Geological highlights of the Cape Liptrap coast at Walkerville, South Gippsland

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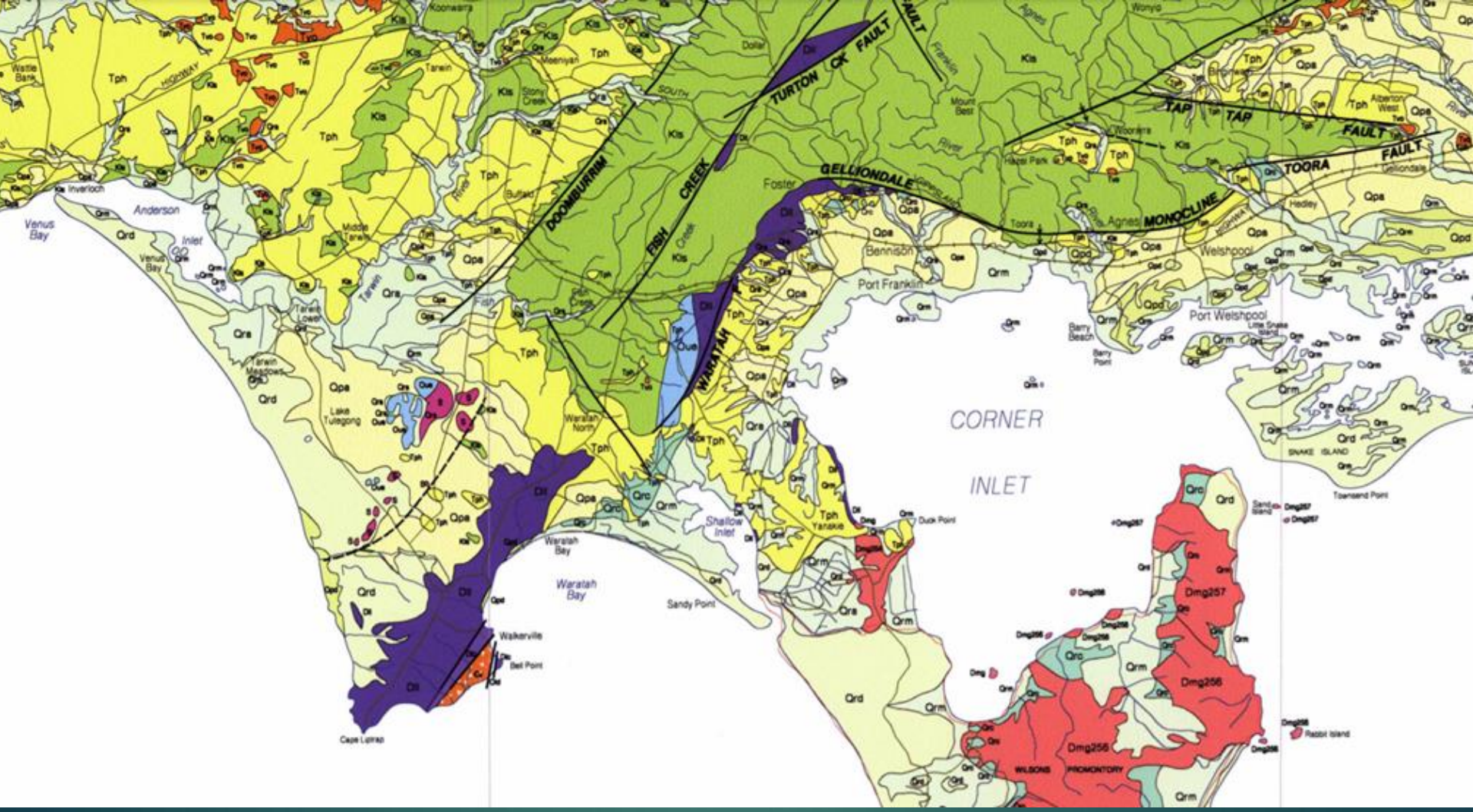
Coastcare Victoria: Summer by the Sea program 2021



Geological Map of South Gippsland

Geological maps, like this Warragul 1:250 000 geological map (1997), are available free online at Victoria State Government Earth Resources publications

Walkerville North road and carpark

Park at the end of the road and walk down the ramp to the beach. Proceed to the grey coloured rocks at the top of the beach. The erosion control works here are made of basalt, a volcanic rock quarried at Leongatha.

