Making waves: a storm in a teacup?

Three ways to make waves in a container of water: wind, earthquake and impact

Making waves – in the classroom

Put a container of water on the table and ask the class to work out as many ways as they can to make waves (ripples) on the surface of the water.

Possibilities are:
1. blow over the surface;
2. move the container;
3. drop something into the container.

These processes can easily be demonstrated.

Making waves in oceans and seas

All three methods of making waves in the classroom also affect oceans, seas and lakes. Ask the class to suggest how waves could be made in Earth's bodies of water in similar ways.

1. **Blow over the surface:** Waves in oceans, seas and lakes are formed this way.
2. **Move the container:** Earthquakes move ocean, sea and lake floors, generating tsunami waves.
3. **Drop something into the container:** Landslips or asteroids can fall into oceans, seas or lakes, also producing tsunamis.

Winds producing waves

Winds blow over the surface of water bodies, raising the surface into ripples. The wind behind these ripples raises them into waves. The wider the area over which winds blow, the larger the waves. So waves in lakes are small whilst waves in oceans range from small to very large. The largest open ocean wave recorded was 30m (100 ft) high.

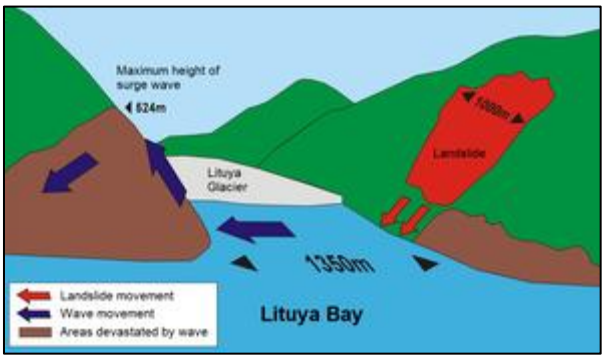
Earthquakes producing tsunami waves

You can mimic the way in which earthquakes produce tsunami waves in the classroom using a square plastic container, a slope and blocks of wood using the Earthlearningidea *Tsunami alert! Run for the hills or stay by the sea?* This shows how some movements cause tsunamis and some do not.

Modelling the cause of tsunami waves by earthquakes. (*Peter Kennett*).

Landslides or asteroids producing tsunami waves

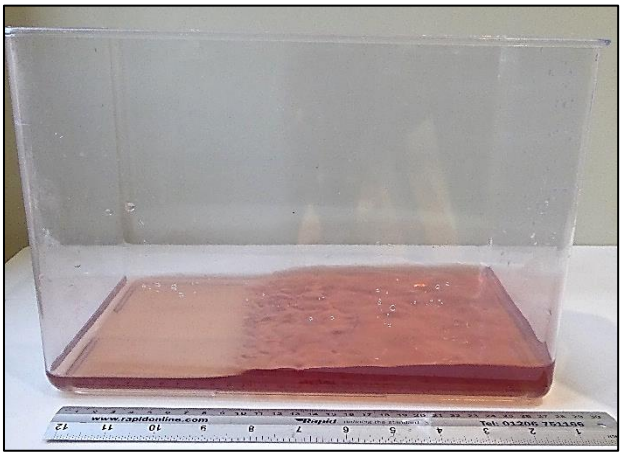
The 1958 landslide into Lituya Bay in Alaska caused the largest tsunami ever recorded, now called a megatsunami. As the diagram shows the 1958 landslide caused a tsunami that reached a height of 524 m up the other side of the bay. Fortunately, no humans have been around to record the heights of megatsunami caused by asteroid impacts because they would be devastating.



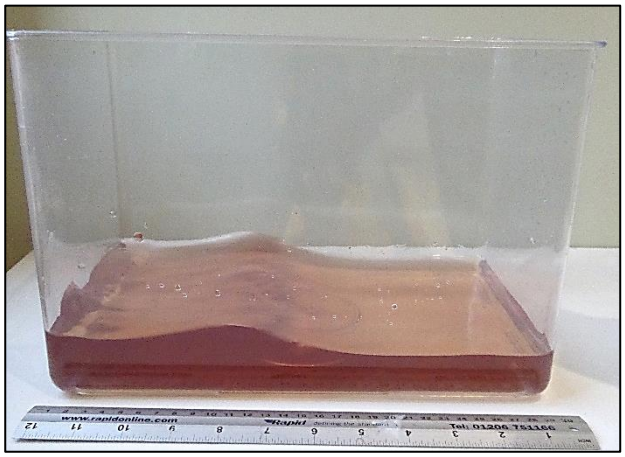
The Lituya Bay megatsunami. (*SirGorg – public domain*).

Waves and shorelines

You can investigate how the depth of water affects waves using a tank with different water depths as in the Earthlearningidea: *Tsunami: what controls the speed of a tsunami wave?*



A classroom tsunami wave in 2cm depth of water.



A classroom tsunami wave in 4cm depth of water.

You will find, the deeper the water, the faster the wave. So in deep water, waves move fast, but as they reach shallower water, they slow down. As they slow, they become higher and higher. So the highest wind-formed and tsunami waves are found on coastlines with shallow slopes.

(Photos: Chris King unless otherwise shown).

The back up

Title: Making waves: a storm in a teacup?

Subtitle: Three ways to make waves in a container of water: wind, earthquake and impact

Topic: A class introduction to wave-formation, using a glass of water as a prompt.

Age range of pupils: 12 years upwards

Time needed to complete activity: 15 minutes

Pupil learning outcomes: Pupils can:
- explain the three common ways in which waves are formed on Earth, by wind, earthquake and impact;
- explain how water depth affects wave height.

Context:
This activity can be used to introduce the formation of normal coastal waves and of tsunami waves and the distinction between them.

Following up the activity:
The class could use the internet to check if the best surfing beaches on Earth are opposite wide oceans.

Underlying principles:
- Normal coastal/lake waves are formed by wind drag on the water surface.
- Tsunami waves are formed by earthquake displacement of the sea bed or by impacts from landslides or asteroids..

Thinking skill development:
Developing a picture of the different modes of wave formation is a construction activity. Relating the classroom discussions of a container of water to wave formation in lakes, seas and oceans involves bridging.

Resource list:
- a container of water

Useful links:
There are many videos of large wind-formed waves and of tsunami waves on the internet.

Source: Chris King of the Earthlearningidea Team.