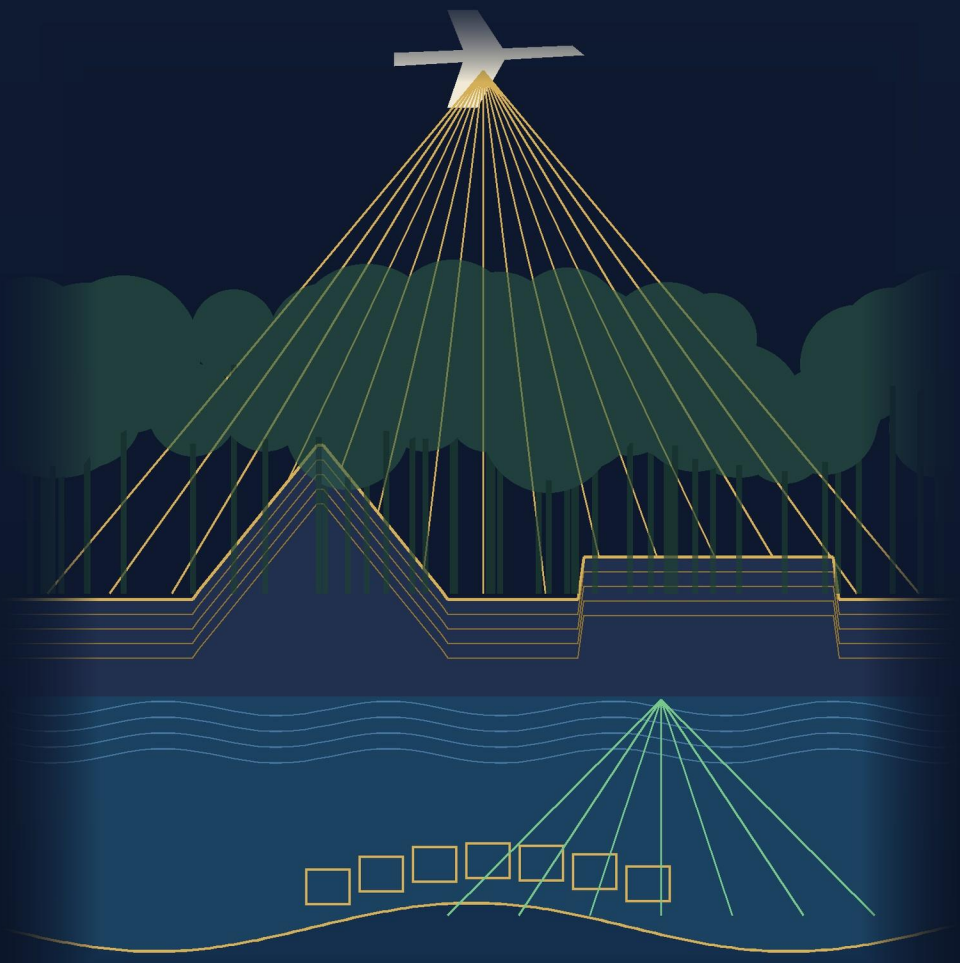
A PLAIN-ENGLISH FACT CHECK

UNDER THE CANOPY, UNDER THE SEA

What LiDAR Has Really Found

and What It Means for the Bible Lands



MAYA | ANGKOR | AMAZON | UNDERWATER | BIBLE LANDS

ANDREW DOMINGUEZ

TRINFINITY Enterprises

UNDER THE CANOPY, UNDER THE SEA

What LiDAR Has Really Found, and What It Means for the Bible Lands

Lost Maya cities, Khmer capitals, Amazon towns, drowned coastlines and the tels of Israel, checked against the original reports

Andrew Dominguez

Fact Check Series

Trinfinity Enterprises

Under the Canopy, Under the Sea: What LiDAR Has Really Found, and What It Means for the Bible Lands

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The information in this book stops at November 18, 2026. Archaeology moves fast. New surveys are published every month, and dates get revised when new samples come back from the lab. Check the sources named in the footnotes for anything newer.

Scripture quotations are taken from the Steadfast Literal Bible (SLB). Words added in English to make the sense clear are printed in bold italics.

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A Word About Scripture

The Scripture in this book comes from the Steadfast Literal Bible (SLB), a word-for-word translation in today's language. Words added in English to make the sense clear are printed in bold italics. Where I give a Bible reference without quoting it, I encourage you to open your own Bible and read the whole passage. Context matters, and a reference in a book like this is never a substitute for reading the chapter around it.

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Summary: The Short Version

The information in this book stops at November 18, 2026.

LiDAR (Light Detection and Ranging) is a way of mapping the ground with a laser fired from an airplane, helicopter or drone. Because some of the laser pulses slip through gaps in the leaves and bounce back off the soil, a computer can strip away the trees and show the bare earth underneath. A special green-light version can also see the bottom of shallow, clear water.[1]

Over the last twenty-five years, that one tool has changed what we know about the ancient world. Here is what the original reports actually show.

- **The Maya world was far bigger than anyone had mapped.** A 2016 survey of 2,144 square kilometers of northern Guatemala counted 61,480 ancient structures, about 106 kilometers of raised causeways and large defensive works. The team's population estimate for the central Maya lowlands in the Late Classic period (about AD 650 to 800) is 7 to 11 million people.[2]
- **Some of the biggest monuments came early, and may have been built by people working together rather than by kings.** At Aguada Fenix in Mexico, LiDAR found an artificial plateau 1,400 meters long and 10 to 15 meters high, built between 1000 and 800 BC.[3]
- **Angkor in Cambodia was a planned city, not just a set of temples.** LiDAR showed a formally laid-out urban landscape wrapped around Angkor Wat, and on the Phnom Kulen plateau it traced the grid of the early capital Mahendraparvata over about 40 to 50 square kilometers.[4]
- **The Amazon held towns.** In Bolivia, LiDAR mapped two large Casarabe-culture settlements of 147 and 315 hectares, with pyramids up to 22 meters tall, causeways several kilometers long, and canals and reservoirs.[5]
- **Underwater LiDAR is real and new.** In Florida's Apalachee Bay, a 2024 study used bathymetric LiDAR to find at least four previously unrecorded submerged sites.[6] In 2025, an aerial survey

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[1] National Oceanic and Atmospheric Administration (NOAA), National Ocean Service, "What is lidar?", page last updated September 23, 2026. https://oceanservice.noaa.gov/facts/lidar.html. Accessed November 18, 2026.

[2] Marcello A. Canuto, Francisco Estrada-Belli, Thomas G. Garrison, Stephen D. Houston, and others, "Ancient Lowland Maya Complexity as Revealed by Airborne Laser Scanning of Northern Guatemala", Science 361, no. 6409 (September 28, 2018): eaau0137. Accepted manuscript read through the National Science Foundation Public Access Repository, record 10097677. https://doi.org/10.1126/science.aau0137. Accessed November 18, 2026.

[3] Takeshi Inomata, Daniela Triadan, Veronica A. Vazquez Lopez, and others, "Monumental Architecture at Aguada Fenix and the Rise of Maya Civilization", Nature 582, no. 7813 (2020): 530-533. https://doi.org/10.1038/s41586-020-2343-4. Accessed November 18, 2026.

[4] Damian H. Evans, Roland J. Fletcher, Christophe Pottier, Jean-Baptiste Chevance, and others, "Uncovering Archaeological Landscapes at Angkor Using Lidar", Proceedings of the National Academy of Sciences 110, no. 31 (2013): 12595-12600. https://doi.org/10.1073/pnas.1306539110. Accessed November 18, 2026. Jean-Baptiste Chevance, Damian Evans, Nina Hofer, Sakada Sakhoeun, and Ratha Chhean, "Mahendraparvata: An Early Angkor-Period Capital Defined through Airborne Laser Scanning at Phnom Kulen", Antiquity 93, no. 371 (October 2019): 1303-1321, published online October 15, 2019; correction in Antiquity 94, no. 376 (2020): 1123. https://doi.org/10.15184/aqy.2019.133. Accessed November 18, 2026.

[5] Heiko Prumers, Carla Jaimes Betancourt, Jose Iriarte, Mark Robinson, and Martin Schaich, "Lidar Reveals Pre-Hispanic Low-Density Urbanism in the Bolivian Amazon", Nature 606, no. 7913 (2022): 325-328, published May 25, 2022. https://doi.org/10.1038/s41586-022-04780-4. Accessed November 18, 2026.

[6] Dylan S. Davis, Jessica W. Cook Hale, Nathan L. Hale, Trevor Z. Johnston, and others, "Bathymetric LiDAR and Semi-Automated Feature Extraction Assist Underwater Archaeological Surveys", Archaeological Prospection 31, no. 2 (2024): 171-186. https://doi.org/10.1002/arp.1939. Accessed November 18, 2026.

flown to map seagrass also produced a sharp seabed map of the sunken Roman resort of Baiae in Italy.[7]

- **The Bible lands are a different story.** LiDAR has done little there so far. What has changed the picture in Jerusalem, Lachish, Hazor, Megiddo and Jericho is careful digging and large sets of radiocarbon dates, not airborne lasers.[8]
- **Popular claims go beyond the evidence.** No LiDAR survey has shown that the lost tribes of Israel built cities in the Americas, that Atlantis existed, or that drowned coastlines prove Noah's Flood. Two widely shared papers that tied ancient sites to dramatic stories, the Tall el-Hammam "Sodom airburst" paper and the Gunung Padang "oldest pyramid" paper, were both retracted by the journals that published them.[9]

A pasted research draft I was given made most of these points, and most of its facts hold up when traced to the original papers. Its citations, however, were broken placeholders that pointed nowhere, and a few of its claims could not be traced to any source I could open. Those claims are left out of this book. Appendix B lists every remaining claim from the draft with a verdict and the source that settles it.

The central question

This book asks one question in three parts.

1. What has LiDAR really found, site by site, according to the teams who did the work?
2. Who lived at those places, and when, as far as excavation and dating can tell us?
3. How, if at all, do these findings connect to the Bible, and which popular claims about them hold up?

Who this book is for

I wrote this for an informed general reader: someone who saw a headline about a "lost city found by laser" and wants to know what is real. You do not need any background in archaeology. When I use a technical word, I explain it the first time, and there is a glossary at the back.

I am a Christian, and I believe the Bible is the Word of God. I also believe that the truth has nothing to fear from honest evidence. In this book I hold every claim to the same standard, whether it supports something I believe or not. Where the evidence is strong, I say so. Where it is thin, I say that too. Where the evidence simply cannot answer a question, such as a question about a miracle, I say that plainly instead of pretending the science has spoken.

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[7] Italian Institute for Environmental Protection and Research (ISPRA), "MER Project - Coastal Mapping: Exploring the Submerged Wonders of the Baia Archaeological Park", news release, 2025. https://www.isprambiente.gov.it/en/news/mer-project-2013-coastal-mapping-exploring-the-submerged-wonders-of-the-baia-archaeological-park. Accessed November 18, 2026.

[8] Giacomo Vinci, Federica Vanzani, Alessandro Fontana, and Stefano Campana, "LiDAR Applications in Archaeology: A Systematic Review", Archaeological Prospection 32, no. 1 (2025): 81-101. https://doi.org/10.1002/arp.1931. Accessed November 18, 2026. Johanna Regev, Yuval Gadot, Joe Uziel, Ortal Chalaf, and others, "Radiocarbon Chronology of Iron Age Jerusalem Reveals Calibration Offsets and Architectural Developments", Proceedings of the National Academy of Sciences 121, no. 19 (May 7, 2024): e2321024121. https://doi.org/10.1073/pnas.2321024121. Accessed November 18, 2026.

[9] Scientific Reports, "Retraction Note: A Tunguska Sized Airburst Destroyed Tall el-Hammam a Middle Bronze Age City in the Jordan Valley near the Dead Sea", Scientific Reports 15 (2025): 14291. https://doi.org/10.1038/s41598-025-99265-5. Accessed November 18, 2026. Archaeological Prospection, "Retraction: Geo-Archaeological Prospecting of Gunung Padang Buried Prehistoric Pyramid in West Java, Indonesia", Archaeological Prospection 31, no. 2 (2024): 199. https://doi.org/10.1002/arp.1932. Accessed November 18, 2026.

How I Checked the Facts

What I started with

The starting point for this book was a pasted research draft, roughly 3,500 words long, surveying LiDAR discoveries and then asking how they relate to the Bible. Here is what I could and could not establish about it.

Item	What I found
Creator	Not stated. The draft's style and its citation markers show it came from a chat with an AI research tool.
Date	Not stated. The newest event it mentions is a 2025 survey at Baiae, so it was written in 2025 or 2026.
Provenance	Pasted text only. No links, files, images or videos came with it.
Citations	Every citation was a broken placeholder in a form like a bracketed "turn" code. None could be followed to a source.
Main claims	Eleven site summaries (Guatemala, Ceibal, Aguada Fenix, Angkor, Mahendraparvata, Casarabe, Poverty Point, Stonehenge, Apalachee Bay, western Australia, Baiae), four general lessons, and a Bible section with direct links, thematic parallels and claims to reject.
How I used it	As a list of leads. I treated every sentence as a claim to verify, found the original paper or official record behind it where one exists, and rated it.

Because the draft's citations could not be followed, nothing in this book rests on the draft itself. Every fact here is footnoted to a source I opened and read on November 18, 2026. The one exception is marked where it appears: a 1990 article I know only through later citations.

The research questions

From the draft, I drew these questions.

- For each site: What did LiDAR show that was not known before? Who lived there? When? What changed in how scholars understand it?
- How was each finding confirmed on the ground, and how much of it is still an estimate?
- What major LiDAR discoveries did the draft leave out?
- What does the evidence say about Jerusalem, Qumran, Jericho, Hazor, Lachish, Megiddo and the Dead Sea basin?
- Where did the popular rumors about lost tribes, Atlantis and drowned worlds come from, who spreads them, and how well do they hold up?

How I read the sources

For each site, I went back to the original report by the team that did the survey, usually a peer-reviewed article in a journal such as *Science*, *Nature*, *Antiquity* or *PLoS ONE*. I read every article's abstract. For the studies the book leans on most, I also read the full text: northern Guatemala, Ceibal, Casarabe, Mahendraparvata, Campeche, Iron Age Jerusalem and the Jericho review. I used open-access copies or the publishers' own pages. When a news story repeated a number, I traced the number back to the paper rather than counting the news story as a second confirmation.

I sorted sources into five tiers, and I preferred the higher tiers.

Tier	What it includes	Examples
1. Primary and official	The original field reports by the teams who did the work, and official heritage and government records	Reports in *Science*, *Nature*, *Antiquity*, *PNAS* and *PLoS ONE*; UNESCO World Heritage listings; NOAA; English Heritage; journal retraction notices
2. Reviews and syntheses	Scholarly reviews that survey many studies	A 2025 systematic review of 291 LiDAR studies; a review of how the news media present LiDAR findings
3. Scholarly debate and history	Articles that argue for one reading of the evidence, histories of ideas, and book reviews	The Jericho dating debate; the Iron Age chronology debate; histories of the lost-tribes theory
4. Journalism	News reports, used only for what people said in public and when	Reporting on the 2022 Netflix series *Ancient Apocalypse*
5. Claims under examination	The writings and retracted papers that are the subject of a fact check	The retracted Tall el-Hammam and Gunung Padang papers; Ignatius Donnelly's 1882 *Atlantis*

A tier 5 source is cited only to show what was claimed, never as evidence that the claim is true.

When a source has a stake in the outcome, I say so. For example, a scholar who teaches in a Christian university's science and religion program may read the Jericho evidence differently from a scholar who doubts the conquest story. Both can be honest, and both are cited for what they argue.

Facts, interpretations and unknowns

I keep three kinds of statements apart.

- **Confirmed facts** are things the record shows directly, such as the number of structures a survey counted or the date a paper was retracted.
- **Interpretations** are what scholars make of the facts, such as a population estimate or the identity of a city's builders. When I give one, I say whose it is.

- **Unknowns** are things the record does not settle. When I could not confirm something, I mark it **[Not verified]** and say what I searched.

The verdicts

For the claims in the pasted draft, I use the four verdicts used in every book in this series.

- **True:** The original sources support the claim as stated.
- **Partly true:** Part of the claim holds up, but it leaves out something important, overstates it, or mixes in something the sources do not say.
- **False:** The sources contradict the claim as stated.
- **Inconclusive:** I could not find a source that settles it either way.

For the rumors and disputed claims in Part Four, I use a finer scale, because these are larger stories with long histories: **Supported**, **Partly supported**, **Disputed**, **Unsupported**, **Contradicted by evidence**, and **Unresolved**. Each rumor chapter explains why it got the rating it did, and what new evidence could change it.

What this book cannot see

Every investigation has blind spots, and you should know mine.

- **Geographic bias in the research itself.** A 2025 review of 291 published LiDAR studies from 2001 to 2022 found 167 in Europe, 104 in the Americas, and only 20 in all of Asia, the Middle East, Oceania and Africa combined.[10] The map of "where LiDAR found things" is partly a map of where people could afford to fly it and where governments share their data.
- **Language.** I read sources in English, plus one Spanish-language article. Important work published in Khmer, Portuguese, Hebrew, Arabic, Italian or Chinese may be missing.
- **Paywalls.** For a few articles I could read only the abstract. Where a detail rests on an abstract alone, the footnote points to the article so you can check the full text.
- **Who kept the records.** Ancient inscriptions and texts mostly record kings, priests and wars. LiDAR is valuable partly because it shows farms, roads and houses of ordinary people who wrote nothing down. Even so, the people who lived in these places were rarely the ones who named them, mapped them or wrote their history.
- **Fast-moving field.** New LiDAR papers appear almost weekly. This book covers the major, best-documented finds, not every site ever mapped.

[10] Giacomo Vinci, Federica Vanzani, Alessandro Fontana, and Stefano Campana, "LiDAR Applications in Archaeology: A Systematic Review", Archaeological Prospection 32, no. 1 (2025): 81-101. https://doi.org/10.1002/arp.1931. Accessed November 18, 2026.

Part One: How LiDAR Works

Chapter 1: Light, Lasers and Bare Earth

The basic idea

LiDAR stands for Light Detection and Ranging. The National Oceanic and Atmospheric Administration (NOAA) describes it as a remote sensing method that uses light in the form of a pulsed laser to measure distances to the earth. The instrument has three main parts: a laser, a scanner, and a specialized GPS (Global Positioning System) receiver. Airplanes and helicopters are the usual platforms for large areas.[11]

Here is how it works in plain words. The aircraft flies back and forth over the area in strips, like mowing a lawn. The laser fires a very large number of short pulses at the ground. Each pulse bounces off whatever it hits, a leaf, a branch, a rooftop or the soil, and the sensor times how long the light takes to come back. Light travels at a known speed, so the time tells you the distance. Combine that distance with the aircraft's exact position from GPS and its tilt from an inertial measurement unit, and each return becomes a point in space with a latitude, a longitude and a height. Millions of those points together make what is called a "point cloud."[12]

Why it can see through a forest

In a forest, most pulses hit leaves. But some find gaps and reach the ground, then bounce back. The computer sorts the returns by type. The last returns from each spot are usually the ground. When the analyst removes everything that is not ground, what is left is a "bare-earth" model of the surface beneath the trees, called a digital elevation model or digital terrain model.[13]

On that bare-earth model, things that are almost invisible on foot jump out: a house mound one foot high, a causeway running straight for miles, the square outline of a buried temple platform, terraces on a hillside. At Ceibal in Guatemala, the team found that in nearly ideal conditions, such as low pasture, LiDAR detected small structures only 10 to 30 centimeters high, about 4 to 12 inches.[14]

Two kinds of LiDAR

NOAA describes two main types.[15]

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[11] National Oceanic and Atmospheric Administration (NOAA), National Ocean Service, "What is lidar?", page last updated September 23, 2026. https://oceanservice.noaa.gov/facts/lidar.html. Accessed November 18, 2026.

[12] National Oceanic and Atmospheric Administration (NOAA), National Ocean Service, "What is lidar?", page last updated September 23, 2026. https://oceanservice.noaa.gov/facts/lidar.html. Accessed November 18, 2026.

[13] National Oceanic and Atmospheric Administration (NOAA), National Ocean Service, "What is lidar?", page last updated September 23, 2026. https://oceanservice.noaa.gov/facts/lidar.html. Accessed November 18, 2026.

[14] Takeshi Inomata, Daniela Triadan, Flory Pinzon, and others, "Archaeological Application of Airborne LiDAR to Examine Social Changes in the Ceibal Region of the Maya Lowlands", PLoS ONE 13, no. 2 (February 21, 2018): e0191619. https://doi.org/10.1371/journal.pone.0191619. Accessed November 18, 2026.

[15] National Oceanic and Atmospheric Administration (NOAA), National Ocean Service, "What is lidar?", page last updated September 23, 2026. https://oceanservice.noaa.gov/facts/lidar.html. Accessed November 18, 2026.

- **Topographic LiDAR** uses a near-infrared laser to map land.
- **Bathymetric LiDAR** uses green light, which passes through water, to measure the bottom of shallow seas, lakes and rivers.

Bathymetric LiDAR only works in fairly clear, shallow water. In Florida, researchers found that sea grass on the bottom did not stop it, but heavy sediment greatly reduced their success in spotting archaeological deposits.[16] For deeper or murky water, archaeologists still rely on sonar, which uses sound instead of light.[17]

What LiDAR cannot tell you

This is the most important point in the whole book, and the pasted draft got it right: LiDAR shows shape, not identity.

A LiDAR map tells you there is a rectangular mound 20 meters across. It does not tell you who built it, when, or what it was for. Those answers come from people on the ground: excavating, collecting pottery, dating charcoal with radiocarbon, reading inscriptions where there are any. Archaeologists call that work "ground-truthing."

The Ceibal team made this point directly. They wrote that LiDAR "only provides a synchronic view of the current topography," meaning a snapshot of the ground as it is today, and that the challenge is to pull information about change over time out of that snapshot. They did it by tying the LiDAR map to a building chronology from years of excavation at the site center, plus surface collection and test pits in the outlying areas.[18]

Ground-truthing also checks the map itself. Teams measure how often the analyst marked something that turned out not to be a structure (a false positive) and how often they missed a real one (a false negative). The Ceibal team used those error rates to adjust their counts.[19] The large 2016 Guatemala survey reported that field checks found its identifications "accurate if slightly conservative," meaning it more likely missed structures than invented them.[20] On the other hand, the Campeche team that found

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[16] Jessica W. Cook Hale, Dylan S. Davis, and Matthew C. Sanger, "Evaluating the Archaeological Efficacy of Bathymetric LiDAR across Oceanographic Contexts: A Case Study from Apalachee Bay, Florida", Heritage 6, no. 2 (2023): 928-945. https://doi.org/10.3390/heritage6020051. Accessed November 18, 2026.

[17] Nicodemo Abate, Crescenzo Violante, and Nicola Masini, "A Semi-Automatic-Based Approach to the Extraction of Underwater Archaeological Features from Ultra-High-Resolution Bathymetric Data: The Case of the Submerged Baia Archaeological Park", Remote Sensing 16, no. 11 (2024): 1908. https://doi.org/10.3390/rs16111908. Accessed November 18, 2026. Crescenzo Violante, Nicola Masini, and Nicodemo Abate, "Integrated Remote Sensing Technologies for Multi-Depth Seabed and Coastal Cultural Resources: The Case of the Submerged Roman Site of Baia (Naples, Italy)", EGU General Assembly 2022, abstract EGU22-9939. https://doi.org/10.5194/egusphere-egu22-9939. Accessed November 18, 2026.

[18] Takeshi Inomata, Daniela Triadan, Flory Pinzon, and others, "Archaeological Application of Airborne LiDAR to Examine Social Changes in the Ceibal Region of the Maya Lowlands", PLoS ONE 13, no. 2 (February 21, 2018): e0191619. https://doi.org/10.1371/journal.pone.0191619. Accessed November 18, 2026.

[19] Takeshi Inomata, Daniela Triadan, Flory Pinzon, and others, "Archaeological Application of Airborne LiDAR to Examine Social Changes in the Ceibal Region of the Maya Lowlands", PLoS ONE 13, no. 2 (February 21, 2018): e0191619. https://doi.org/10.1371/journal.pone.0191619. Accessed November 18, 2026.

[20] Marcello A. Canuto, Francisco Estrada-Belli, Thomas G. Garrison, Stephen D. Houston, and others, "Ancient Lowland Maya Complexity as Revealed by Airborne Laser Scanning of Northern Guatemala", Science 361, no. 6409 (September 28, 2018): eaau0137. Accepted manuscript read through the National Science Foundation Public Access Repository, record 10097677. https://doi.org/10.1126/science.aau0137. Accessed November 18, 2026.

Valeriana warned that some rock piles may have been counted as house mounds, which would make their counts slightly too high, and called all their counts preliminary.[21]

So when you read a LiDAR number, read it as a careful estimate with a margin, not as a census.

Chapter 2: A Short History of Archaeological LiDAR

From flood maps to lost cities

Many of the first LiDAR data sets archaeologists used were not made for archaeology at all. In Europe and North America, government agencies flew LiDAR to make elevation maps for flood control and planning, and archaeologists borrowed the data.[22]

That pattern continues. The first wide-area airborne LiDAR mapping in Central America was flown by the United States Geological Survey after Hurricane Mitch hit Honduras in 1998, to help model flooding.[23] The Campeche data that revealed the Maya city of Valeriana were collected in 2013 for a forest-monitoring project.[24] The 2025 LiDAR map of sunken Baiae came from a survey whose main goal was mapping seagrass.[25]

A timeline of key moments

The table below lists the major turning points covered in this book. The year is the year of the survey or the publication, as noted.

Year	Event	Source
1998-2000	After Hurricane Mitch, the USGS flies the first wide-area airborne LiDAR in Central America (Honduras), for flood modeling	[26]

[21] Luke Auld-Thomas, Marcello A. Canuto, Adriana Velazquez Morlet, Francisco Estrada-Belli, and others, "Running Out of Empty Space: Environmental Lidar and the Crowded Ancient Landscape of Campeche, Mexico", Antiquity 98, no. 401 (October 2024): 1340-1358, published online October 29, 2024. https://doi.org/10.15184/aqy.2024.148. Accessed November 18, 2026.

[22] Anna S. Cohen, Sarah Klassen, and Damian Evans, "Ethics in Archaeological Lidar", Journal of Computer Applications in Archaeology 3, no. 1 (2020): 76-91. https://doi.org/10.5334/jcaa.48. Accessed November 18, 2026.

[23] Juan Carlos Fernandez-Diaz and Anna S. Cohen, "Whose Data Is It Anyway? Lessons in Data Management and Sharing from Resurrecting and Repurposing Lidar Data for Archaeology Research in Honduras", Journal of Computer Applications in Archaeology 3, no. 1 (2020): 122-134. https://doi.org/10.5334/jcaa.51. Accessed November 18, 2026.

[24] Luke Auld-Thomas, Marcello A. Canuto, Adriana Velazquez Morlet, Francisco Estrada-Belli, and others, "Running Out of Empty Space: Environmental Lidar and the Crowded Ancient Landscape of Campeche, Mexico", Antiquity 98, no. 401 (October 2024): 1340-1358, published online October 29, 2024. https://doi.org/10.15184/aqy.2024.148. Accessed November 18, 2026.

