

EARTHQUAKES

BEGIN

EARTHQUAKES

1. Earthquakes occur when plates grind against one another along cracks called faults.

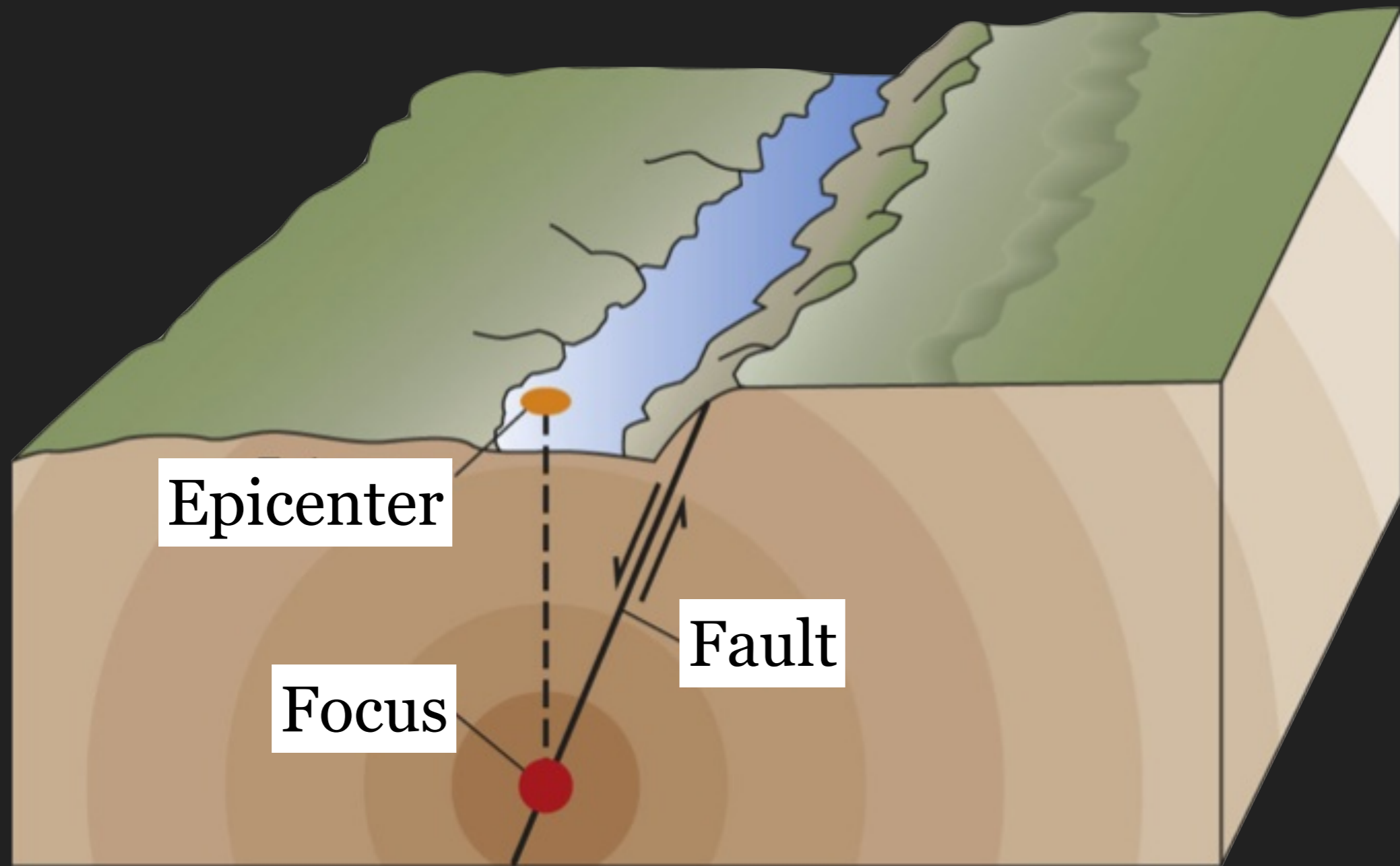
EARTHQUAKES

1. Earthquakes occur when plates grind against one another along cracks called faults.
2. The location underground where the energy is released is called the **focus**.

