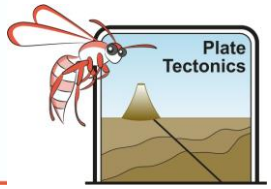
Australian Earthquakes & Faults – Teacher Notes



Since Australia and its continental shelf lie well within the greater Australian Continental Plate we do not suffer from the major quakes felt on continental plate margins where the crust may be crumpled upwards, subducted downwards or sheared against another continental plate.

Our knowledge of faults causing earthquakes is limited by:

- Geological knowledge. Some resource rich areas have been mapped in minute detail whilst less explored areas are mapped in less detail. (Funds from the "Royalties for Regions" program are being expended in geological and geophysical exploration of promising oil, gas and mineral rich provinces in Western Australia).

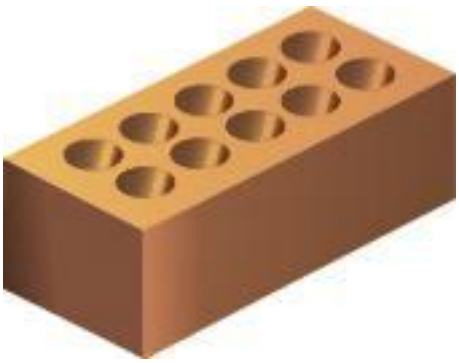
- Low population density means "felt earthquakes" may not be reported. An interesting earthquake "swarm" has been moving northwards through the Central Wheatbelt for many years. Because movements are not severe and few people or properties are affected the phenomenon is poorly reported.

- Access to seismic information for "small" quake information. Australian Seismometers in Schools project has placed seismometers in 28 schools (October 2013) across Australia. These can be used to monitor activity across the Indo-Pacific region. Presently (2013) six schools in Bussleton, Carnarvon, Kalgoorlie, Karratha, Kulin and Perth are hosting themhttp://rev.seis.sc.edu/stationList.html
www.ga.gov.au/earthquakes/staticPageController.do?page=earthquake-activity

Most Australian earthquakes happen in the upper 20km of the crust where rocks are cold and brittle. Some faults allow almost constant friction free movement whilst others build up stress until it is released in damaging movement. When rocks are required to move past each other along a fault line they will resist until the force applied exceeds "limiting friction". This results in sporadic jerky movements which are felt as earthquakes. Movement is greatest at the margins of crustal plates where noticeable earthquakes are felt.
Students may experience this jerky movement by pushing two bricks past each other or by pushing a brick over a cement surface.
www.ga.gov.au/earthquakes/staticPageController.do?page=earthquake-activity

Materials per student or group:

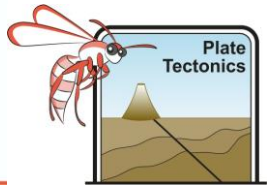
- 1 brick and a cement or hard rough surface
- String
- Newton spring balance
- Water (bucket)



What can be done to make this experiment a "Fair Trial"?
Repeat the experiment.

Method:

1. Trial your activity to ensure your equipment will result in data that is accurate (using equipment which will record the data effectively) and precise (to two decimal places).



2. Tie the string round the brick and lift it freely into the air. Read the force required to move it through air (3 readings).

3. Place the brick on concrete and increase force until it will move it across the surface of the concrete. (3 readings)

What was the difference in force between rock and air and rock and rock?
Less energy was required to lift the block through air.

How could this experiment be improved to model movement along a fault line?
Rocks on either side of a fault line would not be smooth and fault lines are not always simple straight lines.

4. Wet the surface of the concrete and repeat step 3. What do you observe? Less force is required to get the block moving and it moves faster.

What effect do you think water would have on fault movement?
More frequent and less destructive movement.