

Archaeology at Meadowcroft Rockshelter GigaPan Lessons

An exploration of archaeological methodology at Meadowcroft Rockshelter

Summary: This activity guides learners through an exploration of the **archaeological** process employed at Meadowcroft Rockshelter using the interactive *First Peoples* GigaPan images. The lesson walks students through the discovery of the site, the establishment of the University of Pittsburgh **field school**, the organization of the site to preserve **context, geoarchaeological methodology**, the difference between natural and **cultural evidence**, the documentation of data, and the construction of a **chronology** using relative and scientific dating.

Through the exploration students will:

- Define **archaeology**
- Identify and define the two categories of **cultural evidence**: **artifacts** and **features**
- Explore how **archaeologists** use a **grid system** to document the **context** of **artifacts** and **features**
- Explore how **archaeologists** create a **chronology** for the site using **relative dating** (stratigraphy and the **Law of Superposition**) and **scientific dating** (**radiocarbon assay**)
- Discover the purpose of the **field school** and **field lab**
- Recognize the **archaeological methodologies** and **excavation** process as state-of-the-art

Timing: 40 minutes

Materials:

Writing Instruments
Paper
Internet Access

Optional Reference Materials:

*First Peoples Teachers Guide to
Archaeology*

Stratigraphic Profile of Meadowcroft
Rockshelter Table

Michael Collins, [Meadowcroft: Shelter in
a Storm](#)” article

J.M. Adovasio, “[The Great Journey](#)”
article

James B. Richardson, III, “[Peopling the
New World: The View From South
America](#)” article

J.M. Adovasio and Jake Page, “[Searching
for the First Americans: a 500 Year
Quest](#)” article

Terms

Archaeology
Artifact
Closed-Site
Context
Cultural evidence
Cultural features
Datum
Dripline
Excavation
Feature
Field Designation Tags
Field Lab
Field School
Geoarchaeology
Grid System
Methodology
Multi-disciplinary
Strata

Concepts

Stratigraphy/ Law of Superposition
Relative Dating
Scientific Dating

Identification Significance

Albert Miller
Meadowcroft Rockshelter
Meadowcroft Village
Dr. James Adovasio

Background Information

In 1973, Dr. James Adovasio established a **field school** at Meadowcroft Rockshelter for the Archaeological Resource Program at the University of Pittsburgh. The project was supported by extraordinary funding, which enabled a comprehensive, long-term, **multi-disciplinary excavation**.

Generally, the purpose of an **archaeological excavation** is to recover evidence that will enable **archaeologists** to draw conclusions about patterns of human behavior at the site. To achieve this goal, Meadowcroft's **archaeologists** devoted much of their **excavation** work to mapping a site to preserve the **context** of any data that is recovered. A **datum**, **grid system**, and **field tags** provide means of documenting the horizontal and vertical location of materials so that the resulting map accurately represents the living floor of a site at a specific time. The site also utilized an early computer terminal, connected by phone lines to a mainframe at the University of Pittsburgh, for the systematic entry of all data.

In the long run, **archaeologists** are interested in **chronology**. **Stratigraphy** is the most basic tool for understanding the passage of time at a site. **Stratigraphy** is based on a geologic concept that describes how sediments are arranged at a site. The basic premise is that as people occupy a site, they drop **artifacts** or leave evidence of activity areas (**features**). Over time, sediment buries this ground surface without disrupting the evidence. **Archaeologists** at Meadowcroft found 11 occupational floors stacked on top of one another, marking the site as relatively rare in the **archaeological** world. **Archaeologists** use the **Law of Superposition** to illustrate how **stratigraphy** establishes **chronology**: sediments or materials that are deepest are also oldest, sediments that are located on the surface are newest.