[25] Italian Institute for Environmental Protection and Research (ISPRA), "MER Project - Coastal Mapping: Exploring the Submerged Wonders of the Baia Archaeological Park", news release, 2025. https://www.isprambiente.gov.it/en/news/mer-project-2013-coastal-mapping-exploring-the-submerged-wonders-of-the-baia-archaeological-park. Accessed November 18, 2026.

[26] Juan Carlos Fernandez-Diaz and Anna S. Cohen, "Whose Data Is It Anyway? Lessons in Data Management and Sharing from Resurrecting and Repurposing Lidar Data for Archaeology Research in Honduras", Journal of Computer Applications in Archaeology 3, no. 1 (2020): 122-134. https://doi.org/10.5334/jcaa.51. Accessed November 18, 2026.

Year	Event	Source
2005	English Heritage and the Environment Agency publish a LiDAR survey of the Stonehenge landscape that found new sites and extended known ones	[27]
2012	Khmer Archaeology LiDAR Consortium flies Angkor and part of Phnom Kulen; results published 2013	[28]
2012	Exploratory LiDAR over the Mosquitia region of Honduras finds large ancient settlements	[29]
2013	Forest-monitoring LiDAR flown over Campeche, Mexico; Valeriana identified in it in 2024	[30]
2015	Cambodian Archaeological LiDAR Initiative flies about 975 km2 including all of Phnom Kulen, described as the most extensive acquisition by an archaeological project up to that time	[31]
2016	PACUNAM LiDAR Initiative maps 2,144 km2 of northern	[32]

[27] Robert Bewley, Simon Crutchley, and Colin Shell, "New Light on an Ancient Landscape: Lidar Survey in the Stonehenge World Heritage Site", Antiquity 79, no. 305 (2005): 636-647. https://doi.org/10.1017/s0003598x00114577. Accessed November 18, 2026.

[28] Damian H. Evans, Roland J. Fletcher, Christophe Pottier, Jean-Baptiste Chevance, and others, "Uncovering Archaeological Landscapes at Angkor Using Lidar", Proceedings of the National Academy of Sciences 110, no. 31 (2013): 12595-12600. https://doi.org/10.1073/pnas.1306539110. Accessed November 18, 2026. Jean-Baptiste Chevance, Damian Evans, Nina Hofer, Sakada Sakhoeun, and Ratha Chhean, "Mahendraparvata: An Early Angkor-Period Capital Defined through Airborne Laser Scanning at Phnom Kulen", Antiquity 93, no. 371 (October 2019): 1303-1321, published online October 15, 2019; correction in Antiquity 94, no. 376 (2020): 1123. https://doi.org/10.15184/aqy.2019.133. Accessed November 18, 2026.

[29] Juan Carlos Fernandez-Diaz, William E. Carter, Ramesh L. Shrestha, Stephen J. Leisz, and others, "Archaeological Prospection of North Eastern Honduras with Airborne Mapping LiDAR", 2014 IEEE Geoscience and Remote Sensing Symposium (2014): 902-905. https://doi.org/10.1109/igarss.2014.6946571. Accessed November 18, 2026. Juan Carlos Fernandez-Diaz and Anna S. Cohen, "Whose Data Is It Anyway? Lessons in Data Management and Sharing from Resurrecting and Repurposing Lidar Data for Archaeology Research in Honduras", Journal of Computer Applications in Archaeology 3, no. 1 (2020): 122-134. https://doi.org/10.5334/jcaa.51. Accessed November 18, 2026.

[30] Luke Auld-Thomas, Marcello A. Canuto, Adriana Velazquez Morlet, Francisco Estrada-Belli, and others, "Running Out of Empty Space: Environmental Lidar and the Crowded Ancient Landscape of Campeche, Mexico", Antiquity 98, no. 401 (October 2024): 1340-1358, published online October 29, 2024. https://doi.org/10.15184/aqy.2024.148. Accessed November 18, 2026.

[31] Damian H. Evans, "Airborne Laser Scanning as a Method for Exploring Long-Term Socio-Ecological Dynamics in Cambodia", Journal of Archaeological Science 74 (2016): 164-175. https://doi.org/10.1016/j.jas.2016.05.009. Accessed November 18, 2026. Jean-Baptiste Chevance, Damian Evans, Nina Hofer, Sakada Sakhoeun, and Ratha Chhean, "Mahendraparvata: An Early Angkor-Period Capital Defined through Airborne Laser Scanning at Phnom Kulen", Antiquity 93, no. 371 (October 2019): 1303-1321, published online October 15, 2019; correction in Antiquity 94, no. 376 (2020): 1123. https://doi.org/10.15184/aqy.2019.133. Accessed November 18, 2026.

Year	Event	Source
	Guatemala; published 2018	
2018	Ceibal region LiDAR (470 km2) published	[33]
2019	Mahendraparvata defined by LiDAR	[34]
2020	Aguada Fenix published; Murujuga underwater sites published	[35]
2022	Casarabe settlements in Bolivia published	[36]
2024	Upano Valley (Ecuador); Valeriana (Mexico); Tugunbulak (Uzbekistan); Apalachee Bay semi-automated detection	[37]
2025	June 5 bathymetric LiDAR flight	[38]

[32] Marcello A. Canuto, Francisco Estrada-Belli, Thomas G. Garrison, Stephen D. Houston, and others, "Ancient Lowland Maya Complexity as Revealed by Airborne Laser Scanning of Northern Guatemala", Science 361, no. 6409 (September 28, 2018): eaau0137. Accepted manuscript read through the National Science Foundation Public Access Repository, record 10097677. https://doi.org/10.1126/science.aau0137. Accessed November 18, 2026.

[33] Takeshi Inomata, Daniela Triadan, Flory Pinzon, and others, "Archaeological Application of Airborne LiDAR to Examine Social Changes in the Ceibal Region of the Maya Lowlands", PLoS ONE 13, no. 2 (February 21, 2018): e0191619. https://doi.org/10.1371/journal.pone.0191619. Accessed November 18, 2026.

[34] Jean-Baptiste Chevance, Damian Evans, Nina Hofer, Sakada Sakhoeun, and Ratha Chhean, "Mahendraparvata: An Early Angkor-Period Capital Defined through Airborne Laser Scanning at Phnom Kulen", Antiquity 93, no. 371 (October 2019): 1303-1321, published online October 15, 2019; correction in Antiquity 94, no. 376 (2020): 1123. https://doi.org/10.15184/aqy.2019.133. Accessed November 18, 2026.

[35] Takeshi Inomata, Daniela Triadan, Veronica A. Vazquez Lopez, and others, "Monumental Architecture at Aguada Fenix and the Rise of Maya Civilization", Nature 582, no. 7813 (2020): 530-533. https://doi.org/10.1038/s41586-020-2343-4. Accessed November 18, 2026. Jonathan Benjamin, Michael O'Leary, Jo McDonald, Chelsea Wiseman, and others, "Aboriginal Artefacts on the Continental Shelf Reveal Ancient Drowned Cultural Landscapes in Northwest Australia", PLoS ONE 15, no. 7 (2020): e0233912; correction published 2023 as e0287490. https://doi.org/10.1371/journal.pone.0233912. Accessed November 18, 2026.

[36] Heiko Prumers, Carla Jaimes Betancourt, Jose Iriarte, Mark Robinson, and Martin Schaich, "Lidar Reveals Pre-Hispanic Low-Density Urbanism in the Bolivian Amazon", Nature 606, no. 7913 (2022): 325-328, published May 25, 2022. https://doi.org/10.1038/s41586-022-04780-4. Accessed November 18, 2026.

[37] Stephen Rostain, Antoine Dorison, Geoffroy de Saulieu, Heiko Prumers, and others, "Two Thousand Years of Garden Urbanism in the Upper Amazon", Science 383, no. 6679 (2024): 183-189. https://doi.org/10.1126/science.adi6317. Accessed November 18, 2026. Luke Auld-Thomas, Marcello A. Canuto, Adriana Velazquez Morlet, Francisco Estrada-Belli, and others, "Running Out of Empty Space: Environmental Lidar and the Crowded Ancient Landscape of Campeche, Mexico", Antiquity 98, no. 401 (October 2024): 1340-1358, published online October 29, 2024. https://doi.org/10.15184/aqy.2024.148. Accessed November 18, 2026. Michael D. Frachetti, Jack Berner, Xiaoyi Liu, Edward R. Henry, and others, "Large-Scale Medieval Urbanism Traced by UAV-Lidar in Highland Central Asia", Nature 634, no. 8036 (2024): 1118-1124. https://doi.org/10.1038/s41586-024-08086-5. Accessed November 18, 2026. Dylan S. Davis, Jessica W. Cook Hale, Nathan L. Hale, Trevor Z. Johnston, and others, "Bathymetric LiDAR and Semi-Automated Feature Extraction Assist Underwater Archaeological Surveys", Archaeological Prospection 31, no. 2 (2024): 171-186. https://doi.org/10.1002/arp.1939. Accessed November 18, 2026.

[38] Italian Institute for Environmental Protection and Research (ISPRA), "MER Project - Coastal Mapping: Exploring the Submerged Wonders of the Baia Archaeological Park", news release, 2025. https://www.isprambiente.gov.it/en/news/mer-project-2013-coastal-mapping-exploring-the-submerged-wonders-of-the-baia-archaeological-park. Accessed November 18, 2026.

Year	Event	Source
	over Baiae, Italy	
2026	LiDAR over 4,430 km of flight lines in southwest Amazonia; authors report this region alone holds as many earthworks as were previously estimated for all of Amazonia	[39]

How much LiDAR archaeology is there?

A systematic review published in 2025 searched international journals from 2001 through 2022 and found 291 LiDAR archaeology studies. As noted earlier, 167 were in Europe, 104 in the Americas, and only 20 across Asia, the Middle East, Oceania and Africa together. The authors found that LiDAR had its greatest impact where governments made the data openly available.[40]

That matters for this book's Bible chapters. The Middle East is one of the least-studied regions by this method, so when people ask, "What has LiDAR found in the Holy Land?", the honest answer is, "Very little has been published."

Ethics and the "lost city" problem

Archaeologists themselves have raised concerns. A 2020 special collection on ethics in archaeological LiDAR noted that the method has been welcomed as a breakthrough but has also drawn criticism and controversy, and called for a code of ethics.[41] A 2025 review of how news outlets covered recent LiDAR papers found a common trope: "lost cities" being "found." That framing, the author wrote, usually ignores existing knowledge, especially that of Indigenous local communities and of archaeologists who already knew about the sites.[42]

You will see this pattern again and again in Part Two. Several of the "lost" cities were already known. What LiDAR added was their true size and shape.

Chart 1: How big were the major surveys?

The chart below compares the areas covered by the major surveys in this book. It shows that the survey that drew the most headlines, the 2016 Guatemala survey, was also one of the largest.

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[39] Martti H. Parssinen, Risto Kalliola, Alceu Ranzi, Eetu Puttonen, and others, "Over 20,000 Precolonial Earthworks in the Southwest Amazonia", Nature 657, no. 8131 (2026): 420-425. https://doi.org/10.1038/s41586-026-10835-7. Accessed November 18, 2026.

[40] Giacomo Vinci, Federica Vanzani, Alessandro Fontana, and Stefano Campana, "LiDAR Applications in Archaeology: A Systematic Review", Archaeological Prospection 32, no. 1 (2025): 81-101. https://doi.org/10.1002/arp.1931. Accessed November 18, 2026.

[41] Anna S. Cohen, Sarah Klassen, and Damian Evans, "Ethics in Archaeological Lidar", Journal of Computer Applications in Archaeology 3, no. 1 (2020): 76-91. https://doi.org/10.5334/jcaa.48. Accessed November 18, 2026.

[42] Kathryn Reese-Taylor, "Lidar and Lost Cities: Examining the Public Presentation of Recent Lidar Findings through News Media", Advances in Archaeological Practice 13, no. 1 (2025): 142-149. https://doi.org/10.1017/aap.2025.2. Accessed November 18, 2026.

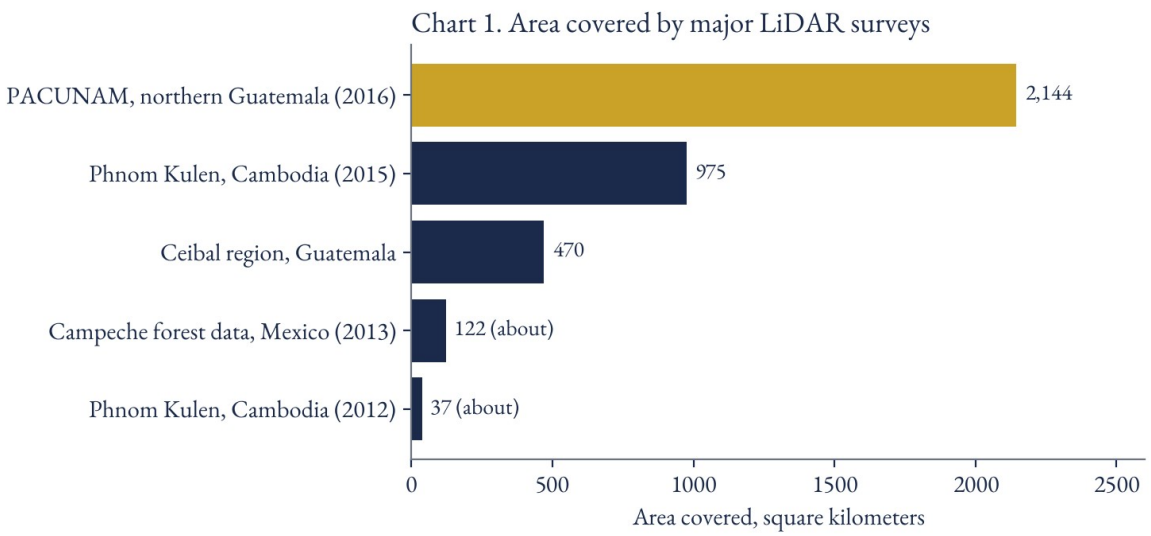


Chart 1. Area covered by major archaeological LiDAR surveys, in square kilometers. Sources: Canuto et al. 2018; Inomata et al. 2018; Chevance et al. 2019; Auld-Thomas et al. 2024. Figures as reported by each team.

The data behind the chart:

Survey	Area (km2)	Year flown	Source
PACUNAM, northern Guatemala	2,144	2016	[43]
Phnom Kulen, Cambodia (2015 campaign)	975	2015	[44]
Ceibal region, Guatemala	470	Not stated in source read	[45]
Alianza transects and blocks, Campeche	about 122	2013	[46]

[43] Marcello A. Canuto, Francisco Estrada-Belli, Thomas G. Garrison, Stephen D. Houston, and others, "Ancient Lowland Maya Complexity as Revealed by Airborne Laser Scanning of Northern Guatemala", Science 361, no. 6409 (September 28, 2018): eaau0137. Accepted manuscript read through the National Science Foundation Public Access Repository, record 10097677. https://doi.org/10.1126/science.aau0137. Accessed November 18, 2026.

[44] Jean-Baptiste Chevance, Damian Evans, Nina Hofer, Sakada Sakhoeun, and Ratha Chhean, "Mahendraparvata: An Early Angkor-Period Capital Defined through Airborne Laser Scanning at Phnom Kulen", Antiquity 93, no. 371 (October 2019): 1303-1321, published online October 15, 2019; correction in Antiquity 94, no. 376 (2020): 1123. https://doi.org/10.15184/aqy.2019.133. Accessed November 18, 2026.

[45] Takeshi Inomata, Daniela Triadan, Flory Pinzon, and others, "Archaeological Application of Airborne LiDAR to Examine Social Changes in the Ceibal Region of the Maya Lowlands", PLoS ONE 13, no. 2 (February 21, 2018): e0191619. https://doi.org/10.1371/journal.pone.0191619. Accessed November 18, 2026.

[46] Luke Auld-Thomas, Marcello A. Canuto, Adriana Velazquez Morlet, Francisco Estrada-Belli, and others, "Running Out of Empty Space: Environmental Lidar and the Crowded Ancient Landscape of Campeche, Mexico", Antiquity 98, no. 401 (October 2024): 1340-1358, published online October 29, 2024. https://doi.org/10.15184/aqy.2024.148. Accessed November 18, 2026.

Survey	Area (km2)	Year flown	Source
Phnom Kulen, Cambodia (2012 campaign)	about 37	2012	[47]

Some surveys report their coverage differently. The 2026 southwest Amazonia study reports flight-line length (4,430 km) rather than area, so it is not on this chart.[48]

[47] Jean-Baptiste Chevance, Damian Evans, Nina Hofer, Sakada Sakhoeun, and Ratha Chhean, "Mahendraparvata: An Early Angkor-Period Capital Defined through Airborne Laser Scanning at Phnom Kulen", Antiquity 93, no. 371 (October 2019): 1303-1321, published online October 15, 2019; correction in Antiquity 94, no. 376 (2020): 1123. https://doi.org/10.15184/aqy.2019.133. Accessed November 18, 2026.

[48] Martti H. Parssinen, Risto Kalliola, Alceu Ranzi, Eetu Puttonen, and others, "Over 20,000 Precolonial Earthworks in the Southwest Amazonia", Nature 657, no. 8131 (2026): 420-425. https://doi.org/10.1038/s41586-026-10835-7. Accessed November 18, 2026.

Part Two: What LiDAR Found, Site by Site

Each chapter in this part follows the same pattern. First, what LiDAR showed that was not known before. Then who lived there and when, as far as excavation and dating can tell us. Then what changed in how scholars understand the place. Where the pasted draft made a claim about the site, I give my verdict on it at the end of the section. The full list of verdicts is in Appendix B.

Map 1. Sites in this book (gold: Bible lands, where little LiDAR has been published)



Map 1. Locations of the main sites in this book. Positions are approximate. Map by the author; coastlines from GSHHG data distributed with the Basemap toolkit.

Site	Country	Kind of survey	Source
PACUNAM survey area	Guatemala	Airborne LiDAR	[49]
Ceibal	Guatemala	Airborne LiDAR	[50]
Aguada Fenix	Mexico	Airborne LiDAR	[51]
Valeriana and Ocomtun	Mexico	Airborne LiDAR	[52]

[49] Marcello A. Canuto, Francisco Estrada-Belli, Thomas G. Garrison, Stephen D. Houston, and others, "Ancient Lowland Maya Complexity as Revealed by Airborne Laser Scanning of Northern Guatemala", Science 361, no. 6409 (September 28, 2018): eaau0137. Accepted manuscript read through the National Science Foundation Public Access Repository, record 10097677. https://doi.org/10.1126/science.aau0137. Accessed November 18, 2026.

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[51] Takeshi Inomata, Daniela Triadan, Veronica A. Vazquez Lopez, and others, "Monumental Architecture at Aguada Fenix and the Rise of Maya Civilization", Nature 582, no. 7813 (2020): 530-533. https://doi.org/10.1038/s41586-020-2343-4. Accessed November 18, 2026.

[52] Luke Auld-Thomas, Marcello A. Canuto, Adriana Velazquez Morlet, Francisco Estrada-Belli, and others, "Running Out of Empty Space: Environmental Lidar and the Crowded Ancient Landscape of Campeche, Mexico", Antiquity 98, no. 401 (October 2024): 1340-1358, published online October 29, 2024. https://doi.org/10.15184/aqy.2024.148. Accessed November 18, 2026. Ivan Sprajc, Octavio Q.

Site	Country	Kind of survey	Source
Caracol	Belize	Airborne LiDAR	[53]
Mosquitia	Honduras	Airborne LiDAR	[54]
Casarabe sites	Bolivia	Airborne LiDAR	[55]
Upano Valley	Ecuador	Airborne LiDAR	[56]
Southwest Amazonia	South America	Airborne LiDAR	[57]
Poverty Point	United States	Airborne LiDAR	[58]
Apalachee Bay	United States	Bathymetric LiDAR	[59]
Stonehenge	England	Airborne LiDAR	[60]
Baiae	Italy	Bathymetric LiDAR and sonar	[61]
Angkor and Phnom	Cambodia	Airborne LiDAR	[62]

Esparza Olguin, Quintin Hernandez Gomez, and others, "Ocomtun: un centro mayor recientemente descubierto en las Tierras Bajas Mayas Centrales", Estudios de Cultura Maya 66 (2025): 11-43. https://doi.org/10.19130/iifl.ecm.66.2025/fall-wint/1469. Accessed November 18, 2026.

[53] Diane Z. Chase and Arlen F. Chase, "Caracol, Belize, and Changing Perceptions of Ancient Maya Society", Journal of Archaeological Research 25, no. 3 (2017): 185-249. https://doi.org/10.1007/s10814-016-9101-z. Accessed November 18, 2026.

[54] Christopher T. Fisher, Juan Carlos Fernandez-Diaz, Anna S. Cohen, Oscar Neil Cruz, and others, "Identifying Ancient Settlement Patterns through LiDAR in the Mosquitia Region of Honduras", PLoS ONE 11, no. 8 (2016): e0159890. https://doi.org/10.1371/journal.pone.0159890. Accessed November 18, 2026.

[55] Heiko Prumers, Carla Jaimes Betancourt, Jose Iriarte, Mark Robinson, and Martin Schaich, "Lidar Reveals Pre-Hispanic Low-Density Urbanism in the Bolivian Amazon", Nature 606, no. 7913 (2022): 325-328, published May 25, 2022. https://doi.org/10.1038/s41586-022-04780-4. Accessed November 18, 2026.

[56] Stephen Rostain, Antoine Dorison, Geoffroy de Saulieu, Heiko Prumers, and others, "Two Thousand Years of Garden Urbanism in the Upper Amazon", Science 383, no. 6679 (2024): 183-189. https://doi.org/10.1126/science.adi6317. Accessed November 18, 2026.

[57] Martti H. Parssinen, Risto Kalliola, Alceu Ranzi, Eetu Puttonen, and others, "Over 20,000 Precolonial Earthworks in the Southwest Amazonia", Nature 657, no. 8131 (2026): 420-425. https://doi.org/10.1038/s41586-026-10835-7. Accessed November 18, 2026.

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[59] Dylan S. Davis, Jessica W. Cook Hale, Nathan L. Hale, Trevor Z. Johnston, and others, "Bathymetric LiDAR and Semi-Automated Feature Extraction Assist Underwater Archaeological Surveys", Archaeological Prospection 31, no. 2 (2024): 171-186. https://doi.org/10.1002/arp.1939. Accessed November 18, 2026.

[60] Robert Bewley, Simon Crutchley, and Colin Shell, "New Light on an Ancient Landscape: Lidar Survey in the Stonehenge World Heritage Site", Antiquity 79, no. 305 (2005): 636-647. https://doi.org/10.1017/s0003598x00114577. Accessed November 18, 2026.

[61] Italian Institute for Environmental Protection and Research (ISPRA), "MER Project - Coastal Mapping: Exploring the Submerged Wonders of the Baia Archaeological Park", news release, 2025. https://www.isprambiente.gov.it/en/news/mer-project-2013-coastal-mapping-exploring-the-submerged-wonders-of-the-baia-archaeological-park. Accessed November 18, 2026. Crescenzo Violante, Nicola Masini, and Nicodemo Abate, "Integrated Remote Sensing Technologies for Multi-Depth Seabed and Coastal Cultural Resources: The Case of the Submerged Roman Site of Baia (Naples, Italy)", EGU General Assembly 2022, abstract EGU22-9939. https://doi.org/10.5194/egusphere-egu22-9939. Accessed November 18, 2026.

[62] Damian H. Evans, Roland J. Fletcher, Christophe Pottier, Jean-Baptiste Chevance, and others, "Uncovering Archaeological Landscapes at Angkor Using Lidar", Proceedings of the National Academy of Sciences 110, no. 31 (2013): 12595-12600. https://doi.org/10.1073/pnas.1306539110. Accessed November 18, 2026. Jean-Baptiste Chevance, Damian Evans, Nina Hofer, Sakada

Site	Country	Kind of survey	Source
Kulen			
Tugunbulak	Uzbekistan	Drone LiDAR	[63]
Murujuga	Australia	Aerial and underwater remote sensing	[64]
Jerusalem, Hazor, Megiddo, Lachish, Jericho, Qumran	Israel and Palestinian territories	Excavation and dating (no major LiDAR)	Part Three

A note on dates. I use BC (before Christ) and AD (Anno Domini, "in the year of the Lord") throughout. Many of the papers use BCE and CE (Before the Common Era and Common Era), which count the same years. "Cal BP" in a scientific paper means calibrated radiocarbon years before present, where "present" is fixed at AD 1950.

Chapter 3: The Maya Lowlands

The 2016 PACUNAM survey of northern Guatemala

In 2016, a team flying for the PACUNAM LiDAR Initiative scanned 2,144 square kilometers (about 828 square miles) of forested northern Guatemala. The results were published in *Science* on September 28, 2018, by Marcello Canuto, Francisco Estrada-Belli, Thomas Garrison, Stephen Houston and a large team.[65]

Here is what they counted, in their own numbers.[66]

Finding	Figure reported
Ancient structures identified	61,480
Average density	about 29 structures per square kilometer

Sakhoeun, and Ratha Chhean, "Mahendraparvata: An Early Angkor-Period Capital Defined through Airborne Laser Scanning at Phnom Kulen", Antiquity 93, no. 371 (October 2019): 1303-1321, published online October 15, 2019; correction in Antiquity 94, no. 376 (2020): 1123. https://doi.org/10.15184/aqy.2019.133. Accessed November 18, 2026.

[63] Michael D. Frachetti, Jack Berner, Xiaoyi Liu, Edward R. Henry, and others, "Large-Scale Medieval Urbanism Traced by UAV-Lidar in Highland Central Asia", Nature 634, no. 8036 (2024): 1118-1124. https://doi.org/10.1038/s41586-024-08086-5. Accessed November 18, 2026.

[64] Jonathan Benjamin, Michael O'Leary, Jo McDonald, Chelsea Wiseman, and others, "Aboriginal Artefacts on the Continental Shelf Reveal Ancient Drowned Cultural Landscapes in Northwest Australia", PLoS ONE 15, no. 7 (2020): e0233912; correction published 2023 as e0287490. https://doi.org/10.1371/journal.pone.0233912. Accessed November 18, 2026.

[65] Marcello A. Canuto, Francisco Estrada-Belli, Thomas G. Garrison, Stephen D. Houston, and others, "Ancient Lowland Maya Complexity as Revealed by Airborne Laser Scanning of Northern Guatemala", Science 361, no. 6409 (September 28, 2018): eaau0137. Accepted manuscript read through the National Science Foundation Public Access Repository, record 10097677. https://doi.org/10.1126/science.aau0137. Accessed November 18, 2026.

[66] Marcello A. Canuto, Francisco Estrada-Belli, Thomas G. Garrison, Stephen D. Houston, and others, "Ancient Lowland Maya Complexity as Revealed by Airborne Laser Scanning of Northern Guatemala", Science 361, no. 6409 (September 28, 2018): eaau0137. Accepted manuscript read through the National Science Foundation Public Access Repository, record 10097677. https://doi.org/10.1126/science.aau0137. Accessed November 18, 2026.

