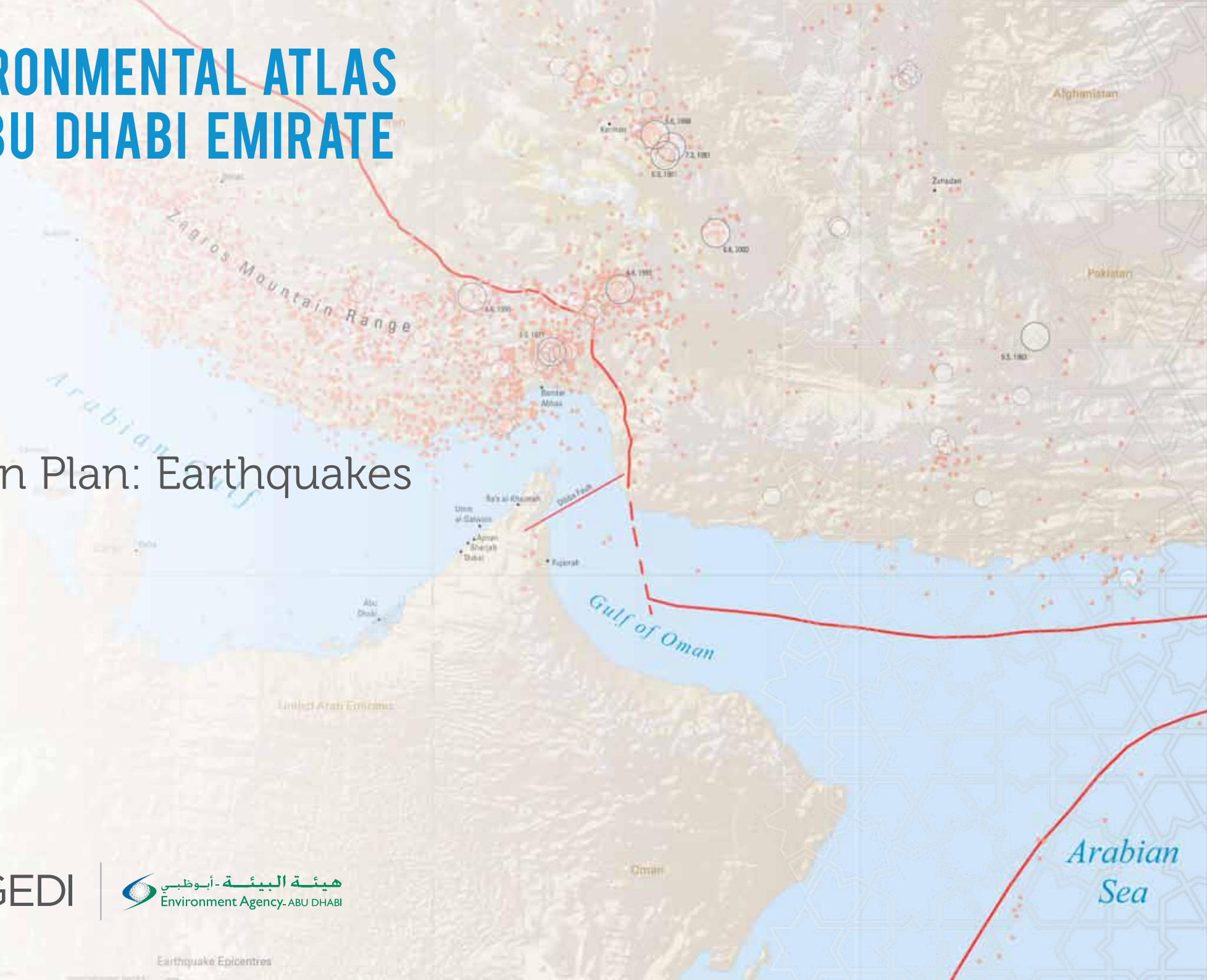


ENVIRONMENTAL ATLAS OF ABU DHABI EMIRATE

Lesson Plan: Earthquakes



Lesson Plan: Earthquakes

Lesson Plan Content:

This lesson plan and slide presentation is to be used in conjunction with:

- 1 x earthquakes teacher briefing
- 1 x earthquakes teacher fact sheet
- 1 x earthquakes class work sheet

Lesson Overview:

Students will gain an understanding of earthquakes and seismic activity.

Estimated Time Requirement:

One 60 minute session.

Learning Objectives:

Students will be able to:

- > understand the causes and types of earthquakes
- > understand the effects and impacts of earthquakes
- > understand the measurement of earthquakes

Skills:

This lesson plan can aid students to demonstrate:

- > Classifying skills
- > Communicating skills

> Observing skills

Preparation prior to the lesson:

Before commencing the lesson, download and read through the teacher briefing, fact sheet, work sheet and this presentation so you are fully conversant with the content and key terms. Also, ensure that the work sheet activity is possible to undertake in your classroom environment.