Ultimately, **archaeologists** correlate the site's **chronology** with the maps to understand patterns of continuity and change in the prehistoric world. At Meadowcroft, **archaeologists** found a continuous occupational record of every known prehistoric cultural group in the northeastern United States. Meadowcroft Rockshelter makes an excellent case study for understanding the process of **archaeology** because it was meticulously excavated using the best stratigraphic **methodology** available at the time. Ultimately, the endeavor spread over 6 field seasons consisting of 417 **excavation** days that lasted 12 to 14 hour each. When the project concluded in 1979, tremendous amounts of cultural, geological, and **ecological**

data had been recovered from the site.

To this day, nearly 40 years later, the **excavations** are still widely considered to be state-of-the-art.

Procedure:

1. Define **archaeology** or ask students if they can define **archaeology**. If you have not already done so, provide an introduction to Meadowcroft Rockshelter, identifying the site, explaining its significance, and why you are studying it.
2. Conduct an introductory exercise; one possible activity suggestion is offered below. **Lesson Introduction Activity:** Project the Front Image for one minute. Ask students to write down everything they see that might involve **archaeology**. Review student observations. Ask what they think they are seeing from an **archaeological** standpoint. Use this exercise to launch the following exploration:

Archaeological Methodology GigaMap						
GigaPan Image	Tab	Point #	Title	Content Description	Multimedia/ Visual	Transitions
Front	Archaeology	2	Groundhog Hole	Albert Miller , local farmer and founder of Meadowcroft Village , found the first evidence of a prehistoric occupation of the Rockshelter when he investigated a burrow along the cliff face. This happened in 1955. He preserved the site for 18 years until Dr. James Adovasio began a proper excavation .	A scan of the journal entry written by Albert Miller upon making his discovery.	Albert Miller employed amateur archaeological techniques to investigate the Rockshelter. He realized that his findings were significant and that any excavation needed to follow established procedures to preserve any cultural evidence ... Dr. Adovasio, an archaeologist at the University of Pittsburgh, had prior experience with closed-site archaeological methodologies . . .
Front	Archaeology	3	Tool Box	The excavation was established as a field school for the training of	1m12s video on the use of the site as an	The recovery of cultural evidence is a painstaking process . . .

				archaeologists. Students were at the site to learn how to properly excavate a site, document the findings, and draw conclusions from the evidence recovered.	archaeological field school.	
Front	Archaeology	4	Historic Firepit	The cultural evidence archaeologists find can be broken into two categories: cultural features , and artifacts . Artifacts show what people had with them while visiting the Rockshelter. Features are an important clue as to what activities people were undertaking while here. Combining the two lines of evidence gives a glimpse of the lives of the occupants.	47s video on the site as it was in 1973.	Artifacts and features do not mean anything if their context is lost.
Front	Archaeology	5	Rear Stakes	A proper grid system is paramount to the organization of the data being recovered through excavation . The context in which artifacts and features are found is often as important as what is found.	A map of the excavation grid used at the site.	Once they establish a way to organize the site for excavation , archaeologists must determine where to dig . . .
Front	Archaeology	6	Wooden Stake	Finding the usable dry	31s video on the	As they dig and encounter information,

				area was an important early step in the excavation . Tracing the dripline using carbonate analyses of the soil allowed archaeologists to identify areas that were most likely to have cultural remains.	first trench dug at the site.	archaeologists attach field designation tags . . .
Front	Archaeology	7	10cm Tags	The field designation tags around the site represent the locations of various features , both natural (strata , burrows) and cultural (pits, firefloors, postmolds)	23s video on the use of the white tags.	Slowly, the grid system expands and the field designation tags increase as the prehistoric floors emerged . . .
Front	Archaeology	8	5 Meter Line	Archaeologists continue to expand the excavation grid as the digging continues. The east-west axis that this string represents is used in conjunction with a plumb bob to determine the context of findings.	No image/ multimedia	This process generates a lot of data that has to be organized . . .
Front	Archaeology	9	Site Office	The Meadowcroft excavation was one of the first sites to have a computer in the field lab .	24s clip on the innovation of the Meadowcroft Rockshelter excavation	New technologies are constantly being developed that will aid future archaeologists in their excavation and analysis . . .
Front	Archaeology	10	Unexcavated	Archaeology continues to develop better excavation techniques and analytical	50s video on what happens once the digging	Archaeology at Meadowcroft often took a geoarchaeological approach, which means that the scientists at the site used geography ,

