Preliminary Results of Magnetic Gradiometry and Photogrammetric Imagery from La Playa, Sonora, Mexico (SON F:10:3)

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Preliminary Results of Magnetic Gradiometry and Photogrammetric Imagery from La Playa, Sonora, Mexico (SON F:10:3)

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Abstract

Covering an area of nearly ten square kilometers, La Playa (SON F:10:3) is one of the most important archaeological sites in northwest Mexico. While La Playa has been best known for its Early Agricultural occupation, this research, funded through National Geographic, targets the poorly understood origins of the Trincheras Tradition. This poster presents initial results of magnetic gradiometry and photogrammetric imagery collected from the site in April 2017 as part of the ongoing binational project Proyecto La Playa. Along with magnetic gradiometry data collection, several unmanned aerial vehicle flights with a Trimble UX5 captured photogrammetric images of the site. This data has yielded the possible presence of irrigation canals, pithouses, and thermal features. With erosion damaging much of La Playa, this research documents at-risk features for future excavation.

Resumen

La Playa (SON F:10:3), con una superficie aproximada de diez kilómetros cuadrados, es uno de los sitios arqueológicos más importantes de la noroeste de México. Aunque La Playa es reconocida por su ocupación en el periodo de Agricultura Temprana, esta investigación, financiada por el Grupo Geográfico, tiene como objetivo caracterizar el inicio todo poco conocido de la Tradición Trincheras. En este cartel se presentan las interpretaciones preliminares de la presencia magnética y las imágenes fotogramétricas colectadas en el sitio en abril de 2017 en el marco del Proyecto La Playa. Adicionalmente a la recolección de los datos magnéticos, se realizaron varios vuelos con un vehículo aéreo no tripulado con un Trimble UX5 con el que se capturaron las imágenes fotogramétricas del sitio. Estos datos han mostrado la posible presencia de canales de riego, casas en foso y elementos térmicos. Esta investigación documenta los elementos en riesgo por la erosión y propone una gran parte de La Playa para posibles excavaciones dirigidas.

Previous Research at La Playa

La Playa is located along the Rio Boquillas in the Trincheras Municipality of Sonora (Gallaga and Newell 2004), and is the largest Early Agricultural Period (EAP) site in Northwest/Southwest Sonora. La Playa’s unique geomorphology, and vast cultural deposition, were initially described by Sauer and Brand in 1931. While Alfred Johnson (1960) conducted the first testing at the site, further excavations were not conducted until Centro INAH Sonora’s establishment of Proyecto La Playa in the 1990s (Carpenter et al. 2009).

Ongoing work at La Playa examines the transition from the EAP to the subsequent Trincheras Tradition. It is presently unclear if the Trincheras tradition (ca. 450y/1450 CE) emerged via population upflow, or if it was the result of an in situ development (Carpenter et al. 2015). Recent work through INAH’s Proyecto La Playa unraveled a small structure at the site which produced the earliest Trincheras Tradition dates, however additional work is still needed (Abrego et al. 2016).

Research presented in this poster was conducted by a team led by the first author, working in collaboration with the second author. The team was funded by a National Geographic grant, and all data collection was conducted by the second author.

For the future, we propose to conduct a more extensive fieldwork campaign, including additional aerial and ground survey in order to fully understand the site’s potential and future research directions.

Methods for Data Collection

- Grids were mapped with a total station, then recorded with a Trimble UX5.
- Three areas were designated: Area 5, Area 6, and Area 7.
- Grids measured 50x50 meters or were modified due to heavy soil deflation.
- Grids were formed using tapes and ropes. Ropes were laid every 1 meter (10cm intervals) north/south with fiducials at every 10 meters (east/west).
- We used a Geometrics G-858 cesium vapor magnetometer, recording data at 10 intervals per second.
- In all but two cases (in Area 5), grids were recorded bidirectionally.
- Magnetic Gradiometry data was processed with MAGMAP, Surfer 14, and Topographic Map software.
- We flew a Trimble UX5 at 250m above ground level across the majority of the official site boundary, as well as to the south of the boundary, where additional components of the La Playa landscape are located. We also flew a DJI Phantom 4 Pro Quadcopter at a 55m elevation over each of the magnetic gradiometry areas for higher resolution.

Photogrammetry

- Photogrammetric images from the Trimble UX5 provide 10cm resolution of the entire site.
- Images from the Phantom 4 Pro provided a 3cm resolution of magnetic gradiometry survey areas.
- Images are currently being processed with Pix4Dmapper software. Initial results are displayed in the map to the right.
- Photogrammetric images will be used to create a DEM and a topographic map of the site.

Area 5

This area was located south of a previously excavated Trincheras structure (Abrego et al. 2016). The grid transects a contemporary dirt road to the north, and contains heavily deflated soil to the south. Trincheras Lisa and Purple-on-red ceramics are present at the surface of northern portions of this study area.

- The far northeast grid yielded two circular features that are consistent with previously excavated pit structures. Given their proximity to the previously excavated Trincheras structure, these features provide excellent areas for subsequent testing.
- Several (possibly 5) linear anomalies have been identified. While some of these anomalies may represent prehistoric irrigation canals, others may be the result of contemporary soil deflation.

Area 6

Very little archaeological work had been conducted in Area 6. It was located north of a utilized road, and contained many historic metal artifacts that were removed from the area prior to data collection. The remains of a historic road also appear within the area.

- A prominent double-lined linear anomaly was observed in this area. This features crosses two grids.
- Subsequent research aims to continue targeting this area.

Area 7

This area improved subsurface knowledge in one of Capaj’s previous areas by targeting one of the site’s montículos (or large cultural mounds of the-tranquil-rock). Area 7 was also located near several previous INAH test trenches.

- At least two linear anomalies are observed transecting northeast.
- The region to the east of the montículo contains several potential features including possible pit structures and/or thermal features.
- Three INAH test trenches are visible in the data.

Discussion & Future Research

Photogrammetric images, once fully processed, will produce high quality maps of La Playa. Additional UAV flights in December of 2017 will provide images of areas missed during the April 2017 fieldwork.

The area of geophysical remote sensing at La Playa has yet to be fully examined. The most promising area may be the presence of prehistoric irrigation canals. As part of Proyecto La Playa, possible features will be targeted for test excavations.

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Acknowledgments

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