Lesson Sequence:

Here is a sequence of the lesson with suggested timings:

Preparation (5mins)

Inform the students that today they are all going to learn about earthquakes and seismic activity and take part in some fun activity. Elicit from the students some of the things they already know about earthquakes.

Presentation (25mins)

Using a projector to present to the class, progressively run through the slides to impart all the key points about earthquakes.

Activity (25mins)

Having completed the presentation, undertake the participation and discussion

exercise contained in the work sheet. This activity enables students to learn about some of the key words used in the study of earthquakes, boosting their vocabulary.

Assessment (5mins)

Ask students to write and/or illustrate what they did during this lesson and what they learned from their participation in the activity.

Close of Lesson

Closure: Ensure each group has completed the practical session and correctly matches the green and blue cards.

Extending the Lesson: Encourage students to do some research at home on earthquakes, the impact they have on human settlements and how people prepare themselves for earthquakes.

Source of Lesson:

Abu Dhabi Global Environmental Data Initiative.

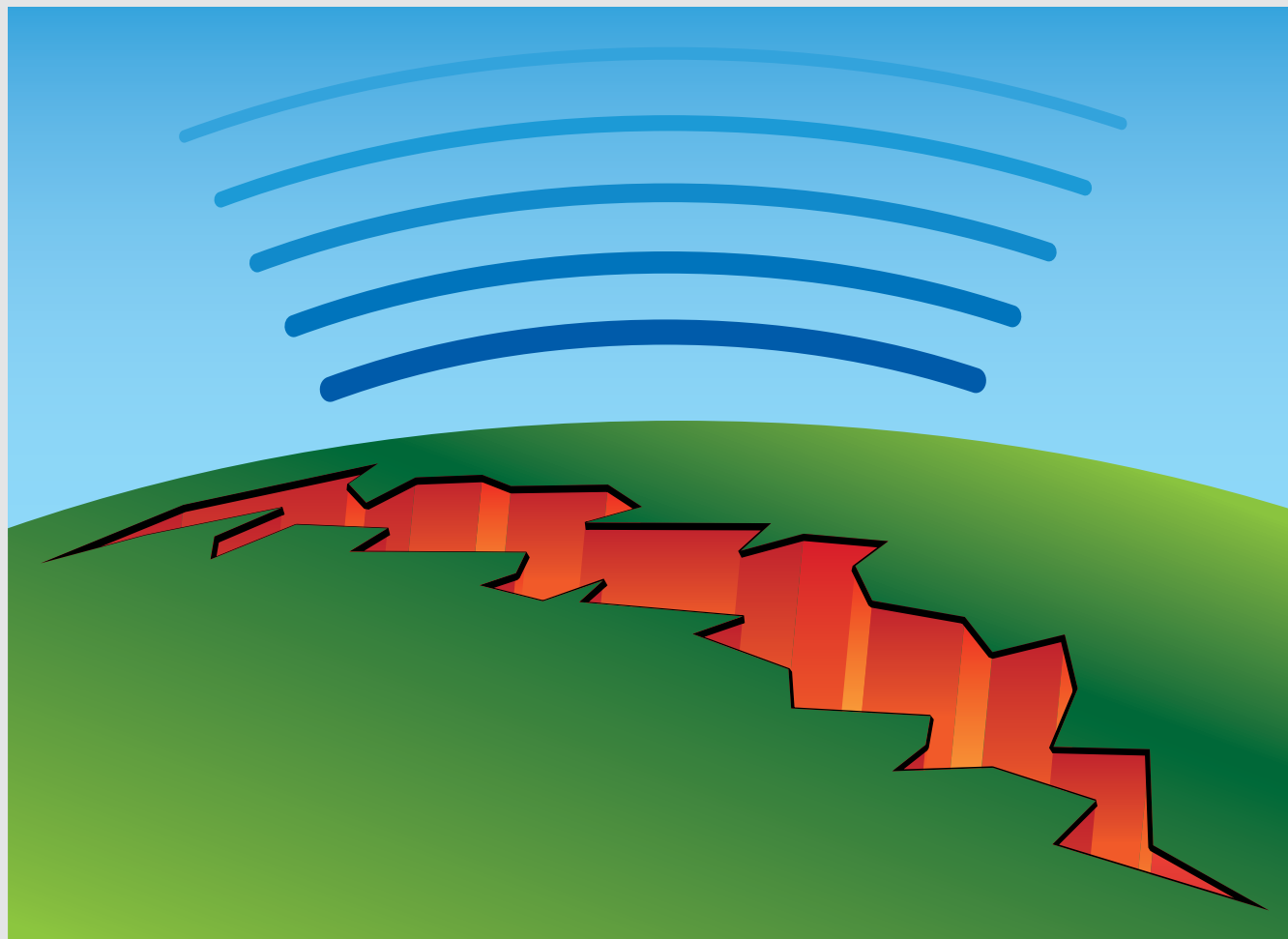
All supporting material can be downloaded freely at: www.environmentalatlas.ae

Classroom Presentation: Earthquakes

What is an earthquake?

