Experiments on sea level rise

ACTIVITY 1 Investigating what happens to water when it is heated

This activity looks at what happens to water as it is heated by the sun. This is an experiment to help students answer the question and confirm their ideas.

Prediction

Ask the students:

What do you think will happen to the level of the water in a bottle when it is heated?

They can discuss their ideas in a group and write down their group explanation.

Materials

- A flask or clear plastic drink bottle with a lid
- A stopper
- A straw or a piece of clear plastic tubing about 30cm long
- A ruler or stick to hold up the clear plastic tube
- Food colouring
- Some Blu-Tack or plasticine

Setting up

 Make a small hole in the lid or stopper slightly less than the diameter of the tube or straw.	 Put the tube or straw through the hole. It should be a tight fit.	 Now seal around the tube with blu-tack or plasticine. This is to make it watertight.

		
In a separate bottle or jug, mix a couple of drops of food colouring with water. Use this to fill this bottle to the brim. The meniscus should be curved over the top of the bottle.	Attach the ruler or stick to the tube (sellotape works.) Put on the stopper/lid carefully. Check that no liquid escapes through the seal. Use more Blu-Tack if necessary.	Place in a sunny spot and mark the level of the water on the tube using a permanent marker. Measure the height of the water as it moves up the tube, every 10 minutes.

Observation

What happens to the water?

Water should rise up the tube.

Measure

How far does the water travel up the tube?

It is worth marking or measuring the height of the water up the tube with time. This makes a worthwhile graphing exercise.

Explanation

Why has the water moved in this way?

When water gets warm, it expands because the water particles have more energy so they need to occupy more space as they move around more. This fits in with the action model for the states of water (solid, liquid and ice).

Extension

1. Carefully place the bottle in a cool place.

2. Measure/observe the rate at which the water level changes.

Is it the same as the rate of heating? Any thoughts to explain what is observed?

ACTIVITY 2 Establishing the link between ice melt and sea level rise

Introduction

Ice can be found either on land or floating in the sea. There is the land-based ice that covers Greenland, Antarctica, the tops of mountains and glaciers. There is also sea based ice, that's the ice that's floating on the oceans, the icebergs and the Arctic ice sheet.

This activity will help understanding of what will happen to sea levels as the snow and ice melts.

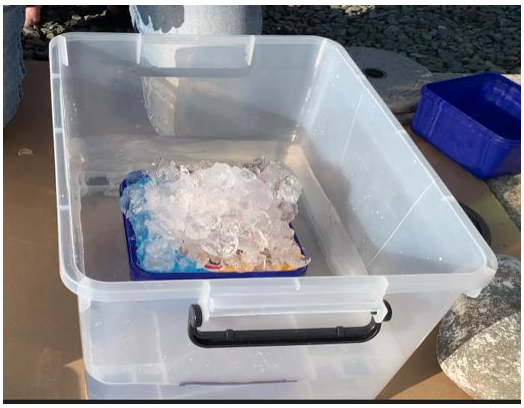
Prediction

What is the effect of the floating sea ice on sea level rise?

Materials

- A bowl or container large enough to contain water
- Ice cubes
- A flat rock
- Some foil to wrap the rock or a plastic container to put the rock in, see note below

Instructions



1. Place the container in a sunny spot.
2. Add enough water to give approximately 2.5 to 3 cm of water.
3. Place a flat rock in the middle of the container.

Note: You may need to wrap the rock in some aluminium foil or similar to stop the water being absorbed into the rock, put the rock inside an ice cream container or allow the rock to sit in the water for a period of time so that it becomes saturated.

4. Now put several handfuls of ice on the rock. Once the ice has been added, mark the side of the container to show the water/ice level.

Observation

What happens to the water level once the ice has melted?

Explanation

Was there as much change as you expected? Can you explain what has happened?

Questions

We know that the Greenhouse Effect is warming the oceans and melting the floating ice caps. We know that some land based ice in Antarctica and in glaciers is melting.

1. Which one do you think will have the greatest effect in your lifetime on sea levels?

2. What evidence do you have to support your answer?

3. What is the main cause of sea level rise at the moment?

Review the first activity

How does this model what happens in the ocean?

The ocean is bordered by land. The water is very cold at the bottom (– 4° C), so warm water cannot move down. When it expands, the only place it can go is upwards.