Finding	Figure reported
Causeways (raised roads)	about 106 kilometers
Land deliberately reshaped for farming	362 square kilometers
Unmodified upland that could also be farmed	952 square kilometers
Defensive features	described as "sizable"

The team sorted the landscape into rural, periurban and urban zones and found that settlement filled the land between the big cities rather than stopping at their edges. Their conclusion was that the Maya lowlands held an interconnected urban landscape, and that this "compels" a fresh look at Maya population, farming and political economy.[67]

The population estimate, and why it is an estimate

The most quoted number from the study is that the central Maya lowlands held 7 to 11 million people in the Late Classic period (about AD 650 to 800). It is important to see how the team got there. They estimated about 80 to 120 people per square kilometer at the height of the Late Classic period in their survey area. Then they extended that density across an estimated 95,000 square kilometers of the central lowlands.[68]

That is a reasoned estimate built on several assumptions: how many people lived in each house, how many houses were in use at the same time, and whether the surveyed area is typical of the whole region. It is not a count. The team itself says their field checks found the map "accurate if slightly conservative," meaning it more likely missed structures than invented them.[69]

Who lived there, and when

These were Lowland Maya people. The paper describes Lowland Maya civilization as lasting more than 2,500 years, from about 1000 BC to AD 1500.[70] The densest building in the survey belongs to the Classic period, when the great Maya cities were at their height.

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[67] Marcello A. Canuto, Francisco Estrada-Belli, Thomas G. Garrison, Stephen D. Houston, and others, "Ancient Lowland Maya Complexity as Revealed by Airborne Laser Scanning of Northern Guatemala", Science 361, no. 6409 (September 28, 2018): eaau0137. Accepted manuscript read through the National Science Foundation Public Access Repository, record 10097677. https://doi.org/10.1126/science.aau0137. Accessed November 18, 2026.

[68] Marcello A. Canuto, Francisco Estrada-Belli, Thomas G. Garrison, Stephen D. Houston, and others, "Ancient Lowland Maya Complexity as Revealed by Airborne Laser Scanning of Northern Guatemala", Science 361, no. 6409 (September 28, 2018): eaau0137. Accepted manuscript read through the National Science Foundation Public Access Repository, record 10097677. https://doi.org/10.1126/science.aau0137. Accessed November 18, 2026.

[69] Marcello A. Canuto, Francisco Estrada-Belli, Thomas G. Garrison, Stephen D. Houston, and others, "Ancient Lowland Maya Complexity as Revealed by Airborne Laser Scanning of Northern Guatemala", Science 361, no. 6409 (September 28, 2018): eaau0137. Accepted manuscript read through the National Science Foundation Public Access Repository, record 10097677. https://doi.org/10.1126/science.aau0137. Accessed November 18, 2026.

[70] Marcello A. Canuto, Francisco Estrada-Belli, Thomas G. Garrison, Stephen D. Houston, and others, "Ancient Lowland Maya Complexity as Revealed by Airborne Laser Scanning of Northern Guatemala", Science 361, no. 6409 (September 28, 2018): eaau0137. Accepted manuscript read through the National Science Foundation Public Access Repository, record 10097677. https://doi.org/10.1126/science.aau0137. Accessed November 18, 2026.

Verdict on the draft's claims about this survey: True. The draft's area, date range and main conclusion match the paper. The draft's summary that the region was "much more intensively engineered than earlier scholarship appreciated" is a fair paraphrase of the paper's abstract.[71]

Ceibal: watching a society settle down

Ceibal, in Guatemala, had been excavated for years before any laser flew over it. That is what makes the LiDAR study there so useful. Takeshi Inomata, Daniela Triadan and their team could tie the new map to a building history they already knew from digging.[72]

Their LiDAR covered 470 square kilometers. In it they registered, in their words, "10,208 structures, 4,538 possible structures, 724 supporting platforms, and 253 possible supporting platforms."[73] They also mapped causeways, walls and depressions such as reservoirs. Test excavations at two places the LiDAR found, La Felicidad and El Eden, checked what the map showed.[74]

What the team reconstructed is a society in transition.[75]

- Around 1000 BC, Ceibal was the only ceremonial complex in the region, at the time people were shifting from a more mobile life toward settled villages and farming.
- From about 600 to 300 BC, more ceremonial complexes appeared outside the center.
- From about 300 BC to AD 300, pyramid complexes spread.
- The population peaked in the Late and Terminal Classic, about AD 600 to 950.

The authors argue that Ceibal served as a gathering place for communal ceremonies before people settled permanently around it. In other words, the ceremonial center may have come first, and the settled town grew up around it.[76]

Verdict on the draft's claims: True. The 470 square kilometer area, the count of 10,208 structures, and the dating of early sedentary life to about 1000 BC all match the paper.

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[71] Marcello A. Canuto, Francisco Estrada-Belli, Thomas G. Garrison, Stephen D. Houston, and others, "Ancient Lowland Maya Complexity as Revealed by Airborne Laser Scanning of Northern Guatemala", Science 361, no. 6409 (September 28, 2018): eaau0137. Accepted manuscript read through the National Science Foundation Public Access Repository, record 10097677. https://doi.org/10.1126/science.aau0137. Accessed November 18, 2026.

[72] Takeshi Inomata, Daniela Triadan, Flory Pinzon, and others, "Archaeological Application of Airborne LiDAR to Examine Social Changes in the Ceibal Region of the Maya Lowlands", PLoS ONE 13, no. 2 (February 21, 2018): e0191619. https://doi.org/10.1371/journal.pone.0191619. Accessed November 18, 2026.

[73] Takeshi Inomata, Daniela Triadan, Flory Pinzon, and others, "Archaeological Application of Airborne LiDAR to Examine Social Changes in the Ceibal Region of the Maya Lowlands", PLoS ONE 13, no. 2 (February 21, 2018): e0191619. https://doi.org/10.1371/journal.pone.0191619. Accessed November 18, 2026.

[74] Takeshi Inomata, Daniela Triadan, Flory Pinzon, and others, "Archaeological Application of Airborne LiDAR to Examine Social Changes in the Ceibal Region of the Maya Lowlands", PLoS ONE 13, no. 2 (February 21, 2018): e0191619. https://doi.org/10.1371/journal.pone.0191619. Accessed November 18, 2026.

[75] Takeshi Inomata, Daniela Triadan, Flory Pinzon, and others, "Archaeological Application of Airborne LiDAR to Examine Social Changes in the Ceibal Region of the Maya Lowlands", PLoS ONE 13, no. 2 (February 21, 2018): e0191619. https://doi.org/10.1371/journal.pone.0191619. Accessed November 18, 2026.

[76] Takeshi Inomata, Daniela Triadan, Flory Pinzon, and others, "Archaeological Application of Airborne LiDAR to Examine Social Changes in the Ceibal Region of the Maya Lowlands", PLoS ONE 13, no. 2 (February 21, 2018): e0191619. https://doi.org/10.1371/journal.pone.0191619. Accessed November 18, 2026.

Aguada Fenix: the oldest and largest

Aguada Fenix, in the Mexican state of Tabasco near the Guatemalan border, was not known to scholars until LiDAR revealed it. The site is so large and so low that people walking across it would not have noticed it was built. The team, again led by Takeshi Inomata, published it in *Nature* in 2020.[77]

What they found is an artificial plateau 1,400 meters long (nearly nine-tenths of a mile) and 10 to 15 meters high, with nine causeways leading out from it. Radiocarbon dates, analyzed with a statistical method called Bayesian modeling, place its construction between 1000 and 800 BC. The authors call it the oldest monumental construction yet found in the Maya area and the largest in the region's entire pre-Hispanic history, meaning the time before Spanish contact.[78]

The finding that drew the most attention is about who built it. The authors compared Aguada Fenix with San Lorenzo, an older center of the Olmec culture with signs of strong rulers. At Aguada Fenix they found no comparable evidence of marked inequality. They suggest the plateau was raised by communal work, people working together, rather than by the orders of a powerful king.[79]

That is an interpretation, and the authors present it as one. Absence of evidence for rulers is not proof that there were none. But it is a fair reading of what was found, and it has pushed scholars to rethink how big monuments and social rank are related.

Verdict on the draft's claims: True. Every figure the draft gives for Aguada Fenix matches the paper.

Other Maya finds the draft left out

The draft covered three Maya studies. Several other major ones belong in any honest survey.

Caracol, Belize. Caracol was rediscovered in 1937 in west-central Belize. Diane and Arlen Chase have excavated there for decades. Their 2017 review draws on LiDAR mapping of the site and its road system, and it estimates that more than 100,000 people lived there at its height, around AD 600 to 700.[80]

Valeriana, Campeche, Mexico. In 2024, Luke Auld-Thomas, Marcello Canuto and colleagues reported a striking test. They took LiDAR that had been collected in 2013 for a forest-monitoring project, not for archaeology, and searched it for ancient remains. The data covered about 122 square kilometers in three long, narrow strips and three blocks.[81]

They found 6,764 structures, an average of 55.3 per square kilometer. Among them was a city they named Valeriana, after a nearby freshwater lagoon. They describe it as "previously unknown to the

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[77] Takeshi Inomata, Daniela Triadan, Veronica A. Vazquez Lopez, and others, "Monumental Architecture at Aguada Fenix and the Rise of Maya Civilization", Nature 582, no. 7813 (2020): 530-533. https://doi.org/10.1038/s41586-020-2343-4. Accessed November 18, 2026.

[78] Takeshi Inomata, Daniela Triadan, Veronica A. Vazquez Lopez, and others, "Monumental Architecture at Aguada Fenix and the Rise of Maya Civilization", Nature 582, no. 7813 (2020): 530-533. https://doi.org/10.1038/s41586-020-2343-4. Accessed November 18, 2026.

[79] Takeshi Inomata, Daniela Triadan, Veronica A. Vazquez Lopez, and others, "Monumental Architecture at Aguada Fenix and the Rise of Maya Civilization", Nature 582, no. 7813 (2020): 530-533. https://doi.org/10.1038/s41586-020-2343-4. Accessed November 18, 2026.

[80] Diane Z. Chase and Arlen F. Chase, "Caracol, Belize, and Changing Perceptions of Ancient Maya Society", Journal of Archaeological Research 25, no. 3 (2017): 185-249. https://doi.org/10.1007/s10814-016-9101-z. Accessed November 18, 2026.

[81] Luke Auld-Thomas, Marcello A. Canuto, Adriana Velazquez Morlet, Francisco Estrada-Belli, and others, "Running Out of Empty Space: Environmental Lidar and the Crowded Ancient Landscape of Campeche, Mexico", Antiquity 98, no. 401 (October 2024): 1340-1358, published online October 29, 2024. https://doi.org/10.15184/aqy.2024.148. Accessed November 18, 2026.

scientific community." It has two monumental hubs about two kilometers apart. The larger one has enclosed plazas, a broad causeway, temple pyramids, a ballcourt, a reservoir made by damming a stream, and a probable "E-Group." An E-Group is an arrangement of buildings associated with tracking the sun, and its presence suggests the site was founded before AD 150.[82]

The authors' main point was about method, not one city. Earlier LiDAR surveys had targeted areas already known to hold big sites, and critics asked whether that made the Maya world look more crowded than it was. A random strip of forest-monitoring data still showed dense settlement, which the team takes as evidence that crowded landscapes were common across the central lowlands. They also warned that some rock piles may have been counted as house mounds and called their counts preliminary.[83]

Ocomtun, Campeche, Mexico. Ivan Sprajc's team found a major center they named Ocomtun using airborne LiDAR, then surveyed it on the ground in 2023. They recorded monumental complexes, carved stone monuments called stelae, altars and causeways, with occupation from the Middle Preclassic through the Terminal Classic period.[84]

The Puuc region, Yucatan, Mexico. Not every LiDAR survey finds sprawl. William Ringle and colleagues found that settlement in part of the Puuc hills was dense but clustered into towns, with no defensive features detected.[85] That contrast matters. LiDAR does not always show the same pattern, which is a sign that it is measuring something real rather than confirming a fashionable idea.

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[82] Luke Auld-Thomas, Marcello A. Canuto, Adriana Velazquez Morlet, Francisco Estrada-Belli, and others, "Running Out of Empty Space: Environmental Lidar and the Crowded Ancient Landscape of Campeche, Mexico", Antiquity 98, no. 401 (October 2024): 1340-1358, published online October 29, 2024. https://doi.org/10.15184/aqy.2024.148. Accessed November 18, 2026.

[83] Luke Auld-Thomas, Marcello A. Canuto, Adriana Velazquez Morlet, Francisco Estrada-Belli, and others, "Running Out of Empty Space: Environmental Lidar and the Crowded Ancient Landscape of Campeche, Mexico", Antiquity 98, no. 401 (October 2024): 1340-1358, published online October 29, 2024. https://doi.org/10.15184/aqy.2024.148. Accessed November 18, 2026.

[84] Ivan Sprajc, Octavio Q. Esparza Olguin, Quintin Hernandez Gomez, and others, "Ocomtun: un centro mayor recientemente descubierto en las Tierras Bajas Mayas Centrales", Estudios de Cultura Maya 66 (2025): 11-43. https://doi.org/10.19130/iifl.ecm.66.2025/fall-wint/1469. Accessed November 18, 2026.

[85] William M. Ringle, Tomas Gallareta Negron, Rossana May Ciau, Kenneth E. Seligson, and others, "Lidar Survey of Ancient Maya Settlement in the Puuc Region of Yucatan, Mexico", PLoS ONE 16, no. 4 (2021): e0249314. https://doi.org/10.1371/journal.pone.0249314. Accessed November 18, 2026.

Chapter 4: Angkor and Mahendraparvata, Cambodia

Angkor: a city, not just temples

Angkor Wat is one of the most famous buildings on earth. For a long time, scholars knew Angkor as the largest settlement complex of the preindustrial world, but the forest hid much of what lay between and around the temples.[86]

In 2012, the Khmer Archaeology LiDAR Consortium flew LiDAR over Angkor and part of the Phnom Kulen plateau. Damian Evans, Roland Fletcher, Christophe Pottier, Jean-Baptiste Chevance and colleagues published the results in the *Proceedings of the National Academy of Sciences* in 2013.[87]

They reported a "previously undocumented formally planned urban landscape" that included and surrounded Angkor Wat itself. The data showed streets, ponds, mounds and embankments laid out in a grid around the temple. The authors also argued that Angkor's elaborate water and land infrastructure, together with farming that could not be sustained over time and changes in climate, played a part in the city's decline.[88]

Angkor was the center of the Khmer Empire, which flourished from about the 9th to the 15th century AD.[89] A later study by many of the same scholars describes Angkor as the "world's most extensive pre-industrial settlement."[90]

Verdict on the draft's claims: True. The draft's summary matches the paper.

The 2015 campaign

In 2015, the Cambodian Archaeological LiDAR Initiative flew a second, much larger campaign, about 975 square kilometers covering the whole Phnom Kulen range among other areas. Evans described it as the most extensive acquisition of LiDAR by an archaeological project up to that time.[91]

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[86] Damian H. Evans, Roland J. Fletcher, Christophe Pottier, Jean-Baptiste Chevance, and others, "Uncovering Archaeological Landscapes at Angkor Using Lidar", Proceedings of the National Academy of Sciences 110, no. 31 (2013): 12595-12600. https://doi.org/10.1073/pnas.1306539110. Accessed November 18, 2026.

[87] Damian H. Evans, Roland J. Fletcher, Christophe Pottier, Jean-Baptiste Chevance, and others, "Uncovering Archaeological Landscapes at Angkor Using Lidar", Proceedings of the National Academy of Sciences 110, no. 31 (2013): 12595-12600. https://doi.org/10.1073/pnas.1306539110. Accessed November 18, 2026. Jean-Baptiste Chevance, Damian Evans, Nina Hofer, Sakada Sakhoeun, and Ratha Chhean, "Mahendraparvata: An Early Angkor-Period Capital Defined through Airborne Laser Scanning at Phnom Kulen", Antiquity 93, no. 371 (October 2019): 1303-1321, published online October 15, 2019; correction in Antiquity 94, no. 376 (2020): 1123. https://doi.org/10.15184/aqy.2019.133. Accessed November 18, 2026.

[88] Damian H. Evans, Roland J. Fletcher, Christophe Pottier, Jean-Baptiste Chevance, and others, "Uncovering Archaeological Landscapes at Angkor Using Lidar", Proceedings of the National Academy of Sciences 110, no. 31 (2013): 12595-12600. https://doi.org/10.1073/pnas.1306539110. Accessed November 18, 2026.

[89] Damian H. Evans, Roland J. Fletcher, Christophe Pottier, Jean-Baptiste Chevance, and others, "Uncovering Archaeological Landscapes at Angkor Using Lidar", Proceedings of the National Academy of Sciences 110, no. 31 (2013): 12595-12600. https://doi.org/10.1073/pnas.1306539110. Accessed November 18, 2026.

[90] Damian H. Evans, Roland J. Fletcher, Sarah Klassen, Christophe Pottier, and others, "Trajectories of Urbanism in the Angkorian World", in The Angkorian World (London: Routledge, 2023), 173-194. https://doi.org/10.4324/9781351128940-13. Accessed November 18, 2026.

[91] Damian H. Evans, "Airborne Laser Scanning as a Method for Exploring Long-Term Socio-Ecological Dynamics in Cambodia", Journal of Archaeological Science 74 (2016): 164-175. https://doi.org/10.1016/j.jas.2016.05.009. Accessed November 18, 2026. Jean-Baptiste

Mahendraparvata: an early capital takes shape

Old Khmer inscriptions speak of a capital called Mahendraparvata, associated with King Jayavarman II. As early as 1932, the scholar Philippe Stern proposed that this capital lay on the Phnom Kulen plateau, northeast of Angkor.[92]

In 2019, Jean-Baptiste Chevance, Damian Evans, Nina Hofer, Sakada Sakhoeun and Ratha Chhean published the LiDAR and ground evidence in *Antiquity*. Combining the 2012 and 2015 data with years of ground survey and excavation, they defined an urban network dating from the 9th century AD.[93]

What they found, in their figures:[94]

- A network of axes running about 10 kilometers north to south and about 15 kilometers east to west.
- A developed area of about 40 to 50 square kilometers.
- A central grid of square parcels about 1.5 kilometers across, divided into plots of about 1 to 4 hectares.
- An unfinished reservoir of more than 35 hectares.
- At a site called Rong Chen, excavation produced radiocarbon dates consistent with the reign of Jayavarman II, AD 770 to 835.

One hectare is 10,000 square meters, about two and a half acres.

The team also noted mound fields from the 10th century and later, which shows that people kept living and farming on the plateau after the capital moved.[95]

Verdict on the draft's claims: Partly true. The figures are right. But the draft says LiDAR "confirmed that Mahendraparvata ... was located on the Phnom Kulen massif." The paper is more careful. It says inscriptions suggest Phnom Kulen is Mahendraparvata, and that LiDAR and ground work defined the city's layout.[96] The identification rests on inscriptions and a scholarly tradition going back to 1932. LiDAR showed what the city looked like.

Chevance, Damian Evans, Nina Hofer, Sakada Sakhoeun, and Ratha Chhean, "Mahendraparvata: An Early Angkor-Period Capital Defined through Airborne Laser Scanning at Phnom Kulen", Antiquity 93, no. 371 (October 2019): 1303-1321, published online October 15, 2019; correction in Antiquity 94, no. 376 (2020): 1123. https://doi.org/10.15184/aqy.2019.133. Accessed November 18, 2026.

[92] Jean-Baptiste Chevance, Damian Evans, Nina Hofer, Sakada Sakhoeun, and Ratha Chhean, "Mahendraparvata: An Early Angkor-Period Capital Defined through Airborne Laser Scanning at Phnom Kulen", Antiquity 93, no. 371 (October 2019): 1303-1321, published online October 15, 2019; correction in Antiquity 94, no. 376 (2020): 1123. https://doi.org/10.15184/aqy.2019.133. Accessed November 18, 2026.

[93] Jean-Baptiste Chevance, Damian Evans, Nina Hofer, Sakada Sakhoeun, and Ratha Chhean, "Mahendraparvata: An Early Angkor-Period Capital Defined through Airborne Laser Scanning at Phnom Kulen", Antiquity 93, no. 371 (October 2019): 1303-1321, published online October 15, 2019; correction in Antiquity 94, no. 376 (2020): 1123. https://doi.org/10.15184/aqy.2019.133. Accessed November 18, 2026.

[94] Jean-Baptiste Chevance, Damian Evans, Nina Hofer, Sakada Sakhoeun, and Ratha Chhean, "Mahendraparvata: An Early Angkor-Period Capital Defined through Airborne Laser Scanning at Phnom Kulen", Antiquity 93, no. 371 (October 2019): 1303-1321, published online October 15, 2019; correction in Antiquity 94, no. 376 (2020): 1123. https://doi.org/10.15184/aqy.2019.133. Accessed November 18, 2026.

[95] Jean-Baptiste Chevance, Damian Evans, Nina Hofer, Sakada Sakhoeun, and Ratha Chhean, "Mahendraparvata: An Early Angkor-Period Capital Defined through Airborne Laser Scanning at Phnom Kulen", Antiquity 93, no. 371 (October 2019): 1303-1321, published online October 15, 2019; correction in Antiquity 94, no. 376 (2020): 1123. https://doi.org/10.15184/aqy.2019.133. Accessed November 18, 2026.

[96] Jean-Baptiste Chevance, Damian Evans, Nina Hofer, Sakada Sakhoeun, and Ratha Chhean, "Mahendraparvata: An Early Angkor-Period Capital Defined through Airborne Laser Scanning at Phnom Kulen", Antiquity 93, no. 371 (October 2019): 1303-1321, published online October 15, 2019; correction in Antiquity 94, no. 376 (2020): 1123. https://doi.org/10.15184/aqy.2019.133. Accessed November 18, 2026.

Chapter 5: The Amazon Held Towns

For most of the 20th century, many scholars believed the Amazon rainforest could not have supported large, settled societies before Europeans arrived. The soils are poor, the forest is dense, and early European accounts of populous riverbanks were often doubted. LiDAR has helped overturn that view.

Casarabe culture, Bolivia

In 2022, Heiko Prumers, Carla Jaimes Betancourt, Jose Iriarte, Mark Robinson and Martin Schaich published LiDAR results from the Llanos de Mojos, a seasonally flooded savanna in the Bolivian Amazon, in *Nature*.[97]

They studied sites of the Casarabe culture, which flourished from about AD 500 to 1400. What they found:[98]

- Two large settlements, Cotoca at 147 hectares and Landivar at 315 hectares.
- A four-tier settlement system, from large centers down to small sites.
- Platforms, U-shaped structures, rectangular platform mounds and conical pyramids up to 22 meters tall.
- Causeways running several kilometers, along with canals and reservoirs.
- In the area they surveyed, two large sites and 24 smaller ones, "of which only 15 were previously known."
- Three concentric defensive structures around the large sites.

The two big sites were "already known," the authors wrote, "but their massive size and architectural elaboration became apparent only through the lidar survey."[99] Excavation and studies of human remains showed the sites were lived in year-round by farmers who grew maize (corn) as their main staple, and who also hunted and fished.[100]

The authors call this "low-density urbanism," a spread-out form of city not previously described in Amazonia.[101]

Verdict on the draft's claims: True. Every figure in the draft matches the paper.

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[97] Heiko Prumers, Carla Jaimes Betancourt, Jose Iriarte, Mark Robinson, and Martin Schaich, "Lidar Reveals Pre-Hispanic Low-Density Urbanism in the Bolivian Amazon", Nature 606, no. 7913 (2022): 325-328, published May 25, 2022. https://doi.org/10.1038/s41586-022-04780-4. Accessed November 18, 2026.

[98] Heiko Prumers, Carla Jaimes Betancourt, Jose Iriarte, Mark Robinson, and Martin Schaich, "Lidar Reveals Pre-Hispanic Low-Density Urbanism in the Bolivian Amazon", Nature 606, no. 7913 (2022): 325-328, published May 25, 2022. https://doi.org/10.1038/s41586-022-04780-4. Accessed November 18, 2026.

[99] Heiko Prumers, Carla Jaimes Betancourt, Jose Iriarte, Mark Robinson, and Martin Schaich, "Lidar Reveals Pre-Hispanic Low-Density Urbanism in the Bolivian Amazon", Nature 606, no. 7913 (2022): 325-328, published May 25, 2022. https://doi.org/10.1038/s41586-022-04780-4. Accessed November 18, 2026.

[100] Heiko Prumers, Carla Jaimes Betancourt, Jose Iriarte, Mark Robinson, and Martin Schaich, "Lidar Reveals Pre-Hispanic Low-Density Urbanism in the Bolivian Amazon", Nature 606, no. 7913 (2022): 325-328, published May 25, 2022. https://doi.org/10.1038/s41586-022-04780-4. Accessed November 18, 2026.

[101] Heiko Prumers, Carla Jaimes Betancourt, Jose Iriarte, Mark Robinson, and Martin Schaich, "Lidar Reveals Pre-Hispanic Low-Density Urbanism in the Bolivian Amazon", Nature 606, no. 7913 (2022): 325-328, published May 25, 2022. https://doi.org/10.1038/s41586-022-04780-4. Accessed November 18, 2026.

The Upano Valley, Ecuador

In 2024, Stephen Rostain and colleagues published LiDAR results from the Upano Valley in the Ecuadorian Amazon, in *Science*. They mapped monumental platforms, plazas, streets, drainage channels, farming terraces and wide, straight roads, some running tens of kilometers. Occupation ran from about 500 BC to somewhere between AD 300 and 600.[102] They called it "garden urbanism," a city woven into farmland.

Southwest Amazonia, 2026

The newest study in this book is also one of the largest. In 2026, Martti Parssinen and colleagues reported in *Nature* on LiDAR flown along 4,430 kilometers of flight lines in southwest Amazonia. The title reports more than 20,000 precolonial earthworks. The authors say this one cultural area alone holds as many earthworks as had previously been estimated for the whole of Amazonia. They propose a population of 1.25 to 3 million people in the region around AD 100 to 300.[103]

That population figure is an interpretation built on assumptions, like every LiDAR population estimate. It is new, and other scholars have not yet had much time to test it.

[102] Stephen Rostain, Antoine Dorison, Geoffroy de Saulieu, Heiko Prumers, and others, "Two Thousand Years of Garden Urbanism in the Upper Amazon", Science 383, no. 6679 (2024): 183-189. https://doi.org/10.1126/science.adi6317. Accessed November 18, 2026.

[103] Martti H. Parssinen, Risto Kalliola, Alceu Ranzi, Eetu Puttonen, and others, "Over 20,000 Precolonial Earthworks in the Southwest Amazonia", Nature 657, no. 8131 (2026): 420-425. https://doi.org/10.1038/s41586-026-10835-7. Accessed November 18, 2026.