				technologies. One-third of the site was left unexcavated for future study.	stops, and the future of the Meadowcroft Rockshelter.	geology , and ecology (among other disciplines) to explain the archaeological process . . .
Firestack	Archaeology	1	Tool Box	Archaeologists were not the only scientists that took part in the excavation . Other related fields were involved to figure out the history of the Rockshelter itself, and the environment people were interacting with.	1m 21s video on the multi-disciplinary approach to excavations .	Excavating Meadowcroft Rockshelter was a tedious process. In addition to recovering and documenting minute data, archaeologists sometimes had to do some heavy lifting . . .
Firestack	Archaeology	5	Drilled Rock	Held within the stratigraphy are rocks of various sizes that have fallen from the overhang or rear wall. Removing large pieces must be done with precision so that the context of the material around it is not disturbed. Drilling holes allows them to be broken into smaller parts for removal.		Archaeologists must also determine if evidence is cultural in origin. . .
Firestack	Archaeology	6	Deer Bone	Not everything found on an archaeological site is cultural in origin. Sometimes it can be hard to tell if an item is an artifact or an ecofact like this bone of a white-tailed deer.	This bone punch has evidence of being crafted into a tool.	Sometimes a piece of evidence can be used to understand several aspects of the site . . .

Firestack	Archaeology	7	Charcoal	Firepits and associated charcoal remains are extremely important to archaeology . The presence of a hearth is evidence of human occupation, its location within the stratigraphy relatively dates the occupation, and the charcoal can be absolutely dated using the radiocarbon method to find a date that the fire was burning.	1m 14s video on dating the cultural evidence .	However, the most important factor remains context . . .
Firestack	Archaeology	8	20W8N	Archaeologists establish a datum point at the start of an excavation . All material that is recovered from the site is measured horizontally and vertically from this point. Using set points for reference helps to keep data organized for post-dig analysis.		Context applies to elevations and regions as well. . .
Firestack	Archaeology	9	Elevation Pin	Not only is the depth that material is found recorded, but site elevations above sea level are also documented. This helps archaeologists compare sites across larger regions. For		Conclusion: Artifacts and features are just the “stuff” of archaeology - none of this mean anything without context . Archaeology is a destructive science because the process of excavating destroys the site. Archeologists only have one opportunity to employ the appropriate excavation process and the correct methodologies . At Meadowcroft, their care

				instance, because of this data we know that Paleoindian cultures through Pennsylvania preferred to camp and forage in upland situations along rivers and their smaller tributaries.		paid off. The process employed there are regarded as state-of-the-art even 40 years after the fact. Evidence from the site helps us understand prehistoric life not only at Meadowcroft Rockshelter, but throughout the region.
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Alternate Delivery Options:

- Use the GigaMap above to create a worksheet or scavenger hunt for your students. Give them time to explore the images on their own, completing their worksheets as they go.
- Provide an introduction to the theme and lesson. Randomly assign each student or group of students one of the points to investigate. They should prepare a short summary of what their point discusses. The teacher will then provide an introduction to the first point on the GigaMap and a transition. The student/ group that has the next point should raise their hands and present. Continue working around the room until all of the GigaPoints have been covered.
- Give students KWL charts to complete as you view the images. During the introduction have them record everything they Know about the image. Then ask them to write what they Want to know. After you view the images, ask them to write what they Learned. Address any questions that remain unanswered. What sources can students use to answer these questions?

Post-Activity Enrichment

- After the lesson ask students to write a reflection about the significance of **archaeology** at Meadowcroft Rockshelter. What do the students think are the most important take-aways about **archaeology**? What lessons from the **archaeological** process can they apply to other areas of their studies?
- Read the descriptions of Albert Miller's discovery and exploration of the Meadowcroft Rockshelter. What tools did he use? What techniques did he employ? What was he trying to learn? How does this differ from the tools and techniques **archaeologists** employ? Based on this, what is the goal of professional **archaeological excavation**?
- **Archaeology** and **anthropology** are social sciences that employ scientific **methodology**. Identify the steps of the scientific method for students. Ask students to write or draw what they think describes the stages of the **archaeological** method. How is **archaeology** similar and different than other sciences? What are the major questions **archaeologists** ask? What activities or evidence might **archaeologists** do or use to answer these questions?

