



science  
& technology

Department:  
Science and Technology  
REPUBLIC OF SOUTH AFRICA

# THE ROCKS OF TABLE MOUNTAIN



Parts of the Cape Fold Belt

The flat-topped Table Mountain is a distinctive landmark of Cape Town. Characteristically it has a near-vertical relief reaching almost 1000m from sea level, to a top that is nearly horizontal. The highest part of Table Mountain, Maclear's Beacon, rises 1086 metres above sea level, and allows a spectacular view of the ocean and the beaches. It is possible that this closeness of the mountain to the ocean led the indigenous Khoisan people to call it Hoerikwaggo which means "Sea Mountain."

Table Mountain, the Hottentots Hollands, and the Cederberg are all part of a much larger mountain chain called the Cape Fold Belt, which was formed by continental collision about 250 million years ago during the formation of the supercontinent Gondwana. Table Mountain escaped much of the intense folding experienced in other parts of the range (dramatically displayed in Cogman's Kloof near Montague or the Swartberg Pass near Oudtshoorn), but was uplifted to its current elevation in this mountain building process. Parts of the Cape Fold Belt can also be found in Argentina and the Falkland Islands, which were separated from the Cape when the South Atlantic Ocean opened 130 million years ago.



200 million years ago



Present day

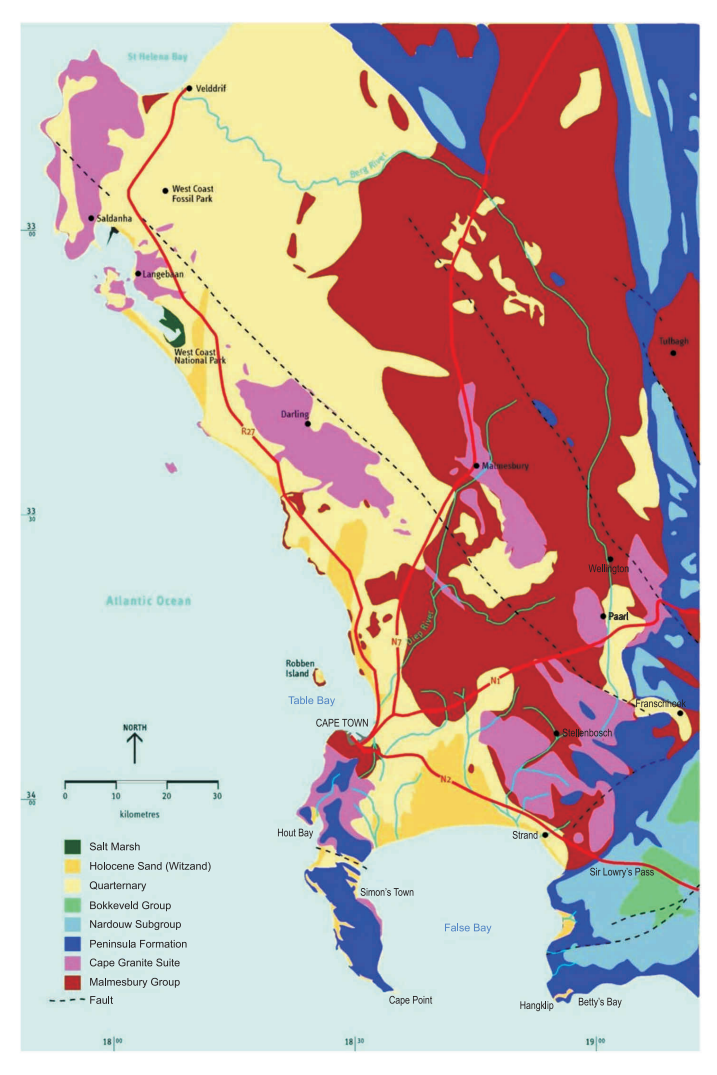
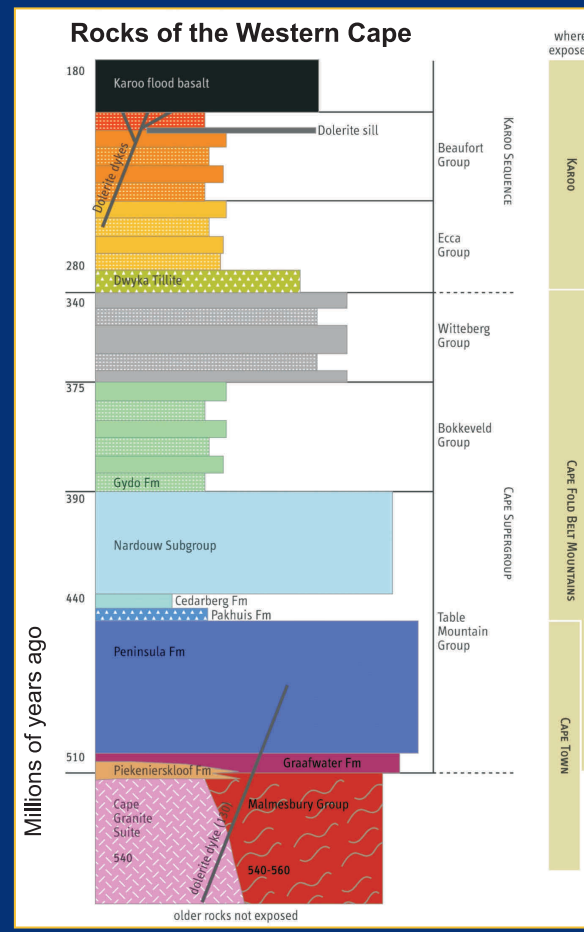
## Rocks of Table Mountain and surrounds