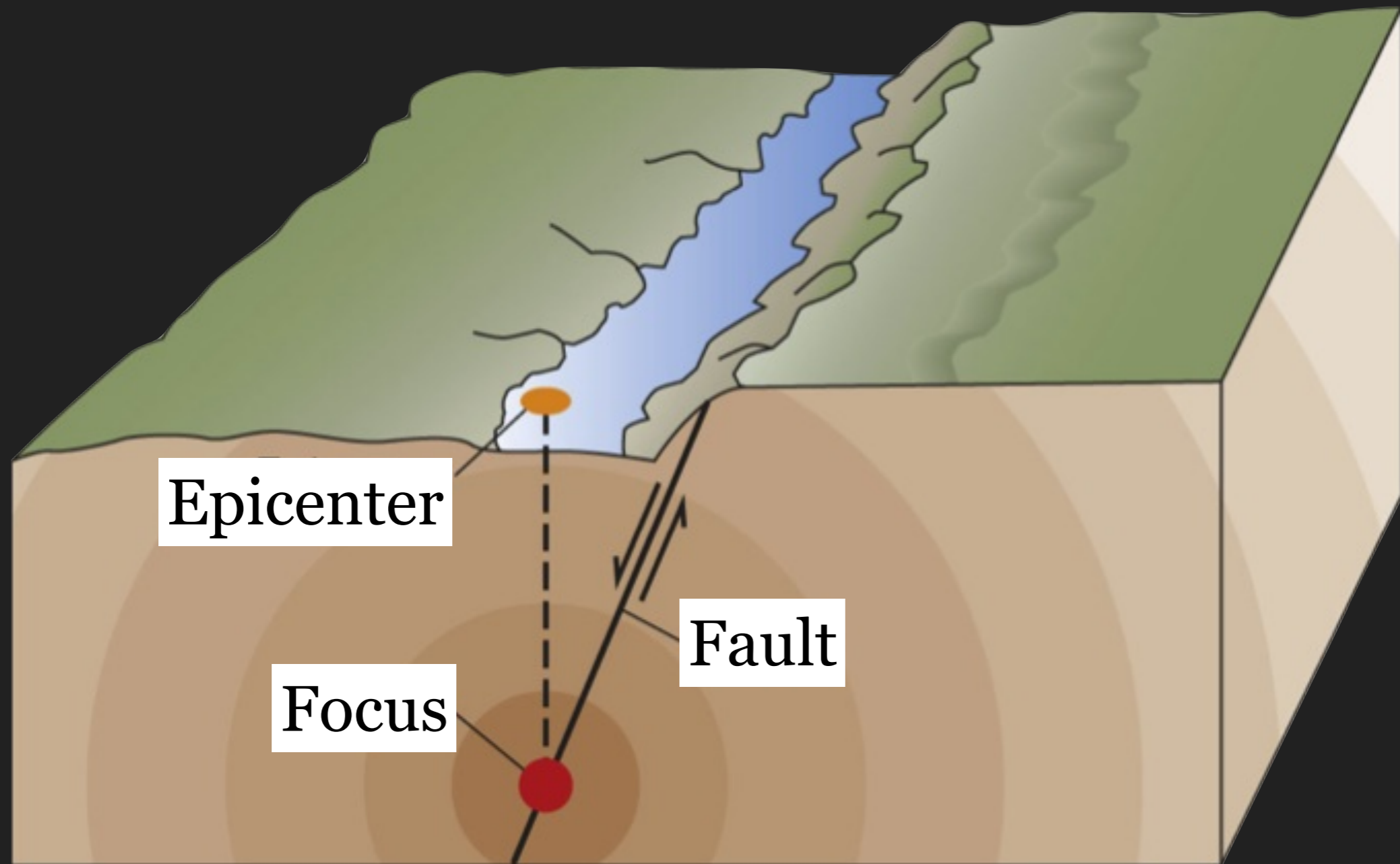
EARTHQUAKES

1. Earthquakes occur when plates grind against one another along cracks called faults.
2. The location underground where the energy is released is called the **focus**.
3. The point on the surface directly above the focus is called the **epicenter**.

EARTHQUAKES



WHEN STRESS IS RELEASED ALONG A FAULT, VIBRATIONS ARE SENT OUT IN ALL DIRECTIONS FROM THE FOCUS



**EARTHQUAKE VIBRATIONS
TRAVEL AS WAVES CALLED**

**SEISMIC
WAVES**

◀ LAST

7

NEXT ▶

THERE ARE TWO TYPES...

