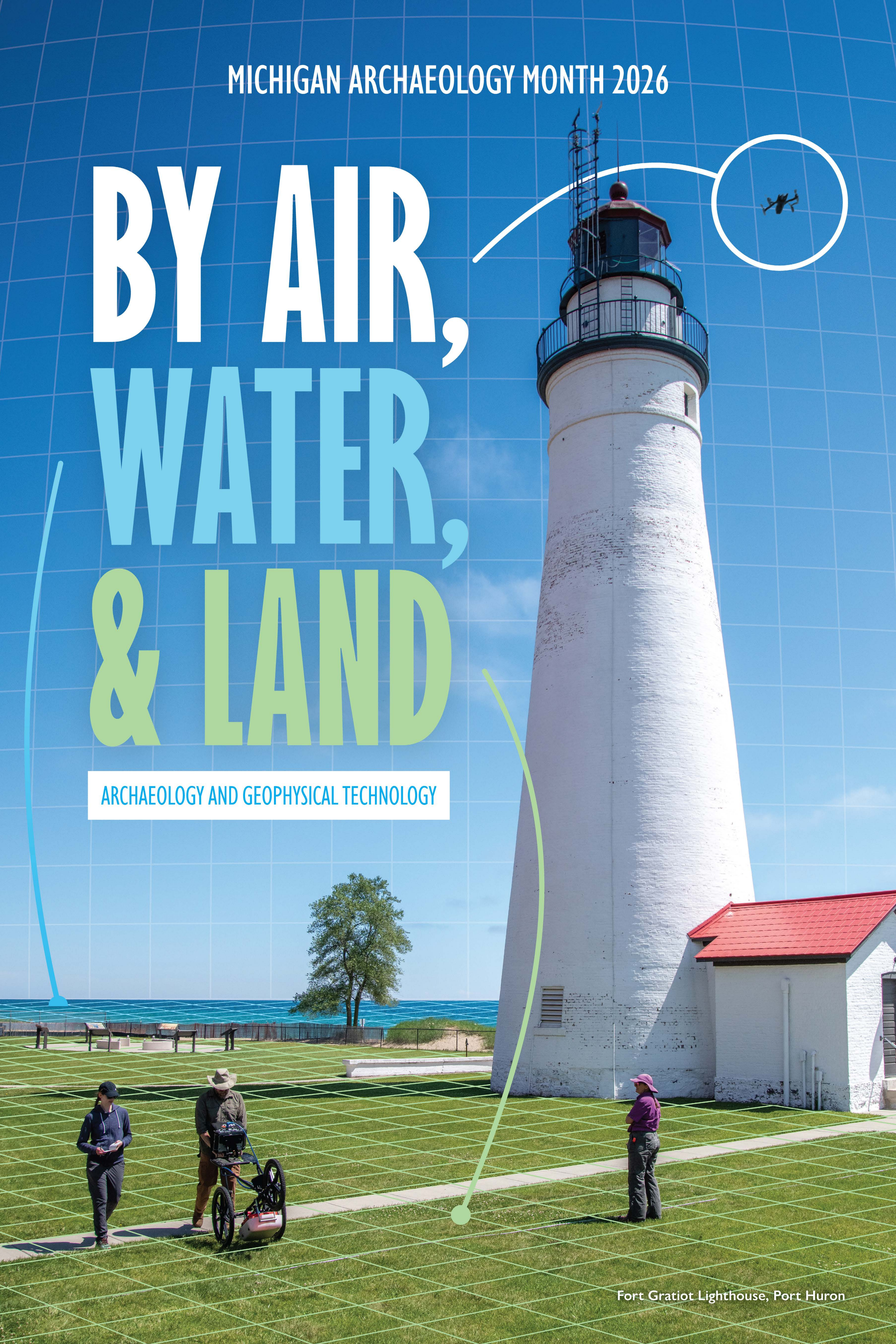


MICHIGAN ARCHAEOLOGY MONTH 2026

BY AIR, WATER, & LAND

ARCHAEOLOGY AND GEOPHYSICAL TECHNOLOGY



Fort Gratiot Lighthouse, Port Huron

Today’s archaeologists don’t just use trowels and shovels to find archaeological sites! Modern archaeology includes a variety of advanced technology, tools, and equipment to inform us about human activities in the past.

