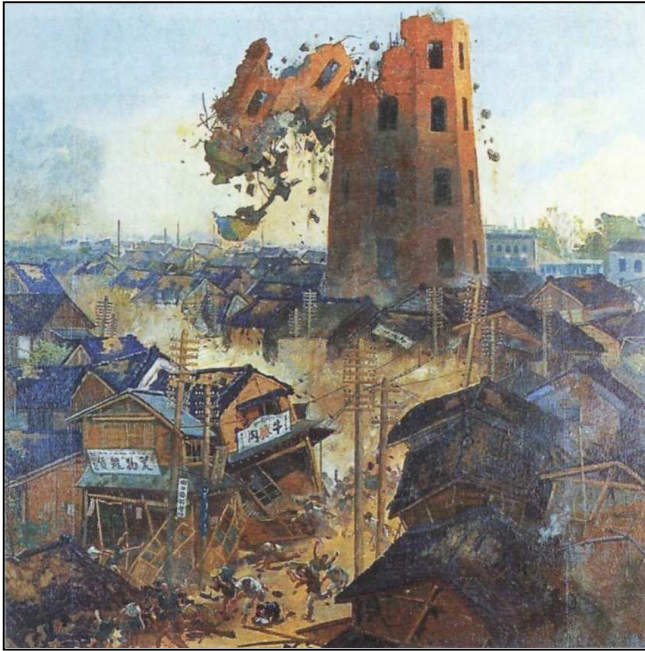


Earthquakes in art

Developing a scientific report based on evidence in historic paintings



"Collapse of the 1st Earthquake 12th Floor"

Tokunaga Yuuzu (1871-1936)

From 'Visual history' (Tokyo law or publication, c. 2002) P133 *



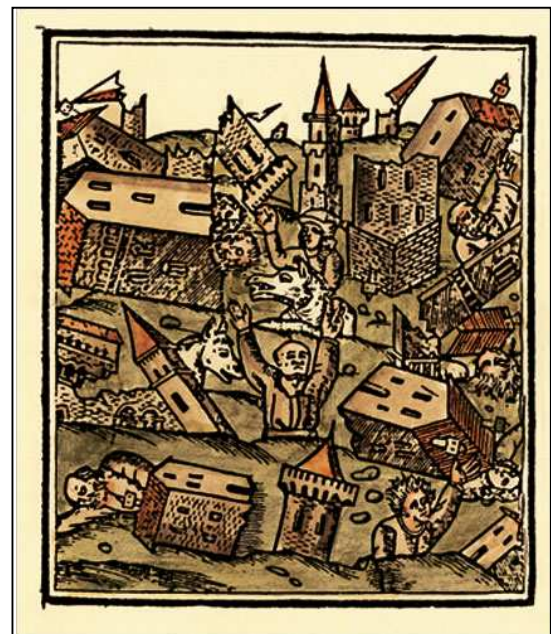
Basel earthquake by Karl Jauslin, 1842-1904 ***



Gifu City destroyed by the 1891 Mino-Owari earthquake

Utagawa Kuniyoshi (1847-1899)

Source: <http://morimiya.net/online/ukiyo-e-big-files/U782.html> **



A woodcut (c.16th) depicting damage to an unknown town in the September 1509 earthquake in the sea of Marmara.

From Ambraseys, N.N. and C.F. Finkel.
'The Marmara Sea Earthquake of 1509',
Terra Nova, 2:2 (1990), pp. 167-174 ****

Divide the pupils into groups and tell them that they are science correspondents developing a news report for a quality newspaper or television or radio broadcast. Give each group a copy of one of the paintings.

Ask each group to report on the earthquakes shown in the group's painting.

They should include where relevant:-

- effects on people;
- effects on buildings;

- signs of liquefaction, e.g. buildings falling over because the earthquake vibrations have 'liquefied' the ground beneath them;
- what could be heard?
- tectonic setting for why the earthquake occurred;
- beliefs at the time about why earthquakes occur;
- facts about the earthquake available on the internet.

The reports should then be presented to the rest of the class, followed by a discussion.

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The back up

Title: Earthquakes in art.

Subtitle: Developing a scientific report based on evidence in historic paintings.

