

OpenAI to Z Challenge

TITLE : TEMPLEQUEST: REDISCOVERING A LOST
AMAZONIAN TEMPLE VIA AI, LIDAR & SATELLITE ANALYSIS

SUBMISSION TYPE: ARCHAEOLOGICAL SITE DISCOVERY

COORDINATES OF DISCOVERY: -3.4497, -62.1345

DURATION: (JUNE 7 – JUNE 14, 2025)

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2. ABSTRACT / EXECUTIVE SUMMARY :-

- THIS PROJECT, CREATED FOR THE OPENAI TO Z CHALLENGE, AIMED TO DISCOVER HIDDEN ARCHAEOLOGICAL STRUCTURES IN THE AMAZON RAINFOREST USING A COMBINATION OF ARTIFICIAL INTELLIGENCE, SATELLITE IMAGERY, AND REMOTE SENSING TECHNOLOGIES. THE FOCUS WAS ON IDENTIFYING MAN-MADE PATTERNS SUCH AS TEMPLES OR ENCLOSURES BURIED UNDER DENSE VEGETATION IN THE AMAZONAS REGION OF BRAZIL.
- TO ACHIEVE THIS, THE PROJECT USED MULTIPLE TOOLS AND DATASETS: HIGH-RESOLUTION SATELLITE IMAGERY FROM GOOGLE EARTH AND SENTINEL-2, LIDAR ELEVATION DATA FROM NASA'S ICESAT-2, NDVI VEGETATION ANALYSIS FROM GOOGLE EARTH ENGINE, AND GPT-4O FOR INTERPRETING HISTORICAL TRIBAL LEGENDS AND CROSS-VERIFYING SITE CLUES. PYTHON LIBRARIES SUCH AS MATPLOTLIB, GEOPANDAS, AND EARTHPY WERE USED TO PROCESS AND VISUALIZE DATA.
- THE KEY DISCOVERY WAS A GEOMETRIC LAND FORMATION NEAR THE COORDINATES -3.4497 LATITUDE, -62.1345 LONGITUDE, SHOWING A SQUARE-SHAPED ELEVATION ANOMALY AND SURROUNDING VEGETATION DISRUPTIONS. THIS SPATIAL CONFIGURATION, ALONG WITH AI-INTERPRETED TRIBAL STORIES, STRONGLY SUGGESTS THE PRESENCE OF A POTENTIALLY UNDOCUMENTED TEMPLE STRUCTURE.
- THE FINAL HYPOTHESIS CONCLUDES THAT THE SITE MAY BE THE REMAINS OF AN ANCIENT, HUMAN-BUILT CEREMONIAL COMPLEX, NOW OBSCURED BY RAINFOREST CANOPY— REPRESENTING A SUCCESSFUL USE CASE OF AI-POWERED ARCHAEOLOGY.

3. INTRODUCTION :-

- THE AMAZON RAINFOREST, OFTEN CALLED THE “LUNGS OF THE EARTH,” IS NOT ONLY A BIODIVERSITY HOTSPOT BUT ALSO A VAST, UNDEREXPLORED CANVAS OF HUMAN HISTORY. BENEATH ITS THICK CANOPY LIE TRACES OF LOST CIVILIZATIONS, FORGOTTEN SETTLEMENTS, AND POSSIBLY SACRED STRUCTURES THAT PREDATE MODERN RECORDS. RECENT ADVANCES IN REMOTE SENSING AND AI HAVE OPENED THE DOOR TO REDISCOVERING THESE HIDDEN LEGACIES WITHOUT DISTURBING THE ENVIRONMENT.
- THE OPENAI TO Z CHALLENGE ENCOURAGED THE INNOVATIVE USE OF OPEN-SOURCE TOOLS AND DATA TO UNCOVER SUCH SITES. THIS PROJECT SET OUT TO IDENTIFY A POTENTIAL ANCIENT TEMPLE OR CEREMONIAL STRUCTURE WITHIN THE AMAZON USING A BLEND OF AI-DRIVEN INFERENCE, LIDAR ELEVATION DATA, NDVI VEGETATION OVERLAYS, AND HISTORICAL SATELLITE IMAGERY.
- HISTORICALLY, THE AMAZON HAS BEEN UNDERESTIMATED IN TERMS OF HUMAN DEVELOPMENT. HOWEVER, EVIDENCE IS EMERGING OF COMPLEX PRE-COLUMBIAN SOCIETIES THAT BUILT LARGE, ORGANIZED SETTLEMENTS WITH ROADS, MOUNDS, AND GEOMETRIC ENCLOSURES. THIS PROJECT FOCUSES ON ONE SUCH POSSIBLE SITE, COMBINING TECHNOLOGICAL TOOLS WITH CULTURAL INSIGHTS TO HIGHLIGHT THE REGION’S FORGOTTEN PAST AND BRING NEW ATTENTION TO INDIGENOUS HISTORICAL FOOTPRINTS.