The oldest rocks in the Cape Town area are the Malmesbury Group which were originally deposited as marine mud and muddy sands, and have been dated to about 560 – 540 million years. The next oldest rocks in the area are the 545-515 million year old Cape Granite, prominently seen in the granite hills of Lion's Head and Paarl Rock, and the large rounded granite boulders exposed along the shoreline of the Cape Peninsula.

Where the hot magma was in direct contact with the Malmesbury rocks, the huge amount of heat resulted in a recrystallisation of the Malmesbury shale to form a metamorphic rock (See Sea-point Contact section.)

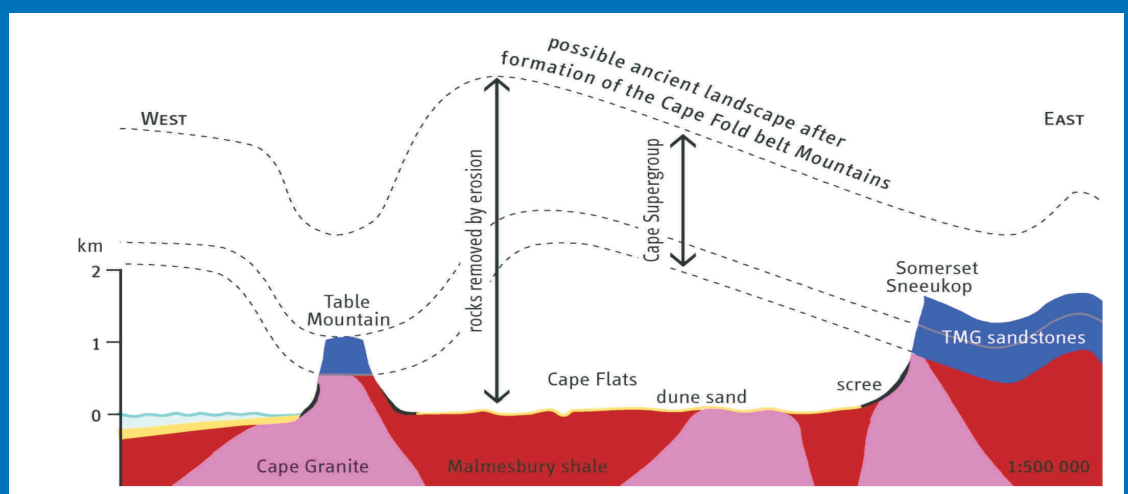
The Malmesbury and Cape Granite are overlain by mudstone and sandstone of the Table Mountain Group (TMG) which date to about 500-440 million years. The contact or boundary between the TMG and the Malmesbury is well exposed at the waterfall site on Tafelberg Road, and the contact between the granite and TMG is well exposed at the southern end of Chapman's Peak Drive. (See Chapman's Peak Section)

These deposits are known as "diamictites" because they contain sediment particles of two distinct size classes—large rocks and pebbles carried by the ice, and very fine-grained particles ground up by the moving ice. This glacial deposit, known as the Pakhuis Formation, dates to about 450 million years ago, and can be traced as far north as Clanwilliam.