Chapter 6: Honduras and Central Asia

The Mosquitia, Honduras

The Mosquitia is a remote rainforest region in northeastern Honduras. In 2012, an exploratory LiDAR survey flown there for archaeology documented the first large-scale ancient settlements recorded in the region.[104]

In 2016, Christopher Fisher, Juan Carlos Fernandez-Diaz, Anna Cohen and colleagues described what they found in one valley in *PLoS ONE*. The valley had been densely inhabited. Settlement followed a three-tier system of 19 settlements dominated by one city, set in an engineered landscape.[105]

Tugunbulak, Uzbekistan

LiDAR is not just for jungles. In 2024, Michael Frachetti and colleagues reported in *Nature* on the first drone-carried LiDAR survey in Central Asia, high in the mountains of southeastern Uzbekistan at 2,000 to 2,300 meters above sea level. Drone is used here for an uncrewed aerial vehicle (UAV).[106]

They mapped two medieval towns on the Silk Roads, the trade routes linking China and the West, dating from the 8th to the 11th century AD. One of them, Tugunbulak, covers about 120 hectares, with monumental architecture and fortifications.[107] It shows that large towns could thrive at high altitude, which earlier scholarship had not expected.

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[104] Juan Carlos Fernandez-Diaz, William E. Carter, Ramesh L. Shrestha, Stephen J. Leisz, and others, "Archaeological Prospection of North Eastern Honduras with Airborne Mapping LiDAR", 2014 IEEE Geoscience and Remote Sensing Symposium (2014): 902-905. https://doi.org/10.1109/igarss.2014.6946571. Accessed November 18, 2026. Juan Carlos Fernandez-Diaz and Anna S. Cohen, "Whose Data Is It Anyway? Lessons in Data Management and Sharing from Resurrecting and Repurposing Lidar Data for Archaeology Research in Honduras", Journal of Computer Applications in Archaeology 3, no. 1 (2020): 122-134. https://doi.org/10.5334/jcaa.51. Accessed November 18, 2026.

[105] Christopher T. Fisher, Juan Carlos Fernandez-Diaz, Anna S. Cohen, Oscar Neil Cruz, and others, "Identifying Ancient Settlement Patterns through LiDAR in the Mosquitia Region of Honduras", PLoS ONE 11, no. 8 (2016): e0159890. https://doi.org/10.1371/journal.pone.0159890. Accessed November 18, 2026.

[106] Michael D. Frachetti, Jack Berner, Xiaoyi Liu, Edward R. Henry, and others, "Large-Scale Medieval Urbanism Traced by UAV-Lidar in Highland Central Asia", Nature 634, no. 8036 (2024): 1118-1124. https://doi.org/10.1038/s41586-024-08086-5. Accessed November 18, 2026.

[107] Michael D. Frachetti, Jack Berner, Xiaoyi Liu, Edward R. Henry, and others, "Large-Scale Medieval Urbanism Traced by UAV-Lidar in Highland Central Asia", Nature 634, no. 8036 (2024): 1118-1124. https://doi.org/10.1038/s41586-024-08086-5. Accessed November 18, 2026.

Chapter 7: Poverty Point and Stonehenge

These two sites were never lost. Both were famous long before LiDAR. What the laser did was clarify the shape of the landscape around them.

Poverty Point, Louisiana

Poverty Point, in northeastern Louisiana, is a set of huge earthworks built by people who lived by hunting, fishing and gathering, not by farming. UNESCO (the United Nations Educational, Scientific and Cultural Organization) listed it as a World Heritage Site in 2014. According to UNESCO's listing:[108]

- The site has five mounds, six concentric C-shaped ridges and a central plaza.
- The outer ridge is about 1.14 kilometers across.
- It was built and used by hunter-fisher-gatherers between about 3,700 and 3,100 years ago.
- Mound A is one of the largest earthen mounds in North America.
- Earthworks on this scale were not built again in North America for at least 2,000 years, and then only by farming peoples.
- Its people traded for stone from hundreds of kilometers away.

A study of World Heritage management reports that LiDAR, also called airborne laser scanning, supported the successful nomination of Poverty Point to the World Heritage List.[109]

Excavation and dating have changed how scholars see the building process.

- Mound B construction began about 3,580 years ago (calibrated).[110]
- A 2021 study of one ridge section, Ridge West 3, found it was built "exceptionally" fast. The builders appear to have aimed to raise the ridge quickly, not bit by bit over generations.[111]
- A 2023 study in *Antiquity* by Seth Grooms, Grace Ward and Tristram Kidder found that mound building at Jaketown, Mississippi, began before Poverty Point. That challenges the older idea that the Poverty Point culture spread outward from the site itself.[112]

Verdict on the draft's claims: True. The draft's description of the earthworks and the culture's foraging way of life holds up,[113] and its point about rapid construction is supported.[114]

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[108] UNESCO World Heritage Centre, "Monumental Earthworks of Poverty Point (list entry 1435)", inscribed 2014. https://whc.unesco.org/en/list/1435/. Accessed November 18, 2026.

[109] William P. Megarry, Bryce Davenport, and Douglas C. Comer, "Emerging Applications of LiDAR / Airborne Laser Scanning in the Management of World Heritage Sites", Conservation and Management of Archaeological Sites 18, no. 4 (2016): 393-410. https://doi.org/10.1080/13505033.2016.1290481. Accessed November 18, 2026.

[110] Tristram R. Kidder, Anthony L. Ortmann, and Thurman Allen, "Testing Mounds B and E at Poverty Point", Southeastern Archaeology 23, no. 1 (2004): 98 and following.

[111] Tristram R. Kidder, Kai Su, Edward R. Henry, Seth B. Grooms, and others, "Multi-Method Geoarchaeological Analyses Demonstrates Exceptionally Rapid Construction of Ridge West 3 at Poverty Point", Southeastern Archaeology 40, no. 3 (2021): 212-227. https://doi.org/10.1080/0734578x.2021.1958445. Accessed November 18, 2026.

[112] Seth B. Grooms, Grace M. V. Ward, and Tristram R. Kidder, "Convergence at Poverty Point: A Revised Chronology of the Late Archaic Lower Mississippi Valley", Antiquity 97, no. 396 (2023): 1453-1469. https://doi.org/10.15184/aqy.2023.155. Accessed November 18, 2026.

Stonehenge

According to English Heritage, which manages the site, Stonehenge was built in stages. The first monument, an early henge with a circular ditch about 100 meters across, dates to about 5,000 years ago, around 3000 BC. The stone circle itself was raised in the late Neolithic (New Stone Age), about 2500 BC. Burial mounds from the early Bronze Age cluster nearby.[115] A 2012 study using radiocarbon and Bayesian modeling divided the monument's history into five prehistoric stages.[116]

In 2005, Robert Bewley, Simon Crutchley and Colin Shell published the results of a LiDAR survey of the Stonehenge World Heritage Site, made with data from the Environment Agency, the government body that handles flood risk in England. It found new sites and extended known ones.[117] That is LiDAR as a "landscape clarifier," exactly as the draft put it.

LiDAR is only one of the remote sensing tools used there. The Stonehenge Hidden Landscapes Project, begun in 2010, combined many methods, especially geophysics, which uses magnetic and radar instruments to see below the surface, and found many new features.[118]

Verdict on the draft's claims: True. The draft's English Heritage dates and its description of LiDAR's role are correct.

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[113] UNESCO World Heritage Centre, "Monumental Earthworks of Poverty Point (list entry 1435)", inscribed 2014. https://whc.unesco.org/en/list/1435/. Accessed November 18, 2026. William P. Megarry, Bryce Davenport, and Douglas C. Comer, "Emerging Applications of LiDAR / Airborne Laser Scanning in the Management of World Heritage Sites", Conservation and Management of Archaeological Sites 18, no. 4 (2016): 393-410. https://doi.org/10.1080/13505033.2016.1290481. Accessed November 18, 2026.

[114] Tristram R. Kidder, Kai Su, Edward R. Henry, Seth B. Grooms, and others, "Multi-Method Geoarchaeological Analyses Demonstrates Exceptionally Rapid Construction of Ridge West 3 at Poverty Point", Southeastern Archaeology 40, no. 3 (2021): 212-227. https://doi.org/10.1080/0734578x.2021.1958445. Accessed November 18, 2026.

[115] English Heritage, "History of Stonehenge", web page, read November 18, 2026. https://www.english-heritage.org.uk/visit/places/stonehenge/history-and-stories/history/. Accessed November 18, 2026.

[116] Timothy Darvill, Peter Marshall, Mike Parker Pearson, and Geoff Wainwright, "Stonehenge Remodelled", Antiquity 86, no. 334 (2012): 1021-1040. https://doi.org/10.1017/s0003598x00048225. Accessed November 18, 2026.

[117] Robert Bewley, Simon Crutchley, and Colin Shell, "New Light on an Ancient Landscape: Lidar Survey in the Stonehenge World Heritage Site", Antiquity 79, no. 305 (2005): 636-647. https://doi.org/10.1017/s0003598x00114577. Accessed November 18, 2026.

[118] Vincent Gaffney, Wolfgang Neubauer, Paul Garwood, Chris Gaffney, and others, "Durrington Walls and the Stonehenge Hidden Landscape Project 2010-2016", Archaeological Prospection 25, no. 3 (2018): 255-269. https://doi.org/10.1002/arp.1707. Accessed November 18, 2026.

Chapter 8: Under the Sea

At the end of the last Ice Age, melting ice sheets raised the world's oceans. A major study of sea level found that the oceans stood about 134 meters (about 440 feet) lower than today at the coldest point, and that most of the rise happened between about 16,500 and 8,200 years ago.[119] Coastlines where people lived, hunted and fished went under water. Some of that drowned land is now shallow enough for green-light LiDAR to reach.

Apalachee Bay, Florida

Apalachee Bay lies on Florida's Gulf coast. In a 2023 study, Jessica Cook Hale, Dylan Davis and Matthew Sanger tested whether bathymetric LiDAR could spot known archaeological sites on the bay floor. It could re-identify recorded sites and pointed to new deposits. Sea grass did not stop it, but heavy sediment in the water greatly reduced its success.[120]

In 2024, Davis, Cook Hale and colleagues went further. They built a semi-automated method that searches the LiDAR for the contour shapes typical of archaeological deposits. The method re-identified several recorded sites and found at least four previously undocumented sites, from the Pleistocene (the Ice Age) and the Holocene (the period since).[121]

Verdict on the draft's claims: True.

Murujuga, Western Australia

About one third of Australia's land, some 2.12 million square kilometers, was drowned by rising seas over the last 20,000 years, according to a team led by Peter Veth working on the Murujuga coast (the Dampier Archipelago) of northwest Australia.[122]

In 2020, Jonathan Benjamin and colleagues reported in *PLoS ONE* the first confirmed ancient underwater archaeological sites on Australia's continental shelf, at Murujuga. They used aerial and underwater remote sensing, then sent divers to check. At Cape Bruguieres they recorded more than 260 stone artifacts down to 2.4 meters below sea level. At Flying Foam Passage they found a site at a submerged freshwater spring 14 meters down. The sites can be dated no later than about 7,000 and 8,500 years ago, respectively, because that is when rising seas covered them.[123]

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[119] Kurt Lambeck, Helene Rouby, Anthony Purcell, Yiying Sun, and Malcolm Sambridge, "Sea Level and Global Ice Volumes from the Last Glacial Maximum to the Holocene", Proceedings of the National Academy of Sciences 111, no. 43 (2014): 15296-15303. https://doi.org/10.1073/pnas.1411762111. Accessed November 18, 2026.

[120] Jessica W. Cook Hale, Dylan S. Davis, and Matthew C. Sanger, "Evaluating the Archaeological Efficacy of Bathymetric LiDAR across Oceanographic Contexts: A Case Study from Apalachee Bay, Florida", Heritage 6, no. 2 (2023): 928-945. https://doi.org/10.3390/heritage6020051. Accessed November 18, 2026.

[121] Dylan S. Davis, Jessica W. Cook Hale, Nathan L. Hale, Trevor Z. Johnston, and others, "Bathymetric LiDAR and Semi-Automated Feature Extraction Assist Underwater Archaeological Surveys", Archaeological Prospection 31, no. 2 (2024): 171-186. https://doi.org/10.1002/arp.1939. Accessed November 18, 2026.

[122] Peter Veth, Jo McDonald, Ingrid Ward, Michael O'Leary, and others, "A Strategy for Assessing Continuity in Terrestrial and Maritime Landscapes from Murujuga (Dampier Archipelago), North West Shelf, Australia", Journal of Island and Coastal Archaeology 15, no. 4 (2020): 477-503. https://doi.org/10.1080/15564894.2019.1572677. Accessed November 18, 2026.

[123] Jonathan Benjamin, Michael O'Leary, Jo McDonald, Chelsea Wiseman, and others, "Aboriginal Artefacts on the Continental Shelf Reveal Ancient Drowned Cultural Landscapes in Northwest Australia", PLoS ONE 15, no. 7 (2020): e0233912; correction published 2023 as e0287490. https://doi.org/10.1371/journal.pone.0233912. Accessed November 18, 2026.

Verdict on the draft's claims: True for the drowned-landscape point. The one-third figure is confirmed by Veth and colleagues,[124] and the 2020 *PLoS ONE* paper confirms the first drowned sites in the region.[125]

Baiae, Italy

Baiae (Baia in Italian), on the Bay of Naples, was a seaside resort for wealthy Romans. Much of it now lies under the sea because of bradyseism, the slow rising and sinking of the ground in this volcanic area. Its Roman structures date from about the 1st century BC to the 4th century AD.[126]

The Italian Institute for Environmental Protection and Research (ISPRA) reported that on June 5, 2025, an aerial bathymetric LiDAR survey mapped the seabed of the Baia Archaeological Park at a resolution of 1 square meter or better. The ruins lie about 5 to 13 meters below sea level. The map showed sea walls, the entrance to the ancient harbor of Portus Baianus, the Villa dei Pisoni, the Secca Fumosa and Portus Julius, a harbor of the Roman navy. ISPRA states that the survey's primary goal was mapping seagrass habitats, as part of a marine restoration project.[127]

Before that flight, Italian researchers had already mapped much of the park with very high resolution sonar (sound) and used drone-carried LiDAR for the coastline above water.[128]

Verdict on the draft's claims: True, with one addition. The draft did not mention that the LiDAR flight was made for seagrass mapping, or that earlier detailed seabed maps of Baiae came from sonar.[129]

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[124] Peter Veth, Jo McDonald, Ingrid Ward, Michael O'Leary, and others, "A Strategy for Assessing Continuity in Terrestrial and Maritime Landscapes from Murujuga (Dampier Archipelago), North West Shelf, Australia", Journal of Island and Coastal Archaeology 15, no. 4 (2020): 477-503. https://doi.org/10.1080/15564894.2019.1572677. Accessed November 18, 2026.

[125] Jonathan Benjamin, Michael O'Leary, Jo McDonald, Chelsea Wiseman, and others, "Aboriginal Artefacts on the Continental Shelf Reveal Ancient Drowned Cultural Landscapes in Northwest Australia", PLoS ONE 15, no. 7 (2020): e0233912; correction published 2023 as e0287490. https://doi.org/10.1371/journal.pone.0233912. Accessed November 18, 2026.

[126] Crescenzo Violante, Nicola Masini, and Nicodemo Abate, "Integrated Remote Sensing Technologies for Multi-Depth Seabed and Coastal Cultural Resources: The Case of the Submerged Roman Site of Baia (Naples, Italy)", EGU General Assembly 2022, abstract EGU22-9939. https://doi.org/10.5194/egusphere-egu22-9939. Accessed November 18, 2026.

[127] Italian Institute for Environmental Protection and Research (ISPRA), "MER Project - Coastal Mapping: Exploring the Submerged Wonders of the Baia Archaeological Park", news release, 2025. https://www.isprambiente.gov.it/en/news/mer-project-2013-coastal-mapping-exploring-the-submerged-wonders-of-the-baia-archaeological-park. Accessed November 18, 2026.

[128] Crescenzo Violante, Nicola Masini, and Nicodemo Abate, "Integrated Remote Sensing Technologies for Multi-Depth Seabed and Coastal Cultural Resources: The Case of the Submerged Roman Site of Baia (Naples, Italy)", EGU General Assembly 2022, abstract EGU22-9939. https://doi.org/10.5194/egusphere-egu22-9939. Accessed November 18, 2026. Nicodemo Abate, Crescenzo Violante, and Nicola Masini, "A Semi-Automatic-Based Approach to the Extraction of Underwater Archaeological Features from Ultra-High-Resolution Bathymetric Data: The Case of the Submerged Baia Archaeological Park", Remote Sensing 16, no. 11 (2024): 1908. https://doi.org/10.3390/rs16111908. Accessed November 18, 2026.

[129] Italian Institute for Environmental Protection and Research (ISPRA), "MER Project - Coastal Mapping: Exploring the Submerged Wonders of the Baia Archaeological Park", news release, 2025. https://www.isprambiente.gov.it/en/news/mer-project-2013-coastal-mapping-exploring-the-submerged-wonders-of-the-baia-archaeological-park. Accessed November 18, 2026. Crescenzo Violante, Nicola Masini, and Nicodemo Abate, "Integrated Remote Sensing Technologies for Multi-Depth Seabed and Coastal Cultural Resources: The Case of the Submerged Roman Site of Baia (Naples, Italy)", EGU General Assembly 2022, abstract EGU22-9939. https://doi.org/10.5194/egusphere-egu22-9939. Accessed November 18, 2026.

Chapter 9: The People Behind the Maps

The request behind this book asked for profiles of the people whose work had real, documented effects. The table below lists the researchers whose names appear as lead or senior authors on the studies in this book. For each, I give only what the cited paper documents: the work and its measurable result. I did not look up biographies, and I make no claims about anyone's career beyond the cited work.

Person	Active in the cited work	Documented contribution	Documented result	Source
Marcello A. Canuto, Francisco Estrada-Belli	2016 to 2024	Lead authors of the PACUNAM survey; senior authors on the Campeche (Valeriana) study	61,480 structures and the 7 to 11 million estimate; a test showing dense settlement in data not chosen for archaeology	[130]
Luke Auld-Thomas	2024	Lead author of the Campeche study	Valeriana and 6,764 structures identified	[131]
Takeshi Inomata, Daniela Triadan	2018 to 2020	Led the Ceibal and Aguada Fenix studies	10,208 structures at Ceibal; the oldest and largest Maya monument at Aguada Fenix	[132]
Diane Z. Chase, Arlen F. Chase	Long-term work at Caracol, reviewed 2017	Excavated and mapped Caracol	Population estimate of more than 100,000	[133]

[130] Marcello A. Canuto, Francisco Estrada-Belli, Thomas G. Garrison, Stephen D. Houston, and others, "Ancient Lowland Maya Complexity as Revealed by Airborne Laser Scanning of Northern Guatemala", Science 361, no. 6409 (September 28, 2018): eaau0137. Accepted manuscript read through the National Science Foundation Public Access Repository, record 10097677. https://doi.org/10.1126/science.aau0137. Accessed November 18, 2026. Luke Auld-Thomas, Marcello A. Canuto, Adriana Velazquez Morlet, Francisco Estrada-Belli, and others, "Running Out of Empty Space: Environmental Lidar and the Crowded Ancient Landscape of Campeche, Mexico", Antiquity 98, no. 401 (October 2024): 1340-1358, published online October 29, 2024. https://doi.org/10.15184/aqy.2024.148. Accessed November 18, 2026.

[131] Luke Auld-Thomas, Marcello A. Canuto, Adriana Velazquez Morlet, Francisco Estrada-Belli, and others, "Running Out of Empty Space: Environmental Lidar and the Crowded Ancient Landscape of Campeche, Mexico", Antiquity 98, no. 401 (October 2024): 1340-1358, published online October 29, 2024. https://doi.org/10.15184/aqy.2024.148. Accessed November 18, 2026.

[132] Takeshi Inomata, Daniela Triadan, Flory Pinzon, and others, "Archaeological Application of Airborne LiDAR to Examine Social Changes in the Ceibal Region of the Maya Lowlands", PLoS ONE 13, no. 2 (February 21, 2018): e0191619. https://doi.org/10.1371/journal.pone.0191619. Accessed November 18, 2026. Takeshi Inomata, Daniela Triadan, Veronica A. Vazquez Lopez, and others, "Monumental Architecture at Aguada Fenix and the Rise of Maya Civilization", Nature 582, no. 7813 (2020): 530-533. https://doi.org/10.1038/s41586-020-2343-4. Accessed November 18, 2026.

[133] Diane Z. Chase and Arlen F. Chase, "Caracol, Belize, and Changing Perceptions of Ancient Maya Society", Journal of Archaeological Research 25, no. 3 (2017): 185-249. https://doi.org/10.1007/s10814-016-9101-z. Accessed November 18, 2026.

Person	Active in the cited work	Documented contribution	Documented result	Source
Ivan Sprajc	2023 to 2025	Led the Ocomtun survey	New major center recorded	[134]
Damian H. Evans	2012 to 2023	Lead author of the Angkor LiDAR study; led the 2015 campaign study	Planned urban landscape around Angkor Wat; 975 square kilometer survey	[135]
Jean-Baptiste Chevance	2012 to 2019	Lead author of the Mahendraparvata study	City plan of about 40 to 50 square kilometers	[136]
Heiko Prumers, Carla Jaimes Betancourt	2022	Led the Casarabe study	Two large settlements and a four-tier system	[137]
Stephen Rostain	2024	Lead author of the Upano Valley study	Garden urbanism dated about 500 BC to AD 300-600	[138]
Martti H. Parssinen	2026	Lead author of the southwest Amazonia study	More than 20,000 earthworks reported	[139]
Christopher T. Fisher, Juan Carlos Fernandez-Diaz	2012 to 2020	Led the Mosquitia work	19 settlements in a three-tier system	[140]

[134] Ivan Sprajc, Octavio Q. Esparza Olguin, Quintin Hernandez Gomez, and others, "Ocomtun: un centro mayor recientemente descubierto en las Tierras Bajas Mayas Centrales", Estudios de Cultura Maya 66 (2025): 11-43. https://doi.org/10.19130/iifl.ecm.66.2025/fall-wint/1469. Accessed November 18, 2026.

[135] Damian H. Evans, Roland J. Fletcher, Christophe Pottier, Jean-Baptiste Chevance, and others, "Uncovering Archaeological Landscapes at Angkor Using Lidar", Proceedings of the National Academy of Sciences 110, no. 31 (2013): 12595-12600. https://doi.org/10.1073/pnas.1306539110. Accessed November 18, 2026. Damian H. Evans, "Airborne Laser Scanning as a Method for Exploring Long-Term Socio-Ecological Dynamics in Cambodia", Journal of Archaeological Science 74 (2016): 164-175. https://doi.org/10.1016/j.jas.2016.05.009. Accessed November 18, 2026.

[136] Jean-Baptiste Chevance, Damian Evans, Nina Hofer, Sakada Sakhoeun, and Ratha Chhean, "Mahendraparvata: An Early Angkor-Period Capital Defined through Airborne Laser Scanning at Phnom Kulen", Antiquity 93, no. 371 (October 2019): 1303-1321, published online October 15, 2019; correction in Antiquity 94, no. 376 (2020): 1123. https://doi.org/10.15184/aqy.2019.133. Accessed November 18, 2026.

[137] Heiko Prumers, Carla Jaimes Betancourt, Jose Iriarte, Mark Robinson, and Martin Schaich, "Lidar Reveals Pre-Hispanic Low-Density Urbanism in the Bolivian Amazon", Nature 606, no. 7913 (2022): 325-328, published May 25, 2022. https://doi.org/10.1038/s41586-022-04780-4. Accessed November 18, 2026.

[138] Stephen Rostain, Antoine Dorison, Geoffroy de Saulieu, Heiko Prumers, and others, "Two Thousand Years of Garden Urbanism in the Upper Amazon", Science 383, no. 6679 (2024): 183-189. https://doi.org/10.1126/science.adi6317. Accessed November 18, 2026.

[139] Martti H. Parssinen, Risto Kalliola, Alceu Ranzi, Eetu Puttonen, and others, "Over 20,000 Precolonial Earthworks in the Southwest Amazonia", Nature 657, no. 8131 (2026): 420-425. https://doi.org/10.1038/s41586-026-10835-7. Accessed November 18, 2026.

[140] Christopher T. Fisher, Juan Carlos Fernandez-Diaz, Anna S. Cohen, Oscar Neil Cruz, and others, "Identifying Ancient Settlement Patterns through LiDAR in the Mosquitia Region of Honduras", PLoS ONE 11, no. 8 (2016): e0159890. https://doi.org/10.1371/journal.pone.0159890. Accessed November 18, 2026. Juan Carlos Fernandez-Diaz, William E. Carter, Ramesh L. Shrestha, Stephen J. Leisz, and others, "Archaeological Prospection of North Eastern Honduras with Airborne Mapping LiDAR", 2014 IEEE Geoscience and Remote Sensing Symposium (2014): 902-905. https://doi.org/10.1109/igarss.2014.6946571. Accessed November 18, 2026.

Person	Active in the cited work	Documented contribution	Documented result	Source
Michael D. Frachetti	2024	Lead author of the Uzbekistan drone LiDAR study	Tugunbulak, about 120 hectares	[141]
Robert Bewley, Simon Crutchley, Colin Shell	2005	Authors of the Stonehenge LiDAR study	New sites found, known sites extended	[142]
Tristram R. Kidder	2004 to 2023	Senior author on Poverty Point dating studies	Rapid ridge building; Jaketown earlier than Poverty Point	[143]
Jessica W. Cook Hale, Dylan S. Davis	2023 to 2024	Led the Apalachee Bay studies	At least four new underwater sites	[144]
Jonathan Benjamin	2020	Lead author of the Murujuga study	First confirmed drowned sites in Australia	[145]
Kathryn Reese-Taylor	2025	Author of a study of news coverage	Documented the "lost city found" trope	[146]

Three patterns stand out. First, most of these projects are team efforts with long author lists, and the table names only the leads. Second, many of the teams include scholars from the countries where the work happened, such as Ratha Chhean and Sakada Sakhoeun in Cambodia and Carla Jaimes Betancourt in Bolivia.[147] Third, the same names recur. A small number of research groups produced most of the

[141] Michael D. Frachetti, Jack Berner, Xiaoyi Liu, Edward R. Henry, and others, "Large-Scale Medieval Urbanism Traced by UAV-Lidar in Highland Central Asia", Nature 634, no. 8036 (2024): 1118-1124. https://doi.org/10.1038/s41586-024-08086-5. Accessed November 18, 2026.

[142] Robert Bewley, Simon Crutchley, and Colin Shell, "New Light on an Ancient Landscape: Lidar Survey in the Stonehenge World Heritage Site", Antiquity 79, no. 305 (2005): 636-647. https://doi.org/10.1017/s0003598x00114577. Accessed November 18, 2026.

[143] Tristram R. Kidder, Kai Su, Edward R. Henry, Seth B. Grooms, and others, "Multi-Method Geoarchaeological Analyses Demonstrates Exceptionally Rapid Construction of Ridge West 3 at Poverty Point", Southeastern Archaeology 40, no. 3 (2021): 212-227. https://doi.org/10.1080/0734578x.2021.1958445. Accessed November 18, 2026. Seth B. Grooms, Grace M. V. Ward, and Tristram R. Kidder, "Convergence at Poverty Point: A Revised Chronology of the Late Archaic Lower Mississippi Valley", Antiquity 97, no. 396 (2023): 1453-1469. https://doi.org/10.15184/aqy.2023.155. Accessed November 18, 2026.