An earthquake is the sudden release of strain energy in the Earth's crust resulting in waves of shaking that radiate outwards from the earthquake source.

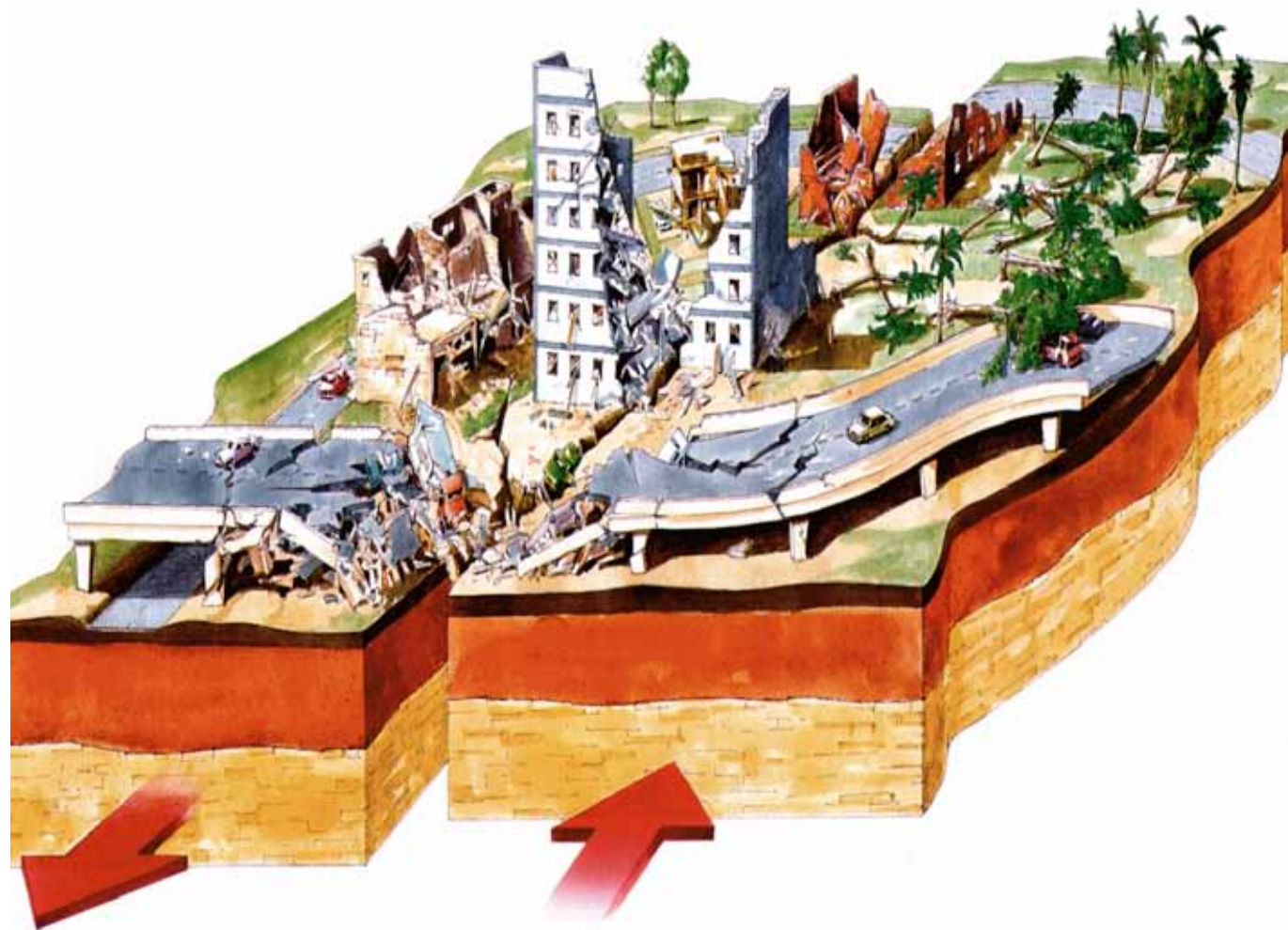
When stresses in the crust exceed the strength of the rock, it breaks along lines of weakness.



What is an earthquake?