4.TOOLS & TECHNOLOGY :-

- GOOGLE EARTH & SENTINEL-2 HELPED VISUALLY COMPARE CHANGES FROM 2020 TO 2025, REVEALING UNUSUAL PATTERNS BENEATH THE FOREST CANOPY.
- NASA ICESAT-2 LIDAR EXPOSED SUBTLE ELEVATION SHIFTS, HINTING AT HIDDEN MAN-MADE STRUCTURES LIKE MOUNDS OR ENCLOSURES.
- NDVI FROM EARTH ENGINE HIGHLIGHTED IRREGULAR VEGETATION GROWTH, SIGNALING AREAS POSSIBLY SHAPED BY PAST HUMAN ACTIVITY.
- GPT-4O AI INTERPRETED TRIBAL MYTHS AND ALIGNED THEM WITH SPATIAL CLUES, TURNING CULTURAL MEMORY INTO COORDINATE-BASED INSIGHT.
- PYTHON & JUPYTER TOOLS STITCHED TOGETHER ALL DATA LAYERS INTO CLEAR, EVIDENCE-BACKED VISUAL MAPS OF THE SUSPECTED SITE.

5. METHODOLOGY / STEPS TAKEN :-

- 7-DAY DISCOVERY TIMELINE

DAY 1: EXPLORED AMAZON REGION ON GOOGLE EARTH & STUDIED KAGGLE CHALLENGE SCOPE.

DAY 2: COLLECTED SENTINEL-2 IMAGERY (2020 VS 2025) AND SPOTTED VISUAL ANOMALIES.

DAY 3: PULLED NASA ICESAT-2 LIDAR DATA; PLOTTED ELEVATION HEATMAPS.

DAY 4: APPLIED NDVI LAYERS TO DETECT ABNORMAL VEGETATION GROWTH PATTERNS.

DAY 5: USED GPT-4O TO INTERPRET TRIBAL MYTHS AND ALIGN THEM WITH MAP DATA.

DAY 6: OVERLAID ALL LAYERS—SATELLITE, LIDAR, NDVI, AND CULTURAL CLUES.

DAY 7: ISOLATED ONE STRONG COORDINATE: -3.4497, -62.1345 — LIKELY A HIDDEN SITE.

- LIDAR HEATMAPS: DETECTED SQUARE-SHAPED ELEVATION SUGGESTING HUMAN-MADE MOUND.
- NDVI MAPPING: FLAGGED UNUSUAL CIRCULAR VEGETATION GAPS.
- AI INTERPRETATION: GPT-4O MATCHED LEGENDS TO THE LANDSCAPE, NARROWING THE SEARCH.
- LAYER FUSION: ALL DATA ALIGNED AT ONE SPOT—BACKED BY SCIENCE AND STORY.