[144] Jessica W. Cook Hale, Dylan S. Davis, and Matthew C. Sanger, "Evaluating the Archaeological Efficacy of Bathymetric LiDAR across Oceanographic Contexts: A Case Study from Apalachee Bay, Florida", Heritage 6, no. 2 (2023): 928-945. https://doi.org/10.3390/heritage6020051. Accessed November 18, 2026. Dylan S. Davis, Jessica W. Cook Hale, Nathan L. Hale, Trevor Z. Johnston, and others, "Bathymetric LiDAR and Semi-Automated Feature Extraction Assist Underwater Archaeological Surveys", Archaeological Prospection 31, no. 2 (2024): 171-186. https://doi.org/10.1002/arp.1939. Accessed November 18, 2026.

[145] Jonathan Benjamin, Michael O'Leary, Jo McDonald, Chelsea Wiseman, and others, "Aboriginal Artefacts on the Continental Shelf Reveal Ancient Drowned Cultural Landscapes in Northwest Australia", PLoS ONE 15, no. 7 (2020): e0233912; correction published 2023 as e0287490. https://doi.org/10.1371/journal.pone.0233912. Accessed November 18, 2026.

[146] Kathryn Reese-Taylor, "Lidar and Lost Cities: Examining the Public Presentation of Recent Lidar Findings through News Media", Advances in Archaeological Practice 13, no. 1 (2025): 142-149. https://doi.org/10.1017/aap.2025.2. Accessed November 18, 2026.

[147] Jean-Baptiste Chevance, Damian Evans, Nina Hofer, Sakada Sakhoeun, and Ratha Chhean, "Mahendraparvata: An Early Angkor-Period Capital Defined through Airborne Laser Scanning at Phnom Kulen", Antiquity 93, no. 371 (October 2019): 1303-1321, published online October 15, 2019; correction in Antiquity 94, no. 376 (2020): 1123. https://doi.org/10.15184/aqy.2019.133. Accessed November 18, 2026. Heiko Prumers, Carla Jaimes Betancourt, Jose Iriarte, Mark Robinson, and Martin Schaich, "Lidar Reveals Pre-Hispanic Low-Density Urbanism in the Bolivian Amazon", Nature 606, no. 7913 (2022): 325-328, published May 25, 2022.

headline findings, which is worth remembering when one group's interpretation becomes the popular story.

The people who actually lived at these sites are mostly nameless in the record. Where kings are named, as with Jayavarman II at Mahendraparvata, it is because inscriptions recorded them.[148] The farmers who built Casarabe's causeways and the foragers who raised Poverty Point's ridges left no names. LiDAR gives them something that written history did not: a map of the homes, fields and roads they built.

https://doi.org/10.1038/s41586-022-04780-4. Accessed November 18, 2026.

[148] Jean-Baptiste Chevance, Damian Evans, Nina Hofer, Sakada Sakhoeun, and Ratha Chhean, "Mahendraparvata: An Early Angkor-Period Capital Defined through Airborne Laser Scanning at Phnom Kulen", Antiquity 93, no. 371 (October 2019): 1303-1321, published online October 15, 2019; correction in Antiquity 94, no. 376 (2020): 1123. https://doi.org/10.15184/aqy.2019.133. Accessed November 18, 2026.

Chapter 10: What the Evidence Adds Up To

The pasted draft ended its site survey with four "lessons." Here is how each one holds up.

1. Ancient cities were often bigger and more spread out than older archaeology assumed. Verdict: True. Angkor, the Maya lowlands and the Casarabe sites all show what scholars call low-density urbanism: a city spread across an engineered landscape of fields, ponds and roads, not packed inside a wall.[149] The Puuc study is a useful reminder that not every region followed that pattern.[150]

2. Infrastructure is the hidden story. Verdict: True. Causeways, canals, reservoirs, terraces and defensive works appear again and again in the LiDAR results, and they are hard to see from the ground.[151]

3. Some big monuments were built without clear signs of rigid hierarchy. Verdict: Partly true. The Aguada Fenix team argues this directly, and it is a fair reading of their evidence.[152] For Poverty Point, the monuments were built by foragers, which is documented,[153] but the sources I read do not say whether that society had rulers. The absence of rulers is an interpretation, not a settled fact.

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[149] Damian H. Evans, Roland J. Fletcher, Christophe Pottier, Jean-Baptiste Chevance, and others, "Uncovering Archaeological Landscapes at Angkor Using Lidar", Proceedings of the National Academy of Sciences 110, no. 31 (2013): 12595-12600. https://doi.org/10.1073/pnas.1306539110. Accessed November 18, 2026. Marcello A. Canuto, Francisco Estrada-Belli, Thomas G. Garrison, Stephen D. Houston, and others, "Ancient Lowland Maya Complexity as Revealed by Airborne Laser Scanning of Northern Guatemala", Science 361, no. 6409 (September 28, 2018): eaau0137. Accepted manuscript read through the National Science Foundation Public Access Repository, record 10097677. https://doi.org/10.1126/science.aau0137. Accessed November 18, 2026. Heiko Prumers, Carla Jaimes Betancourt, Jose Iriarte, Mark Robinson, and Martin Schaich, "Lidar Reveals Pre-Hispanic Low-Density Urbanism in the Bolivian Amazon", Nature 606, no. 7913 (2022): 325-328, published May 25, 2022. https://doi.org/10.1038/s41586-022-04780-4. Accessed November 18, 2026.

[150] William M. Ringle, Tomas Gallareta Negron, Rossana May Ciau, Kenneth E. Seligson, and others, "Lidar Survey of Ancient Maya Settlement in the Puuc Region of Yucatan, Mexico", PLoS ONE 16, no. 4 (2021): e0249314. https://doi.org/10.1371/journal.pone.0249314. Accessed November 18, 2026.

[151] Marcello A. Canuto, Francisco Estrada-Belli, Thomas G. Garrison, Stephen D. Houston, and others, "Ancient Lowland Maya Complexity as Revealed by Airborne Laser Scanning of Northern Guatemala", Science 361, no. 6409 (September 28, 2018): eaau0137. Accepted manuscript read through the National Science Foundation Public Access Repository, record 10097677. https://doi.org/10.1126/science.aau0137. Accessed November 18, 2026. Heiko Prumers, Carla Jaimes Betancourt, Jose Iriarte, Mark Robinson, and Martin Schaich, "Lidar Reveals Pre-Hispanic Low-Density Urbanism in the Bolivian Amazon", Nature 606, no. 7913 (2022): 325-328, published May 25, 2022. https://doi.org/10.1038/s41586-022-04780-4. Accessed November 18, 2026. Jean-Baptiste Chevance, Damian Evans, Nina Hofer, Sakada Sakhoeun, and Ratha Chhean, "Mahendraparvata: An Early Angkor-Period Capital Defined through Airborne Laser Scanning at Phnom Kulen", Antiquity 93, no. 371 (October 2019): 1303-1321, published online October 15, 2019; correction in Antiquity 94, no. 376 (2020): 1123. https://doi.org/10.15184/aqy.2019.133. Accessed November 18, 2026. Stephen Rostain, Antoine Dorison, Geoffroy de Saulieu, Heiko Prumers, and others, "Two Thousand Years of Garden Urbanism in the Upper Amazon", Science 383, no. 6679 (2024): 183-189. https://doi.org/10.1126/science.adi6317. Accessed November 18, 2026.

[152] Takeshi Inomata, Daniela Triadan, Veronica A. Vazquez Lopez, and others, "Monumental Architecture at Aguada Fenix and the Rise of Maya Civilization", Nature 582, no. 7813 (2020): 530-533. https://doi.org/10.1038/s41586-020-2343-4. Accessed November 18, 2026.

[153] UNESCO World Heritage Centre, "Monumental Earthworks of Poverty Point (list entry 1435)", inscribed 2014. https://whc.unesco.org/en/list/1435/. Accessed November 18, 2026.

4. Underwater LiDAR opens a new frontier. Verdict: True, with limits. It works in clear, shallow water,[154] and much underwater mapping still relies on sonar.[155]

When these places were lived in

The chart below lines up the sites in this book against time, with the major periods of biblical history marked for comparison. It shows something the text alone makes hard to see: the earliest Maya monuments were going up while Israel's kings ruled in Jerusalem, and the great Amazonian and Cambodian cities came more than a thousand years later.

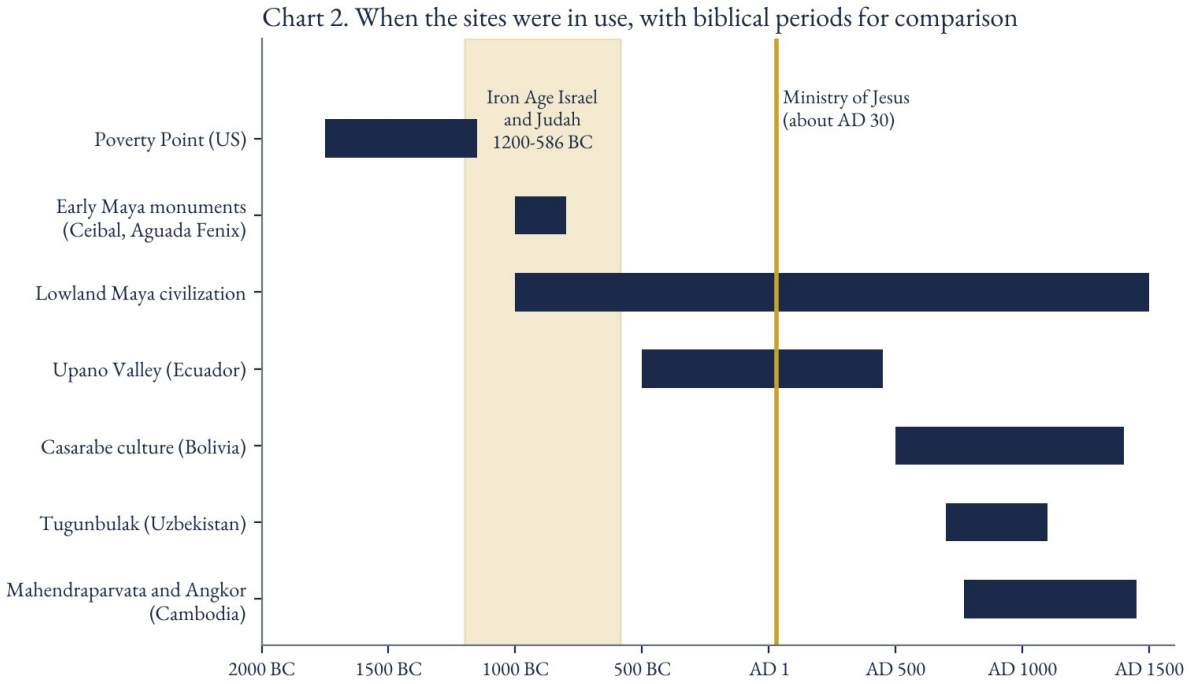


Chart 2. Approximate periods of use for major sites in this book, with periods of biblical history for comparison. Bars show the date ranges reported by each study; open-ended or uncertain ranges are approximate. Chart by the author.

Site or period	Start	End	Source
Poverty Point	about 1750 BC	about 1150 BC	[156] (3,700 to 3,100 years ago)
Ceibal, Aguada Fenix (early monuments)	1000 BC	800 BC	[157]

[154] Jessica W. Cook Hale, Dylan S. Davis, and Matthew C. Sanger, "Evaluating the Archaeological Efficacy of Bathymetric LiDAR across Oceanographic Contexts: A Case Study from Apalachee Bay, Florida", Heritage 6, no. 2 (2023): 928-945. https://doi.org/10.3390/heritage6020051. Accessed November 18, 2026.

[155] Crescenzo Violante, Nicola Masini, and Nicodemo Abate, "Integrated Remote Sensing Technologies for Multi-Depth Seabed and Coastal Cultural Resources: The Case of the Submerged Roman Site of Baia (Naples, Italy)", EGU General Assembly 2022, abstract EGU22-9939. https://doi.org/10.5194/egusphere-egu22-9939. Accessed November 18, 2026.

[156] UNESCO World Heritage Centre, "Monumental Earthworks of Poverty Point (list entry 1435)", inscribed 2014. https://whc.unesco.org/en/list/1435/. Accessed November 18, 2026.

Site or period	Start	End	Source
Lowland Maya civilization	1000 BC	AD 1500	[158]
Upano Valley	500 BC	about AD 450	[159] (end AD 300 to 600)
Casarabe culture	AD 500	AD 1400	[160]
Mahendraparvata and Angkor	AD 770	AD 1450	[161]
Tugunbulak	AD 700	AD 1100	[162]
Iron Age Israel and Judah	1200 BC	586 BC	[163]
Ministry of Jesus	about AD 30 (traditional dating)		Shown for reference only

The "years ago" figures for Poverty Point were converted to BC by subtracting 1,950 years, the convention for dates "before present." That is my arithmetic.

What LiDAR has and has not changed

LiDAR has changed the scale of the story. Scholars now know that ancient populations in the tropics were larger, more connected and more engineered than the maps of 1990 suggested. It has given a voice, in a sense, to ordinary people whose homes and fields were invisible before.

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[157] Takeshi Inomata, Daniela Triadan, Flory Pinzon, and others, "Archaeological Application of Airborne LiDAR to Examine Social Changes in the Ceibal Region of the Maya Lowlands", PLoS ONE 13, no. 2 (February 21, 2018): e0191619. https://doi.org/10.1371/journal.pone.0191619. Accessed November 18, 2026. Takeshi Inomata, Daniela Triadan, Veronica A. Vazquez Lopez, and others, "Monumental Architecture at Aguada Fenix and the Rise of Maya Civilization", Nature 582, no. 7813 (2020): 530-533. https://doi.org/10.1038/s41586-020-2343-4. Accessed November 18, 2026.

[158] Marcello A. Canuto, Francisco Estrada-Belli, Thomas G. Garrison, Stephen D. Houston, and others, "Ancient Lowland Maya Complexity as Revealed by Airborne Laser Scanning of Northern Guatemala", Science 361, no. 6409 (September 28, 2018): eaau0137. Accepted manuscript read through the National Science Foundation Public Access Repository, record 10097677. https://doi.org/10.1126/science.aau0137. Accessed November 18, 2026.

[159] Stephen Rostain, Antoine Dorison, Geoffroy de Saulieu, Heiko Prumers, and others, "Two Thousand Years of Garden Urbanism in the Upper Amazon", Science 383, no. 6679 (2024): 183-189. https://doi.org/10.1126/science.adi6317. Accessed November 18, 2026.

[160] Heiko Prumers, Carla Jaimes Betancourt, Jose Iriarte, Mark Robinson, and Martin Schaich, "Lidar Reveals Pre-Hispanic Low-Density Urbanism in the Bolivian Amazon", Nature 606, no. 7913 (2022): 325-328, published May 25, 2022. https://doi.org/10.1038/s41586-022-04780-4. Accessed November 18, 2026.

[161] Jean-Baptiste Chevance, Damian Evans, Nina Hofer, Sakada Sakhoeun, and Ratha Chhean, "Mahendraparvata: An Early Angkor-Period Capital Defined through Airborne Laser Scanning at Phnom Kulen", Antiquity 93, no. 371 (October 2019): 1303-1321, published online October 15, 2019; correction in Antiquity 94, no. 376 (2020): 1123. https://doi.org/10.15184/aqy.2019.133. Accessed November 18, 2026. Damian H. Evans, Roland J. Fletcher, Christophe Pottier, Jean-Baptiste Chevance, and others, "Uncovering Archaeological Landscapes at Angkor Using Lidar", Proceedings of the National Academy of Sciences 110, no. 31 (2013): 12595-12600. https://doi.org/10.1073/pnas.1306539110. Accessed November 18, 2026.

[162] Michael D. Frachetti, Jack Berner, Xiaoyi Liu, Edward R. Henry, and others, "Large-Scale Medieval Urbanism Traced by UAV-Lidar in Highland Central Asia", Nature 634, no. 8036 (2024): 1118-1124. https://doi.org/10.1038/s41586-024-08086-5. Accessed November 18, 2026.

[163] Johanna Regev, Yuval Gadot, Joe Uziel, Ortal Chalaf, and others, "Radiocarbon Chronology of Iron Age Jerusalem Reveals Calibration Offsets and Architectural Developments", Proceedings of the National Academy of Sciences 121, no. 19 (May 7, 2024): e2321024121. https://doi.org/10.1073/pnas.2321024121. Accessed November 18, 2026.

LiDAR has not, by itself, told us who these people were or what they believed. Every identity, date and population figure in this part comes from excavation, radiocarbon dating, inscriptions or careful estimates layered on top of the map. When a headline says "laser reveals lost civilization," the honest translation is usually, "laser reveals the size and layout of a place that archaeologists are still working to understand."

Part Three: The Bible Lands

Chapter 11: Why LiDAR Has Done Little Here

People who hear about lost Maya cities often ask the natural next question: what has LiDAR found in the Holy Land? The honest answer is, very little that has been published.

The numbers show it. The 2025 systematic review of 291 LiDAR archaeology studies from 2001 to 2022 found only 20 in all of Asia, the Middle East, Oceania and Africa combined.[164] I did not find a single published LiDAR survey that changed the understanding of a major biblical site.

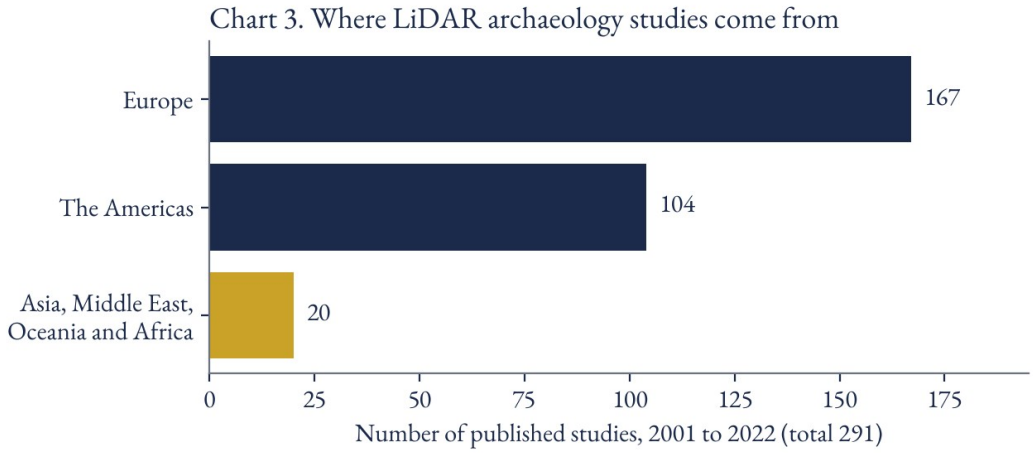


Chart 3. Where published LiDAR archaeology studies come from, 2001 to 2022, by region. Source: Vinci et al. 2025, a systematic review of 291 studies. Chart by the author.

Region	Studies, 2001 to 2022	Source
Europe	167	[165]
The Americas	104	[166]
Asia, the Middle East, Oceania and Africa combined	20	[167]
Total	291	[168]

[164] Giacomo Vinci, Federica Vanzani, Alessandro Fontana, and Stefano Campana, "LiDAR Applications in Archaeology: A Systematic Review", Archaeological Prospection 32, no. 1 (2025): 81-101. https://doi.org/10.1002/arp.1931. Accessed November 18, 2026.

[165] Giacomo Vinci, Federica Vanzani, Alessandro Fontana, and Stefano Campana, "LiDAR Applications in Archaeology: A Systematic Review", Archaeological Prospection 32, no. 1 (2025): 81-101. https://doi.org/10.1002/arp.1931. Accessed November 18, 2026.

[166] Giacomo Vinci, Federica Vanzani, Alessandro Fontana, and Stefano Campana, "LiDAR Applications in Archaeology: A Systematic Review", Archaeological Prospection 32, no. 1 (2025): 81-101. https://doi.org/10.1002/arp.1931. Accessed November 18, 2026.

[167] Giacomo Vinci, Federica Vanzani, Alessandro Fontana, and Stefano Campana, "LiDAR Applications in Archaeology: A Systematic Review", Archaeological Prospection 32, no. 1 (2025): 81-101. https://doi.org/10.1002/arp.1931. Accessed November 18, 2026.

[168] Giacomo Vinci, Federica Vanzani, Alessandro Fontana, and Stefano Campana, "LiDAR Applications in Archaeology: A Systematic Review", Archaeological Prospection 32, no. 1 (2025): 81-101. https://doi.org/10.1002/arp.1931. Accessed November 18, 2026.

My own search result is a negative finding, and it has limits. I searched in English, and work published in Hebrew or Arabic, or in technical reports, could be missing. **[Not verified that none exists]**

Why the gap? My reading of the reasons

The following points are my own reasoning, not a finding from any one study. They help explain why the most important recent advances in biblical archaeology have come from other tools.

- **The sites are not hidden.** Most biblical cities survive as tels, mounds built up by many layers of rebuilding over centuries. UNESCO notes that Israel alone has more than 200 tels.[169] You can see a tel from miles away. There is no forest canopy to see through.
- **The big questions are about time, not shape.** The debates in biblical archaeology are mostly about when a wall was built, who destroyed a city, and in which century. LiDAR measures shape. It cannot date a layer or name a king.
- **The best tools are different.** The biggest changes in the last twenty years have come from radiocarbon dating of seeds and charcoal, from statistical models that combine hundreds of dates, and from archaeomagnetic dating, which reads the record of the earth's magnetic field locked into burned material. The chapters below show those tools at work.

So this part of the book does what the pasted draft offered as a follow-up: a Bible-lands review that relies on excavation and dating, because that is where the evidence is.

A word about how I handle Scripture here

I believe the Bible is the Word of God. I also believe the evidence deserves an honest report. Where excavation lines up well with the biblical account, I say so. Where scholars disagree, I give the strongest case on each side and say where the records part ways. Where the question is about a miracle, I say plainly that archaeology cannot test it, one way or the other.

[169] UNESCO World Heritage Centre, "Biblical Tels - Megiddo, Hazor, Beer Sheba (list entry 1108)", inscribed 2005. https://whc.unesco.org/en/list/1108/. Accessed November 18, 2026.

Chapter 12: Jerusalem

The city of David

> And David captured the stronghold of Zion; it ***is*** the city of David. (2 Samuel 5:7, SLB)

The ridge south of today's Temple Mount, known as the City of David, is the oldest part of Jerusalem. Jerusalem was already an important place long before David. A 2021 radiocarbon study found that its public building works go back to the beginning of the 19th century BC, in the Middle Bronze Age.[170]

The 2024 radiocarbon study

The most important recent study of biblical-era Jerusalem is not a LiDAR survey. It is a 2024 paper in the *Proceedings of the National Academy of Sciences* by Johanna Regev, Yuval Gadot, Joe Uziel, Ortal Chalaf and colleagues. They gathered 103 radiocarbon dates from five excavation areas to build a timeline of Iron Age Jerusalem, about 1200 to 586 BC.[171]

Here is what they report.[172]

- **An anchor in 586 BC.** The Babylonian destruction of Jerusalem is fixed by Babylonian chronicles and by the books of Jeremiah and 2 Kings. The team used that destruction layer to check their method, with 100 measurements of single tree rings spanning 624 to 572 BC.
- **Settlement in the 12th to 10th centuries BC.** The team found evidence of settlement in this period, the era the Bible assigns to the judges, Saul, David and Solomon. One twig from a room in one excavation area dated to the 10th century BC.
- **Expansion by the 9th century BC.** Jerusalem expanded westward by the 9th century BC.
- **An earthquake.** A destruction layer from the mid-8th century BC, about 760 BC, matches a major earthquake. The book of Amos is dated by that same earthquake.
- **A wall reassigned.** A fortification on the slope, often credited to King Hezekiah, was dated earlier and attributed instead to King Uzziah.

> The words of Amos, who was among the sheep-breeders from Tekoa, which he saw concerning Israel in the days of Uzziah king of Judah and in the days of Jeroboam son of Joash king of Israel, two years before the earthquake. (Amos 1:1, SLB)
>
> And he burned the house of the LORD and the house of the king and all the houses of Jerusalem; and every house of a great ***one*** he burned with fire. And the walls of Jerusalem all around, all the army of ***the*** Chaldeans who ***were with*** the chief of the bodyguards broke down. (2 Kings 25:9-10, SLB)

What this study does and does not show matters. It shows that Jerusalem was inhabited and growing through the time of the early kings, and it confirms the 586 BC destruction with physical evidence. It

[170] Johanna Regev, Yuval Gadot, Helena Roth, Joe Uziel, and others, "Middle Bronze Age Jerusalem: Recalculating Its Character and Chronology", Radiocarbon 63, no. 3 (2021): 853-883. https://doi.org/10.1017/rdc.2021.21. Accessed November 18, 2026.

[171] Johanna Regev, Yuval Gadot, Joe Uziel, Ortal Chalaf, and others, "Radiocarbon Chronology of Iron Age Jerusalem Reveals Calibration Offsets and Architectural Developments", Proceedings of the National Academy of Sciences 121, no. 19 (May 7, 2024): e2321024121. https://doi.org/10.1073/pnas.2321024121. Accessed November 18, 2026.

[172] Johanna Regev, Yuval Gadot, Joe Uziel, Ortal Chalaf, and others, "Radiocarbon Chronology of Iron Age Jerusalem Reveals Calibration Offsets and Architectural Developments", Proceedings of the National Academy of Sciences 121, no. 19 (May 7, 2024): e2321024121. https://doi.org/10.1073/pnas.2321024121. Accessed November 18, 2026.

does not, by itself, settle how large or powerful Jerusalem was in David's and Solomon's day. That remains debated.

Water for the city

> And the rest of the matters of Hezekiah, and all his might, and how he made the pool and the conduit and brought the waters into the city, ***are*** they not written in the book of the matters of the days of the kings of Judah? (2 Kings 20:20, SLB)

In 2003, Amos Frumkin, Aryeh Shimron and Jeff Rosenbaum published radiocarbon and uranium-thorium dates for the Siloam Tunnel in *Nature*. They reported that the dates prove an Iron Age II date for the tunnel, which fits the time of Hezekiah, and concluded that "the Biblical text presents an accurate historic record of the Siloam Tunnel's construction." They also noted that, until then, no well-identified biblical structure had been dated this way, and that their result refuted a claim that the tunnel was cut in the 2nd century BC.[173] A 2025 study by Regev and colleagues dated a dam at the Siloam Pool to about 800 BC and linked it to a time of droughts and flash floods in the late 9th century BC.[174]

The Tel Dan inscription

At Tel Dan in northern Israel, excavators found an inscription in Aramaic that contains a phrase most scholars read as "House of David," a reference to David's royal line. Its date is debated. One early dissertation on the inscription dated it to about 795 BC.[175] I did not survey the full range of proposed dates.

Khirbet Qeiyafa

At Khirbet Qeiyafa, a fortified site in the hills west of Jerusalem, Yosef Garfinkel's team dated olive pits to about 1000 BC. The title of their 2015 paper states their view plainly: "King David's City at Khirbet Qeiyafa."[176] That reading is part of the wider debate about early Judah described in the next two chapters.

The draft's Jerusalem claim

The pasted draft's point that the City of David is the strongest direct link between archaeology and the Bible in its discussion, and that excavation rather than LiDAR is the main tool there, is fair.[177] **Verdict: True.**

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[173] Amos Frumkin, Aryeh Shimron, and Jeff Rosenbaum, "Radiometric Dating of the Siloam Tunnel, Jerusalem", Nature 425, no. 6954 (2003): 169-171. https://doi.org/10.1038/nature01875. Accessed November 18, 2026.