- The **archaeological excavation** process can take a long time - at Meadowcroft the process was spread over 6 field seasons consisting of 417 **excavation** days that lasted 12 to 14 hour each (the **field school** operated from 1973 to 1979). However, the analysis of the materials takes even longer - many of the materials recovered from Meadowcroft are still being studied and analyzed, almost 40 *years* after the dig concluded. Have students read some of the published accounts of **archaeology** at Meadowcroft Rockshelter. Based on what they read, what evidence might need additional clarification? What future technologies might make it worthwhile to investigate the remaining one-third of the site?
- One end “product” of **archaeology** is the publication of a **monograph** of the **excavation**. A **monograph** is usually written from an **archaeological** perspective, explains the recovery, classification, analysis, and interpretation of the different types of evidence. Essentially it explains this is the process used, this is what was found, this is how we might interpret it. While many final reports have been published about Meadowcroft (some of them more complete than many **archaeological monographs**), there is not yet a **monograph**. Ask students to discuss why it is essential that a **monograph** be published. How might a **monograph** about Meadowcroft help further **archaeological** thought? How would it impact existing theories?

Other Archaeology GigaMaps to explore

The GigaMaps on the following pages offer additional **archaeological** themes and **sequences** to explore in the *First Peoples* GigaPan Images. The transitions column is left open so that you can build your own transitions or customize the table as a worksheet for student use.

They include:

Archaeological Context

Relative Dating

Absolute Dating

Archaeological Context GigaMap						
GigaPan Image	Tab	Point #	Title	Content Description	Multimedia/ Visual	Transitions
Front	Archaeology	5	Rear Stakes	A proper grid system is paramount to the organization of the data being recovered through excavation . The context in which artifacts and features are found is often as important as what it found.	A map of the excavation grid used at the site.	Most of time devoted to field work at an excavation is spent documenting the context of any evidence . . .Every find is marked with a field designation tag and mapped three dimensionally using the grid system .
Front	Archaeology	7	10cm Tags	The field designation tags around the site represent the locations of various features , both natural (strata , burrows) and cultural (pits, firefloors, postmolds)	23s video on the use of the white tags.	Archaeologists made extensive field notes about their work and findings. They also input much of this data into a computer . . .
Front	Archaeology	9	Site Office	The Meadowcroft excavation was one of the first sites to have a computer in the field lab .	24s clip on the innovation of the Meadowcroft Rockshelter excavation	As they excavate vertically, archaeologists must look for variations in the composition of the sediments they are removing; this can indicate they are approaching another stratigraphic layer . . .
Firestack	Archaeology	3	East Face	The physical characteristics of a stratum are called its matrix , and can vary greatly depending on the depositional mode and source material. Those differences can clearly be seen in this photograph of the East face taken in 1976.	A photograph taken in 1976 of the east wall's stratigraphy	Studying the matrix can also help archaeologists understand the context of events that disrupted the stratigraphy , such as the digging of a hole . . .

Firestack	Archaeology	4	Post-mold	By investigating which strata are broken by the hole, and which stratum provided the fill archaeologists can determine a relative age of the hole.	A photograph taken of a post mold found at this location.	Context can also help archaeologists understand the origins of evidence: for instance, many of the floral and faunal remains could have been dropped by humans or animals . . .
Upper	Ecology	3	Mollusk Shell	Archaeologists must consider the context of floral and faunal remains: both animals and people left deposits of these materials in the Rockshelter. Mussel shells were a byproduct of human foodways.		Conclusion: The context of an artifact or feature is as important as the evidence itself. Context paints a more complete picture of cultural activity during the prehistoric past.