This walk highlights the diverse geology beautifully exposed along the Walkerville coast of the Cape Liptrap Peninsula.

View from the Lookout above Walkerville North

1. Start on the beach at the end of Walkerville North Road.

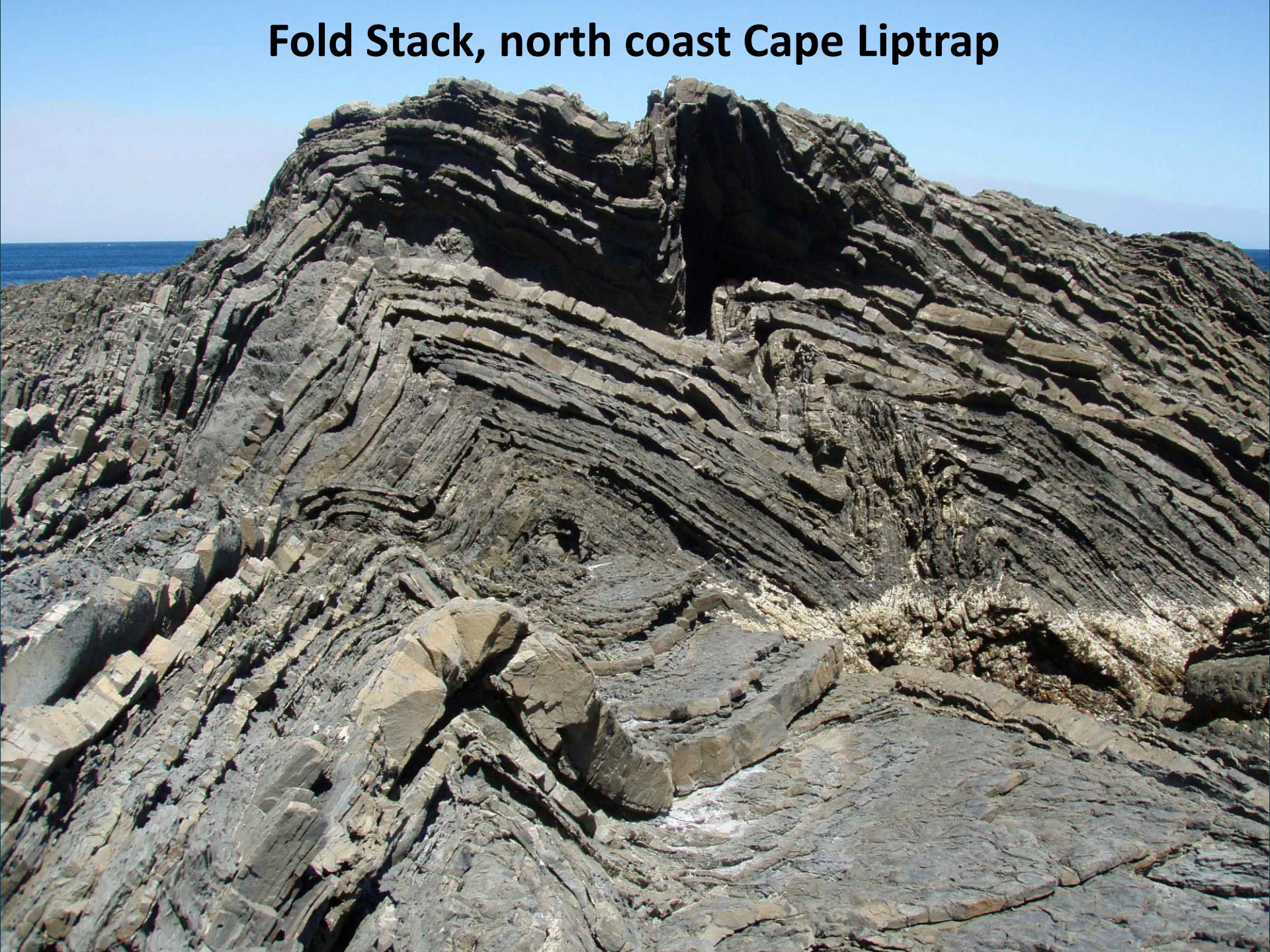
Folded mudstones and sandstones of the Cape Liptrap Formation. These marine rocks are 400 million years old.

