

Temperature Weathering – Teacher Notes

Temperature changes causing weathering

Although in Western Australia at present it really only gets cold for part of the year, in Permian times about 300 million years ago, half of Australia was covered by ice. Great glaciers scoured their way over the Yilgarn Plateau north towards the Pilbara breaking off rocks and using them to flatten the landscape. When the glaciers melted they flooded the Carnarvon and Canning Basins.



This rock was found north east of Minginew in the Central Wheatbelt. It still shows scrapes and gouges where it lay at the bottom of a glacier that pushed its way across the country during Permian times.

Glaciers Scraping the Landscape – Student Activity

Materials

- Ice cube tray or two small plastic cups.
- Small pieces of broken rock (road metal, quartz or concrete).
- Water
- Freezer
- A cement block or pathway.

Method

1. Fill containers with water
2. Into one place the rock pieces
3. Freeze overnight
4. Select two strong (and heavy) students
5. Each student draws their cube along the cement surface pressing down as hard as they can
6. Stop before the surface gets too damaged!

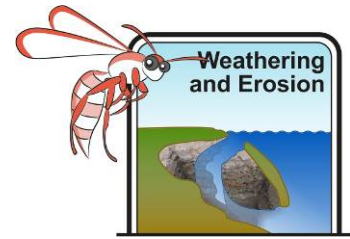
Observation

What was the difference between the effect of the two blocks on the hard surface?

They both left a wet mark but after a little while the block with rocks began to scrape the surface.

Discussion

What change to the landscape would glaciers make? They would grind rocks in the landscape flat.



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Expanding Ice, Changing Landscape - Teacher Demonstration

Since prehistoric times masons have used the expansion of water on freezing to break resistant rock. They chisel out an initial furrow in the rock, apply water over freezing nights and watch the cracks expand, lengthen and deepen.

Materials

- One empty cool drink bottle with lid
- Plastic bag to contain bottle
- Water
- Permanent marking pen or masking tape and ruler
- Freezer



Method Experiment A

1. Fill bottle with water
2. Screw lid on tightly
3. Place in freezer overnight
4. Observe change

Method Experiment B

1. Fill bottle approximately 2/3rd full
2. Mark the level of water on the outside of the bottle.
3. Measure the height from bottle base to water level
4. Place bottle upright in bag
5. Place upright bottle and bag in freezer overnight.
6. Observe and mark the level of water/ice in the bottle
7. Measure the height from bottle base to water/ice level

Observations

Experiment A: What changed overnight? [The bottle has expanded and may have even cracked.](#)

Experiment B: What changed overnight? [The ice is sitting above the marked water level on the bottle.](#)

Expansion of water on freezing expands cracks in rock and is a process of weathering

Heat Causes the Outer Layers of Rocks to Peel Off

In desert areas rocks can be subjected to extreme heat during the day with temperatures rising above 40°C and then falling below freezing point at night. When rocks are heated they expand and when they cool they shrink. The inner layers of great rocks are insulated from heating and cooling by their outer layers. They are slower to heat and cool. In the cooler evenings the outer layers shrink while the inner layers are still expanding. This causes curved shearing in the rock called “onion skin weathering”.

