EarthCache
Educational Adventures

MSTA 2013
Presented by MiTEP Cohort 4
What is an EarthCache?

- An EarthCache is a form of a Geocache.

- Geocache: An adventure game for Global Positioning System (GPS) users to cache and find locations with actual hidden items.
How is an EarthCache different from a Geocache?

- EarthCaches are similar in that they utilize GPS coordinates and are almost like a scavenger hunt.

- The difference – and exciting part for us as educators – is that the adventure is treasure hunting for the caches that the Earth has stored.

- The “prize” for finding the cache isn’t something in a container, but rather is the earth itself. The “treasure” is the lessons people learn about our planet when they visit the site.
EarthCache Information

• EarthCache introduction video clip:

• Typical EarthCache:

Waterfront/Canal in Houghton
EarthCache Websites

http://www.geocaching.com/

http://www.earthcache.org/
Earthcache Example
Jacobsville Sandstone Buildings

- Cache Summary: Jacobsville Sandstone buildings are found throughout downtown Houghton and the Upper Peninsula. These sandstones were taken from the Lake Superior region, and used as building stones throughout the UP and other places in the United States.
Using a GPS to Navigate

- Cache Coordinates: 47° 7.311’N 88° 34.012’W
Why is the *Jacobsville Sandstone* and other sandstones considered a useful building material?

**Jacobsville Sandstone**
Jacobsville Sandstone is a red sandstone formation marked with light-colored streaks and spots that is exposed in the Upper Peninsula and portions of Ontario. It also can be found in the buildings throughout the Upper Peninsula and United States. The stone has had many names: redstone, brownstone, Lake Superior Sandstone, and Eastern Sandstone. Its official name, Jacobsville Sandstone, came from a quarry owner John Henry Jacobs and the city of Jacobsville, where his quarry was located. The quarries in the Upper Peninsula operated from 1870 to 1915, removing rocks from the ground and shipping them to building sites like this one in downtown Houghton.

Throughout the lesson there are questions that are asked with information to help answer the questions.
Logging your Cache

- **Logging Your Visit:** To receive credit for your EarthCache, email me your responses to the questions below.

Logging Question 1: How do you think some of the sandstone that was quarried in the Upper Peninsula was shipped?

Logging Question 2: Study the ornate designs on the buildings (like the pictures below). Do you think these were created by a mold or carved in the sandstone? How can you tell?
Earth Science Big Idea

- **Earth Science Big Ideas:**
  - Big Idea 7: Humans depend on Earth for resources. *Soil, rocks, and minerals provide essential metals and other materials for agriculture, manufacturing, and building.*

Looking at the buildings in downtown Houghton that using sandstone as a resource for building shows the connection between our earth and everyday civilization. The designs on the building are a way that humans use sandstone resource as a way of art.
Another example

- JACOBsville SANDSTONE CHURCHES
- Cache Summary:
- Jacobsville sandstone is a red sandstone found in the Upper Peninsula and portions of Ontario. There were 32 quarries in the Upper Peninsula which operated between 1870 and 1915. It was named Jacobsville sandstone after the town notable for its production, Jacobsville, Michigan. The Jacobsville sandstones contains mysterious white spots in the red sandstone. Scientist have proposed two theories to the causes of the white color which will be explored in this EarthCache.
Cache coordinates:

- 47° 7.220 N 88° 33.908 W
Earthcache Lesson

- *What caused the red and white coloring in the Jacobsville Sandstone?*
- Information provided to the earthcacher about red sandstone and the white spots!
The older hypothesis proposes that these white spots are caused by leaching and bleaching of the rock after it developed its red color. Sandstone is very porous like water through a sponge. Under certain conditions when water filtrates the sandstone, reducing agents in water add electrons to iron and oxygen is removed. This makes iron soluble in water. The iron pigment could then dissolve in the groundwater and be removed making the sandstone colorless or white.

A newer hypothesis proposes that the white spots were never oxidized initially and therefore were never red. This idea states that hematite and iron was never present in these spots. These spots were filled with organic material of very primitive life forms. When these life forms broke down the spaces were filled with clay. There is no hematite or iron present in clay materials. This is a redox chemical reaction.
Misconceptions

• In the Earthcache there are common misconceptions that people might have.

• **Common Earth Science Misconceptions:**
  
  • A common misconception about red sandstone is “Scientific ideas are absolute and unchanging.”
  
  • The red sandstone does change color after its deposition and is influenced by how much oxygen exists in the rock pores. If the sandstone is shielded by a reducing agent it remains white. If not it gets rusty red. The sandstone forms from grains broken from an older rock like granite or gneiss which is igneous or metamorphic rock. This is a good example of the rock cycle.
What to do while searching for an Earthcache???????

• HAVE FUN!!!!!!!!!!!
Why Earthcache?
How could you use Earthcaching in your classroom?
How do I find a rich learning feature in my own schoolyard?
How do I use an EarthCache in my own school yard?
Most of our schools do not look like this.

They are more like…
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Questions?

For a copy of this presentation or to see more information about EarthCaching visit: mitep.mtu.edu or email eegochis@mtu.edu