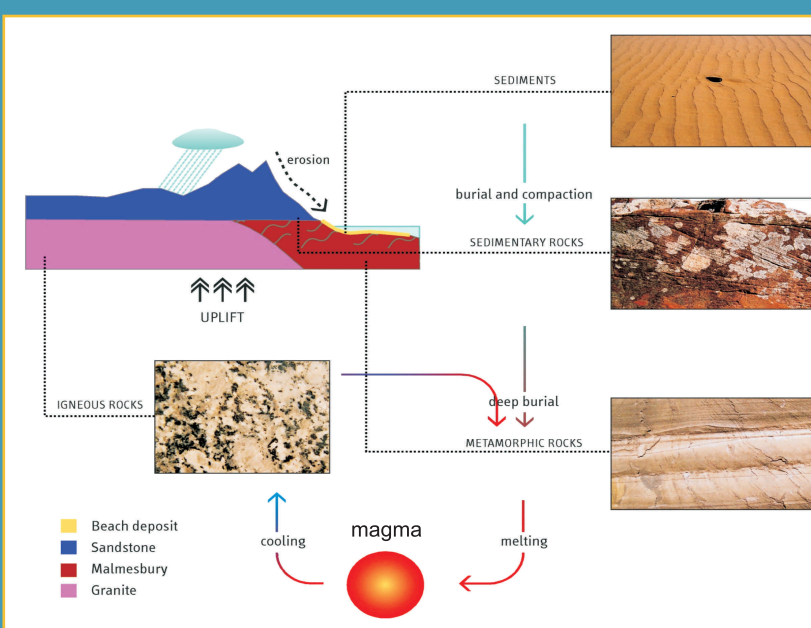
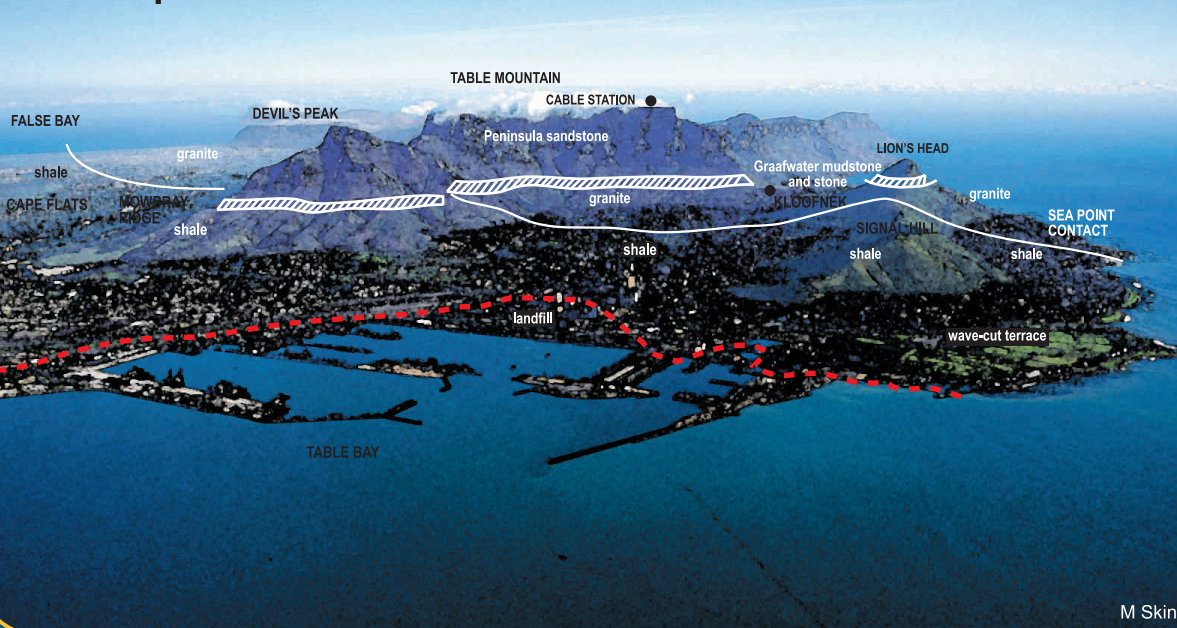