**SEISMIC
WAVES**

◀ LAST

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P-WAVES

S-WAVES

**SEISMIC
WAVES**

◀ LAST

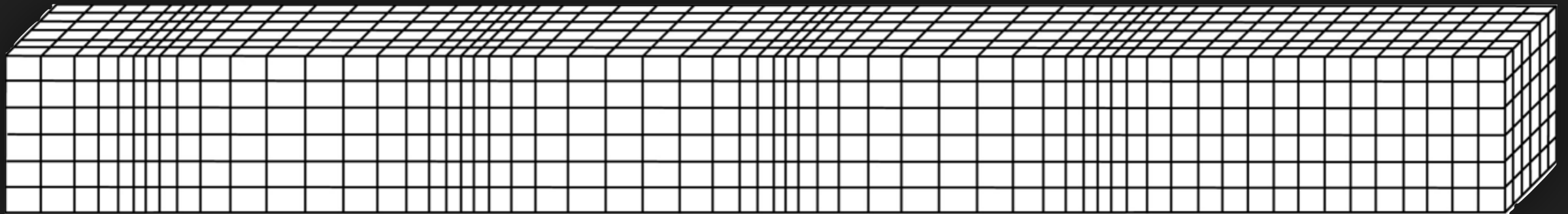
NEXT ▶

P-WAVES

1. Primary Waves
2. Travel phast (fast)
3. Arrive phirst (first)
4. Push-Pull Motion
5. Pass through anything