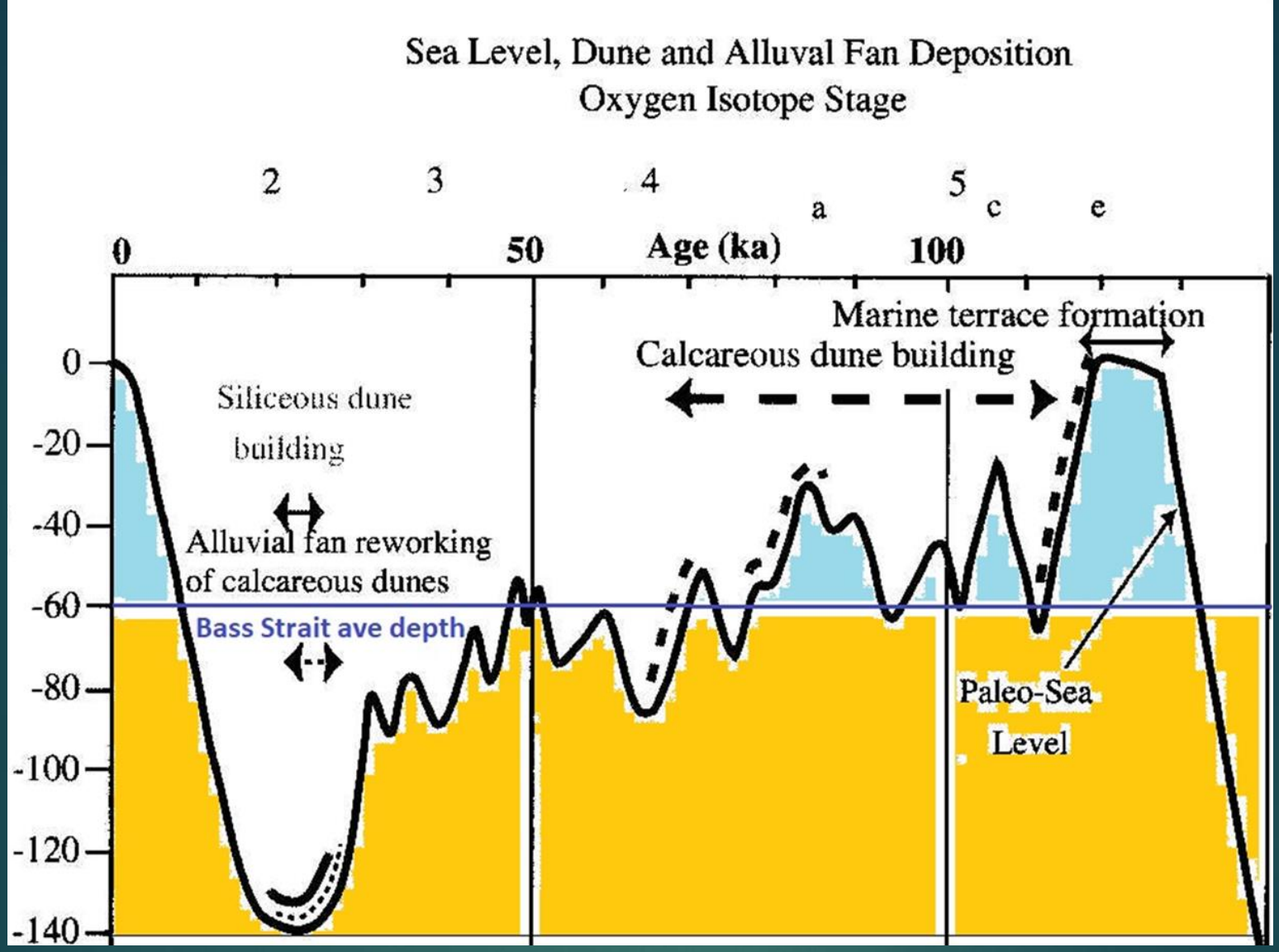
Walkerville North beach cliffs

Above the folded rocks is a layer of large quartz pebble overlain by clay