

UC San Diego

Field Reports

Title

Chichen Itza and Ek Balam, Yucatan, Mexico August 27th – September 2nd 2023.

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Field Report:

Chichen Itza, Ek Balam

August 27th - September 2nd, 2023

Yucatan, Mexico



Field Report prepared September 4th 2024

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Expedition Team:

Scott McAvoy – CHEI/UCSD

Dr. Jeremy Coltman – UCR – iconographer

Dr. Arianna Campiani – Sapienza University of Rome

Esteban Miron Marvan – UC Berkeley

Jose Osorio (Pepe) – INAH Chichen Itza Administrative Director

Francisco Perez (Pancho) – INAH Chichen Itza Archaeological Director

Claudia Garcia-Solis – INAH Yucatan Conservator/Restorer

Jesus Gallegos Flores – INAH Chichen Itza GIS specialist

Luis Alberto Catana (Alberto) – INAH Tren Maya Biologist, Chichen SFM specialist

Expedition Overview:

Our 4th team expedition to Yucatan, acquiring 29 new datasets through various means for integration into the archive and visualization atlas.

An extremely hot and humid August visit, riding up against a presidential visit that weekend. Energy and time was in short supply, but we were nonetheless productive and the presidential event provided a unique networking opportunity, as INAH archaeologists from all over the country flocked to Merida.

Sponsored by Travis Stanton at UC Riverside, Scott and Jeremy along with Scott's Palenque 3D Atlas collaborators Arianna and Esteban, visited Chichen Itza to continue an ongoing 3D documentation campaign, focusing on the augmentation of existing efforts including:

1. Wooden Lintels in El Castillo Superstructure Interior

A study of wooden lintels in the El Castillo superstructure and upper Temple of the Jaguars. 16 wood samples were collected for c14 and species analysis, in close collaboration with Claudia Garcia-Solis. Jeremy Coltman is writing an article describing the iconography on these lintels, which heavily feature the sun god. The lintels were very worn, and very difficult to read in person. The lintels had all been imaged during the February 2023 expedition at approximately 300 micron resolution and incorporated into the 3D Atlas. Jeremy had obtained rubbings of the lintels done by third parties.

2. El Castillo Superstructure Serpent Column Reconstruction

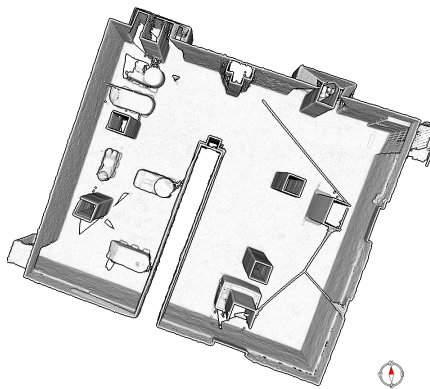
An effort to reconstruct the serpent columns on the El Castillo superstructure exterior. In February Scott had helped confirm conservator theories about the origin of the lone serpent head in the plaza north of El Castillo to have been on the western serpent column. Additional fragments of these columns' tail pieces were scanned atop El Castillo, along with more tail fragments by the Eagle and Jaguars platform which the conservation team also assumed to be from these columns.

3. Grand Ballcourt Monument Context

A collaborator is writing an article about the glyphs on this hemispherical piece, currently housed in the tourist center bodega as 5 pieces, scanned and reconstructed by Scott during the February expedition. Though documents placed the monument on the southern side of the ballcourt, Scott wanted to scan a radial platform at the north temple, which seemed to be the same size, to see if it's possible for the stone to have sat atop the platform. The dimensions were off by a few inches.

4. Structural Assessment of the Temple of the Chacmool

Using the Leica BLK 360 to create a 3mm resolution model of the Temple of the Warriors substructure, which would give some insight into the structural integrity of structural reinforcement performed by the INAH conservation team some years back. These scans were collected by Arianna Campiani.



5. Scan of El Castillo Substructure North Façade

Using a specially configured rig including the low profile Sony qx1 and a battery powered ring light on an extending pole, Jesus and Jeremy went to image the façade which extends some 6 meters above the excavated tunnel floor. Unfortunately, the pole wasn't long enough and images only show the lower criss-cross molding and central Rosette. Apparently Alberto had scanned this earlier with a gopro on a selfie stick, we're trying to track down this data, as previous drawings and images of this feature are problematic.

6. Scan of key structures at Ek Balam

continuing work done in Travis Stanton's July expedition, to obtain a TLS ground truth for his SLS images of the famous façade, along with scans of Banqueta 44 and its context within the acropolis. This visit was key to the continued development of the Ek Balam 3D atlas, as Scott was previously unaware of model locations and received no contextual notes. TLS scans of white facade were obscured by protective netting, but provided key measurement reference for the unconstrained SLS scan.



7. Database Design and 3D Atlas training

Unfortunately Scott was out sick for two key days and this effort was unsuccessful. Jesus offered to share his GIS project detailing INAH location codes names and organizational structure. Scott provided the updated version of the 3D Atlas, featuring new datasets and interface improvements.

8. Osario serpent 3D documentation

The serpents at Osario are many and unique. We spent some time scanning the northern balustrades along with several serpent heads. Plans for the reconstructed Witz façade were frustrated by heavy rain. Some time was mis-spent re-scanning the adjacent venus platform which had already been documented in the July trip.