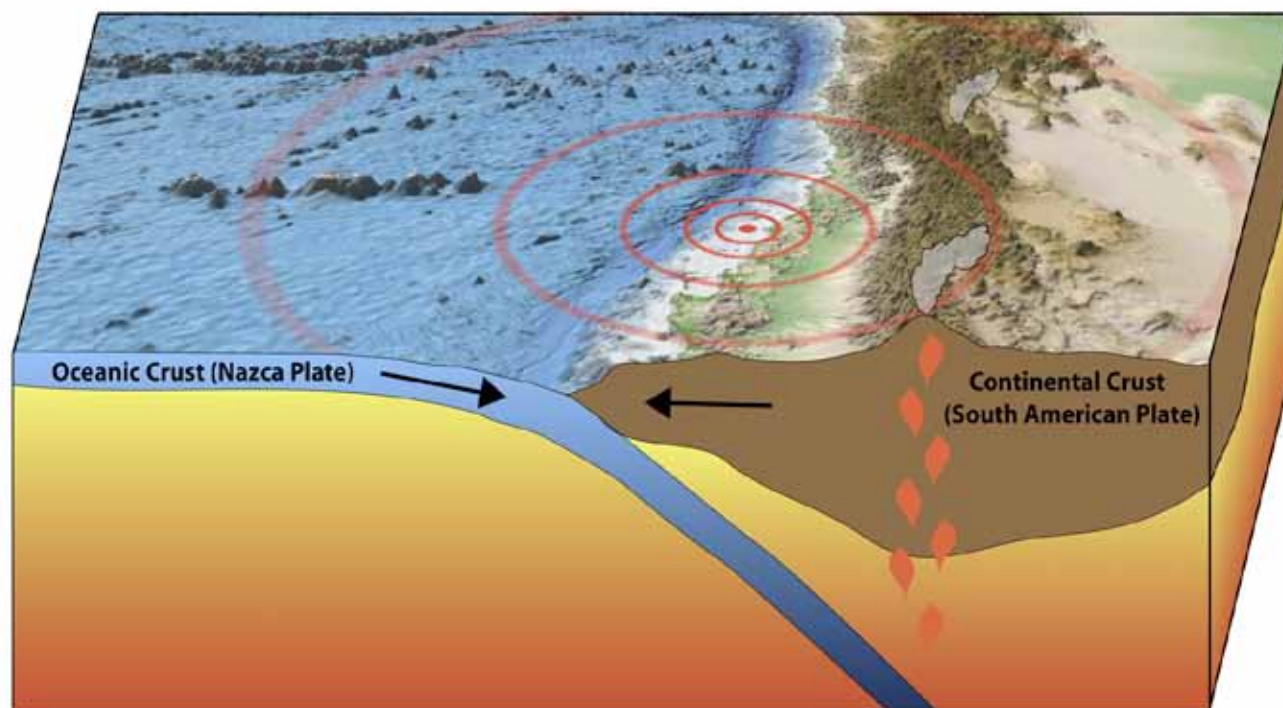
As the Earth's plates move past each other, friction between them results in the build up of pressure.

As the plates continue to move and the pressure builds up, eventually the pressure is great enough to overcome friction and the plate jolts forward releasing the pent up energy in the form of seismic waves.



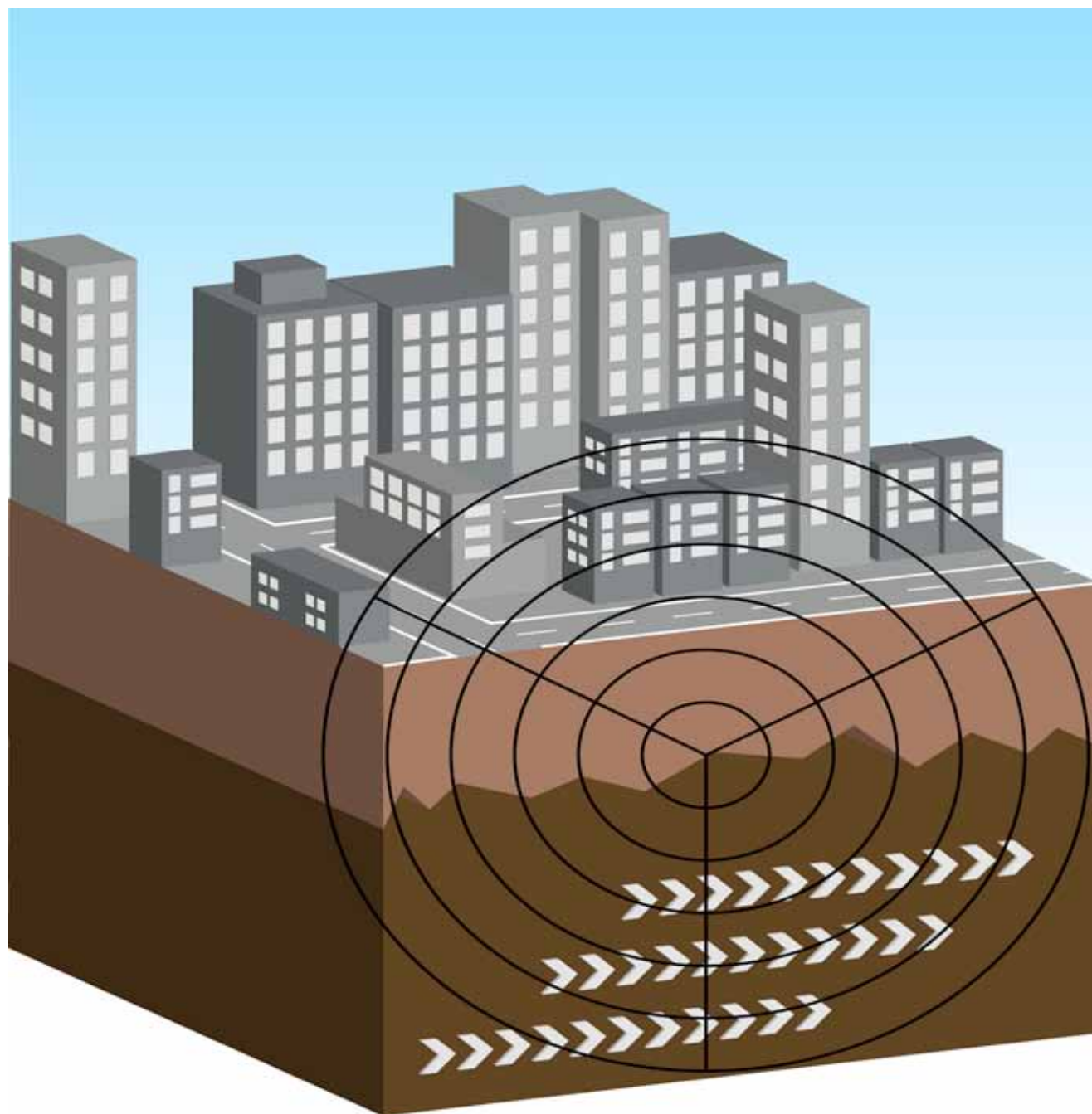
Where do earthquakes occur?