P-WAVES

Push-pull motion

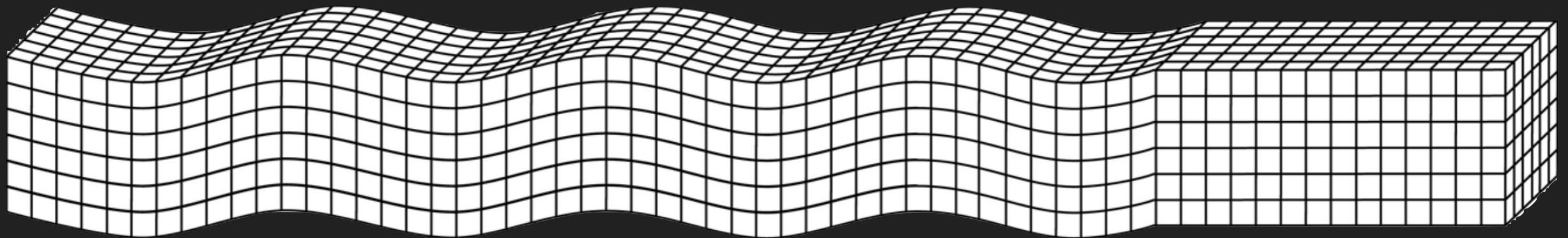


S-WAVES

1. Secondary Waves
2. Travel slow
3. Arrive second
4. Side-to-side motion
5. Pass through solids only

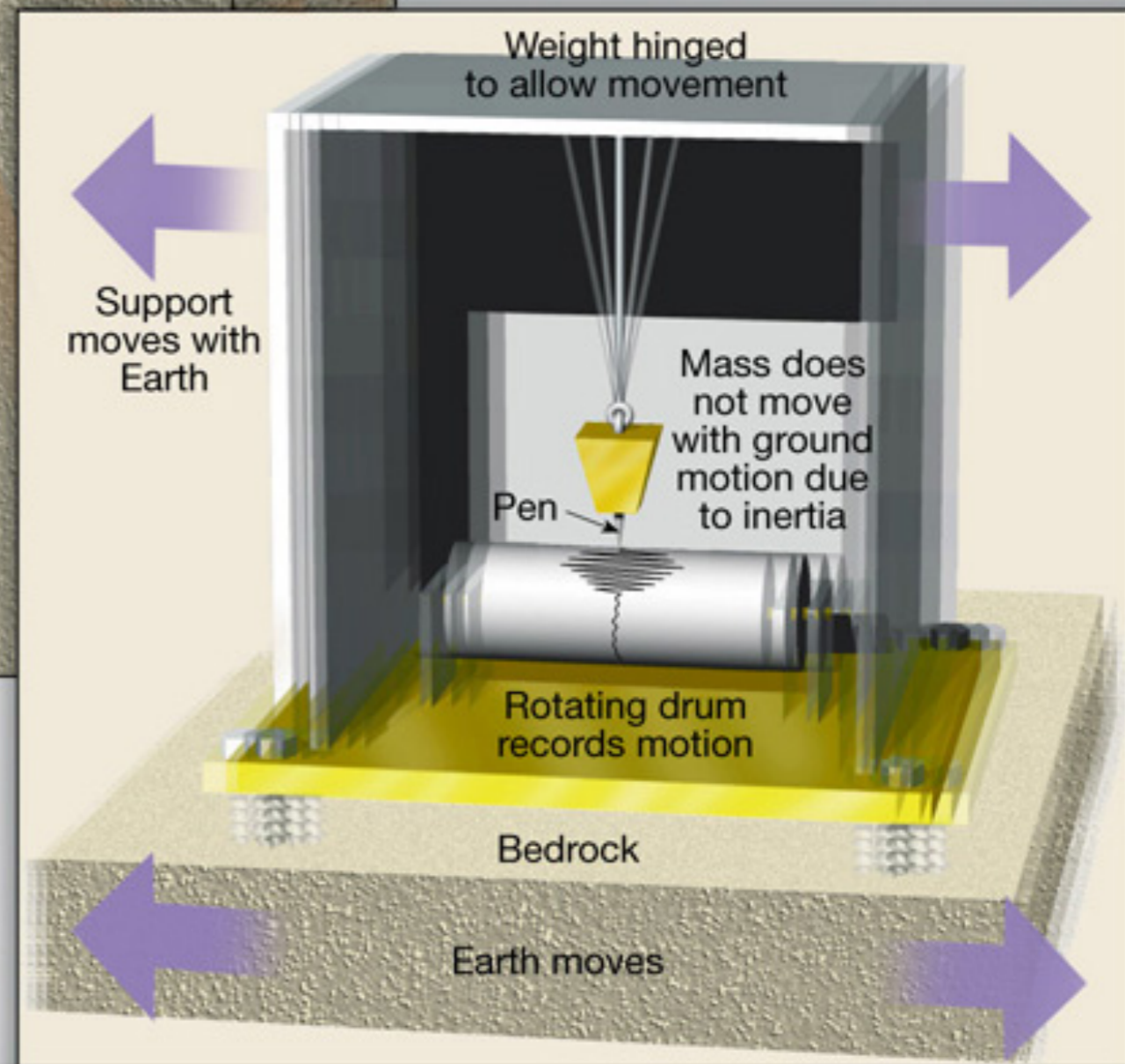
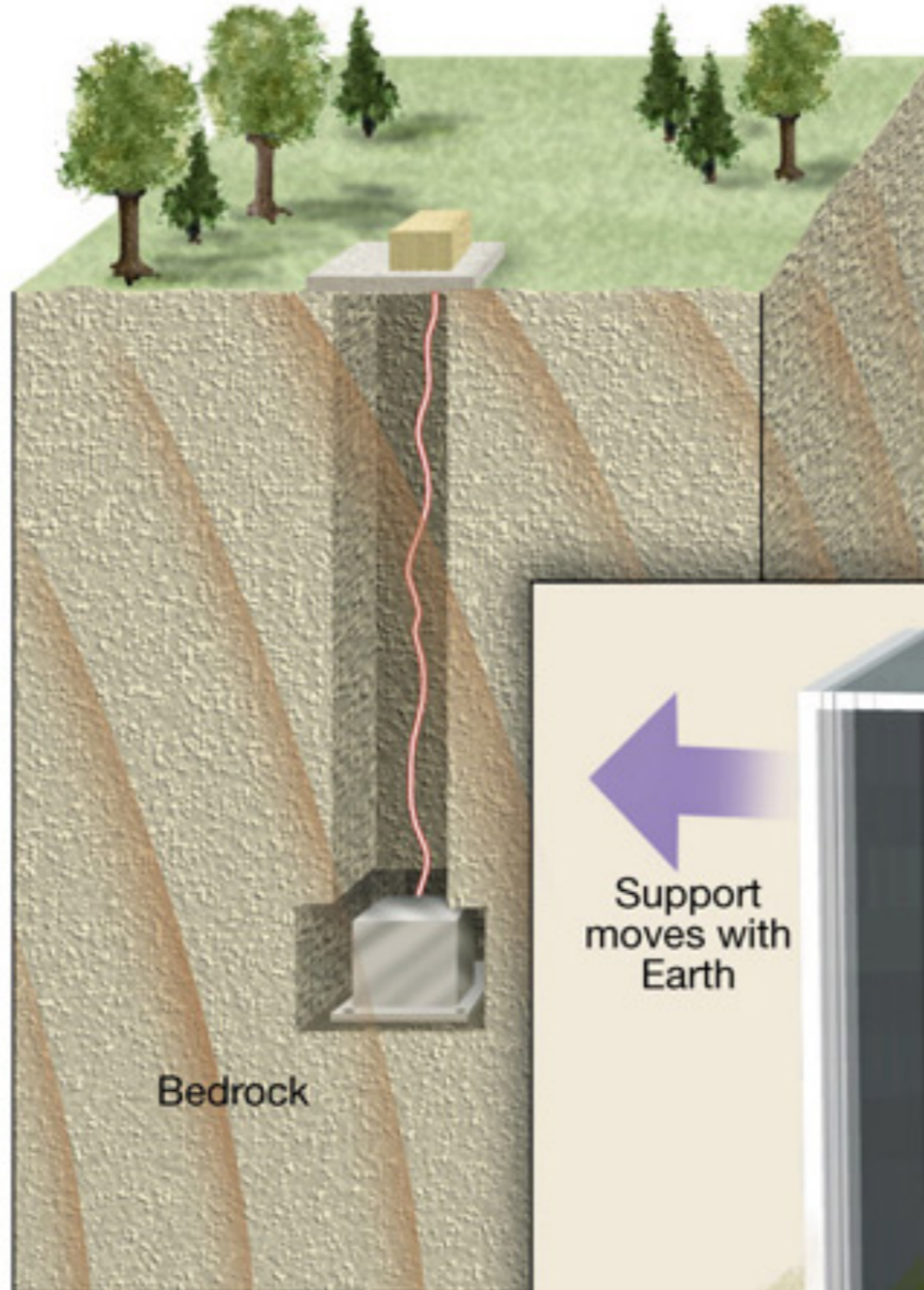
S-WAVES