deposits. This is a raised marine terrace which formed 132,000 years ago.

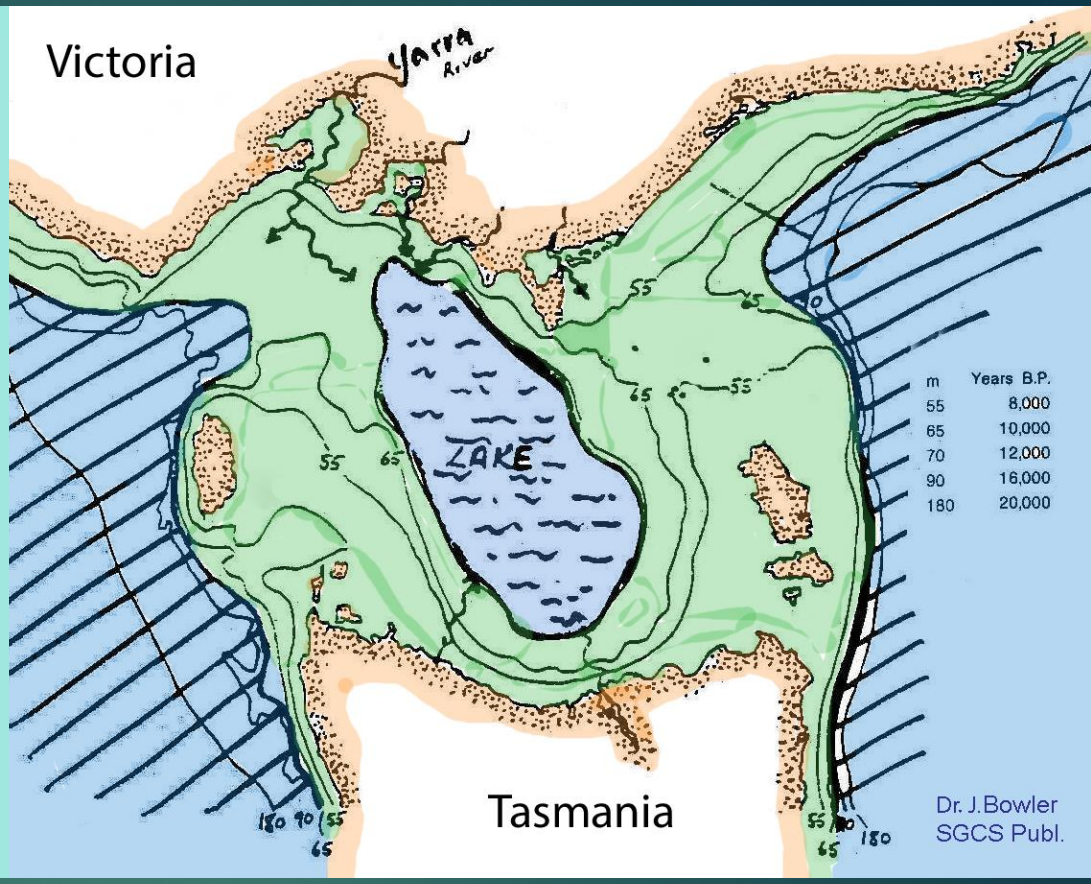
Quartz veins in the Cape Liptrap Formation