6. FINDINGS / DISCOVERY:-

- FINAL COORDINATES:
LATITUDE: -3.4497
LONGITUDE: -62.1345

- WHAT WE FOUND:-

1.LIDAR ELEVATION MAP:-

A SQUARE-SHAPED MOUND IS VISIBLE IN THE LIDAR DATA
UNNATURAL IN THE AMAZON'S RANDOM TERRAIN.

2. SUGGESTS MAN-MADE STRUCTURE LIKE A PLATFORM OR TEMPLE BASE.

3.NDVI & SATELLITE IMAGERY:

NDVI LAYER SHOWS A CIRCULAR VEGETATION GAP AROUND THE
SQUARE.

4.POSSIBLE CLEARING OR SACRED AREA WITH ALTERED PLANT GROWTH.

- WHY THIS MATTERS:-

THE SHAPE, SYMMETRY, AND VEGETATION ANOMALIES POINT
TO A NON-NATURAL PATTERN—STRONG SIGNS OF A FORGOTTEN
CEREMONIAL SITE.

7. DISCUSSION / INTERPRETATION:-

- THE DETECTED SITE LIES IN THE UPPER AMAZON BASIN—AN AREA INCREASINGLY BELIEVED TO HAVE SUPPORTED COMPLEX ANCIENT SOCIETIES. STUDIES SUGGEST PRE-COLUMBIAN TRIBES IN THIS REGION BUILT GEOMETRIC EARTHWORKS, CEREMONIAL CENTERS, AND MOUND-BASED STRUCTURES, OFTEN HIDDEN UNDER DENSE VEGETATION FOR CENTURIES.

POSSIBLE CULTURAL CONNECTION:-

- THE COORDINATES POINT TO A ZONE CONSISTENT WITH THE UPPER PURUS CULTURE AREA, WHERE INDIGENOUS GROUPS ARE BELIEVED TO HAVE PRACTICED FOREST SHAPING AND BUILT RITUAL ENCLOSURES. THE SQUARE FORMATION AND SURROUNDING VEGETATION GAP OBSERVED MAY ALIGN WITH A TEMPLE PLATFORM, PLAZA, OR CEREMONIAL GROUND ONCE USED FOR SPIRITUAL OR SOCIAL GATHERINGS.

HISTORICAL SIGNIFICANCE:-

- IF VERIFIED, THIS SITE COULD CONTRIBUTE TO GROWING EVIDENCE THAT LARGE, ORGANIZED SETTLEMENTS EXISTED DEEP IN THE RAINFOREST—CHALLENGING OUTDATED VIEWS OF THE AMAZON AS UNINHABITED WILDERNESS. IT ALSO ADDS WEIGHT TO ORAL TRADITIONS PASSED DOWN BY LOCAL TRIBES, OFTEN DISMISSED IN THE PAST.

CONFIDENCE LEVEL:-

- BASED ON MULTI-LAYERED EVIDENCE FROM LIDAR, NDVI ANOMALIES, SATELLITE IMAGERY, AND CULTURAL MAPPING USING GPT-4O:
- THIS IS A HYPOTHESIZED ARCHAEOLOGICAL SITE, NOT A CONFIRMED DISCOVERY.
- THE DATA STRONGLY SUGGESTS ARTIFICIAL SHAPING OF THE LAND.
- FURTHER ON-SITE VALIDATION (E.G., GROUND SURVEYS OR DRONE-BASED LIDAR) WOULD BE NEEDED FOR CONFIRMATION.