Side-to-side motion



**BUT, HOW DO WE
RECORD AND MEASURE
THESE SEISMIC WAVES?**

**WE USE AN INSTRUMENT
CALLED A...**



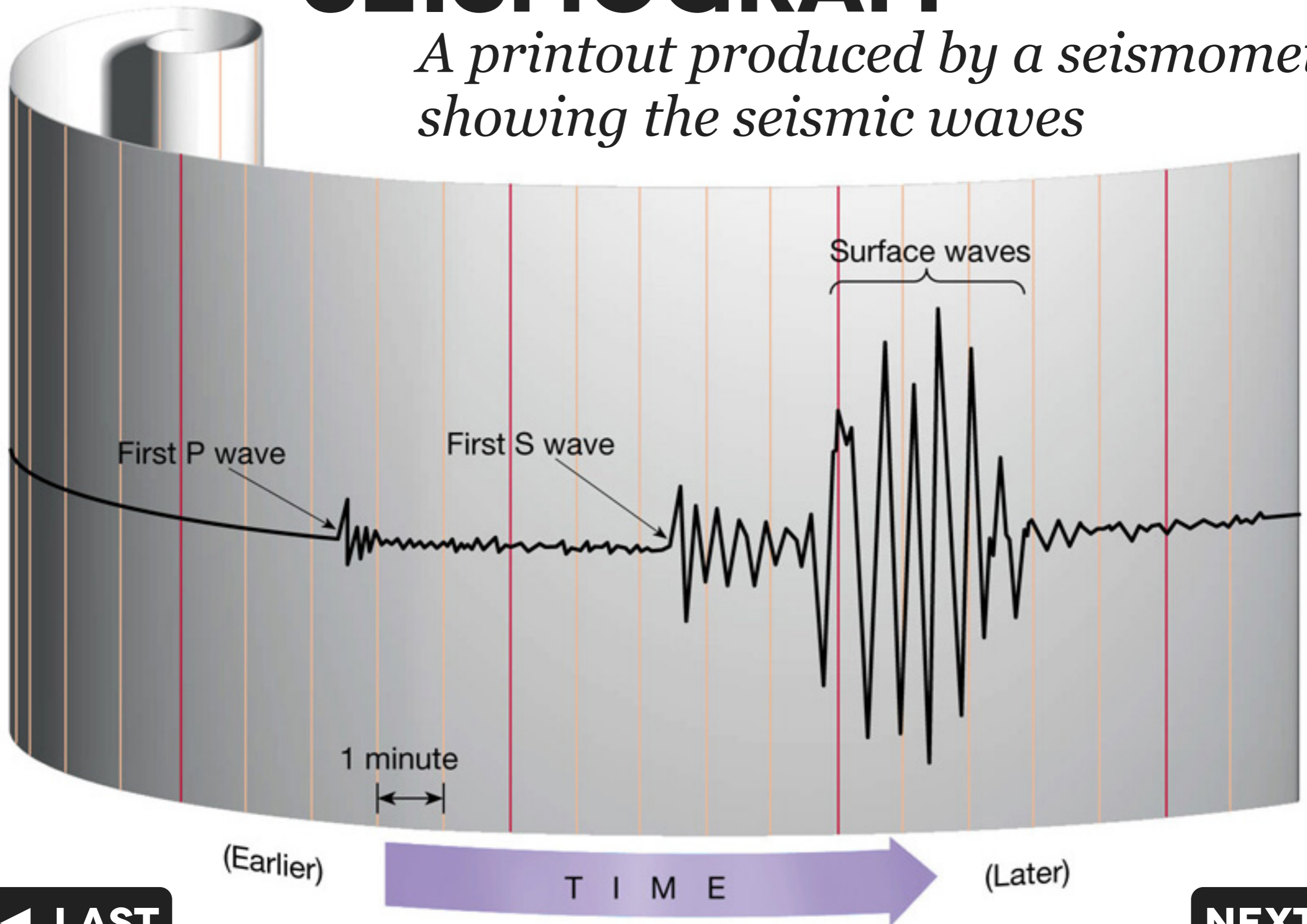
SEISMOGRAPH

Instrument that records seismic waves

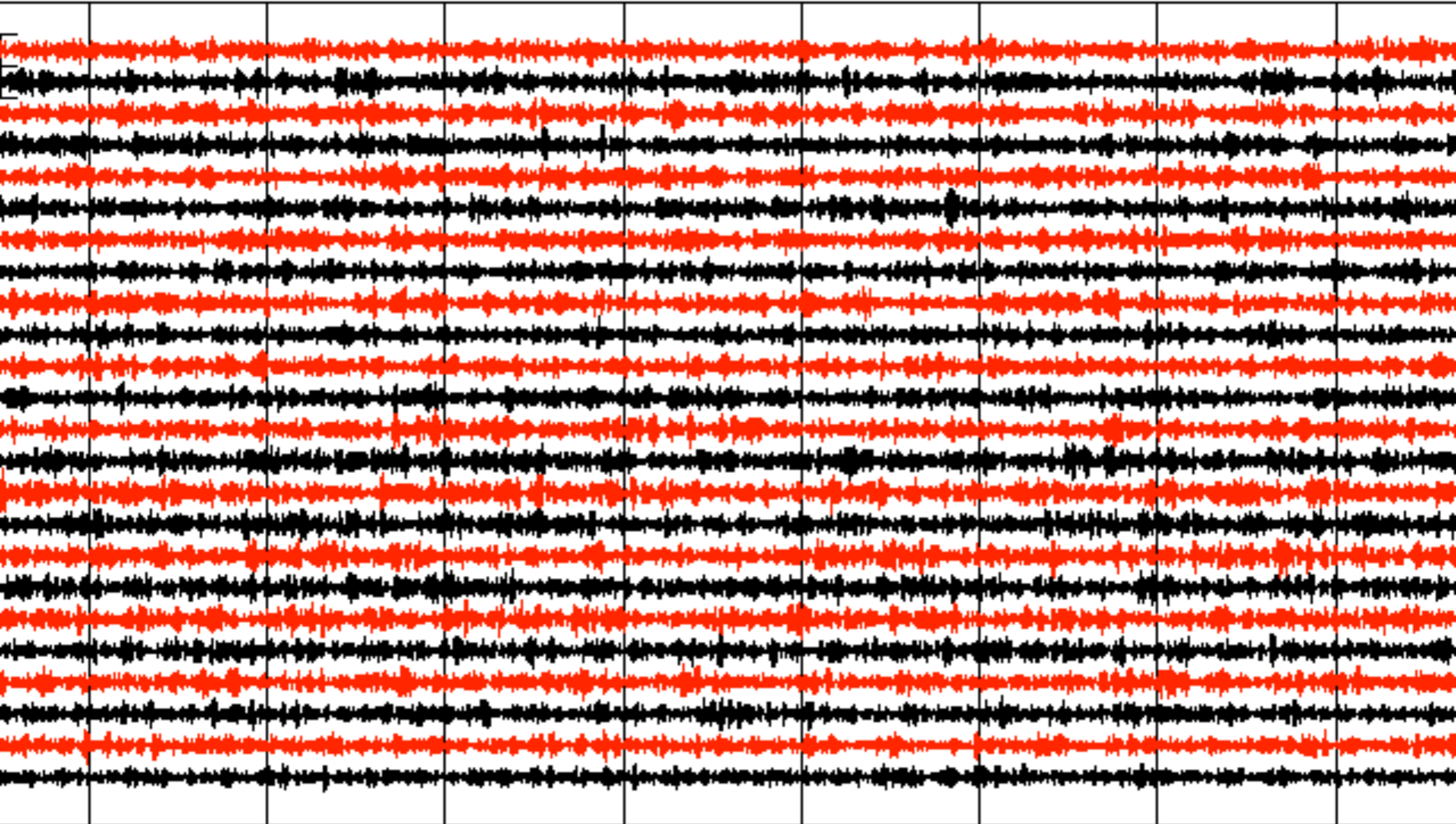
...WHICH CREATES A...