Fold Stack, north coast Cape Liptrap



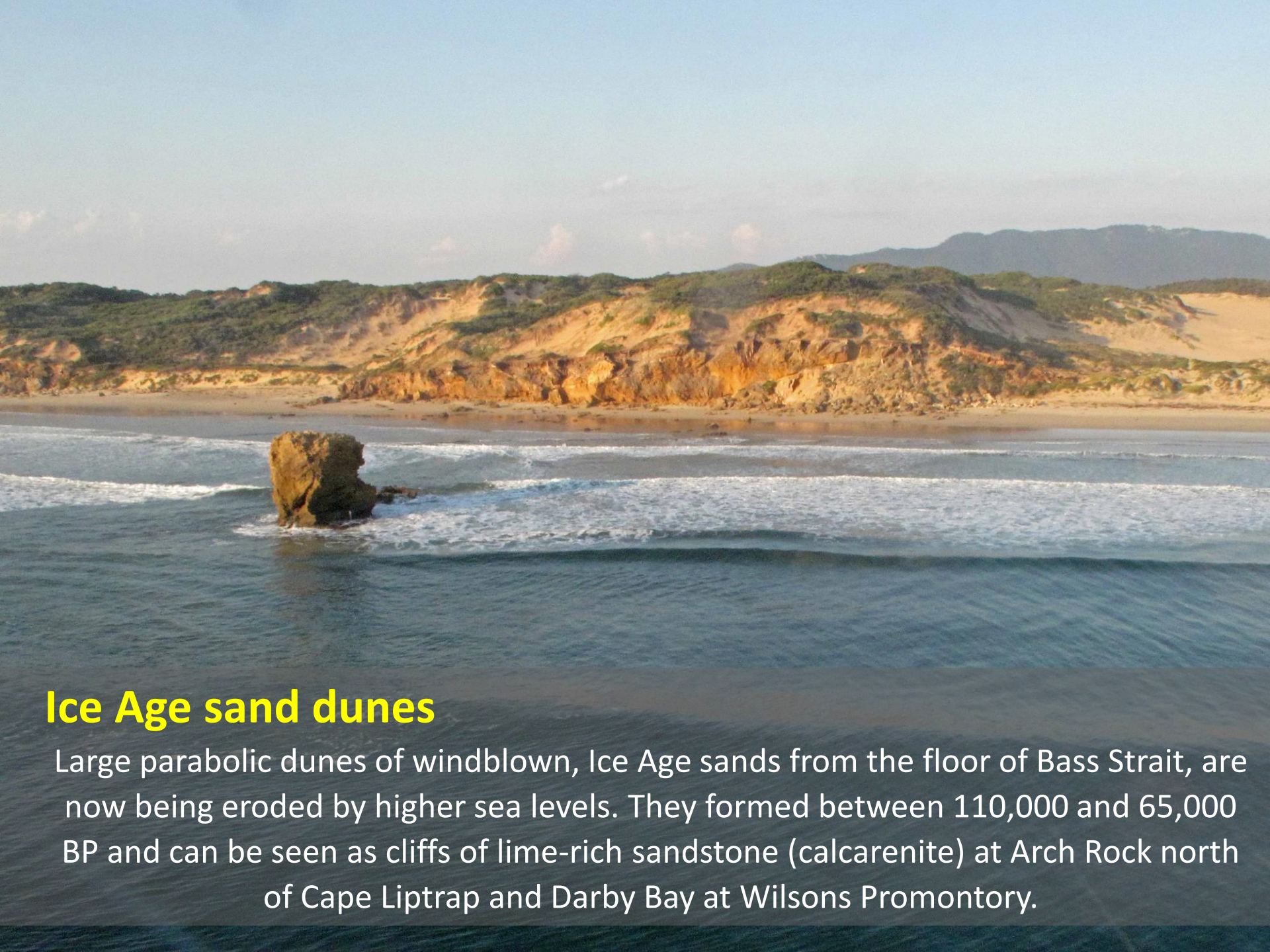


During the last 80,000 years Bass Strait was largely a dry basin. Around 8000 years ago Bass Strait formed when this basin was flooded by rising sea levels. Sea levels have globally changed dramatically over time, between Ice Ages and Greenhouse periods, with sea levels varying by up to 140m.



During low sea level stands a large shallow lake formed in the central basin of Bass Strait. At the end of the Ice Age, 18,000 BP, sea levels rose resulting in a marine embayment from the west from 11,800 BP to 8700 BP.

The basin rim was completely flooded by about 8000 BP, at which point Bass Strait was formed and Tasmania became a separate island.



Ice Age sand dunes

Large parabolic dunes of windblown, Ice Age sands from the floor of Bass Strait, are now being eroded by higher sea levels. They formed between 110,000 and 65,000 BP and can be seen as cliffs of lime-rich sandstone (calcarenite) at Arch Rock north of Cape Liptrap and Darby Bay at Wilsons Promontory.