Topic: Pupils prepare a scientific report about earthquakes, a topic studied in science or geography. The activity creates a cross-curricular link between the sciences and arts.

Age range of pupils: 10 - 18 years.

Time needed to complete activity: 30 minutes or longer for discussion.

Pupil learning outcomes: Pupils can:

- relate their existing knowledge about earthquakes to historic paintings of the results of earthquakes;
- look carefully at a painting to notice the fine details;
- report scientifically using scientific language;
- realise that in the past people did not know how to explain earthquakes and so myths about their origins arose;
- work together in a group to produce one report.

Context:

- *effects on people* -

Pupils should describe what they can see the people doing in the paintings. They are probably panicking, but, as they are outside, they should be running towards open spaces.

- *effects on buildings* -

If this were a major quake, there would be lots of movement; the ground might be moving up and down in waves. Solid buildings would be collapsing, tall buildings would be swaying and any glass used in windows might be falling; timber buildings would be flexing; trees would be waving around.

- *signs of liquefaction* -

Buildings would seem to be toppling over, into the ground without necessarily breaking up if this were occurring.

- *what could be heard?*

Pupils could suggest that there might be a rumbling noise from the earthquake and cracking and breaking noises. People might be shouting and screaming.

- *tectonic setting for why the earthquake occurred* - Earthquakes are mostly caused by movement on a major fault underground. Pressure builds up due to movement of the Earth's tectonic plates. Eventually the rocks break at the fault, sending seismic waves to the surface. These cause surface waves resulting in wave-like movement of the ground surface. It is these that cause the most damage.

Pupils should look at a world map of tectonic plates and work out which two plates were most likely to be responsible for the earthquake they are describing.

- *facts about the earthquakes shown in the paintings available on the internet* -

It is possible to find information about earthquakes that occurred at about the right time in the areas shown in the paintings.

- *beliefs at the time about why earthquakes occur* - Most people believed that earthquakes were caused by a divine power. In the case, of the Japanese earthquake shown below, a catfish was thought to be responsible.



"The cause of the great catfish at Shin Yoshiwara", Edo 1855
The women blame the catfish for the earthquake, but the catfish is delighted to have these ladies with him, and threatens to squirm again (causing aftershock), Tokyo University Library

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Following up the activity:

Use a search engine on the internet to research other paintings of historic earthquakes or look up 'Earthquakes in art' where there is some interesting material about using seismographs as pieces of art.

Underlying principles:

- As tectonic plate movement occurs, stress builds up and the rocks bend (deform elastically).
- Eventually the stress becomes too great, friction is overcome and the rocks fracture (brittle failure) at a fault; the rocks spring back, producing seismic P- (longitudinal) and S- (transverse) waves.
- The P- and S-waves travel outwards from the point of fault movement (the focus); when they reach the surface, they cause surface waves.
- The point on the surface above the focus is the epicentre; surface waves travel outwards from the epicentre, causing ground movement, and potentially, ground liquefaction, landslides and tsunamis.
- The power of an earthquake is measured on the moment magnitude scale. Earthquakes of magnitude 5 and above are often damaging. (Formerly the Richter scale, was used.)

Thinking skill development:

Discussion about the stories told by the four paintings involves metacognition.

Relating the evidence in the paintings to modern scientific knowledge about earthquakes is a bridging skill.

Resource list:

- copies of the four paintings
- pens and paper or laptops.

Useful links:

<http://www.seismo.ethz.ch/en/knowledge/snapshots/earthquakes-in-art/>

Earthlearningideas:-

http://www.earthlearningidea.com/home/Teaching_strategies.html#earthquakes

Source:

Developed by Elizabeth Devon of the ELI Team from an original idea by Chae Cruickshank, Science Subject Specialist of the OCR Awarding Body, Cambridge, UK.

Cross-curricular Earthlearningideas
Geo-art: paintings and sculptures inspired by all things 'geo'
Earthquakes and art: historic paintings of earthquakes
Geo-literature: poems and stories inspired by all things 'geo'
Geo-music: music inspired by all things 'geo'
Rocks music: create your own geo-instrument
Back in time: "Alligators spotted in London"

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