9. Upper Temple of the Jaguars serpent 3D documentation

Scanned large serpent heads, this whole area needs a TLS scan. INAH models should fill out nicer photogrammetric detail.



A full listing of datasets and their contributors are provided in appendix 1. Please contact Scott McAvoy (smcavoy@ucsd.edu) for any questions regarding access to this data.

Data Acquisition:

Given the scale of Salvation Mountain, and the need to document individual sculptures, vehicles, complex interiors and exteriors, along with the landscape upon which it all sits, the team decided to employ a number of survey techniques to appropriately capture structures at varying scales and resolutions.

These tools and methods are outlined below:

Terrestrial LiDAR (TLS) - Leica RTC 360 G2



Highly compact tripod mounted laser scanning system, enabling rapid capture of architectural spaces and features.

HDR 360 images at 13 mp,
point density (resolution) of 6mm at 10 meters
accuracy of 4mm at 10 meters

Ideal for confined spaces, overheats easily in direct sunlight.

Structured Light Scanning (SLS) - Artec Leo



This portable system projects patterns, whose deformation is read realtime and aligned with SLAM to create 3D scans.

Capable of capturing complex geometries at approximately 0.3mm resolution (under best conditions), reliably capturing at 0.6 - 0.7 mm resolution.

Data Quality and Availability

The data provided by this project is not certified by a licensed surveyor. Measurements provided are subject to error. If an application requires a particularly high level of accuracy or precision (for example, a hydrological analysis) please contact the authors of this report.

Appendix - Data Inventory

Data Set	Acquisition Date	Location	Data Type	Device	Contributor
El_Castillo_substructure_photogrammetry	8/29/2023	Chichen Itza	terrestrial_photogrammetry	Sony A7 r4	Jesus Manuel Gallegos Flores
Ek_Balam_facade	8/2024	Ek_Balam	terrestrial_lidar	BLK360 g2	Scott McAvoy
Ek_Balam_banqueta3	8/2024	Ek_Balam	terrestrial_lidar	BLK360 g2	Scott McAvoy
templo_chac_mool	8/2024	Ek_Balam	terrestrial_lidar	BLK360 g2	Arianna Campiani
3c1-h97-1 sw43.leo	8/2024	Chichen Itza	structured_light	Artec Leo	Scott McAvoy
Chac mool venus.leo	8/2024	Chichen Itza	structured_light	Artec Leo	Scott McAvoy
Chacmool_office_10-290155.leo	8/2024	Chichen Itza	structured_light	Artec Leo	Scott McAvoy
Columna bodega.leo	8/2024	Chichen Itza	structured_light	Artec Leo	Scott McAvoy
elcastillosuper serpent tailfragments.leo	8/2024	Chichen Itza	structured_light	Artec Leo	Scott McAvoy
fragmentos tzompa tli.leo	8/2024	Chichen Itza	structured_light	Artec Leo	Scott McAvoy
Fragments_venus_temple.leo	8/2024	Chichen Itza	structured_light	Artec Leo	Scott McAvoy
Jaguares 10-489964.leo	8/2024	Chichen Itza	structured_light	Artec Leo	Scott McAvoy
osario northsidewest .leo	8/2024	Chichen Itza	structured_light	Artec Leo	Alberto Catana
osarionortheastbalustrde.leo	8/2024	Chichen Itza	structured_light	Artec Leo	Alberto Catana
osarioserpenton path.leo	8/2024	Chichen Itza	structured_light	Artec Leo	Alberto Catana
Rattle_venus_possibly_elcastillo.leo	8/2024	Chichen Itza	structured_light	Artec Leo	Scott McAvoy
rescans_elcastillo_lintels 2.leo	8/2024	Chichen Itza	structured_light	Artec Leo	Scott McAvoy
Sascabera_serpent_head.leo	8/2024	Chichen Itza	structured_light	Artec Leo	Scott McAvoy
Sculpted_block_bodega.leo	8/2024	Chichen Itza	structured_light	Artec Leo	Scott McAvoy
Serpent_head_venus_platform.leo	8/2024	Chichen Itza	structured_light	Artec Leo	Arianna Campiani
serpent_rattle_tourist_center_bodega.leo	8/2024	Chichen Itza	structured_light	Artec Leo	Scott McAvoy
Serpent10-290177.leo	8/2024	Chichen Itza	structured_light	Artec Leo	Scott McAvoy
Serpientes norte.leo	8/2024	Chichen Itza	structured_light	Artec Leo	Scott McAvoy

Field Report - Cultural Heritage Engineering Initiative (CHEI)

tcb nightsun 10 489725.leo	8/2024	Chichen Itza	structured_light	Artec Leo	Scott McAvoy
tcb 10_489929 144 .leo	8/2024	Chichen Itza	structured_light	Artec Leo	Scott McAvoy
tcb shelf 6_3.leo	8/2024	Chichen Itza	structured_light	Artec Leo	Scott McAvoy
templonorteradialdisk.leo	8/2024	Chichen Itza	structured_light	Artec Leo	Scott McAvoy
Uppertemplojaguares serpent.leo	8/2024	Chichen Itza	structured_light	Artec Leo	Alberto Catana
venado facades byosario.leo	8/2024	Chichen Itza	structured_light	Artec Leo	Arianna Campiani