Archaeology- Relative Dating GigaMap						
GigaPan Image	Tab	Point #	Title	Content Description	Multimedia/ Visual	
Front	Geology	1	Rear Wall	The stone of the Rockshelter was laid in multiple sequences during the Pennsylvania Age of the Carboniferous period. The strata that this created was what allowed the reentrant to form and create the Rockshelter.	A cross-section of the Meadowcroft Rockshelter sandstone showing its stratigraphy .	
Front	Geology	4	Western Profile	Attrition and Sheetwash deposited layer upon layer of sediments on the floor of the Rockshelter, burying evidence as it built up the site's stratigraphy .	22s video on the sedimentation of the Rockshelter.	
Firestack	Archaeology	3	East Face	The physical characteristics of a stratum are called its matrix , and can vary greatly depending on the depositional mode and source material. Those differences can clearly be seen in this photograph of the East face taken in 1976.	A photograph taken in 1976 of the east wall's stratigraphy	
Firestack	Archaeology	7	Charcoal	Firepits and associated charcoal remains are extremely important to archaeology. The presence	1m 14s video on dating the cultural evidence .	

				of a hearth is evidence of human occupation, its location within the stratigraphy relatively dates the occupation, and the charcoal can be absolutely dated using the radiocarbon method to find a date that the fire was burning.		
Firestack	Archaeology	4	Post-mold	When people dig a hole, regardless of size, it disturbs the natural stratigraphy , leaving this disruption as evidence of the activity. This hole was dug for an unknown reason.	A photograph taken of a post mold found at this location.	
Upper	Archaeology	1	Date Tags	The Meadowcroft deposits are the most complete archaeological sequence of culture in North America, and possibly the world. The stratigraphy stretches from the historic period back into prehistoric times some 16,000 radiocarbon years ago. Notice that the AD 1265 tag is well below AD 1775, thanks to the Law of Superposition .	1m 8s video on the scope of the Meadowcroft Rockshelter.	
Lower	Culture	2	Stratum XI	The top layer of the site houses historic materials such as glass and metal.	Photograph taken of the site before excavations	

					began in 1973.	
Lower	Archaeology	1	Deep Hole	The Law of Superposition states that deeper strata are older than those above. This means that as archaeologists dig down, they are moving back in time. Meadowcroft's sediments offers glimpses into life over a very long time.	48s video on the lower deposits of the Rockshelter.	
Lower	Culture	7	Stratum II a	The lower unit of II houses the oldest materials recovered. Stone (chert) seems to be the medium of choice for tool construction, but perishable materials like wood and bone can disappear from the archaeological record through decay.	Lithic materials recovered from stratum IIa. From left to right: the Miller Lanceolate point, a prismatic blade, utilized flakes, a Mungai knife.	

Archaeology- Absolute Dating GigaMap						
GigaPan Image	Tab	Point #	Title	Content Description	Multimedia/ Visual	
Firestack	Archaeology	7	Charcoal	Firepits and associated charcoal remains are extremely important to archaeology . The presence of a hearth is evidence of human occupation, its location within the stratigraphy relatively dates the occupation, and the charcoal can be absolutely dated using the radiocarbon method to find a date that the fire was burning.	1m 14s video on dating the cultural evidence .	
Upper	Archaeology	2	Fire Feature	Meadowcroft's radiocarbon chronology is one of the most complete in the New World. However, Despite those 52 assays, many experts doubted the findings due to possible coal contamination of the carbon samples and the lack of contemporaneous sites known at the time.	53s video on the radiocarbon chronology of the Meadowcroft Rockshelter	
Upper	Archaeology	1	Date Tags	The Meadowcroft deposits are the most complete archaeological sequence of culture in North America,	1m 8s video on the scope of the Meadowcroft Rockshelter.	

				and possibly the world. The stratigraphy stretches from the historic period back into prehistoric times some 16,000 radiocarbon years ago. Notice that the AD 1265 tag is well below AD 1775, thanks to the Law of Superposition .		
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