Occurrences of earthquakes are unevenly distributed over the Earth, with the majority occurring at the boundaries of the major crustal plates.



What is a foreshock?

Sometimes an earthquake has foreshocks. These are smaller earthquakes that happen in the same place as the larger earthquake that follows.



Main shocks & aftershocks

Scientists can't tell that an earthquake is a foreshock until the larger one happens.

The largest, main earthquake is called the mainshock.

These always have aftershocks that follow.

These are smaller earthquakes that occur afterwards in the same place as the mainshock.

Depending on the size of the mainshock, aftershocks can continue for weeks, months and even years after the mainshock.



Earthquake strength

Earthquakes can have a range of strengths with the strongest having severe consequences for the areas where they are centered, nearby areas, and even some far away in the case of earthquake-generated tsunamis.

The effects of an earthquake can be devastating.



Types of Earthquakes

There are three main types of earthquakes:

- > tectonic
- > volcanic
- > explosion

The type of earthquake depends on the region where it occurs and the geological make-up of that region.

The most common are tectonic earthquakes.

These occur when rocks in the earth's crust break due to geological forces created by movement of tectonic plates.

Another type, volcanic earthquakes, occur in conjunction with volcanic activity.



The causes of Earthquakes

Most earthquakes occur at fault zones, where tectonic plates, the giant rock slabs that make up the Earth's upper layer, collide or slide against each other.

These impacts are usually gradual and unnoticeable on the surface; however, immense stress can build up between plates.

When this stress is released quickly, it sends massive vibrations, called seismic waves, often hundreds of miles through the rock and up to the surface.