SEISMOGRAM

A printout produced by a seismometer showing the seismic waves



**HERE IS AN EXAMPLE OF
A NORMAL SEISMOGRAM**



5 10 15 20 25 30 35 40

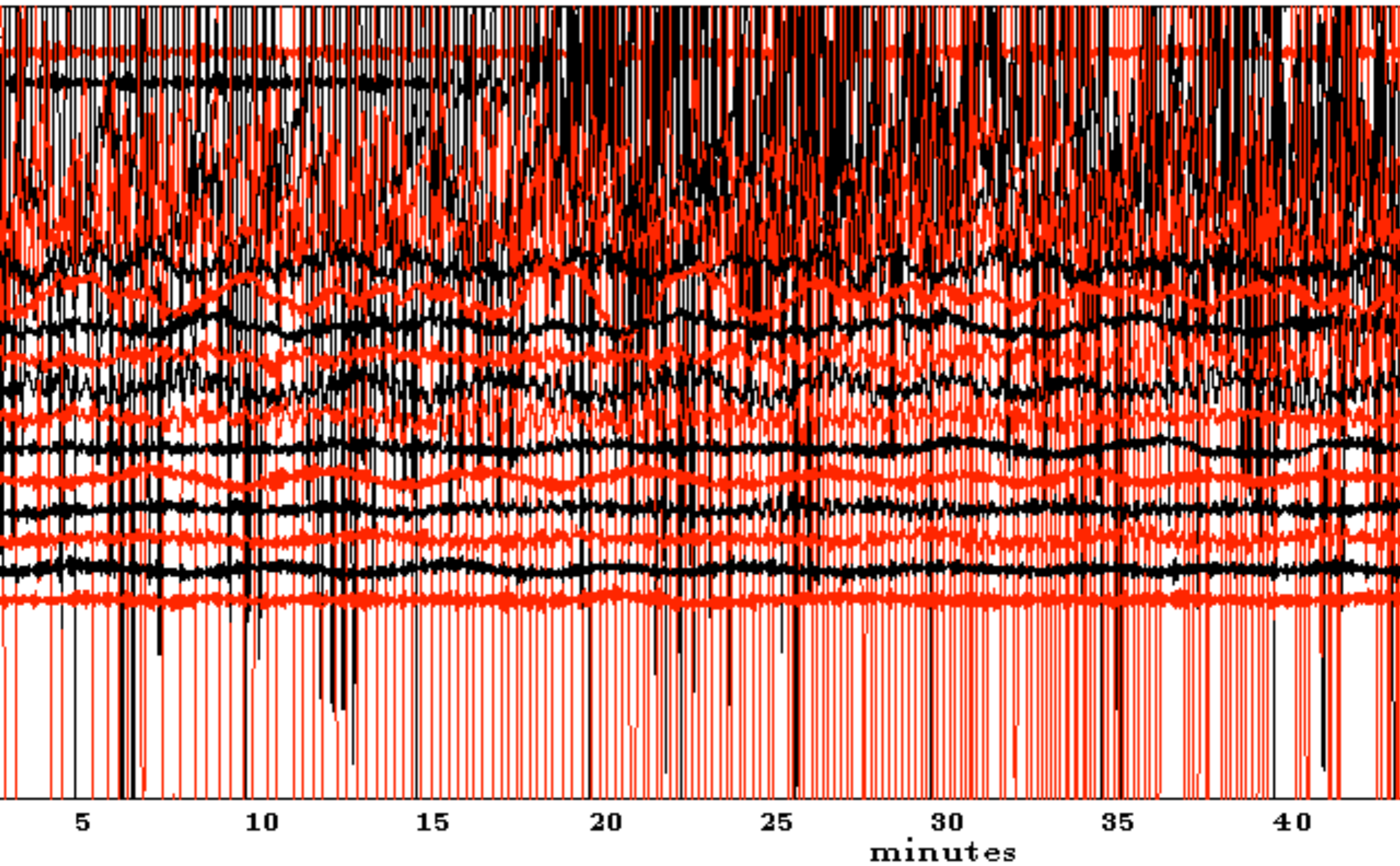
minutes

◀ LAST

NEXT ▶

**HERE IS THE SAME SEISMOGRAM
DURING AN EARTHQUAKE**

micrometer/s Station PAL, channel BHZ - Dec 26, 2004 gain 0.03



◀ LAST

NEXT ▶

**...FROM WHICH WE CAN
DETERMINE THE
INTENSITY USING THE...**

THE RICHTER SCALE

RICHTER MAGNITUDE	DESCRIPTION	OCCURANCE
Less than 2.0	Micro earthquakes, not felt.	Continual
2.0-2.9	Generally not felt, but recorded.	~1,300,000/year
3.0-3.9	Often felt, but rarely causes damage.	~130,000/year
4.0-4.9	Noticeable shaking of indoor items, rattling noises. Significant damage unlikely.	~13,000/year
5.0-5.9	Can cause major damage to poorly constructed buildings over small regions. At most slight damage to well-designed buildings.	~1,319/year
6.0-6.9	Can be destructive in areas up to about 99 miles across in populated areas.	~134/year
7.0-7.9	Can cause serious damage over larger areas.	~15/year
8.0-8.9	Can cause serious damage in areas several hundred miles across.	~1/year
9.0-9.9	Devastating in areas several thousand miles across.	~1/10 years
10+	Never recorded, widespread devastation across very large areas; see below for equivalent seismic energy yield.	Extremely rare (Unknown/ May not be possible)

**THIS SCALE MEASURES
THE ENERGY OF THE
EARTHQUAKE**

...THERE IS ALSO THE...

THE MODIFIED MERCALLI SCALE

MERCALLI MAGNITUDE

EXPECTED EFFECTS

I (instrumental)	Generally not felt by people unless in favorable conditions.
II (weak)	Felt only by a few people at rest, especially on the upper floors of buildings. Delicately suspended objects may swing.