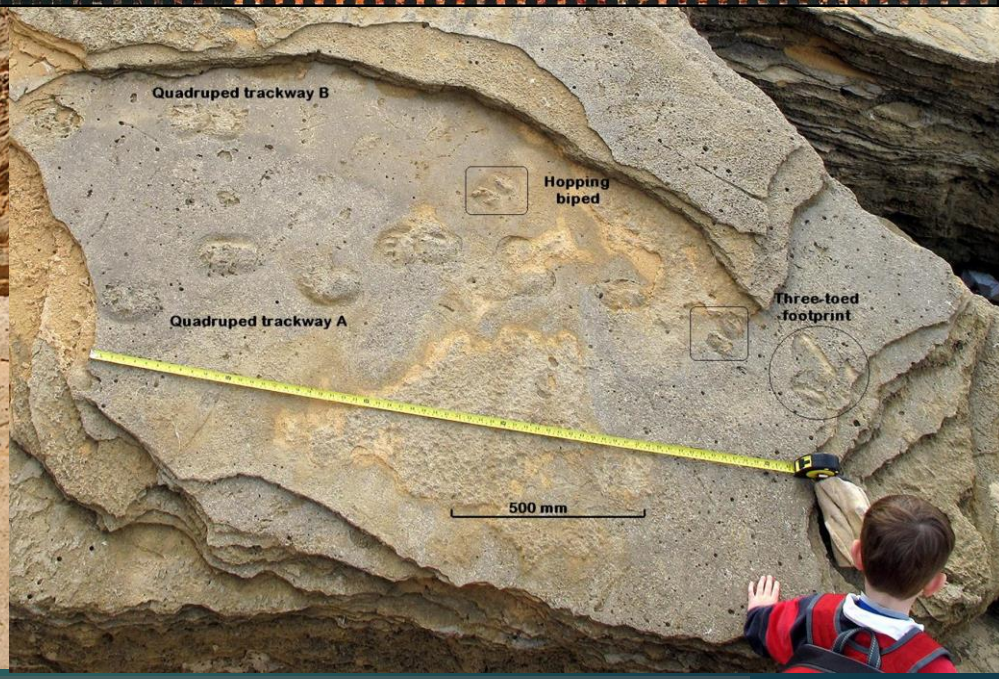
The Bluff and Waratah Fault

2. Boat launching gap in the coastal rocks

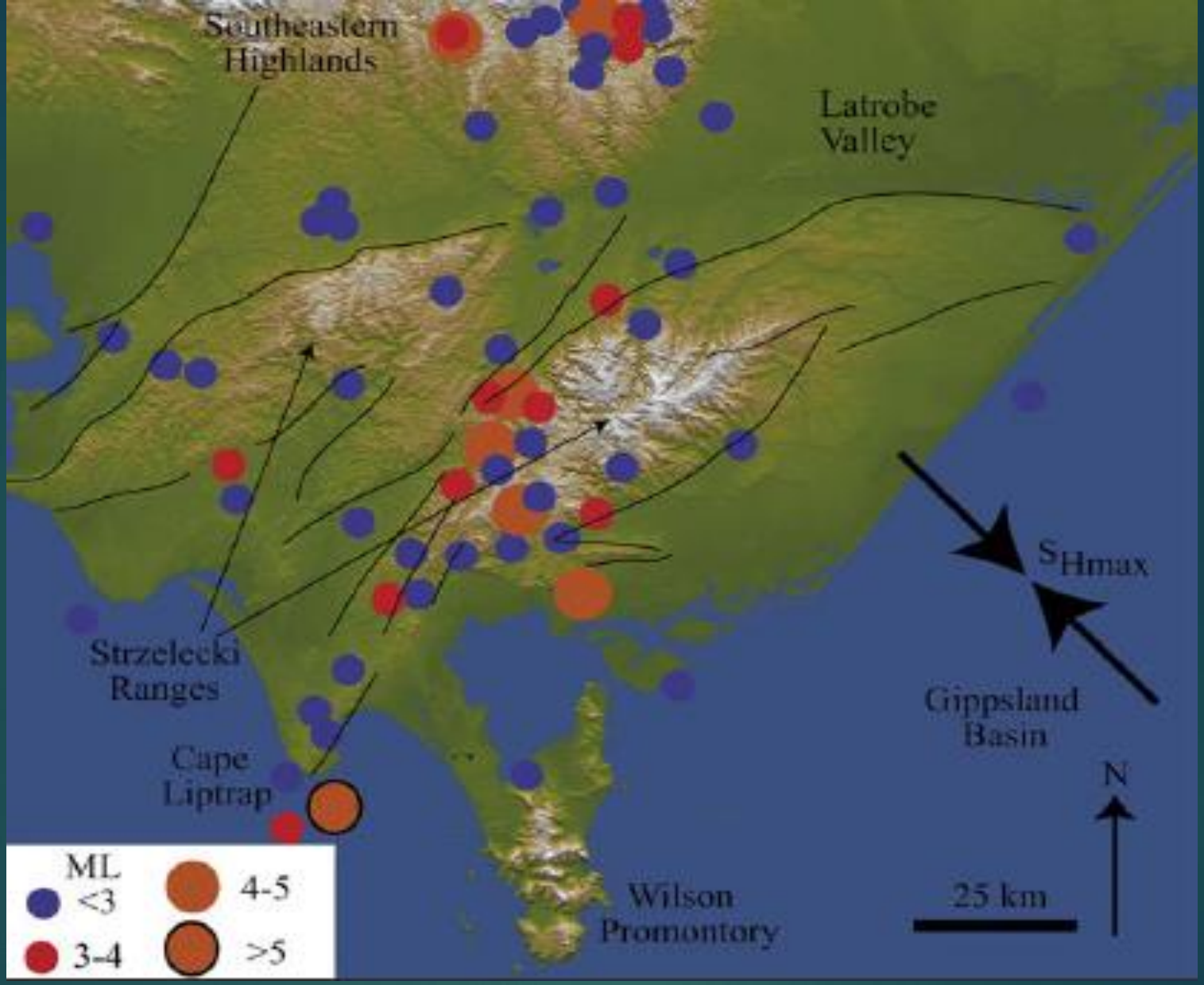
You are standing on the **Waratah Fault zone,** a high angle reverse fault that cuts across Cape Liptrap Peninsula to Grinder Point in the west and across Waratah Bay and Foster to the east.

