 48' 10'S - 47* 07" 44"W) The importance of this point is discussed in a later paper.
262 Degree Radial - Western Most Point in South America
270 Degree Radial - Orientation Radial 270/090
275 Degree Radial - Where the Equator and the Shore of Ecuador Meet
292 Degree Radial - Shortest way Across Panama

307 Degree Radial - Eastern Tip of Yucatan, Mexico
327 Degree Radial - Georgetown, Guyana
353 Degree Radial - Reciprocal 173 - Southern Tip of South America

The following statement in the Journal of Science fully illustrates why the use of Geoglyphology would benefit the field of Archeology. "Paul Kosok discovered Caral (Chupacigarro Grande) in 1948, but it received little attention until recently because it appeared to lack many typical artifacts that were sought at archeological sites throughout the Andes at the time." The use of Geoglyphology, had it been available in 1948, would have given Dr. Kosok other avenues to explore which were directly related to the newly discovered site.

The results of this study reveal the following:

Geoglyphs have been incorporated into the architecture of the Caral complex.

Geoglyphs can hasten and enhance the discovery of critical information not available to the scientist at a newly discovered site.

Geoglyphs can indicate at least the minimum range of the geographic dispersement of a civilization.

Geoglyphs can uncover a hidden sophistication in a society which may have gone unnoticed from data gathered at a dig site.

Geoglyphs can reveal other sites, related to the initially discovered site, which may have never been discovered.

Geoglyphs may provide critical information about a society that was not available at the originally discovered location.

This study has proven that Geoglyphology can be of immense importance to the archaeologist and the related disciplines. Geoglyphs do exist and they tell a story, which until now, has evaded the pages of recorded history.

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