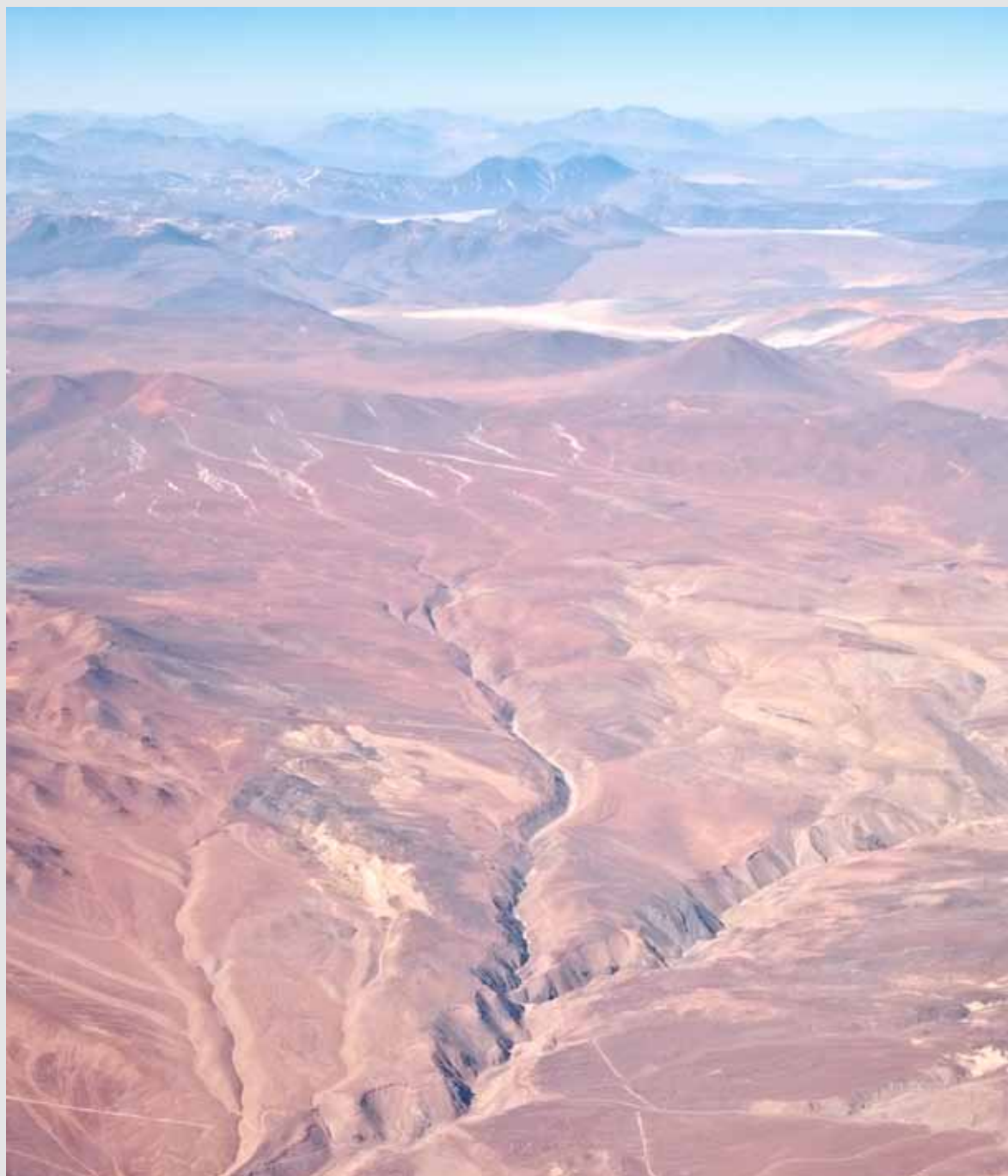


The causes of Earthquakes

The surface where they slip is called the fault or fault plane.

The location below the earth's surface where the earthquake starts is called the hypocenter, and the location directly above it on the surface of the earth is called the epicenter.

The point inside the crust where the pressure is released is called the focus.