[174] Johanna Regev, Nahshon Szanton, Filip Vukosavovic, Itamar Berko, and others, "Radiocarbon Dating of Jerusalem's Siloam Dam Links Climate Data and Major Waterworks", Proceedings of the National Academy of Sciences 122, no. 35 (2025): e2510396122. https://doi.org/10.1073/pnas.2510396122. Accessed November 18, 2026.

[175] Hallvard Hagelia, "The First Dissertation on the Tel Dan Inscription", Scandinavian Journal of the Old Testament 18, no. 1 (2004): 135-146. https://doi.org/10.1080/09018320410007717. Accessed November 18, 2026.

[176] Yosef Garfinkel, Katharina Streit, Saar Ganor, and Paula J. Reimer, "King David's City at Khirbet Qeiyafa: Results of the Second Radiocarbon Dating Project", Radiocarbon 57, no. 5 (2015): 881-890. https://doi.org/10.2458/azu_rc.57.17961. Accessed November 18, 2026.

[177] Johanna Regev, Yuval Gadot, Joe Uziel, Ortal Chalaf, and others, "Radiocarbon Chronology of Iron Age Jerusalem Reveals Calibration Offsets and Architectural Developments", Proceedings of the National Academy of Sciences 121, no. 19 (May 7, 2024): e2321024121. https://doi.org/10.1073/pnas.2321024121. Accessed November 18, 2026.

Chapter 13: Hazor, Megiddo and Gezer

> And this ***is*** the account of the forced labor which King Solomon raised to build the house of the LORD and his own house and the Millo and the wall of Jerusalem, and Hazor and Megiddo and Gezer. (1 Kings 9:15, SLB)

UNESCO listed Megiddo and Hazor, together with Beer Sheba, as the World Heritage Site "Biblical Tels" in 2005. The listing describes them as cities with substantial remains and biblical connections, with Iron Age underground water systems, occupied until the 6th century BC, and reflecting what UNESCO calls the formative stages of biblical history from the 12th to the 6th century BC. It singles out Hazor's ramparts and its Late Bronze Age palace, the most elaborate of its kind in Israel.[178]

Hazor

> And Joshua turned back at that time and captured Hazor, and its king he struck with the sword; for Hazor formerly, it ***was*** the head of all these kingdoms. ... And Hazor he burned with fire. (Joshua 11:10-11, SLB)

Late Bronze Age Hazor, the great Canaanite city, was destroyed at the end of that period. Who destroyed it, and exactly when, is one of the long-running debates in the field.

- A 2021 study by Shlomit Bechar, Amnon Ben-Tor, Ido Wachtel and Daphna Ben-Tor lays out two possible scenarios for the date and process of the destruction.[179]
- Sharon Zuckerman argued in 2007 for an alternative to outside conquest: an internal crisis, with signs of what she called termination rituals.[180]
- Amnon Ben-Tor and Zuckerman also wrote together in 2008 in a dating debate with Israel Finkelstein.[181]

Where this stands: Disputed. The destruction is real. Its cause and date are not settled. The biblical account names Joshua; some excavators see a fit, and others propose other causes.

Megiddo and the dating debate

A 2014 study by Michael Toffolo, Israel Finkelstein and colleagues built a statistical model from 78 samples and 190 radiocarbon measurements, the most thorough radiocarbon study of any single site in the Levant up to that time.[182]

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[178] UNESCO World Heritage Centre, "Biblical Tels - Megiddo, Hazor, Beer Sheba (list entry 1108)", inscribed 2005. https://whc.unesco.org/en/list/1108/. Accessed November 18, 2026.

[179] Shlomit Bechar, Amnon Ben-Tor, Ido Wachtel, and Daphna Ben-Tor, "The Destruction of Late Bronze Age Hazor", Agypten und Levante 31 (2021): 45-74. https://doi.org/10.1553/aeundl31s45. Accessed November 18, 2026.

[180] Sharon Zuckerman, "Anatomy of a Destruction: Crisis Architecture, Termination Rituals and the Fall of Canaanite Hazor", Journal of Mediterranean Archaeology 20, no. 1 (2007). https://doi.org/10.1558/jmea.v20i1.3. Accessed November 18, 2026.

[181] Amnon Ben-Tor and Sharon Zuckerman, "Hazor at the End of the Late Bronze Age: Back to Basics", Bulletin of the American Schools of Oriental Research 350 (2008): 1-6. https://doi.org/10.1086/basor25609263. Accessed November 18, 2026.

[182] Michael B. Toffolo, Eran Arie, Mario A. S. Martin, Elisabetta Boaretto, and Israel Finkelstein, "Absolute Chronology of Megiddo, Israel, in the Late Bronze and Iron Ages: High-Resolution Radiocarbon Dating", Radiocarbon 56, no. 1 (2014): 221-244. https://doi.org/10.2458/56.16899. Accessed November 18, 2026.

That study is part of a larger debate about Iron Age dates, which matters for how archaeologists read the time of David and Solomon.

- **The traditional or "high" chronology** dated key building layers at Megiddo, Hazor and Gezer to the 10th century BC, the time of Solomon. A 2007 team led by Ilan Sharon pointed out that this traditional chronology had been built partly by matching layers to the Bible.[183]
- **The "low" chronology** moves those layers 75 to 100 years later, into the 9th century BC. Sharon's team, using hundreds of radiocarbon measurements from 21 sites, found support for a lower chronology.[184]
- **The response.** Amihai Mazar and Christopher Bronk Ramsey replied in 2008, arguing for a modified version of the traditional dates. The debate is often framed around whether a key transition falls nearer 1000 BC or nearer 900 BC.[185]

Where this stands: Disputed. The difference is about one century. That may sound small, but it decides whether certain gates and palaces belong to Solomon or to the kings who came after him.

Gezer

Gezer is unusual because its identity is "set in stone": boundary inscriptions found near the site name it. A 2023 study by Lyndelle Webster and colleagues built a radiocarbon chronology for Gezer from the end of the Late Bronze Age through Iron Age II and discussed it against the biblical accounts of Solomon and of the Egyptian Pharaoh Shishak.[186] I read the abstract, not the full discussion, so I do not report the study's conclusions on those questions here.

[183] Ilan Sharon, Ayelet Gilboa, A. J. Timothy Jull, and Elisabetta Boaretto, "Report on the First Stage of the Iron Age Dating Project in Israel: Supporting a Low Chronology", Radiocarbon 49, no. 1 (2007): 1-46. https://doi.org/10.1017/s0033822200041886. Accessed November 18, 2026.

[184] Ilan Sharon, Ayelet Gilboa, A. J. Timothy Jull, and Elisabetta Boaretto, "Report on the First Stage of the Iron Age Dating Project in Israel: Supporting a Low Chronology", Radiocarbon 49, no. 1 (2007): 1-46. https://doi.org/10.1017/s0033822200041886. Accessed November 18, 2026.

[185] Amihai Mazar and Christopher Bronk Ramsey, "14C Dates and the Iron Age Chronology of Israel: A Response", Radiocarbon 50, no. 2 (2008): 159-180. https://doi.org/10.1017/s0033822200033506. Accessed November 18, 2026.

[186] Lyndelle C. Webster, Samuel R. Wolff, Steven M. Ortiz, and others, "The Chronology of Gezer from the End of the Late Bronze Age to Iron Age II", PLoS ONE 18, no. 11 (2023): e0293119. https://doi.org/10.1371/journal.pone.0293119. Accessed November 18, 2026.

Chapter 14: Lachish

> And in the fourteenth year of King Hezekiah, Sennacherib the king of Assyria came up against all the fortified cities of Judah and seized them. (2 Kings 18:13, SLB)
>
> and the army of the king of Babylon was fighting against Jerusalem and against all the cities of Judah that were left, against Lachish and against Azekah; for they, they remained among the cities of Judah, cities of fortification. (Jeremiah 34:7, SLB)

Lachish was one of the major fortified cities of the kingdom of Judah, as Jeremiah's words show.

A new wall, and a debate about it

In 2019, Yosef Garfinkel, Michael Hasel, Martin Klingbeil, Hoo-Goo Kang and colleagues reported a previously unknown city wall at Lachish and dated it by radiocarbon to the second half of the 10th century BC. They used 59 dates from three sites, Khirbet Qeiyafa, Lachish and Khirbet al-Ra'i, and connected the results to the formation of the kingdom of Judah.[187] Israel Finkelstein disputed their reading in 2020.[188]

The 701 BC fire

In 2024, Yoav Vaknin, Ron Shaar, Erez Ben-Yosef, Oded Lipschits and colleagues used archaeomagnetic dating on a burned tower along Lachish's outer wall. They concluded that it burned in the intense fire of the Assyrian siege of 701 BC, the campaign of Sennacherib described in 2 Kings 18.[189] Garfinkel replied the same year, arguing that the wall itself dates to the Middle Bronze Age, centuries earlier, and that the towers are a later Iron Age addition.[190]

Where this stands: The 701 BC destruction by Sennacherib is well established, and the new study adds physical evidence that a tower burned in that siege.[191] The dates of some walls are disputed.[192]

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[187] Yosef Garfinkel, Michael G. Hasel, Martin G. Klingbeil, Hoo-Goo Kang, and others, "Lachish Fortifications and State Formation in the Biblical Kingdom of Judah in Light of Radiometric Datings", Radiocarbon 61, no. 3 (2019): 695-712. https://doi.org/10.1017/rdc.2019.5. Accessed November 18, 2026.

[188] Israel Finkelstein, "Iron Age Chronology and Biblical History Rejoinders: The Late Bronze/Iron Age Transition, Tel Eton and Lachish", Palestine Exploration Quarterly 152, no. 2 (2020): 82-93. https://doi.org/10.1080/00310328.2020.1738145. Accessed November 18, 2026.

[189] Yoav Vaknin, Ron Shaar, Erez Ben-Yosef, Oded Lipschits, and others, "Archaeomagnetic Dating of the Outer Revetment Wall at Tel Lachish", Tel Aviv 51, no. 1 (2024): 73-94. https://doi.org/10.1080/03344355.2024.2327801. Accessed November 18, 2026.

[190] Yosef Garfinkel, "Iron Age Towers and the Middle Bronze Age Fortifications of Lachish: A Reply to Vaknin et al.'s Archaeomagnetic Study", Jerusalem Journal of Archaeology 6 (2024): 46-57. https://doi.org/10.52486/01.00006.3. Accessed November 18, 2026.

[191] Yoav Vaknin, Ron Shaar, Erez Ben-Yosef, Oded Lipschits, and others, "Archaeomagnetic Dating of the Outer Revetment Wall at Tel Lachish", Tel Aviv 51, no. 1 (2024): 73-94. https://doi.org/10.1080/03344355.2024.2327801. Accessed November 18, 2026.

[192] Israel Finkelstein, "Iron Age Chronology and Biblical History Rejoinders: The Late Bronze/Iron Age Transition, Tel Eton and Lachish", Palestine Exploration Quarterly 152, no. 2 (2020): 82-93. https://doi.org/10.1080/00310328.2020.1738145. Accessed November 18, 2026. Yosef Garfinkel, "Iron Age Towers and the Middle Bronze Age Fortifications of Lachish: A Reply to Vaknin et al.'s Archaeomagnetic Study", Jerusalem Journal of Archaeology 6 (2024): 46-57. https://doi.org/10.52486/01.00006.3. Accessed November 18, 2026.

Chapter 15: Jericho

> And the people shouted, and they blew the trumpets. And it was, when the people heard the sound of the trumpet, and the people shouted ***with*** a great shout, and the wall fell in its place; and the people went up into the city, each man straight before him, and they captured the city. (Joshua 6:20, SLB)

The site

Tell es-Sultan, beside the spring of Ain es-Sultan, is ancient Jericho. That identification is undisputed.[193] UNESCO listed it as a World Heritage Site in 2023 under the State of Palestine. The listing records deposits going back to about 10,500 BC, 29 phases of occupation, a Neolithic (New Stone Age) wall with a ditch and tower from the 9th to 8th millennium BC, and a large Middle Bronze Age Canaanite city with rampart fortifications.[194]

A century of digging

Titus Kennedy's 2023 review lists the major excavations: Charles Warren in 1868, Frederick Bliss in 1894, Ernst Sellin and Carl Watzinger from 1907 to 1909 (published in 1911), John Garstang from 1930 to 1936, Kathleen Kenyon from 1952 to 1958, a project in 1992, and Italian and Palestinian teams from 1997 onward, with seasons from 2009 to 2017.[195]

The dating debate

The question is when Jericho's last Bronze Age walled city fell, and whether that fits the biblical account of Joshua.

Kenyon's view. Kathleen Kenyon concluded that the last Bronze Age city was destroyed in the Middle Bronze Age, in the 16th century BC, around 1550 BC. She based that partly on the expulsion of the Hyksos rulers from Egypt and on what she saw as a lack of certain imported Late Bronze Age pottery from Cyprus. On her dating, the city was already in ruins long before either of the two dates commonly proposed for Joshua, about 1400 BC or about 1230 BC.[196] A 2013 article by Eben Scheffler contrasts John Garstang's reading, which supported the biblical account, with Kenyon's more critical one.[197]

Radiocarbon. In 1995, Hendrik Bruins and Johannes van der Plicht dated short-lived cereal grains from the destruction layer, from Kenyon's own excavation. Their calibrated results fall in the 16th century BC, either 1601 to 1566 BC or 1561 to 1524 BC.[198]

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[193] Titus Kennedy, "The Bronze Age Destruction of Jericho, Archaeology, and the Book of Joshua", Religions 14, no. 6 (June 15, 2023): 796. https://doi.org/10.3390/rel14060796. Accessed November 18, 2026.

[194] UNESCO World Heritage Centre, "Ancient Jericho/Tell es-Sultan (list entry 1687)", inscribed 2023. https://whc.unesco.org/en/list/1687/. Accessed November 18, 2026.

[195] Titus Kennedy, "The Bronze Age Destruction of Jericho, Archaeology, and the Book of Joshua", Religions 14, no. 6 (June 15, 2023): 796. https://doi.org/10.3390/rel14060796. Accessed November 18, 2026.

[196] Titus Kennedy, "The Bronze Age Destruction of Jericho, Archaeology, and the Book of Joshua", Religions 14, no. 6 (June 15, 2023): 796. https://doi.org/10.3390/rel14060796. Accessed November 18, 2026.

[197] Eben H. Scheffler, "Jericho: From Archaeology Challenging the Canon to Searching for the Meaning(s) of Myth(s)", HTS Teologiese Studies / Theological Studies 69, no. 1 (2013). https://doi.org/10.4102/hts.v69i1.1918. Accessed November 18, 2026.

The case for about 1400 BC. Kennedy argues that pottery such as bichrome ware and "Chocolate-on-White" ware, Egyptian scarabs of the 18th Dynasty running through Amenhotep III, and a cuneiform tablet tentatively dated to the 15th century point to a destruction about 1400 BC, at the end of the Late Bronze I period. He notes that the walls fell all around, that the city burned, and that its stored grain was not looted, and he argues this is consistent with Joshua.[199] Bryant Wood made a similar argument in a 1990 article in *Biblical Archaeology Review*. I know Wood's article only through a later translation and Kennedy's citation, not from the original. **[Known through a secondary source]**[200]

> And they burned the city with fire, and all that ***was*** in it. (Joshua 6:24, SLB, first part of the verse)

Common ground. Scholars on both sides agree there is no evidence of a walled city or destruction in the 13th century BC, the later of the two proposed dates.[201]

Who is writing. Kennedy teaches in the science and religion program at Biola University, a Christian university.[202] That does not make his argument wrong, and Kenyon's interpretation was not free of assumptions either. Readers should know where each scholar stands.

Where this stands: Disputed. The destruction of a walled city at Jericho is real. The radiocarbon dates favor the 16th century BC. A reading of the pottery and scarabs favors about 1400 BC. The gap between those views is about 150 years, and it has not been closed. LiDAR has played no part in this debate.

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[198] Hendrik J. Bruins and Johannes van der Plicht, "Tell es-Sultan (Jericho): Radiocarbon Results of Short-Lived Cereal and Multiyear Charcoal Samples from the End of the Middle Bronze Age", Radiocarbon 37, no. 2 (1995): 213-220. https://doi.org/10.1017/s0033822200030666. Accessed November 18, 2026.

[199] Titus Kennedy, "The Bronze Age Destruction of Jericho, Archaeology, and the Book of Joshua", Religions 14, no. 6 (June 15, 2023): 796. https://doi.org/10.3390/rel14060796. Accessed November 18, 2026.

[200] Titus Kennedy, "The Bronze Age Destruction of Jericho, Archaeology, and the Book of Joshua", Religions 14, no. 6 (June 15, 2023): 796. https://doi.org/10.3390/rel14060796. Accessed November 18, 2026.

[201] Titus Kennedy, "The Bronze Age Destruction of Jericho, Archaeology, and the Book of Joshua", Religions 14, no. 6 (June 15, 2023): 796. https://doi.org/10.3390/rel14060796. Accessed November 18, 2026.

[202] Titus Kennedy, "The Bronze Age Destruction of Jericho, Archaeology, and the Book of Joshua", Religions 14, no. 6 (June 15, 2023): 796. https://doi.org/10.3390/rel14060796. Accessed November 18, 2026.

Chapter 16: Qumran, the Dead Sea and Sodom

Qumran

The Dead Sea Scrolls were found in caves near Qumran, on the northwest shore of the Dead Sea, in the 1940s and 1950s. Roland de Vaux excavated the settlement from 1951 to 1956. The nature of the settlement and who lived there has been debated for a long time. Many scholars identify it as an outpost of the Essenes, a Jewish sect known only from outside writers, and see the scrolls in the caves as the group's library.[203] Jodi Magness's book on the site, now in a second edition (2021), is described in one review as the "standard work" on a "celebrated, and often controversial" site.[204]

I found no published LiDAR survey that changed the understanding of Qumran. **[Not verified that none exists]**

The Dead Sea's rise and fall

> And Lot lifted up his eyes and saw all the district of the Jordan, that all of it ***was*** well-watered, before the LORD destroyed Sodom and Gomorrah, like the garden of the LORD, like the land of Egypt, as you go to Zoar. (Genesis 13:10, SLB)

In 2002, Amos Frumkin and Yoel Elitzur published a history of the Dead Sea's level in *Quaternary Research*. They calibrated biblical and other historical records against geological and archaeological evidence dated by radiocarbon. They found that the lake was low from about 2000 to 1500 BC, high from about 1500 to 1200 BC, and low again from about 1000 to 700 BC. During the dry periods, the shallow southern basin was completely dry.[205]

That matters for the setting of Genesis. According to these results, the southern basin was dry land between about 2000 and 1500 BC. Readers who place Abraham and Lot in that span will see a fit with a text that describes a fertile, well-watered valley where today there is salt water. That link is my inference, not a claim the paper makes.

Verdict on the draft's claim: True. The draft correctly said this paper uses biblical records, calibrated against geology and archaeology, to reconstruct lake levels, and it correctly said this does not prove the story of Sodom and Gomorrah.[206]

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[203] M. Tang and Nanette Scott Goldman, "Review of Khirbet Qumran and Ain-Feshkha, Roland de Vaux's Excavations (1951-1956), IIIA in English Translation", Journal of Eastern Mediterranean Archaeology and Heritage Studies 13, no. 3 (2025): 340-345. https://doi.org/10.5325/jeasmedarcherstu.13.3.0340. Accessed November 18, 2026.

[204] Dennis J. Mizzi, "Review of The Archaeology of Qumran and the Dead Sea Scrolls, 2nd ed., by Jodi Magness (Grand Rapids: Eerdmans, 2021)", Catholic Biblical Quarterly 85, no. 2 (2023): 340-342. https://doi.org/10.1353/cbq.2023.0050. Accessed November 18, 2026.

[205] Amos Frumkin and Yoel Elitzur, "Historic Dead Sea Level Fluctuations Calibrated with Geological and Archaeological Evidence", Quaternary Research 57, no. 3 (2002): 334-342. https://doi.org/10.1006/qres.2002.2330. Accessed November 18, 2026.

[206] Amos Frumkin and Yoel Elitzur, "Historic Dead Sea Level Fluctuations Calibrated with Geological and Archaeological Evidence", Quaternary Research 57, no. 3 (2002): 334-342. https://doi.org/10.1006/qres.2002.2330. Accessed November 18, 2026.

Sodom and Gomorrah

> And the LORD rained on Sodom and on Gomorrah sulfur and fire from the LORD out of the heavens. And He overthrew these cities, and all the district, and all the inhabitants of the cities, and the growth of the ground. (Genesis 19:24-25, SLB)

Genesis presents the destruction of Sodom as a direct act of God. Archaeology can study the region's cities, climate and lake levels. It cannot test whether God acted, and it is not a failure of faith to say so. A 2021 scientific paper claimed to have found physical evidence of a cosmic airburst at a site some identify with Sodom. That paper was retracted in 2025. Its story belongs with the disputed claims in Part Four, Chapter 21.[207]

[207] Ted E. Bunch, Malcolm A. LeCompte, A. Victor Adedeji, James H. Wittke, and others, "A Tunguska Sized Airburst Destroyed Tall el-Hammam a Middle Bronze Age City in the Jordan Valley near the Dead Sea (RETRACTED)", Scientific Reports 11 (2021): 18632. https://doi.org/10.1038/s41598-021-97778-3. Accessed November 18, 2026. Scientific Reports, "Retraction Note: A Tunguska Sized Airburst Destroyed Tall el-Hammam a Middle Bronze Age City in the Jordan Valley near the Dead Sea", Scientific Reports 15 (2025): 14291. https://doi.org/10.1038/s41598-025-99265-5. Accessed November 18, 2026.

Part Four: Rumors, Popular Claims and Disputed Stories

Chapter 17: How This Part Works

This part is kept separate from the rest of the book on purpose. Parts Two and Three report what the original research shows. This part looks at big stories that travel alongside LiDAR news: claims that shaped what many people believe, even though the evidence for them is weak or missing.

For each claim, I give:

- **The claim:** what exactly is said, and why it matters.
- **Earliest traceable appearance:** the oldest source I could verify. That is not always the true origin, which may be older and lost.
- **Who started and spread it:** with a clear line between people promoting the claim and people reporting on it or rebutting it.
- **People and groups named:** who is said to be involved, and what they have said for themselves, where I found a statement.
- **The evidence:** the strongest case for the claim, the strongest case against it, and what is missing.
- **Rating:** one of six levels, explained below, and what new evidence could change it.

Rating	Meaning
Supported	Strong, checkable evidence backs the claim
Partly supported	Some of the claim holds, but part goes beyond the evidence
Disputed	Qualified experts disagree, and the evidence on each side is real
Unsupported	No credible evidence backs the claim, though it is not directly disproved
Contradicted by evidence	Good evidence shows the claim is wrong
Unresolved	The question is open and the evidence is not yet in

One more note. Several of these stories connect to the Bible. Rating a popular claim "unsupported" is not the same as rating the Bible. A claim that LiDAR proves the Flood can be weak even for a reader who believes the Flood happened. Truth is not helped by bad arguments for it.

> Test all things; hold fast the good. (1 Thessalonians 5:21, SLB)

Chapter 18: "Lost City Found by Laser"

The claim. News stories often describe LiDAR results as the discovery of a "lost city" that no one knew existed. The framing matters because it shapes what the public thinks archaeology is for, and it can erase the people who already knew about these places.

Earliest traceable appearance. I did not trace the first use of the phrase. The best documented study of it is a 2025 paper by Kathryn Reese-Taylor, who examined how news media covered recent LiDAR papers published in *Nature* and *Science* since 2022, including studies from the Amazon and Central Asia.[208]

Who spread it. News outlets, according to Reese-Taylor's study. Her paper reviews the coverage, not the scientists' own wording, and I did not survey individual outlets.[209]

People and groups named. Reese-Taylor's concern is for Indigenous local communities and for archaeologists who already knew about sites before they were "found."[210] A 2020 special collection on ethics in archaeological LiDAR also called for a code of ethics.[211]

The evidence.

- Some LiDAR finds really were unknown to science. The Campeche team called Valeriana "previously unknown to the scientific community."[212] Aguada Fenix was also unknown before LiDAR.[213]
- Many others were not lost. The two largest Casarabe sites were "already known"; what LiDAR revealed was their size.[214] Angkor, Poverty Point, Stonehenge, Caracol and Baiae were famous long before any laser flew.[215]

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[208] Kathryn Reese-Taylor, "Lidar and Lost Cities: Examining the Public Presentation of Recent Lidar Findings through News Media", Advances in Archaeological Practice 13, no. 1 (2025): 142-149. https://doi.org/10.1017/aap.2025.2. Accessed November 18, 2026.

[209] Kathryn Reese-Taylor, "Lidar and Lost Cities: Examining the Public Presentation of Recent Lidar Findings through News Media", Advances in Archaeological Practice 13, no. 1 (2025): 142-149. https://doi.org/10.1017/aap.2025.2. Accessed November 18, 2026.

[210] Kathryn Reese-Taylor, "Lidar and Lost Cities: Examining the Public Presentation of Recent Lidar Findings through News Media", Advances in Archaeological Practice 13, no. 1 (2025): 142-149. https://doi.org/10.1017/aap.2025.2. Accessed November 18, 2026.

[211] Anna S. Cohen, Sarah Klassen, and Damian Evans, "Ethics in Archaeological Lidar", Journal of Computer Applications in Archaeology 3, no. 1 (2020): 76-91. https://doi.org/10.5334/jcaa.48. Accessed November 18, 2026.

[212] Luke Auld-Thomas, Marcello A. Canuto, Adriana Velazquez Morlet, Francisco Estrada-Belli, and others, "Running Out of Empty Space: Environmental Lidar and the Crowded Ancient Landscape of Campeche, Mexico", Antiquity 98, no. 401 (October 2024): 1340-1358, published online October 29, 2024. https://doi.org/10.15184/aqy.2024.148. Accessed November 18, 2026.

[213] Takeshi Inomata, Daniela Triadan, Veronica A. Vazquez Lopez, and others, "Monumental Architecture at Aguada Fenix and the Rise of Maya Civilization", Nature 582, no. 7813 (2020): 530-533. https://doi.org/10.1038/s41586-020-2343-4. Accessed November 18, 2026.

[214] Heiko Prumers, Carla Jaimes Betancourt, Jose Iriarte, Mark Robinson, and Martin Schaich, "Lidar Reveals Pre-Hispanic Low-Density Urbanism in the Bolivian Amazon", Nature 606, no. 7913 (2022): 325-328, published May 25, 2022. https://doi.org/10.1038/s41586-022-04780-4. Accessed November 18, 2026.

[215] Damian H. Evans, Roland J. Fletcher, Christophe Pottier, Jean-Baptiste Chevance, and others, "Uncovering Archaeological Landscapes at Angkor Using Lidar", Proceedings of the National Academy of Sciences 110, no. 31 (2013): 12595-12600. https://doi.org/10.1073/pnas.1306539110. Accessed November 18, 2026. UNESCO World Heritage Centre, "Monumental Earthworks of Poverty Point (list entry 1435)", inscribed 2014. https://whc.unesco.org/en/list/1435/. Accessed November 18, 2026. English Heritage, "History of Stonehenge", web page, read November 18, 2026.

