

NAME: _____ PERIOD: _____ DATE: _____

LAB PARTNERS: _____ LAB #19

THE GREAT EARTHQUAKE OF 1811 (THE MERCALLI INTENSITY SCALE)

Phenomena

You may be thinking, “Why am I studying an Earthquake from 1811?”. Read this article to find out why this earthquake is still relevant in our lives and why it is important to study:

<http://www.new-madrid.mo.us/132/Strange-Happenings-during-the-Earthquake>

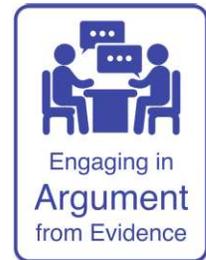
INTRODUCTION

The Richter Scale is used to measure earthquake magnitude based on an analysis of P and S wave data from a seismogram. Another method of measuring earthquakes is the Mercalli Scale, which is not a measure of the amount of energy released by an earthquake, but the damage caused by it.

Standard:

HS-ESS1-5

Evaluate evidence of the past and current movements of continental and oceanic crust and the theory of plate tectonics to explain the ages of crustal rocks.



MATERIALS

Pen

Pencils with eraser

Modified Mercalli scale

PROCEDURE

1. Using the Modified Intensity scale, determine an intensity for each locality given in this exercise. Write the Roman numeral in the column for 'Assigned Mercalli Intensity'.
2. On the U.S. map provided, write the Mercalli intensity Roman numeral on the map **IN PEN** next to the appropriate town.
3. Answer lab questions.

MERCALLI INTENSITY	LOCATION	EARTHQUAKE EFFECTS
	Big Prairie Arkansas	Rails bent greatly Bridges destroyed
	Boston Massachusetts	Shock felt on upper floors of buildings Nothing moved in houses
	Cape Girardeau Missouri	Damaged chimneys, split brick houses Ground cracked, underground pipes broken
	Concordia Kansas	Sleeping persons awakened, swaying of trees, and telephone poles
	Columbia Tennessee	Wakened people, some run outdoors Damage slight
	Detroit Michigan	First shocks distinctly felt. Walls creaked, standing cars rocked
	Fort Worth Texas	Felt by everyone. Heavy furniture moved in rooms within homes.
	Galveston Texas	Parked cars rock noticeably. House walls make creaking noise, dishes clanking together in cabinets.
	Georgetown South Carolina	Felt indoors from many, few from outside Walls creaked in houses
	Henderson City Kentucky	Overtured some chimneys, ordinary buildings partially collapsed.
	Knoxville Tennessee	Windows and furniture shaken. People ran out into streets,
	Lebanon Ohio	Woke people. People left houses. Felt by all.
	Louisville Kentucky	Noticed by persons driving cars. Poorly built structures had great damage. Houses were swaying.
	Memphis Tennessee	Landslides from river banks; shifted mud and sand Building foundations destroyed
	Natchez Mississippi	Clocks stopped. Hanging art vibrated. Articles hanging from ceilings vibrated rapidly. Threw some articles off shelves. Damage slight, cracked some plaster.

	New Madrid Missouri	Awful noise resembling loud thunder, also from the cracking and falling of trees. Mississippi flowed backwards, graveyard fell into river. All chimneys and all houses fell down. Earth rolled in waves a few feet high.
	New Orleans Louisiana	Slight shaking, dishes rattled
	Newark New Jersey	Several shocks felt, felt like a truck passing
	Norfolk Virginia	Several clocks stopped. First awoke people from their sleep. Houses shook with great violence. Shaking of beds.
	Oklahoma City Oklahoma	Older buildings suffered most damage due to poor design to withstand earthquakes. Cracked ground
	Piney River Tennessee	Some chimneys broken. Damage slight in well designed buildings.
	Pittsburgh Pennsylvania	Houses shaken. Clocks stopped.
	Quebec Canada	Shook furniture in houses and doors upon their hinges. Suspended objects swing
	Raleigh North Carolina	Several slight shocks were felt. Standing cars rocked noticeably.
	Richmond Virginia	Some windows broken; trees disturbed
	Riviere aux Tranches Canada	Felt many of the earthquake shocks. Walls creaked.
	St. Louis Missouri	A few chimneys were damaged, a few stone houses were spilt; partial collapse with ordinary buildings; Noticed by persons driving cars.
	Savannah Georgia	Doors, trees, poles disturbed; felt by all; many people frightened from movement
	Waco Texas	Objects outside and inside homes overturned. Swaying of telephone poles and flag poles
	Washington D.C.	Cracked the pavement. Shook doors, windows and furniture Clocks stopped
	Wichita Kansas	Some brick chimneys cracked. Noticed by all persons including those in moving cars



MODIFIED MERCALLI SCALE

- I. Not felt except by a very few under especially favorable circumstances.
- II. Felt only by a few persons at rest, especially on upper floors of buildings. Delicately suspended objects may swing.
- III. Felt quite noticeably indoors, especially on upper floors of buildings, but many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibration like passing truck.
- IV. During the day it is felt indoors by many, outdoors by few. At night some awakened. Dishes, windows, doors disturbed; walls make creaking sound. Sensation like heavy truck striking building. Standing cars rocked noticeably.
- V. Felt by nearly everyone; many awakened. Some dishes, windows, etc. broken; a few instances of cracked plaster and pavement; unstable objects overturned. Disturbances of trees, poles, and other tall objects sometimes noticed. Pendulum clocks may stop.
- VI. Felt by all; many frightened and run outdoors. Some heavy furniture moved; a few instances of fallen plaster or damaged chimneys. Damage slight.
- VII. Everybody runs outdoors. Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; windows and furniture shake; some chimneys broken. Noticed by persons driving motor cars.
- VIII. Damage slight in specially designed structures; considerable damage in ordinary buildings, with partial collapse; great damage in poorly built structures; some chimneys broken. Noticed by persons driving cars.
- IX. Damage considerable in specially designed structures; well-designed frame structures slight slanted; ordinary buildings very slanted, with partial collapse. Buildings shifted off foundations. Ground cracked noticeably. Underground pipes broken.
- X. Some well built wooden structures destroyed; most masonry and frame structures destroyed with foundations; ground badly cracked. Rails bent. Landslides considerable from river banks and steep slopes. Shifted sand and mud. Water splashed over banks.
- XI. Few, if any masonry structures remain standing. Bridges destroyed. Cracks in the ground. Underground pipelines completely out of service. Earth slumps and land slips in soft ground. Rails bent greatly.
- XII. Damage total. Waves seen on ground surfaces. Lines of sight and level distorted. Objects thrown upward into the air.

Questions:

1. Looking at the map, which city would you say is the epicenter of this earthquake? Why did you put this answer?

2. On the map, there are additional cities that did not have damages listed in this lab. Guess the Mercalli scale number and damage that could be seen for the following cities:

a. F. Stephens, Louisiana

b. Vicksburg, Mississippi

c. Vincennes, Indiana

d. Nashville, Tennessee

e. Marked Tree, Arkansas

3. Analyze the map with each city labeled with the Mercalli scale number. There are cities that are far from the epicenter that had damage and felt the affects of the earthquake. What does this information tell you about the magnitude of this earthquake?

4. The phenomena for this lab was talking about why we are studying an earthquake from 1811. Look at the pictures from this article. These pictures are from more recent earthquakes that have occurred. How are these earthquakes and the earthquake studied in this lab similar?

<https://pubs.usgs.gov/mf/1713/plate-1.pdf>

a. What do all these earthquakes tell you about our past history, our current history beginning formed and our future history?