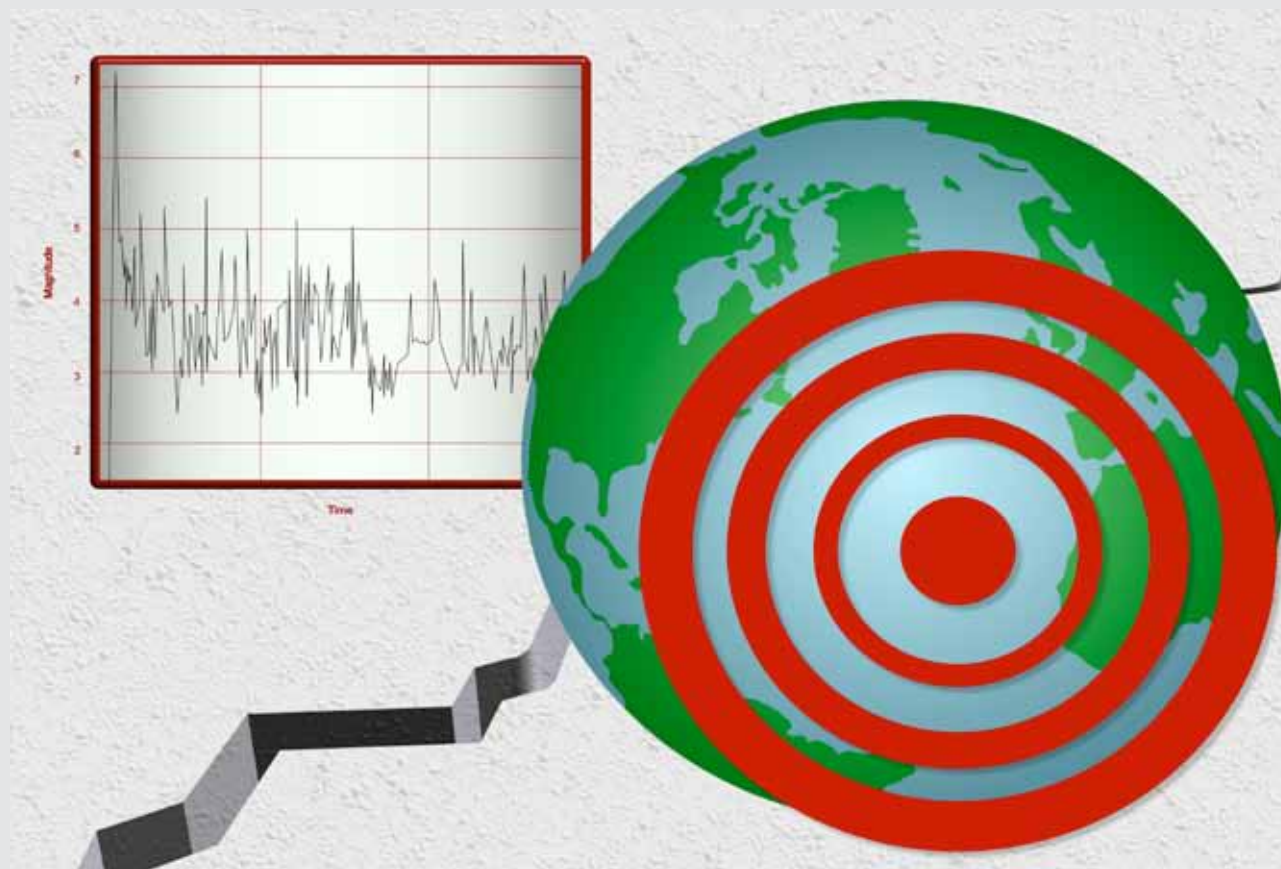
Earthquake energy

Earthquake energy is released in seismic waves.

These waves spread out from the focus.

The waves are felt most strongly at the epicentre, becoming less strong as they travel further away.

The most severe damage caused by an earthquake will happen close to the epicentre.

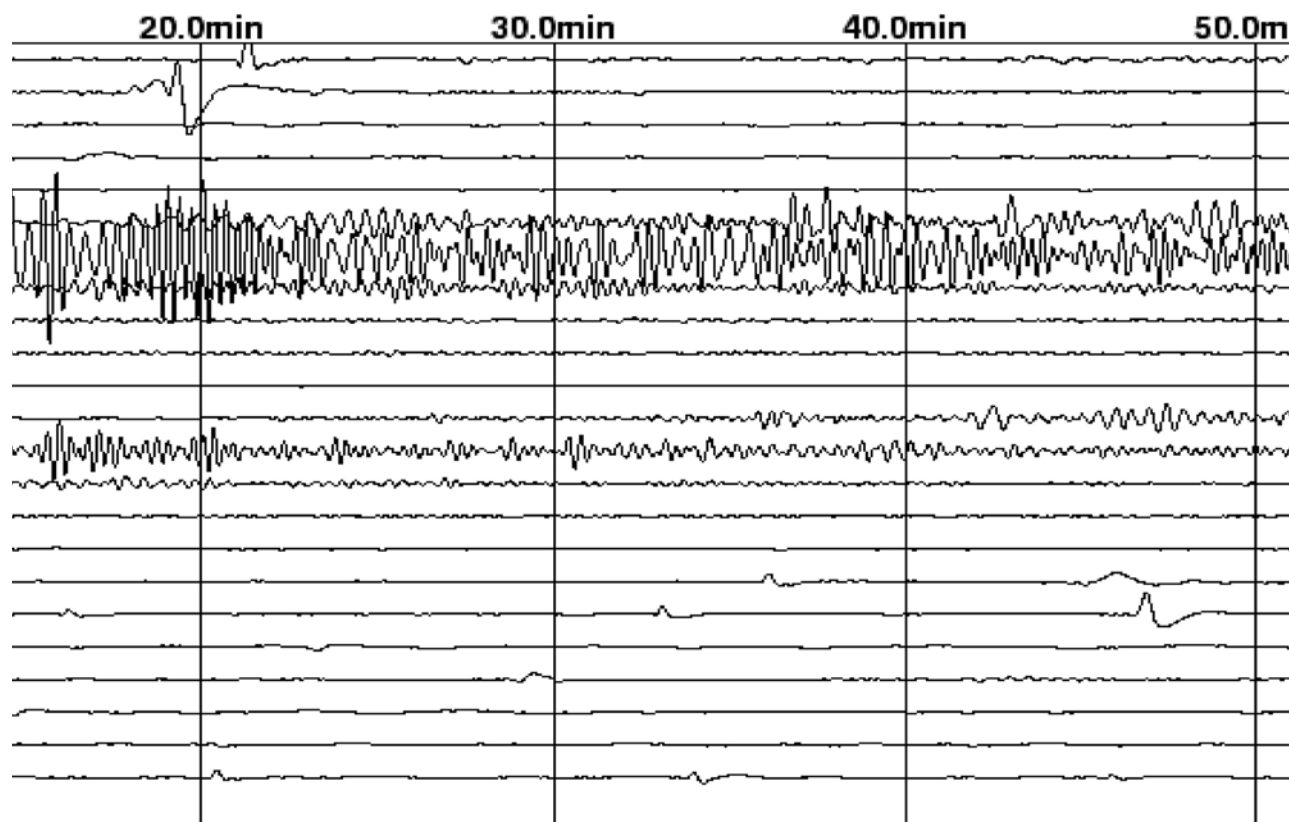


Measuring earthquakes

To measure earthquakes, geologists use seismographs to record the surface and body waves of an earthquake.

The waves from earthquakes are recorded on magnetic tape by a pen attached to the mass.

Seismogram



Effects of earthquakes

Earthquakes can destroy settlements and kill many people.

Aftershocks can cause even more damage to an area.

We can divide the effects of an earthquake into those known as the primary effects and those known as the secondary effects.