- Even "unknown to science" does not mean unknown to everyone. Local people often know the mounds on their own land. Reese-Taylor makes that point directly.[216]

Rating: Partly supported. Some LiDAR finds were genuinely new to researchers. The "lost city" framing usually overstates the case and leaves out existing knowledge. A systematic survey of local knowledge before each announcement would show how often the framing is fair.

https://www.english-heritage.org.uk/visit/places/stonehenge/history-and-stories/history/. Accessed November 18, 2026. Diane Z. Chase and Arlen F. Chase, "Caracol, Belize, and Changing Perceptions of Ancient Maya Society", Journal of Archaeological Research 25, no. 3 (2017): 185-249. https://doi.org/10.1007/s10814-016-9101-z. Accessed November 18, 2026. Italian Institute for Environmental Protection and Research (ISPRA), "MER Project - Coastal Mapping: Exploring the Submerged Wonders of the Baia Archaeological Park", news release, 2025. https://www.isprambiente.gov.it/en/news/mer-project-2013-coastal-mapping-exploring-the-submerged-wonders-of-the-baia-archaeological-park. Accessed November 18, 2026.

[216] Kathryn Reese-Taylor, "Lidar and Lost Cities: Examining the Public Presentation of Recent Lidar Findings through News Media", Advances in Archaeological Practice 13, no. 1 (2025): 142-149. https://doi.org/10.1017/aap.2025.2. Accessed November 18, 2026.

Chapter 19: The Lost Tribes of Israel in the Americas

The claim. That the great earthworks and cities of the Americas, such as those of the Maya, were built by descendants of the ten tribes of the northern kingdom of Israel, who were carried off by Assyria.

> In the ninth year of Hoshea the king of Assyria captured Samaria and carried Israel into exile to Assyria, and he made them dwell in Halah and on the Habor, the river of Gozan, and ***in*** the cities of Media. (2 Kings 17:6, SLB)

The Bible places the exiles in Assyria and Media, in the late 8th century BC. It says nothing about the Americas.

Earliest traceable appearance. The idea was argued in print in England in the mid-17th century. Richard Cogley's history of that debate describes Menasseh ben Israel, a Jewish scholar in Amsterdam, and the English writer Thomas Thorowgood as leading voices for an Israelite origin of Native Americans. Hamon l'Estrange and Edward Brerewood argued against it and favored an Asian ("Tartar") origin instead.[217] Menasseh's *Hope of Israel* appeared in 1650.[218]

Spread and persistence. Matthew Dougherty's study traces the rise and fall of the idea in the United States from about 1790 to 1850. He shows it was told by white evangelical Protestants, by some Native Americans, by American Jews, and by early Latter-day Saints (Mormons).[219] In a 2023 review, Dougherty refers to it as the "Hebraic Indian theory."[220] I did not document who promotes the idea today, so I make no claim about current promoters.

People and groups named. The claim names Native American peoples as descendants of Israel. Dougherty's work shows that some Native Americans themselves took part in telling the story.[221] No LiDAR team in this book makes any claim of an Israelite connection.

The evidence.

- No LiDAR paper, excavation report or inscription cited in this book points to Israelite builders.

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[217] Richard W. Cogley, ""Some Other Kinde of Being and Condition": The Controversy in Mid-Seventeenth-Century England over the Peopling of Ancient America", Journal of the History of Ideas 68, no. 1 (2007): 35-56. https://doi.org/10.1353/jhi.2007.0003. Accessed November 18, 2026.

[218] Richard W. Cogley, ""Some Other Kinde of Being and Condition": The Controversy in Mid-Seventeenth-Century England over the Peopling of Ancient America", Journal of the History of Ideas 68, no. 1 (2007): 35-56. https://doi.org/10.1353/jhi.2007.0003. Accessed November 18, 2026.

[219] Matthew W. Dougherty, "Land of the Jewish Indians: How the Hebrew Bible Made Race and Territory in the Early United States", PhD dissertation, University of North Carolina at Chapel Hill, 2017. https://doi.org/10.17615/ptyz-8s76. Accessed November 18, 2026.

[220] Matthew W. Dougherty, "Old Canaan in a New World: Native Americans and the Lost Tribes of Israel (book review)", Mormon Studies Review 10 (2023): 101-105. https://doi.org/10.5406/21568030.10.16. Accessed November 18, 2026.

[221] Matthew W. Dougherty, "Land of the Jewish Indians: How the Hebrew Bible Made Race and Territory in the Early United States", PhD dissertation, University of North Carolina at Chapel Hill, 2017. https://doi.org/10.17615/ptyz-8s76. Accessed November 18, 2026.

- The dates do not fit for the oldest Maya monuments. Aguada Fenix was built between 1000 and 800 BC, and Ceibal's ceremonial complex dates to about 1000 BC.[222] Both are older than the Assyrian exile of the late 8th century BC.
- The Casarabe culture in Bolivia (about AD 500 to 1400) and Angkor in Cambodia (9th to 15th centuries AD) were built by peoples with their own well-documented cultures.[223]

Rating: Contradicted by evidence for the claim that the LiDAR-mapped Maya monuments were built by the lost tribes, because the earliest monuments predate the exile. **Unsupported** for the wider idea of Israelite migration to the Americas. A securely dated Hebrew inscription in a sealed ancient layer in the Americas would change the second rating. Nothing like that has been reported in any source I read.

[222] Takeshi Inomata, Daniela Triadan, Veronica A. Vazquez Lopez, and others, "Monumental Architecture at Aguada Fenix and the Rise of Maya Civilization", Nature 582, no. 7813 (2020): 530-533. https://doi.org/10.1038/s41586-020-2343-4. Accessed November 18, 2026. Takeshi Inomata, Daniela Triadan, Flory Pinzon, and others, "Archaeological Application of Airborne LiDAR to Examine Social Changes in the Ceibal Region of the Maya Lowlands", PLoS ONE 13, no. 2 (February 21, 2018): e0191619. https://doi.org/10.1371/journal.pone.0191619. Accessed November 18, 2026.

[223] Heiko Prumers, Carla Jaimes Betancourt, Jose Iriarte, Mark Robinson, and Martin Schaich, "Lidar Reveals Pre-Hispanic Low-Density Urbanism in the Bolivian Amazon", Nature 606, no. 7913 (2022): 325-328, published May 25, 2022. https://doi.org/10.1038/s41586-022-04780-4. Accessed November 18, 2026. Damian H. Evans, Roland J. Fletcher, Christophe Pottier, Jean-Baptiste Chevance, and others, "Uncovering Archaeological Landscapes at Angkor Using Lidar", Proceedings of the National Academy of Sciences 110, no. 31 (2013): 12595-12600. https://doi.org/10.1073/pnas.1306539110. Accessed November 18, 2026.

Chapter 20: Atlantis, an Ice Age Civilization and Gunung Padang

The claim. That an advanced civilization existed during the last Ice Age, was destroyed by a catastrophe, and left traces that modern tools such as LiDAR are now uncovering. Atlantis is the best known name for it.

Earliest traceable appearance. The story of Atlantis first appears in the writings of the Greek philosopher Plato.[224] Kenneth Feder, an archaeologist, reviews the long search for archaeological evidence of the legend and finds none.[225]

Who started and spread it.

- **Ignatius Donnelly** popularized the modern Atlantis idea with *Atlantis: The Antediluvian World* in 1882, which argued that Atlantis was real and the source of later civilizations.[226]
- **Graham Hancock** claims that an advanced Ice Age civilization existed, as Hammer and Swartz document.[227] His Netflix series *Ancient Apocalypse* came out on November 10, 2022, and within a week was Netflix's second most popular title, according to Artnet News. In the first episode, Hancock says, "I'm trying to overthrow the paradigm of history."[228] Scholars of religion Olav Hammer and Karen Swartz describe his work as alternative archaeology and modern mythmaking.[229]

People and groups named, and what they said.

- The Society for American Archaeology sent an open letter to Netflix and the producer, ITN Productions, asking them to reclassify the series as fiction and to "add disclaimers to the series that its content is unfounded." According to Artnet, Netflix had not publicly addressed the letter as of December 2, 2022.[230] Hyperallergic reported that the letter also accused the series of

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[224] Vittoria Benzine, Artnet News, "Archaeologists Ask Netflix to Reclassify Graham Hancock's Unfounded Netflix Docuseries Ancient Apocalypse as Fiction", December 2, 2022. https://news.artnet.com/art-world/archaeologists-graham-hancocks-ancient-apocalypse-fiction-2222060. Accessed November 18, 2026. Kenneth L. Feder, "Quest for Atlantis: The Search for Archaeological Evidence of a Legend", Leidschrift 32 (2017): 63-80.

[225] Kenneth L. Feder, "Quest for Atlantis: The Search for Archaeological Evidence of a Legend", Leidschrift 32 (2017): 63-80.

[226] Ignatius Donnelly, "Atlantis: The Antediluvian World (1882), "The Purpose of this Book," reprinted", Routledge, 2024, 385-390. https://doi.org/10.4324/9781003551539-37. Accessed November 18, 2026.

[227] Olav Hammer and Karen Swartz, "Graham Hancock, Prometheus for a New Age: Alternative Archaeology as Modern Mythmaking", Nova Religio 27, no. 4 (2024): 79-95. https://doi.org/10.1353/nvr.2024.a929280. Accessed November 18, 2026.

[228] Vittoria Benzine, Artnet News, "Archaeologists Ask Netflix to Reclassify Graham Hancock's Unfounded Netflix Docuseries Ancient Apocalypse as Fiction", December 2, 2022. https://news.artnet.com/art-world/archaeologists-graham-hancocks-ancient-apocalypse-fiction-2222060. Accessed November 18, 2026.

[229] Olav Hammer and Karen Swartz, "Graham Hancock, Prometheus for a New Age: Alternative Archaeology as Modern Mythmaking", Nova Religio 27, no. 4 (2024): 79-95. https://doi.org/10.1353/nvr.2024.a929280. Accessed November 18, 2026.

[230] Vittoria Benzine, Artnet News, "Archaeologists Ask Netflix to Reclassify Graham Hancock's Unfounded Netflix Docuseries Ancient Apocalypse as Fiction", December 2, 2022. https://news.artnet.com/art-world/archaeologists-graham-hancocks-ancient-apocalypse-fiction-2222060. Accessed November 18, 2026.

disparaging experts while promoting what the letter called racist and white supremacist ideologies.[231] That is the letter's charge as reported, not a finding of this book.

- Flint Dibble, an archaeologist at Cardiff University, told Artnet, "He ignores all of our evidence."[232]
- Hancock responded on social media on November 25, 2022, saying archaeologists wanted him "cancelled."[233]

Gunung Padang. The series linked the site of Gunung Padang in Indonesia to survivors of an Ice Age catastrophe.[234] On October 20, 2023, the journal *Archaeological Prospection* published a paper by Danny Hilman Natawidjaja and colleagues claiming that Gunung Padang was a buried prehistoric pyramid of very great age, presented in coverage as the world's oldest.[235] In 2024, the journal retracted it by agreement of the editors and the publisher, after outside experts in geophysics, archaeology and radiocarbon dating raised concerns.[236] The journal's co-editor, Eileen Ernenwein, later wrote that the "false claim of World's oldest pyramid" got through because of peer review oversights, and that such methods are increasingly exploited for fringe stories.[237]

What LiDAR has actually shown. The oldest sites in this book that LiDAR helped find are scatters of stone tools on drowned Ice Age shorelines, left by foragers, such as those at Murujuga and Apalachee Bay.[238] They are important, and they show that people lived on coasts now under water. They do not show cities or advanced technology.

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[231] Sarah Bond, Hyperallergic, "Why Archaeologists Are Fuming Over Netflix's Ancient Apocalypse Series", January 4, 2023. https://hyperallergic.com/why-archaeologists-are-fuming-over-netflixs-ancient-apocalypse-series/. Accessed November 18, 2026.

[232] Vittoria Benzine, Artnet News, "Archaeologists Ask Netflix to Reclassify Graham Hancock's Unfounded Netflix Docuseries Ancient Apocalypse as Fiction", December 2, 2022. https://news.artnet.com/art-world/archaeologists-graham-hancocks-ancient-apocalypse-fiction-2222060. Accessed November 18, 2026.

[233] Vittoria Benzine, Artnet News, "Archaeologists Ask Netflix to Reclassify Graham Hancock's Unfounded Netflix Docuseries Ancient Apocalypse as Fiction", December 2, 2022. https://news.artnet.com/art-world/archaeologists-graham-hancocks-ancient-apocalypse-fiction-2222060. Accessed November 18, 2026.

[234] Vittoria Benzine, Artnet News, "Archaeologists Ask Netflix to Reclassify Graham Hancock's Unfounded Netflix Docuseries Ancient Apocalypse as Fiction", December 2, 2022. https://news.artnet.com/art-world/archaeologists-graham-hancocks-ancient-apocalypse-fiction-2222060. Accessed November 18, 2026.

[235] Danny Hilman Natawidjaja and others, "Geo-Archaeological Prospecting of Gunung Padang Buried Prehistoric Pyramid in West Java, Indonesia (RETRACTED)", Archaeological Prospection, published online October 20, 2023. https://doi.org/10.1002/arp.1912. Accessed November 18, 2026. Eileen G. Ernenwein, "Retraction and Reflection: The Gunung Padang Controversy and the Challenges of Peer Review in Archaeological Prospection", ArcheoSciences 49-1 (2025): 607-610. https://doi.org/10.4000/14nul. Accessed November 18, 2026.

[236] Archaeological Prospection, "Retraction: Geo-Archaeological Prospecting of Gunung Padang Buried Prehistoric Pyramid in West Java, Indonesia", Archaeological Prospection 31, no. 2 (2024): 199. https://doi.org/10.1002/arp.1932. Accessed November 18, 2026.

[237] Eileen G. Ernenwein, "Retraction and Reflection: The Gunung Padang Controversy and the Challenges of Peer Review in Archaeological Prospection", ArcheoSciences 49-1 (2025): 607-610. https://doi.org/10.4000/14nul. Accessed November 18, 2026.

[238] Jonathan Benjamin, Michael O'Leary, Jo McDonald, Chelsea Wiseman, and others, "Aboriginal Artefacts on the Continental Shelf Reveal Ancient Drowned Cultural Landscapes in Northwest Australia", PLoS ONE 15, no. 7 (2020): e0233912; correction published 2023 as e0287490. https://doi.org/10.1371/journal.pone.0233912. Accessed November 18, 2026. Dylan S. Davis, Jessica W. Cook Hale, Nathan L. Hale, Trevor Z. Johnston, and others, "Bathymetric LiDAR and Semi-Automated Feature Extraction Assist Underwater Archaeological Surveys", Archaeological Prospection 31, no. 2 (2024): 171-186. https://doi.org/10.1002/arp.1939. Accessed November 18, 2026.

Rating: Unsupported. No LiDAR survey, excavation or dating study cited here shows an advanced Ice Age civilization. The Gunung Padang paper that came closest to claiming one was retracted. A securely dated city or monument from the Ice Age, confirmed by independent teams, would change this rating.

Chapter 21: Drowned Lands and Noah's Flood

The claim. That the drowned sites found by underwater LiDAR and sonar prove the Flood of Noah described in Genesis.

> And the waters prevailed exceedingly, exceedingly on the earth, and all the high mountains which ***were*** under all the heavens were covered. (Genesis 7:19, SLB)

Earliest traceable appearance. I did not trace the first time someone tied drowned coastlines to Noah. The best known scientific version is the Black Sea flood hypothesis of William Ryan, Walter Pitman and colleagues, published in 1997. They argued that the Black Sea was once a freshwater lake, and that about 7,150 years ago the Mediterranean broke through the Bosporus and quickly drowned more than 100,000 square kilometers of its shelf.[239]

Spread and debate. Robert Ballard's team reported further evidence for a sudden drowning in 2000.[240] In 2001, Naci Gorur and colleagues challenged it in a paper titled "Is the Abrupt Drowning of the Black Sea Shelf at 7150 yr BP a Myth?"[241] The Black Sea hypothesis is itself disputed among geologists.

The evidence.

- The drowned sites in this book were covered by the slow rise of the sea after the last Ice Age. One major study found that sea level stood about 134 meters lower than today at the coldest point and rose mainly between about 16,500 and 8,200 years ago.[242] That is a rise spread over thousands of years.
- Genesis describes something different: a single event in which "all the high mountains" were covered, and the waters prevailed for 150 days (Genesis 7:19, 7:24).
- So the drowned coastlines are a different kind of event from the one Genesis describes. They cannot be offered as proof of the Flood.

Where faith and evidence meet. I believe the Genesis account. Most geologists do not accept a recent worldwide flood, and Christians who hold to Genesis read the geological record differently. That larger debate is beyond the scope of a book about LiDAR. What this book can say is narrow and firm: drowned Ice Age sites are evidence that sea levels rose and coasts were lost. They neither prove nor disprove Noah's Flood. Questions about Noah's Ark and the current investigation at the Durupinar site in Turkey are covered in my book *Dug Up and Written Down*.

Rating: Unsupported for the claim that LiDAR-found drowned sites prove the Flood. The Black Sea flood hypothesis, a separate question, is **Disputed**.[243]

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[239] William B. F. Ryan, Walter C. Pitman, Candace O. Major, and others, "An Abrupt Drowning of the Black Sea Shelf", Marine Geology 138, no. 1-2 (1997): 119-126. https://doi.org/10.1016/s0025-3227(97)00007-8. Accessed November 18, 2026.

[240] Robert D. Ballard, Dwight F. Coleman, and Gary D. Rosenberg, "Further Evidence of Abrupt Holocene Drowning of the Black Sea Shelf", Marine Geology 170, no. 3-4 (2000): 253-261. https://doi.org/10.1016/s0025-3227(00)00108-0. Accessed November 18, 2026.

[241] Naci Gorur, M. Namik Cagatay, Omer Emre, and others, "Is the Abrupt Drowning of the Black Sea Shelf at 7150 yr BP a Myth?", Marine Geology 176, no. 1-4 (2001): 65-73. https://doi.org/10.1016/s0025-3227(01)00148-7. Accessed November 18, 2026.

[242] Kurt Lambeck, Helene Rouby, Anthony Purcell, Yiying Sun, and Malcolm Sambridge, "Sea Level and Global Ice Volumes from the Last Glacial Maximum to the Holocene", Proceedings of the National Academy of Sciences 111, no. 43 (2014): 15296-15303. https://doi.org/10.1073/pnas.1411762111. Accessed November 18, 2026.

Chapter 22: The Sodom Airburst

The claim. That a cosmic airburst, a space rock exploding in the air, destroyed the Bronze Age city of Tall el-Hammam in the Jordan Valley near the Dead Sea around 1650 BC, and that this event lies behind the Genesis account of Sodom.

Earliest traceable appearance. A paper by Ted Bunch, Malcolm LeCompte and colleagues in *Scientific Reports* in 2021 made the claim and tied it to the Genesis story.[244]

Spread and corrections. The paper drew wide attention. In 2022 the authors published a correction dealing with problems in some of its images.[245] In 2025, *Scientific Reports* retracted the paper. The retraction note cites critiques by other scientists: one found errors in the methods and analyses, and another found that the comparison to the 1908 Tunguska airburst in Siberia was not substantiated.[246]

People and groups named. The paper's authors made the claim. The journal retracted it. I did not find statements by the authors responding to the retraction, so I make no claim about their current view.

The evidence. With the paper retracted, there is no peer-reviewed scientific support for the airburst claim in its published form. That says nothing about whether Genesis is true. It says that this particular scientific explanation failed review.

Rating: Unsupported (the paper was retracted). New, independently confirmed physical evidence of an airburst, published and replicated by other teams, would change this rating.

The draft's list of claims to reject

The pasted draft ended with four "Bible tie-ins" it said should be rejected. I agree with all four, with one change of wording.

Draft's claim to reject	My rating	Why
Maya, Khmer, Amazonian or Poverty Point sites were built by the lost tribes of Israel	Contradicted by evidence (Maya) and Unsupported (others)	Chapter 19
Underwater LiDAR sites prove Noah's Flood	Unsupported	Chapter 21

[243] William B. F. Ryan, Walter C. Pitman, Candace O. Major, and others, "An Abrupt Drowning of the Black Sea Shelf", Marine Geology 138, no. 1-2 (1997): 119-126. https://doi.org/10.1016/s0025-3227(97)00007-8. Accessed November 18, 2026. Robert D. Ballard, Dwight F. Coleman, and Gary D. Rosenberg, "Further Evidence of Abrupt Holocene Drowning of the Black Sea Shelf", Marine Geology 170, no. 3-4 (2000): 253-261. https://doi.org/10.1016/s0025-3227(00)00108-0. Accessed November 18, 2026. Naci Gorur, M. Namik Cagatay, Omer Emre, and others, "Is the Abrupt Drowning of the Black Sea Shelf at 7150 yr BP a Myth?", Marine Geology 176, no. 1-4 (2001): 65-73. https://doi.org/10.1016/s0025-3227(01)00148-7. Accessed November 18, 2026.

[244] Ted E. Bunch, Malcolm A. LeCompte, A. Victor Adedeji, James H. Wittke, and others, "A Tunguska Sized Airburst Destroyed Tall el-Hammam a Middle Bronze Age City in the Jordan Valley near the Dead Sea (RETRACTED)", Scientific Reports 11 (2021): 18632. https://doi.org/10.1038/s41598-021-97778-3. Accessed November 18, 2026.

[245] Ted E. Bunch and others, "Author Correction: A Tunguska Sized Airburst Destroyed Tall el-Hammam", Scientific Reports 12 (2022): 3265. https://doi.org/10.1038/s41598-022-06266-9. Accessed November 18, 2026.

[246] Scientific Reports, "Retraction Note: A Tunguska Sized Airburst Destroyed Tall el-Hammam a Middle Bronze Age City in the Jordan Valley near the Dead Sea", Scientific Reports 15 (2025): 14291. https://doi.org/10.1038/s41598-025-99265-5. Accessed November 18, 2026.

Draft's claim to reject	My rating	Why
LiDAR cities outside the Near East match biblical place names or migrations	Unsupported	No source in this book makes such a match
Submerged cities prove divine judgment stories	Unsupported as science	Baiae sank by slow volcanic ground movement; science cannot test whether God judged a place, so I would not call such a claim "proved" or "disproved" by science[247]

[247] Crescenzo Violante, Nicola Masini, and Nicodemo Abate, "Integrated Remote Sensing Technologies for Multi-Depth Seabed and Coastal Cultural Resources: The Case of the Submerged Roman Site of Baia (Naples, Italy)", EGU General Assembly 2022, abstract EGU22-9939. https://doi.org/10.5194/egusphere-egu22-9939. Accessed November 18, 2026.

Conclusion: What We Know, What We Can Infer, What Is Still Open

> The glory of God ***is*** to conceal a matter, and the glory of kings ***is*** to search out a matter. (Proverbs 25:2, SLB)

This book began with a pasted research draft and three questions. Here are the answers, sorted by how firm they are.

Well established

- LiDAR can see the shape of the ground through forest and, in clear shallow water, the shape of the seabed.[248]
- In the Maya lowlands, Cambodia and the Amazon, LiDAR revealed far more ancient building than earlier maps showed: tens of thousands of structures, long causeways, reservoirs, terraces and planned city grids.[249]
- Some major sites were truly new to science, such as Aguada Fenix and Valeriana.[250] Many others were known and were shown at their real size.[251]
- Bathymetric LiDAR found at least four new drowned sites in Florida, and a 2025 seagrass survey gave a sharp map of sunken Baiae.[252]

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[248] National Oceanic and Atmospheric Administration (NOAA), National Ocean Service, "What is lidar?", page last updated September 23, 2026. https://oceanservice.noaa.gov/facts/lidar.html. Accessed November 18, 2026.

[249] Marcello A. Canuto, Francisco Estrada-Belli, Thomas G. Garrison, Stephen D. Houston, and others, "Ancient Lowland Maya Complexity as Revealed by Airborne Laser Scanning of Northern Guatemala", Science 361, no. 6409 (September 28, 2018): eaau0137. Accepted manuscript read through the National Science Foundation Public Access Repository, record 10097677. https://doi.org/10.1126/science.aau0137. Accessed November 18, 2026. Damian H. Evans, Roland J. Fletcher, Christophe Pottier, Jean-Baptiste Chevance, and others, "Uncovering Archaeological Landscapes at Angkor Using Lidar", Proceedings of the National Academy of Sciences 110, no. 31 (2013): 12595-12600. https://doi.org/10.1073/pnas.1306539110. Accessed November 18, 2026. Jean-Baptiste Chevance, Damian Evans, Nina Hofer, Sakada Sakhoeun, and Ratha Chhean, "Mahendraparvata: An Early Angkor-Period Capital Defined through Airborne Laser Scanning at Phnom Kulen", Antiquity 93, no. 371 (October 2019): 1303-1321, published online October 15, 2019; correction in Antiquity 94, no. 376 (2020): 1123. https://doi.org/10.15184/aqy.2019.133. Accessed November 18, 2026. Heiko Prumers, Carla Jaimes Betancourt, Jose Iriarte, Mark Robinson, and Martin Schaich, "Lidar Reveals Pre-Hispanic Low-Density Urbanism in the Bolivian Amazon", Nature 606, no. 7913 (2022): 325-328, published May 25, 2022. https://doi.org/10.1038/s41586-022-04780-4. Accessed November 18, 2026.

[250] Takeshi Inomata, Daniela Triadan, Veronica A. Vazquez Lopez, and others, "Monumental Architecture at Aguada Fenix and the Rise of Maya Civilization", Nature 582, no. 7813 (2020): 530-533. https://doi.org/10.1038/s41586-020-2343-4. Accessed November 18, 2026. Luke Auld-Thomas, Marcello A. Canuto, Adriana Velazquez Morlet, Francisco Estrada-Belli, and others, "Running Out of Empty Space: Environmental Lidar and the Crowded Ancient Landscape of Campeche, Mexico", Antiquity 98, no. 401 (October 2024): 1340-1358, published online October 29, 2024. https://doi.org/10.15184/aqy.2024.148. Accessed November 18, 2026.

[251] Heiko Prumers, Carla Jaimes Betancourt, Jose Iriarte, Mark Robinson, and Martin Schaich, "Lidar Reveals Pre-Hispanic Low-Density Urbanism in the Bolivian Amazon", Nature 606, no. 7913 (2022): 325-328, published May 25, 2022. https://doi.org/10.1038/s41586-022-04780-4. Accessed November 18, 2026.

[252] Dylan S. Davis, Jessica W. Cook Hale, Nathan L. Hale, Trevor Z. Johnston, and others, "Bathymetric LiDAR and Semi-Automated Feature Extraction Assist Underwater Archaeological Surveys", Archaeological Prospection 31, no. 2 (2024): 171-186. https://doi.org/10.1002/arp.1939. Accessed November 18, 2026. Italian Institute for Environmental Protection and Research (ISPRA), "MER Project - Coastal Mapping: Exploring the Submerged Wonders of the Baia Archaeological Park", news release, 2025. https://www.isprambiente.gov.it/en/news/mer-project-2013-coastal-mapping-exploring-the-submerged-wonders-of-the-baia-archaeological-park. Accessed November 18, 2026.

