Analysis of NYS Earthquake NAME _____

INTRODUCTION

An earthquake's strength depends on how much of the energy stored in the rocks is released. There are two methods of identifying the intensity of an earthquake. One is quantitative (a measurement involving quantity, or amount, of energy released during an earthquake), the other is qualitative (a description of the observations made during an event). The Richter Scale is a quantitative analysis of an earthquake. The Richter Scale correlates the amplitude of the largest peak traced on a seismogram during a quake to the amount of energy released by the quake. Each successive unit is 10 times stronger than the previous. For example, a Richter Scale magnitude of 5 is 10 times stronger than a Richter Scale of 4. There is no upper limit on the Richter scale, but virtually all rock types would fail and release their stored strain energy before accumulating enough energy to produce an earthquake of 9.0 on the Richter Scale. Therefore, 9.0 to 9.5 appears to be the effective upper limit of the scale.

Before Mr. Richter developed his scale, damage reports were based on a comparison of observations of intensity. Until 1902 when Giuseppe Mercalli developed a standard list of increasing levels of damage to human-made structures there was no set scale for comparison. Mercalli's scale made it possible to rank earthquakes by intensity. However, his scale is not adequate for distinguishing an extremely strong earthquake that occurred far away from a less severe event that occurred close by.

This activity is based upon the Mercalli Intensity Scale (see page 2).

PROCEDURE

1. Using the Mercalli Intensity Scale, complete the data table of earthquake observations from the April 20, 2002 earthquake that occurred in New York State.
2. Plot the intensities on the New York State map on page 3, using the appropriate Roman numeral.
3. Plot isolines showing areas of equal intensity.
4. Place a 'X' on the map to indicate the location of the epicenter of the earthquake.

ANALYSIS AND CONCLUSION

1. The towns of Hamburg, Elmira, and Windsor all reported feeling nothing. Based on your knowledge of rocks and the ESRT, suggest a possible explanation for the observers to have felt nothing.

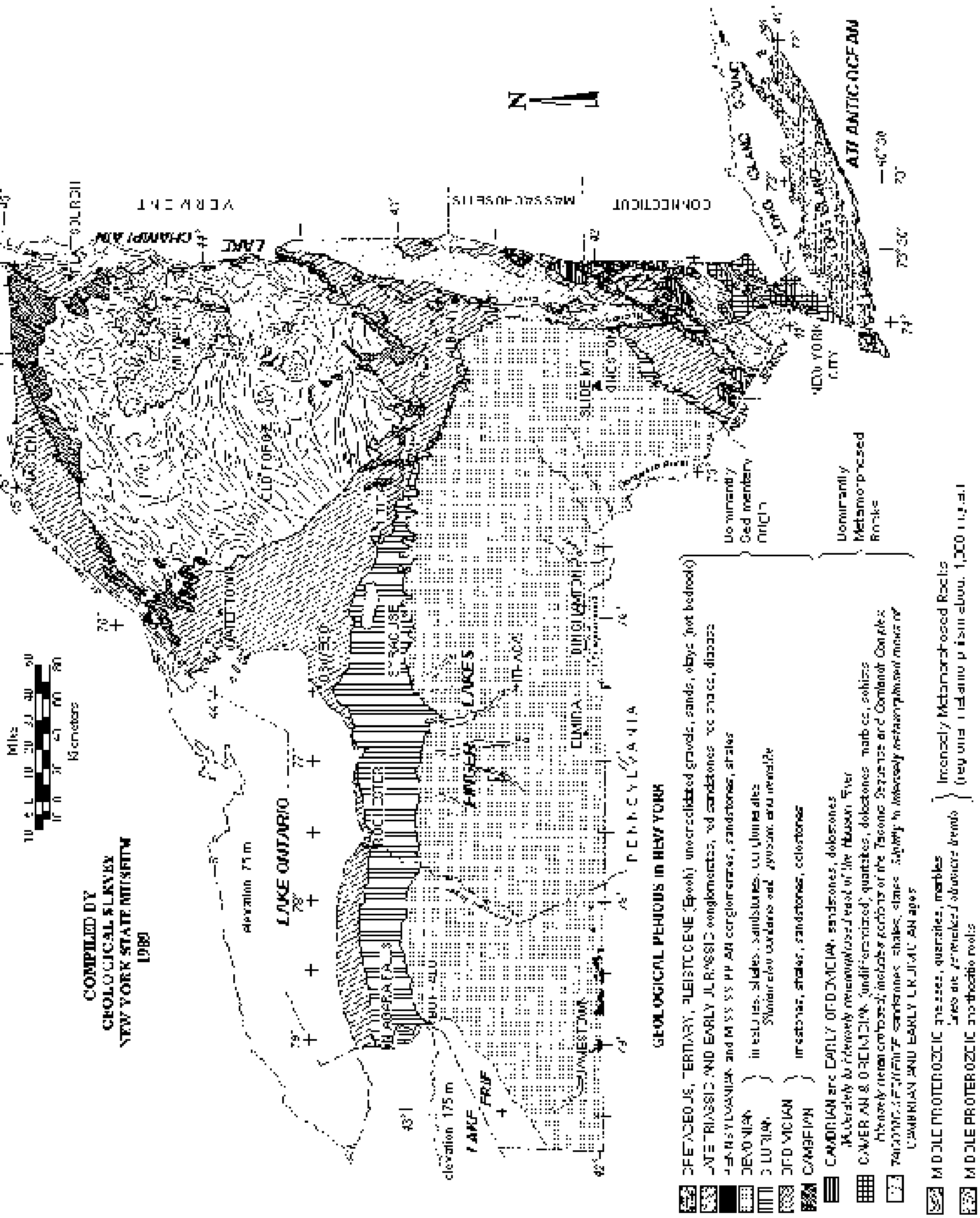
2. The observer in Salt Point also reported feeling nothing and offered something of an explanation. Explain in your own words what the significance of "a peat moss bog" is.