LAND

Geophysical technology allows archaeologists to see below the ground, without digging, and below the water, without diving, as it is a non-invasive technology. Most conventional archaeological methods are destructive, once the soil or sediments have been removed, it cannot simply be put back to the way it was.

Archaeologists use **non-invasive geophysical technology** because it allows them to investigate what lies beneath the ground, or underwater, **without digging or disturbing archaeological sites**. These methods help preserve culturally sensitive sites and features while providing valuable information about the location, size, and layout of buried structures.

Archaeologists use several types of **geophysical survey technologies**. Each method measures a different physical property. Some of these methods include the following:

GROUND-PENETRATING RADAR (GPR)

- Sends high-frequency radio waves into the ground.
- Measures the echoes that bounce back from buried objects or soil layers.
- Produces 2-dimensional profiles and 3-dimensional images of subsurface features.
- Best for finding:
 - Foundations and buried structures
 - Graves

MAGNETOMETRY

- Measures tiny changes in the Earth’s magnetic field caused by buried archaeological remains.
- Very fast and can survey large areas.
- Best for detecting:
 - Hearths and fired bricks
 - Ancient buildings
 - Submerged anchors

MAGNETIC SUSCEPTIBILITY SURVEY

- Measures how easily soil becomes magnetized.
- Helps locate areas with evidence of human occupation, such as:
 - Ancient settlements
 - Fire pits
 - Waste disposal areas

WATER

Underwater Archaeologists also use geophysical technology to see below the water. Magnetometers and metal detectors can be used to locate sites/objects underwater. Sonar is a common geophysical technology used by underwater archaeologists. The following are the two most common methodologies employed by maritime archaeologists in the Great Lakes:

SIDE-SCAN SONAR

- Emits sound waves that bounce off the lake bottom
- Measures the acoustic wave’s speed and density
- Creates highly detailed, 2-dimensional visual of underwater features, including:
 - Shipwrecks
 - Aircraft wrecks
 - Submerged structures

MULTIBEAM SONAR

- Emits a fan-shaped swath of sound waves downward to map the lake floor
- Calculates how long the acoustic pings take to bounce back
- Generates a 3-dimensional bathymetry and detailed images, including:
 - Underwater landscape features
 - Submerged cultural resources

AIR

Geophysical technology can also be attached to drones to get a large-scale picture of the area; digitally mapping terrain features to identify cultural elements hidden beneath vegetation or the water. These methods include the following:

LiDAR

LiDAR (Light Detection and Ranging) is able to make high-resolution models of the ground and lake bottoms. A laser scanner transmits brief pulses of light to the ground surface, which when reflected back, measure the distance between the scanner and the ground.

MULTISPECTRAL CAPTION & THERMAL CAPTION

Useful for detecting archaeological features by sensing differences in vegetation patterns and ground temperature that are invisible to the naked eye.

Benefits of Non-Invasive Geophysical Technology

- **Preserves sites** by minimizing excavation and preventing unnecessary damage.
- **Locates buried features** in advance, making excavations targeted and efficient.
- **Saves time and money** by surveying large areas quickly.
- **Creates detailed maps** of underground features, helping archaeologists understand how ancient settlements were organized.
- **Protects culturally significant locations**, including cemeteries and sacred sites, by reducing or eliminating disturbance.
- **Supports long-term conservation** by allowing researchers to study sites while leaving them intact for future generations, improved technologies, or for sites that must remain undisturbed.

Why Archaeologists Use Multiple Methods

No single technique works perfectly in every environment. Setting, soil type, moisture, depth, and the material being investigated all effect survey results. Archaeologists often combine several geophysical methods to create a more complete and accurate picture of what lies beneath the surface before deciding where—or whether—to excavate.

Learn more about these technologies and other geophysical tools at Michigan.gov/archaeology



Natural Resources Conservation Service
U.S. DEPARTMENT OF AGRICULTURE



An archaeology team operates a GPR on a potential archaeology site.



Above: Maritime archaeologist Wayne Lusardi launches a side scan sonar.

Inset: Side scan sonar images of the Monrovia shipwreck in Lake Huron.



Above: The Michigan State University observatory as seen in 1888. It was demolished in the 1920s.

Inset: Magnetometry reading of the circular observatory foundation.