Geological map

Possible evolution of the Cape Town landscape as depicted in this geological cross-section, which runs parallel to the N2 motorway out to Sir Lowry's Pass. The nearly flat-lying Table Mountain sandstones represent the trough (syncline) and the steeply dipping sandstones of the Hottentots Holland Mountains, to the east, the limb of a large fold that has since worn away to expose the underlying shale. The dashed lines represent a possible ancient landscape featuring a large mountain on the present Cape Flats.



## The major underlying rock types that make up Cape Town's landscape



The rock cycle as depicted by the Cape Town landscape and rock types (beach sand, sandstone, shale/slate and granite).

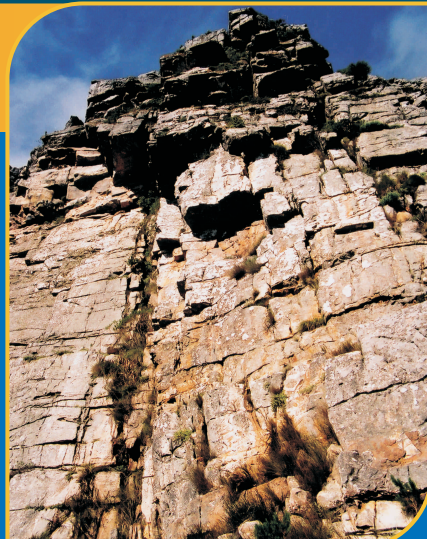
## The Twelve Apostles

Standing guard over the west coast beaches from Camps Bay to Llandudno, the peaks of the Twelve Apostles are not actually separate mountains, but pieces of Table Mountain proper which have been divided up by faults in the sandstone. The underlying granite is exposed on the beach in the foreground.



## Platteklip Gorge

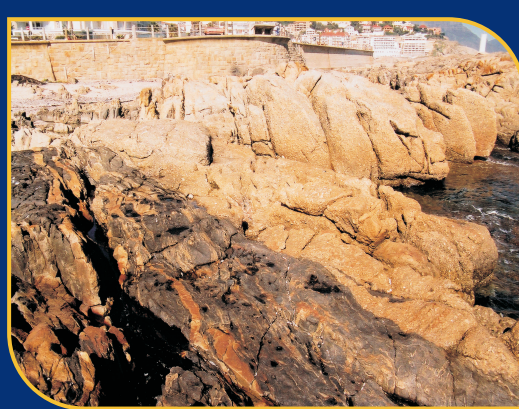
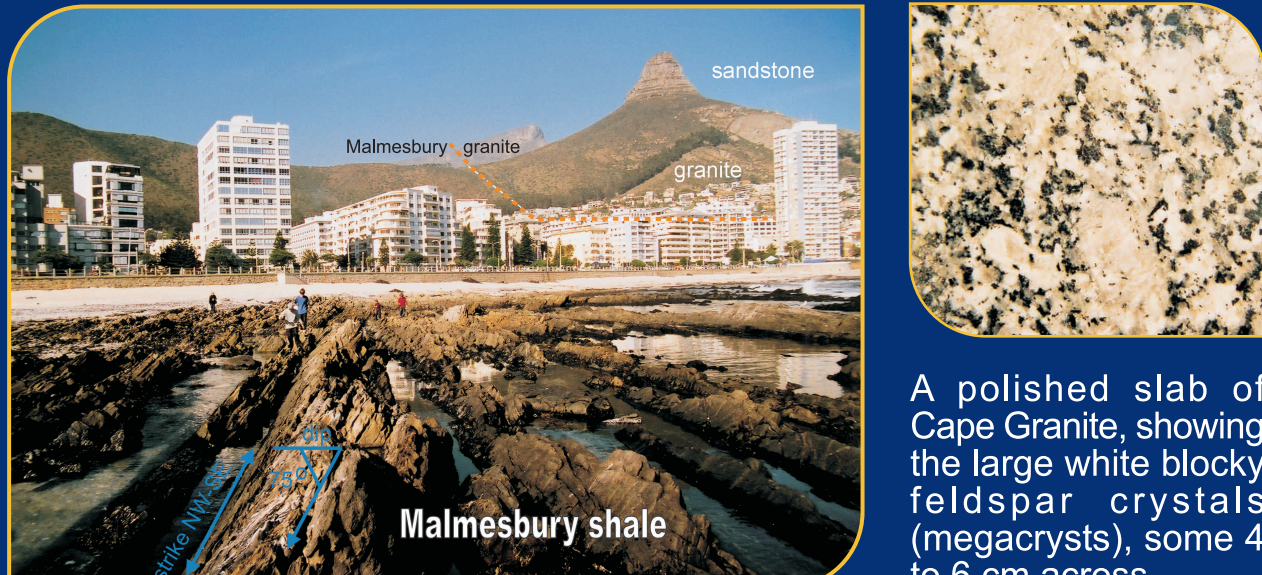
**Below:** The maroon Graafwater Formation mudstone and sandstone and overlying cliff-forming Peninsula sandstone beds, exposed along Platteklip Gorge trail, form the base of the Cape Supergroup pile of sand.