3. According to the ESRT, in which landscape region of New York State was the epicenter of this earthquake. Support your answer with data.

4. The Pittsford observer reported that their house sits on glacial till. What effect, if any, would the type of soil have on the observations made? (HINT: Look up the meaning of glacial till in a textbook!)

New York Earthquake - 4/20/02 - 6:50:44 am - 44°30' N, 73° 40' W			
LOCATION	**LAT/LONG**	**OBSERVATIONS**	**MERCALLI SCORE**
Red Creek	43° N, 77° W	bed shook, knickknack almost toppled over, all people in the house felt it	
Baldwinsville	43° N, 76°30' W	felt the bed shake, house creaked	
Ballston Spa	43° N, 74° W	bed shook	
Laurens	42°30' N, 75° W	felt shaking	
Salt Point	42° N, 74° W	felt nothing, backyard is a peat moss bog	
Hamburg	43° N 78°45' W	felt nothing	
Binghamtom	42° N, 76° W	whole house swayed	
Massena	45° N, 75° W	house shaking, windows rattling, at first thought it was a huge wind gust	
Saranac Lake	44°30' N, 74° W	pictures fell off walls, cracked plaster, stones fell from house façade	
Howard Beach	42° N, 73°30' W	bed shaking, car alarms set off, rumbling like a low-flying plane	
Saratoga Springs	43° N, 74° W		IV
Elmira	42° N, 77° W	felt nothing	
Massena	45° N, 75° W		IV
Ossining	41° N, 73°30' W	woke people up, rattled some things on 2nd floor, bookcases rocking	
Middle Grove	43° N, 74° W		IV
Plattsburg	44°45' N, 73°30' W	chimneys down, bridge closed	
Jay	44°30' N, 74° W	chimney down	
Cooperstown	42°45' N, 74°75' W		IV
Oneonta	42°30' N, 75° W		III
North Rose	43° N, 77° W		IV
Queens	41° N, 73°45' W	bed shook, walls creaking, felt on 3rd floor of brick building	
Napoli	42° N, 79° W	furniture shaking and rattling, people awakened	
AuSable	44°45'N, 73°30' W	road partially collapsed, chimneys down	
Baldwinsville	43° N, 76°30' W	walls creaked	
Binghamtom	42° N, 76° W		IV
Ballston Spa	43° N, 74° W	road damaged	
Plattsburg	44°45' N, 73°30' W		V
Marathon	42° N, 76° W	awakened when on 2nd floor, heard rumbling	
Windsor	42° N, 75°30' W	felt nothing	
Slate Hill	41° N, 75° W	awakened people on 2nd floor, felt like someone had landed on the roof	
Pittsford	43° N, 77°30' W	bed shook, knickknack almost toppled over, all people in the house felt it	

Abridged Mercalli Intensity Scale	
Intensity	Description
I	Not felt except by a very few under especially favorable circumstances.
II	Felt only by a few persons at rest, expecially on upper floors. Delicately suspended objects may swing.
III	Felt quite noticeably indoors, especially on upper floors of buildings. Vibration like passing of truck.
IV	During the day felt indoors by many, outdoors by few. Some awakened at night. Dishes, windows, doors disturbed; walls creak. Sensation like heavy truck striking building.
V	Felt by nearly everyone, amny awakened. Some dishes, windows, and so on broken; cracked plaster in a few places; unstable objects overturned. Disturbance of trees, poles, and other tall objects.
VI	Felt by all, many frightened. Some heavy furniture moves, fallen plaster, damaged chimneys. Damage slight.
VII	Everybody runs outdoors. Damage negligible in buildings of good design. Some chimneys broken.
VIII	Damage slight in specially designed structures. Fall of chimneys, factory stacks, etc. Heavy furniture overturned.
IX	Damage considerable in specially designed structures. Buildings shifted off foundations. Ground cracked.
X	Some well-built wooden structures destroyed. Rails bent. Landslides.
XI	Few, if any, structures remain standing. Bridges destroyed. Earth slumps. Rails greatly bent.
XII	Damage total. Waves seen on ground surface. Lines of sight and level distorted. Objects thrown into the air.


GEOLOGICAL PERIODS in NEW YORK
LAKE ONTARIO
LAKE ERIE
ATLANTIC OCEAN
PENNSYLVANIA
VERMONT
MASSACHUSETTS
CONNECTICUT
NEW YORK CITY
ROCHESTER
BUFFALO
ELMIRA
BINGHAMTON
ITHACA
SYRACUSE
ALBANY
Miles
Kilometers
elevation 75 m
elevation 175 m