Effects of earthquakes

Primary effects of an earthquake are those resulting directly from the earthquake itself including:

- > buildings collapsing
- > roads cracking
- > bridges giving way
- > shattering of glass

and injuries / deaths resulting from these.



Effects of earthquakes

Secondary effects are those that result from the primary effects.

> severe fires due to explosion from escaping gas and difficulties in putting out fires due to lack of water from burst mains.

Other secondary effects include:

- > homelessness
- > business going bankrupt



Impact of Earthquakes

A number of factors can contribute to the impact of an earthquake:

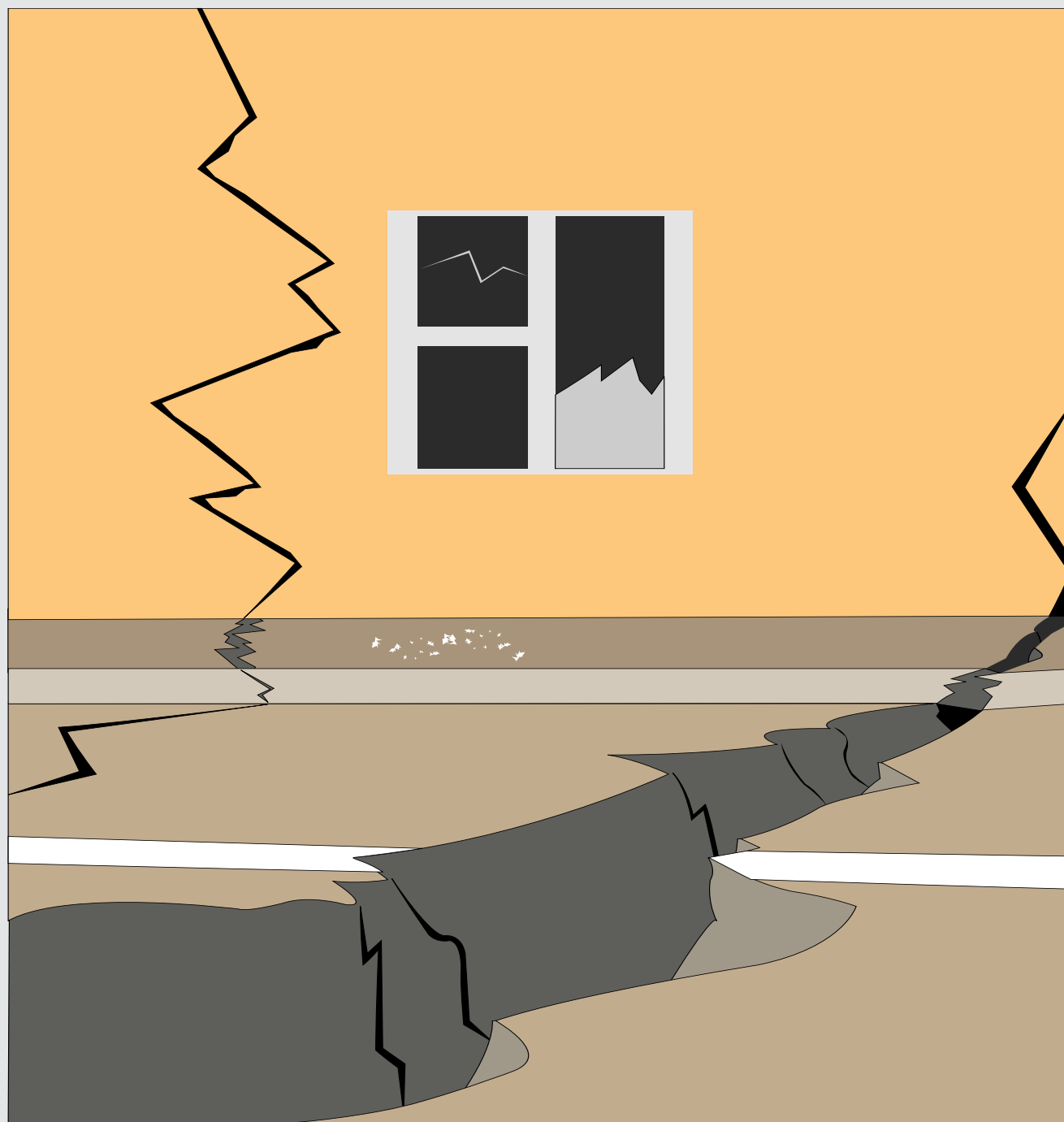
- > The distance from the epicentre - the effects of an earthquake are more severe at its centre.
- > The higher on the Richter scale, the more severe the earthquake is.
- > The level of development – the more developed the nation, the more likely to have the resources and technology for monitoring, prediction and response.
- > The population density - the more densely populated an area, the more likely there are to be deaths and casualties.
- > The time of day influences whether people are in their homes, at work or travelling.



Predicting Earthquakes

Scientists have tried many different ways of predicting earthquakes, but none have been successful.

On any particular fault, scientists know there will be another earthquake sometime in the future, but they have no way of telling when it will happen.



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