8. CONCLUSION :-

- **SITE IDENTIFIED:-**
DETECTED A POTENTIAL ARCHAEOLOGICAL SITE AT -3.4497, -62.1345 DEEP IN THE AMAZON RAINFOREST.
- **MULTI-LAYERED EVIDENCE:-**
COMBINED LIDAR ELEVATION, NDVI VEGETATION GAPS, SENTINEL-2 SATELLITE IMAGERY, AND GPT-4O CULTURAL INFERENCE TO TRIANGULATE THE LOCATION.
- **SUSPECTED STRUCTURE:-**
A SQUARE-SHAPED MOUND SURROUNDED BY AN ANOMALOUS VEGETATION PATTERN SUGGESTS A TEMPLE BASE OR CEREMONIAL GROUND.
- **AI'S ROLE:-**
GPT-4O HELPED DECODE TRIBAL LEGENDS AND ALIGN THEM WITH SPATIAL DATA—BRIDGING CULTURE AND SCIENCE.
- **WHY THIS MATTERS:-**
SUPPORTS THEORIES THAT ADVANCED, ORGANIZED CIVILIZATIONS ONCE THRIVED IN THE AMAZON—CHALLENGING THE MYTH OF AN UNTOUCHED JUNGLE.
- **PROOF OF CONCEPT:-**
DEMONSTRATES HOW AI + REMOTE SENSING CAN UNCOVER LOST HISTORY WITHOUT EXCAVATION.
- **NEXT STEPS:-**
RECOMMEND GROUND-TRUTH SURVEYS, DRONE LIDAR SCANS, AND PARTNERSHIPS WITH ARCHAEOLOGISTS TO CONFIRM AND PRESERVE THE SITE.

9. REFERENCES & DATA SOURCES:-

- SATELLITE IMAGERY:-

SENTINEL-2 (2020 & 2025)
COPERNICUS OPEN ACCESS HUB (ESA)
GOOGLE EARTH ENGINE: SENTINEL-2 DATASET

- LIDAR ELEVATION DATA:-

NASA ICESAT-2 ATL08 DATASET
NSIDC ICESAT-2 ATL08 PRODUCT
EARTHDATA SEARCH (ICESAT-2)

- GPT-4O CITATIONS & AI INFERENCE:-

GPT-4O USED VIA OPENAI (JUNE 2025) FOR:
MATCHING TRIBAL ORAL HISTORIES TO GEOGRAPHY
GENERATING SUMMARIES OF AMAZONIAN ARCHAEOLOGY
OUTPUTS DOCUMENTED IN NOTEBOOK + APPENDIX (GITHUB)

- ACADEMIC & CULTURAL REFERENCES:-

HECKENBERGER, M. ET AL. (2008). PRE-COLUMBIAN URBANISM, ANTHROPOGENIC LANDSCAPES, AND THE FUTURE OF THE AMAZON. SCIENCE, 321(5893), 1214–1217.

PRÜMERS, H., & JAIMES BETANCOURT, C. (2022). A PRE-HISPANIC LOW-DENSITY URBAN CENTER IN THE BOLIVIAN AMAZON. NATURE.

10. APPENDICES :-

A. ANNOTATED MAPS & OVERLAYS:-

- LIDAR ELEVATION MAP SHOWING RAISED RECTANGULAR FORMATION NDVI VEGETATION GAP MAP (2020 VS 2025 COMPARISON)
- SATELLITE COMPOSITE WITH OVERLAYED COORDINATE GRID ALL ANNOTATIONS HIGHLIGHT THE SUSPECTED CEREMONIAL SITE STORED IN /IMAGES FOLDER IN GITHUB REPO

B. FULL NOTEBOOK (ANALYSIS CODE):-

- STEP-BY-STEP DATA PIPELINE USING:-
- EARTH ENGINE API (NDVI, SENTINEL)
- LIDAR ELEVATION PLOTTING (MATPLOTLIB, EARTHPLY)
- GPT-4O PROMPT LOGS FOR CULTURAL ALIGNMENT

C. SCREENSHOTS & VISUAL SNAPSHOTS:-

- AMAZON BASIN REGION VIEW (GOOGLE EARTH)
- 2020 VS 2025 COMPARISON PANELS
- OVERLAY TRANSPARENCY SLIDE VIEWS
- FINAL SUBMISSION THUMBNAILS STORED IN /SCREENSHOTS FOLDER
- GITHUB REPOSITORY .

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