- In the Bible lands, LiDAR has done little. The major recent advances there came from radiocarbon dating, statistical models and archaeomagnetic dating.[253]
- Two widely shared papers that tied ancient sites to dramatic stories, the Tall el-Hammam airburst and the Gunung Padang "pyramid," were retracted.[254]

Reasonable inferences

- Population estimates such as 7 to 11 million Maya, or 1.25 to 3 million people in southwest Amazonia, are careful estimates built on assumptions. They are reasonable, but they are not counts.[255]
- The Aguada Fenix team's view that the plateau was built by communal labor, not by a ruling elite, is a fair reading of their evidence, not a proven fact.[256]
- Iron Age Jerusalem was inhabited and growing in the time the Bible assigns to the early kings, and it was destroyed in 586 BC, as 2 Kings and Jeremiah say.[257]
- The Siloam Tunnel dates to the Iron Age, and its excavators concluded that the biblical text is an accurate record of its construction.[258]

Still unresolved

- The date of Jericho's fall: 16th century BC by radiocarbon, about 1400 BC by one reading of the pottery and scarabs.[259]

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[253] Giacomo Vinci, Federica Vanzani, Alessandro Fontana, and Stefano Campana, "LiDAR Applications in Archaeology: A Systematic Review", Archaeological Prospection 32, no. 1 (2025): 81-101. https://doi.org/10.1002/arp.1931. Accessed November 18, 2026. Johanna Regev, Yuval Gadot, Joe Uziel, Ortal Chalaf, and others, "Radiocarbon Chronology of Iron Age Jerusalem Reveals Calibration Offsets and Architectural Developments", Proceedings of the National Academy of Sciences 121, no. 19 (May 7, 2024): e2321024121. https://doi.org/10.1073/pnas.2321024121. Accessed November 18, 2026. Yoav Vaknin, Ron Shaar, Erez Ben-Yosef, Oded Lipschits, and others, "Archaeomagnetic Dating of the Outer Revetment Wall at Tel Lachish", Tel Aviv 51, no. 1 (2024): 73-94. https://doi.org/10.1080/03344355.2024.2327801. Accessed November 18, 2026.

[254] Scientific Reports, "Retraction Note: A Tunguska Sized Airburst Destroyed Tall el-Hammam a Middle Bronze Age City in the Jordan Valley near the Dead Sea", Scientific Reports 15 (2025): 14291. https://doi.org/10.1038/s41598-025-99265-5. Accessed November 18, 2026. Archaeological Prospection, "Retraction: Geo-Archaeological Prospecting of Gunung Padang Buried Prehistoric Pyramid in West Java, Indonesia", Archaeological Prospection 31, no. 2 (2024): 199. https://doi.org/10.1002/arp.1932. Accessed November 18, 2026.

[255] Marcello A. Canuto, Francisco Estrada-Belli, Thomas G. Garrison, Stephen D. Houston, and others, "Ancient Lowland Maya Complexity as Revealed by Airborne Laser Scanning of Northern Guatemala", Science 361, no. 6409 (September 28, 2018): eaau0137. Accepted manuscript read through the National Science Foundation Public Access Repository, record 10097677. https://doi.org/10.1126/science.aau0137. Accessed November 18, 2026. Martti H. Parssinen, Risto Kalliola, Alceu Ranzi, Eetu Puttonen, and others, "Over 20,000 Precolonial Earthworks in the Southwest Amazonia", Nature 657, no. 8131 (2026): 420-425. https://doi.org/10.1038/s41586-026-10835-7. Accessed November 18, 2026.

[256] Takeshi Inomata, Daniela Triadan, Veronica A. Vazquez Lopez, and others, "Monumental Architecture at Aguada Fenix and the Rise of Maya Civilization", Nature 582, no. 7813 (2020): 530-533. https://doi.org/10.1038/s41586-020-2343-4. Accessed November 18, 2026.

[257] Johanna Regev, Yuval Gadot, Joe Uziel, Ortal Chalaf, and others, "Radiocarbon Chronology of Iron Age Jerusalem Reveals Calibration Offsets and Architectural Developments", Proceedings of the National Academy of Sciences 121, no. 19 (May 7, 2024): e2321024121. https://doi.org/10.1073/pnas.2321024121. Accessed November 18, 2026.

[258] Amos Frumkin, Aryeh Shimron, and Jeff Rosenbaum, "Radiometric Dating of the Siloam Tunnel, Jerusalem", Nature 425, no. 6954 (2003): 169-171. https://doi.org/10.1038/nature01875. Accessed November 18, 2026.

[259] Hendrik J. Bruins and Johannes van der Plicht, "Tell es-Sultan (Jericho): Radiocarbon Results of Short-Lived Cereal and Multiyear Charcoal Samples from the End of the Middle Bronze Age", Radiocarbon 37, no. 2 (1995): 213-220. https://doi.org/10.1017/s0033822200030666. Accessed November 18, 2026. Titus Kennedy, "The Bronze Age Destruction of Jericho, Archaeology, and the Book of Joshua", Religions 14, no. 6 (June 15, 2023): 796. https://doi.org/10.3390/rel14060796. Accessed November 18, 2026.

- Who destroyed Late Bronze Age Hazor, and when.[260]
- Whether key building layers at Megiddo, Hazor and Gezer belong to the 10th or the 9th century BC.[261]
- The dates of some fortifications at Lachish.[262]
- Who lived at Qumran.[263]

The bottom line

LiDAR has changed archaeology by showing that many ancient peoples built larger, more connected and more engineered landscapes than anyone could see from the ground. It is a tool for seeing shape. It does not tell us who built a place, when, or why, and it has so far added little in the lands of the Bible.

For a reader of the Bible, the honest picture is encouraging in its own way. The places the Bible names are real, and careful digging and dating continue to test them. In Jerusalem, Lachish and the Siloam Tunnel, the physical evidence lines up well with the biblical record. At Jericho and Hazor, the evidence is real but its meaning is still argued. The big popular claims, such as lost tribes building Maya cities, Atlantis, or drowned coastlines proving the Flood, do not hold up. They are not needed either. The Bible does not depend on them, and the truth is never served by arguments that cannot stand up to a fair test.

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[260] Shlomit Bechar, Amnon Ben-Tor, Ido Wachtel, and Daphna Ben-Tor, "The Destruction of Late Bronze Age Hazor", Agypten und Levante 31 (2021): 45-74. https://doi.org/10.1553/aeundl31s45. Accessed November 18, 2026. Sharon Zuckerman, "Anatomy of a Destruction: Crisis Architecture, Termination Rituals and the Fall of Canaanite Hazor", Journal of Mediterranean Archaeology 20, no. 1 (2007). https://doi.org/10.1558/jmea.v20i1.3. Accessed November 18, 2026.

[261] Ilan Sharon, Ayelet Gilboa, A. J. Timothy Jull, and Elisabetta Boaretto, "Report on the First Stage of the Iron Age Dating Project in Israel: Supporting a Low Chronology", Radiocarbon 49, no. 1 (2007): 1-46. https://doi.org/10.1017/s0033822200041886. Accessed November 18, 2026. Amihai Mazar and Christopher Bronk Ramsey, "14C Dates and the Iron Age Chronology of Israel: A Response", Radiocarbon 50, no. 2 (2008): 159-180. https://doi.org/10.1017/s0033822200033506. Accessed November 18, 2026.

[262] Israel Finkelstein, "Iron Age Chronology and Biblical History Rejoinders: The Late Bronze/Iron Age Transition, Tel Eton and Lachish", Palestine Exploration Quarterly 152, no. 2 (2020): 82-93. https://doi.org/10.1080/00310328.2020.1738145. Accessed November 18, 2026. Yosef Garfinkel, "Iron Age Towers and the Middle Bronze Age Fortifications of Lachish: A Reply to Vaknin et al.'s Archaeomagnetic Study", Jerusalem Journal of Archaeology 6 (2024): 46-57. https://doi.org/10.52486/01.00006.3. Accessed November 18, 2026.

[263] M. Tang and Nanette Scott Goldman, "Review of Khirbet Qumran and Ain-Feshkha, Roland de Vaux's Excavations (1951-1956), IIIA in English Translation", Journal of Eastern Mediterranean Archaeology and Heritage Studies 13, no. 3 (2025): 340-345. https://doi.org/10.5325/jeasmedarcherstu.13.3.0340. Accessed November 18, 2026.

Appendix A: Chronology

This chronology combines the main events in this book. Dates for ancient events are approximate and come from the cited studies. BC and AD are used throughout.

Date	Event	Source
About 29,000 to 21,000 years ago	Sea level falls slowly to about 134 m below today	[264]
About 16,500 to 8,200 years ago	Main rise in sea level as ice sheets melt	[265]
About 10,500 BC	Earliest deposits at Tell es-Sultan (Jericho)	[266]
No later than about 8,500 and 7,000 years ago	Murujuga sites drowned by rising seas	[267]
About 7,150 years ago	Proposed Black Sea flood (disputed)	[268]
About 3000 BC	Early henge at Stonehenge	[269]
About 2500 BC	Stone circle at Stonehenge	[270]
About 2000 to 1500 BC	Dead Sea low; southern basin dry	[271]
Beginning of the 19th century BC	Public building works in Jerusalem	[272]
About 3,700 to 3,100 years	Poverty Point built and used	[273]

[264] Kurt Lambeck, Helene Rouby, Anthony Purcell, Yiying Sun, and Malcolm Sambridge, "Sea Level and Global Ice Volumes from the Last Glacial Maximum to the Holocene", Proceedings of the National Academy of Sciences 111, no. 43 (2014): 15296-15303. https://doi.org/10.1073/pnas.1411762111. Accessed November 18, 2026.

[265] Kurt Lambeck, Helene Rouby, Anthony Purcell, Yiying Sun, and Malcolm Sambridge, "Sea Level and Global Ice Volumes from the Last Glacial Maximum to the Holocene", Proceedings of the National Academy of Sciences 111, no. 43 (2014): 15296-15303. https://doi.org/10.1073/pnas.1411762111. Accessed November 18, 2026.

[266] UNESCO World Heritage Centre, "Ancient Jericho/Tell es-Sultan (list entry 1687)", inscribed 2023. https://whc.unesco.org/en/list/1687/. Accessed November 18, 2026.

[267] Jonathan Benjamin, Michael O'Leary, Jo McDonald, Chelsea Wiseman, and others, "Aboriginal Artefacts on the Continental Shelf Reveal Ancient Drowned Cultural Landscapes in Northwest Australia", PLoS ONE 15, no. 7 (2020): e0233912; correction published 2023 as e0287490. https://doi.org/10.1371/journal.pone.0233912. Accessed November 18, 2026.

[268] William B. F. Ryan, Walter C. Pitman, Candace O. Major, and others, "An Abrupt Drowning of the Black Sea Shelf", Marine Geology 138, no. 1-2 (1997): 119-126. https://doi.org/10.1016/s0025-3227(97)00007-8. Accessed November 18, 2026. Naci Gorur, M. Namik Cagatay, Omer Emre, and others, "Is the Abrupt Drowning of the Black Sea Shelf at 7150 yr BP a Myth?", Marine Geology 176, no. 1-4 (2001): 65-73. https://doi.org/10.1016/s0025-3227(01)00148-7. Accessed November 18, 2026.

[269] English Heritage, "History of Stonehenge", web page, read November 18, 2026. https://www.english-heritage.org.uk/visit/places/stonehenge/history-and-stories/history/. Accessed November 18, 2026.

[270] English Heritage, "History of Stonehenge", web page, read November 18, 2026. https://www.english-heritage.org.uk/visit/places/stonehenge/history-and-stories/history/. Accessed November 18, 2026.

[271] Amos Frumkin and Yoel Elitzur, "Historic Dead Sea Level Fluctuations Calibrated with Geological and Archaeological Evidence", Quaternary Research 57, no. 3 (2002): 334-342. https://doi.org/10.1006/qres.2002.2330. Accessed November 18, 2026.

[272] Johanna Regev, Yuval Gadot, Helena Roth, Joe Uziel, and others, "Middle Bronze Age Jerusalem: Recalculating Its Character and Chronology", Radiocarbon 63, no. 3 (2021): 853-883. https://doi.org/10.1017/rdc.2021.21. Accessed November 18, 2026.

Date	Event	Source
ago		
16th century BC	Radiocarbon date of Jericho's Middle Bronze Age destruction	[274]
About 1400 BC	Kennedy's proposed date for Jericho's destruction (disputed)	[275]
About 1500 to 1200 BC	Dead Sea high	[276]
Late Bronze Age	Destruction of Canaanite Hazor (date and cause disputed)	[277]
About 1000 BC	Ceibal's ceremonial complex; start of settled life there	[278]
1000 to 800 BC	Aguada Fenix plateau built	[279]
About 1000 BC	Olive pits dated at Khirbet Qeiyafa	[280]
Second half of the 10th century BC	Proposed date of a city wall at Lachish (disputed)	[281]
By the 9th century BC	Jerusalem expands westward	[282]
About 800 BC	Siloam Pool dam	[283]
About 760 BC	Earthquake destruction layer in Jerusalem	[284]

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Date	Event	Source
Late 8th century BC	Assyria exiles the northern kingdom of Israel (2 Kings 17:6)	Scripture
701 BC	Assyrian siege of Lachish; tower burned	[285]
Iron Age II	Siloam Tunnel cut	[286]
586 BC	Babylonian destruction of Jerusalem	[287]
About 500 BC to AD 300-600	Upano Valley occupied	[288]
1st century BC to 4th century AD	Roman structures at Baiae	[289]
Before AD 150	Probable founding of Valeriana's E-Group	[290]
About AD 100 to 300	Proposed population peak in southwest Amazonia	[291]
About AD 500 to 1400	Casarabe culture	[292]
AD 600 to 700	Caracol at its height	[293]
AD 650 to 800	Late Classic Maya peak in northern Guatemala	[294]

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Date	Event	Source
AD 770 to 835	Reign of Jayavarman II; Mahendraparvata	[295]
8th to 11th century AD	Tugunbulak and Tashbulak on the Silk Roads	[296]
9th to 15th century AD	Angkor	[297]
1650	Menasseh ben Israel's *Hope of Israel*	[298]
About 1790 to 1850	Height of the "Hebraic Indian" idea in the United States	[299]
1882	Donnelly's *Atlantis*	[300]
1930 to 1936; 1952 to 1958	Garstang and Kenyon excavate Jericho	[301]
1932	Stern proposes Mahendraparvata on Phnom Kulen	[302]
1937	Caracol rediscovered	[303]
1951 to 1956	De Vaux excavates Qumran	[304]
1998 to 2000	USGS LiDAR in Honduras after Hurricane Mitch	[305]

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Date	Event	Source
2005	Stonehenge LiDAR study published	[306]
2012	LiDAR at Angkor, Phnom Kulen and the Mosquitia	[307]
2013	Forest-monitoring LiDAR over Campeche	[308]
2015	975 km2 Cambodian campaign	[309]
2016	PACUNAM survey flown	[310]
2018	PACUNAM and Ceibal results published	[311]
2020	Aguada Fenix and Murujuga published	[312]
2021	Tall el-Hammam airburst paper	[313]
2022	Casarabe published; *Ancient Apocalypse* released	[314]

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Date	Event	Source
	November 10	
2023	Jericho inscribed as World Heritage; Gunung Padang paper published October 20	[315]
2024	Gunung Padang paper retracted; Jerusalem radiocarbon study; Valeriana, Upano, Tugunbulak published	[316]
2025	Tall el-Hammam paper retracted; Baiae LiDAR flight June 5; Siloam dam dated	[317]
2026	Southwest Amazonia study	[318]

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Appendix B: The Pasted Draft, Claim by Claim

This table maps each major claim from the pasted draft that I could trace to the source that settles it, with my verdict. The draft's own citations were broken placeholders, so every source here is one I found and read.

#	Draft's claim	Verdict	Source and note
1	2016 LiDAR covered 2,144 km2 of northern Guatemala and forces a reevaluation of Maya demography, farming and economy	True	[319]
2	Lowland Maya civilization lasted about 1000 BC to AD 1500	True	[320]
3	Ceibal LiDAR covered 470 km2 and recorded 10,208 structures	True	[321]
4	Ceibal was the primary ceremonial complex at the start of settled life, about 1000 BC	True	[322]
5	Aguada Fenix: plateau 1,400 m long, 10 to 15 m high, nine causeways, built 1000 to 800 BC	True	[323]
6	Aguada Fenix is the oldest monumental construction in the Maya area and probably lacked marked inequality	True (the second part is the authors' interpretation)	[324]
7	Angkor LiDAR revealed a formally planned urban landscape integrated with Angkor Wat	True	[325]

[319] Marcello A. Canuto, Francisco Estrada-Belli, Thomas G. Garrison, Stephen D. Houston, and others, "Ancient Lowland Maya Complexity as Revealed by Airborne Laser Scanning of Northern Guatemala", Science 361, no. 6409 (September 28, 2018): eaau0137. Accepted manuscript read through the National Science Foundation Public Access Repository, record 10097677. https://doi.org/10.1126/science.aau0137. Accessed November 18, 2026.

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#	Draft's claim	Verdict	Source and note
8	Angkor's decline involved infrastructure, subsistence and climate	True (the authors' argument)	[326]
9	LiDAR "confirmed" Mahendraparvata was on Phnom Kulen	Partly true: inscriptions suggest the identification; LiDAR defined the plan	[327]
10	Mahendraparvata covered about 40 to 50 km2; dates consistent with Jayavarman II, AD 770 to 835	True	[328]
11	Casarabe: four-tier system; sites of 147 and 315 ha; pyramids up to 22 m; AD 500 to 1400	True	[329]
12	Casarabe: 24 smaller sites, 15 previously known; Cotoca and Landivar already known	True	[330]
13	Casarabe sites lived in year-round by maize farmers who also hunted and fished	True	[331]
14	LiDAR shows Poverty Point's mounds, six ridges and plaza; its people were foragers	True	[332]
1	Poverty Point's earthworks were built rapidly;	True	[333]

[326] Damian H. Evans, Roland J. Fletcher, Christophe Pottier, Jean-Baptiste Chevance, and others, "Uncovering Archaeological Landscapes at Angkor Using Lidar", Proceedings of the National Academy of Sciences 110, no. 31 (2013): 12595-12600. https://doi.org/10.1073/pnas.1306539110. Accessed November 18, 2026.

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#	Draft's claim	Verdict	Source and note
5	related mound building came earlier elsewhere		
16	Stonehenge work began about 5,000 years ago; stone circle about 2500 BC	True	[334]
17	LiDAR clarified the Stonehenge landscape	True	[335]
18	Apalachee Bay: semi-automated method; at least four new sites	True	[336]
19	One third of Australia's land was drowned	True	[337]
20	Baiae: 2025 bathymetric LiDAR at 1 m2 or better showed sea walls, harbors and villas	True; the flight's main goal was seagrass mapping	[338]
21	Baiae sank through volcanic activity and subsidence	True	[339]
22	Lesson 1: ancient cities were bigger and more spread out than assumed	True	Chapter 10
23	Lesson 2: infrastructure is the hidden story	True	Chapter 10
24	Lesson 3: big monuments without rigid hierarchy	Partly true	Chapter 10
2	Lesson 4: underwater LiDAR is a new frontier	True, within limits	[340]

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#	Draft's claim	Verdict	Source and note
5		of water clarity	
26	City of David: excavation, not LiDAR, is the main tool	True	[341]
27	Dead Sea levels reconstructed using biblical records calibrated with geology and archaeology	True	[342]
28	This does not prove the Sodom story	True	[343]
29	Drowned sites do not prove Noah's Flood, Atlantis or lost tribes	True	Chapters 19 to 21
30	Claims of lost tribes, Flood proof, biblical place names abroad and judgment proof should be rejected	True	Chapter 22 table

Summary: 30 claims checked: 28 True, 2 Partly true (Mahendraparvata and lesson 3), 0 False. A few further claims in the draft could not be traced to any source and are left out of this book.

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Appendix C: Visual Credits

Charts and maps in this book

All four charts and maps in this book were made by the author from the data tables printed beside them. No photographs are reproduced. Each data table names its sources.

Figure	What it shows	Data source	Credit
Chart 1	Area covered by major LiDAR surveys	[344]	Chart by Andrew Dominguez
Map 1	Locations of the sites in this book	Site locations approximate, from the cited papers	Map by Andrew Dominguez. Coastlines from the GSHHG coastline data distributed with the open-source Basemap toolkit.
Chart 2	When each site was in use, alongside major periods of biblical history	Dates from the papers cited in Appendix A	Chart by Andrew Dominguez
Chart 3	Where published LiDAR studies come from	[345]	Chart by Andrew Dominguez

Open-license figures for a future edition

These are candidate images from the original studies that could be added to a future edition or to the website. I did not embed them in this edition. Each license statement comes from the publisher's article page or published policy. **Before using any of them, open the article page, confirm the figure number and its license, and use the credit line exactly.** A figure inside an open-access article can carry a separate credit, for example a base map from another provider.

[344] Marcello A. Canuto, Francisco Estrada-Belli, Thomas G. Garrison, Stephen D. Houston, and others, "Ancient Lowland Maya Complexity as Revealed by Airborne Laser Scanning of Northern Guatemala", Science 361, no. 6409 (September 28, 2018): eaau0137. Accepted manuscript read through the National Science Foundation Public Access Repository, record 10097677. https://doi.org/10.1126/science.aau0137. Accessed November 18, 2026. Takeshi Inomata, Daniela Triadan, Flory Pinzon, and others, "Archaeological Application of Airborne LiDAR to Examine Social Changes in the Ceibal Region of the Maya Lowlands", PLoS ONE 13, no. 2 (February 21, 2018): e0191619. https://doi.org/10.1371/journal.pone.0191619. Accessed November 18, 2026. Jean-Baptiste Chevance, Damian Evans, Nina Hofer, Sakada Sakhoeun, and Ratha Chhean, "Mahendraparvata: An Early Angkor-Period Capital Defined through Airborne Laser Scanning at Phnom Kulen", Antiquity 93, no. 371 (October 2019): 1303-1321, published online October 15, 2019; correction in Antiquity 94, no. 376 (2020): 1123. https://doi.org/10.15184/aqy.2019.133. Accessed November 18, 2026. Luke Auld-Thomas, Marcello A. Canuto, Adriana Velazquez Morlet, Francisco Estrada-Belli, and others, "Running Out of Empty Space: Environmental Lidar and the Crowded Ancient Landscape of Campeche, Mexico", Antiquity 98, no. 401 (October 2024): 1340-1358, published online October 29, 2024. https://doi.org/10.15184/aqy.2024.148. Accessed November 18, 2026.

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Candidate	Creator	Item	License	Suggested credit	Place
LiDAR maps of the Ceibal region	Inomata et al. 2018	https://doi.org/10.1371/journal.pone.0191619	Creative Commons Attribution 4.0 (CC BY 4.0), standard for *PLoS ONE*	Inomata et al., PLoS ONE 13(2): e0191619, CC BY 4.0	Ch 3
Mosquitia settlement maps	Fisher et al. 2016	https://doi.org/10.1371/journal.pone.0159890	CC BY 4.0, standard for *PLoS ONE*	Fisher et al., PLoS ONE 11(8): e0159890, CC BY 4.0	Ch 6
Murujuga underwater site maps and photos	Benjamin et al. 2020	https://doi.org/10.1371/journal.pone.0233912	CC BY 4.0, standard for *PLoS ONE*	Benjamin et al., PLoS ONE 15(7): e0233912, CC BY 4.0	Ch 8
Mahendraparvata city plan	Chevance et al. 2019	https://doi.org/10.15184/aqy.2019.133	CC BY 4.0, as stated on the article page	Chevance et al., Antiquity 93(371), CC BY 4.0	Ch 4
Valeriana LiDAR images	Auld-Thomas et al. 2024	https://doi.org/10.15184/aqy.2024.148	CC BY 4.0, as stated on the article page	Auld-Thomas et al., Antiquity 98(401), CC BY 4.0	Ch 3
Apalachee Bay LiDAR examples	Cook Hale et al. 2023	https://doi.org/10.3390/heritage6020051	CC BY, standard for MDPI journals; confirm	Cook Hale et al., Heritage 6(2), CC BY	Ch 8
Baiae seabed maps	Abate et al. 2024	https://doi.org/10.3390/rs16111908	CC BY, standard for MDPI journals; confirm	Abate et al., Remote Sensing 16(11), CC BY	Ch 8
Casarabe LiDAR images	Prumers et al. 2022	https://doi.org/10.1038/s41586-022-04780-4	**Not confirmed.** Check the article page; permission may be needed	To be confirmed	Ch 5
LiDAR explainer graphics	NOAA	https://oceanservice.noaa.gov/facts/lidar.html	US government works are generally public domain, but individual images can carry other credits. **Confirm each image.**	NOAA National Ocean Service	Ch 1

Alt text for each candidate should describe what the image shows in one sentence, for example: "Shaded LiDAR map showing rectangular house mounds and straight causeways beneath forest in northern Guatemala."

Appendix D: Glossary

- **Archaeomagnetic dating:** Dating burned material by reading the record of the earth's magnetic field locked into it when it cooled.
- **Bare-earth model:** A map of the ground surface with trees and buildings digitally removed. Also called a digital terrain model or digital elevation model.
- **Bathymetric LiDAR:** LiDAR that uses green light to measure the bottom of shallow, clear water.
- **Bayesian model:** A statistical method that combines many radiocarbon dates with what is known about the order of layers to narrow the date range.
- **Bradyseism:** The slow rising and sinking of the ground in a volcanic area, as at Baiae.
- **Causeway:** A raised road or path.
- **E-Group:** A Maya arrangement of buildings associated with tracking the sun.
- **Ground-truthing:** Checking on the ground what a remote map seems to show.
- **Hectare:** 10,000 square meters, about 2.5 acres.
- **Holocene:** The geological period since the end of the last Ice Age, about 11,700 years ago.
- **Iron Age:** In the Levant, roughly 1200 to 586 BC, the period of Israel's judges and kings.
- **Late Bronze Age:** In the Levant, roughly the period before the Iron Age, including the time often proposed for Joshua.
- **Levant:** The lands along the eastern Mediterranean, including Israel, the Palestinian territories, Jordan, Lebanon and Syria.
- **LiDAR:** Light Detection and Ranging. Mapping with laser pulses.
- **Low-density urbanism:** A spread-out city in which homes, fields, ponds and roads are woven together over a large area.
- **Pleistocene:** The geological period of the Ice Ages, before the Holocene.
- **Point cloud:** The millions of measured points that LiDAR produces.
- **Radiocarbon dating:** Dating once-living material by measuring the decay of carbon-14.
- **Retraction:** A journal's formal withdrawal of a published paper.
- **Sonar:** Mapping with sound, used where water is too deep or murky for light.
- **Stela (plural stelae):** An upright carved stone monument.
- **Tel (tell):** A mound built up by many layers of a city rebuilt on the same spot.

Appendix E: Full Source List

Every source cited in this book is listed here once, grouped by the five tiers explained in "How I Checked the Facts." Sources were read on November 18, 2026.

Tier 1: Primary and official sources

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