III (slight)	Felt quite noticeably by people indoors, especially on the upper floors of buildings. Many do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibration similar to the passing of a truck. Duration estimated.
IV (moderate)	Felt indoors by many people, outdoors by few people during the day. At night, some awaken. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rock noticeably. Dishes and windows rattle alarmingly.
V (rather strong)	Felt outside by most, may not be felt by some outside in non-favorable conditions. Dishes and windows may break and large bells will ring. Vibrations like large train passing close to house.
VI (strong)	Felt by all; many frightened and run outdoors, walk unsteadily. Windows, dishes, glassware broken; books fall off shelves; some heavy furniture moved or overturned; a few instances of fallen plaster. Damage slight.
VII (very strong)	Difficult to stand; furniture broken; damage negligible in building of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken. Noticed by people driving motor cars.
VIII (destructive)	Damage slight in specially designed structures; considerable in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture moved.
IX (violent)	General panic; damage considerable in specially designed structures, well designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.
X (intense)	Some well built wooden structures destroyed; most masonry and frame structures destroyed with foundation. Rails bent.
XI (extreme)	Few, if any masonry structures remain standing. Bridges destroyed. Rails bent greatly.
XII (cataclysmic)	Total destruction – Everything is destroyed. Lines of sight and level distorted. Objects thrown into the air. The ground moves in waves or ripples. Large amounts of rock move position. Landscape altered, or leveled by several meters. In some cases, even the routes of rivers are changed.

**...WHICH MEASURES THE
EFFECTS OF THE EARTHQUAKE**