Keep back from the unstable cliffs!

A rich megafauna lived in Australia during the last Ice Age



Megafaunal footprints in Ice Age sandstone



One of the largest earthquakes in Southeastern Australia (M 5.7) occurred just offshore of Cape Liptrap on July 2, 1885.

3. The Bluff limestones

Walk around the Bluff headland. Look for white veins in the grey Waratah Limestone. These may at first look like quartz veins, as seen in the folded mudstone and sandstones, but this white crystalline, soft, mineral is calcite (calcium carbonate). Walk to the old lime burning kilns at Walkerville South looking for evidence of the extraction of limestone in the cliff line.

4. Lime Kilns

The first of six kilns were built in 1878 and operated until 1926. Remnants of these kilns and their shedding are seen along the beach. Burning limestone produced quicklime (calcium oxide) which was highly sort after as a mortar.

Walkerville South 1910

1875

1899

1920

“Marble Cliffs” of Waratah Bay 1875

Local farmer William Millar recognised the limestone in the cliffs and initiated the lime burning industry at Waratah Bay.

Walkerville South to Bird Rocks

5. Walkerville South

After crossing the beach and boat launching area you will come across two different limestones. Against the hillside is a pale grey, cave-rich **Digger Island Dolomite** (magnesium-rich limestone) and the overlying, younger **Waratah Limestone**. Both formed in warm, shallow seas, the 410Ma Waratah Limestone was deposited on top of the 480Ma Digger Island Dolomite. A dipping gritstone layer is the boundary between the two similar looking rocks.

6. Bird Rock corals

At Bird Rock a slightly rusty coloured variety of the Waratah Limestone preserves coral fossils. Look for these on the weathered surface, but please only take photographs. All rocks and wildlife in a National Park are protected.

7. Cave and tunnel

Progress through the cave to the “magic beach” at Bird Rocks. Inside the cave look up at the ceiling for a line of crushed rock. This fracture line is the reason that the cave formed by wave erosion. Most caves on this coastline have small faults in the roofline!

8. “Magic Beach”

Made famous children’s author Alison Lester, this beach is the gateway to Bird Rock islets and the start of the greenstones. Look back to the north and observe the folded limestone layers.

9. Waratah Limestones at Bird Rocks

The Waratah Limestones at “magic beach” on the Bird Rocks point are generally easterly dipping but if you look closely you will see that they are folded.

9. Waratah Limestones at Bird Rocks

Note the easterly dipping Waratah Limestone layers overlying the Digger Island Dolomites. This is an unconformity in the rock layers representing a time break in sedimentation.

10. Ironstone

Ironstone is a rust-rich rock Limonite or iron oxide mineral that has infilled caves in the Digger Island Dolomite. Digger Island, from where the dolomite gets its name can be seen to the west.

11. Greenstone

Greenstone is derived from ancient volcanic rocks, like basalt, which has been altered by heat and pressure (metamorphosed) during its 550Ma history of deep burial and up faulting in the Earth's crust. Some of this greenstone has pillow structures, which indicate an origin from submarine eruptions of lava.

The greenstones near Bird Rock are a good place to end the walk and return to Walkerville.

The more adventurous may like to proceed on to Digger island where lime was also quarried and burnt. However the route is rough, over sharp rocks that requiring good footwear, rock climbing skills and careful attention not to get caught out by the tides!

Conclusion:

The 1km walk has taken you through events spanning over 150 million years of the Earth's history. On this walk you have seen several contrasting rock types that formed over 400 million years ago. The rocks seen include mudstone, sandstone, limestone, ironstone, and greenstone. Fossils tell us about past environments, extinction events and how the Earth is always changing. We live on a dynamic Earth with changing landscapes and climates. We are currently in a geologically significant shift in climate and the sixth extinction event in the history of life on Earth.

I hope you have enjoyed this geological tour of the Walkerville coast, cheers from Gary Wallis