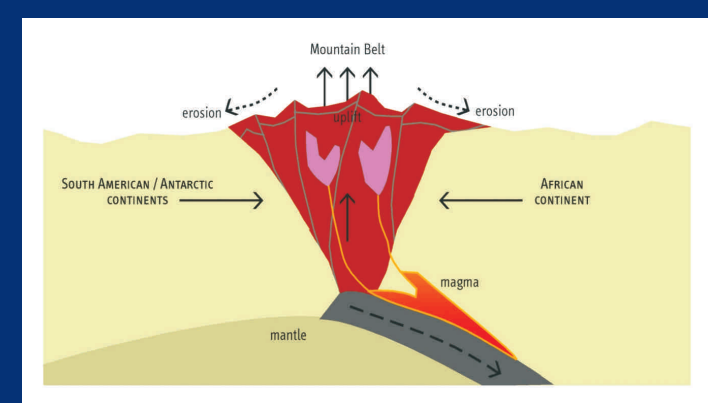
**Top:** A sandstone cliff along Platteklip Gorge, showing the interesting fractures that form overhanging blocks, which will eventually cleave off and end up as large sandstone boulders on the lower mountain slopes.

## Sea- Point Contact

Just off the promenade at Queens Beach in Sea Point is a plaque commemorating a visit by Charles Darwin more than 170 years ago. During his epic voyage around the world on the HMS Beagle, Darwin stopped here and made key observations of the contact zone between the Cape Granite and adjacent Malmesbury Group sediments. His careful description of this "Sea Point Contact" provided irrefutable evidence for early geologists to prove that granite is an igneous rock emplaced within older, preexisting rocks. The pale rocks on the left are Cape Granite which flowed as fluid magma into the older Malmesbury rocks (dark rocks on the right) where it eventually cooled and slowly crystallized into solid rock deep beneath Earth's surface.



Left: The Sea Point Contact exposed on the shore at Bantry Bay, with the dark-baked Malmesbury rocks on the lower left and the light-coloured granite on the upper right.



Intrusion of granite magma

Left: Fragment of Malmesbury rocks, referred to as a "xenolith" floating in granite exposure at Boulders Beach.

## Chapman's Peak Drive

The rocks exposed along the cliff face of Chapman's Peak Drive provide a record of Cape Town's deep geological history. Along the contact between the granite dated at 540 million years, and the near horizontally overlying sedimentary rocks of Table Mountain (dated at 500 million years old), 40 million years is missing! The erosion of the granite has removed some 8 km of crust before the erosion surface was covered again by shallow seas and meandering rivers that deposited the siltstone and sandstone on top of the granite. Careful analyses of the rocks by geologists has allowed a reconstruction of what happened millions of years ago.



Despositional contact between granite and mudstone and sandstone rocks along Chapman's Peak Drive.



Sandstone  
weathered granite  
fresh granite

