

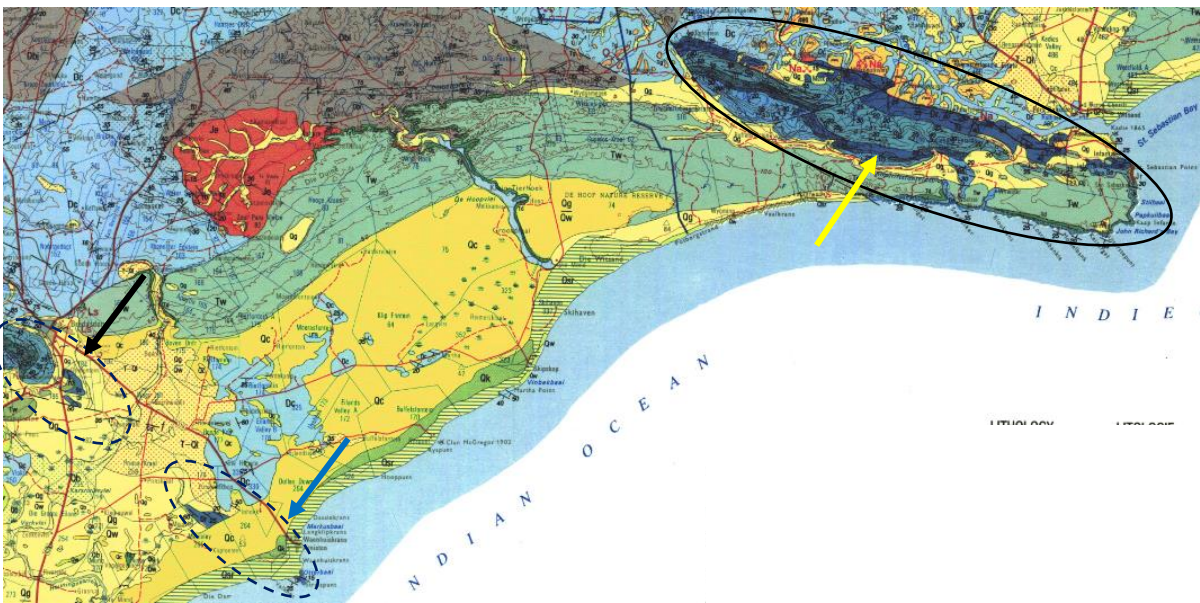
**C. GEOLOGY**

**Field Note C2d1. TMG - Arniston outcrops – Meulvlei Ridge**

The Table Mountain Group Formations in the study area crop out in four areas: Agulhas, Bredasdorp, Arniston and Potberg (Figures 1 to 3). This Field Note is about the Meulvlei Ridge (name given by the author, after the farm on which the ridge is situated), the western of two TMG outcrops near Arniston (Figure 4).



**Figure 1. Satellite image showing the locations of the four TMG Formations outcrops in the Study Area: 1 – Agulhas; 2- Bredasdorp; 3 – Arniston; 4 – Potberg.**



**Figure 2. Geology map (Riversdale, 1:250,000, 1993) showing the locations of three of the four TMG outcrops in the Study Area. Arrows point to: black – Bredasdorp; blue – Arniston; yellow – Potberg. Dark blue represents TMG Formations; light blue represents Bokkeveld Formations.**

The Bredasdorp outcrops and the Arniston outcrops are situated along a NW-SE trending line, which could indicate that they are parts of a ridge subparallel to the Potberg Mountain.



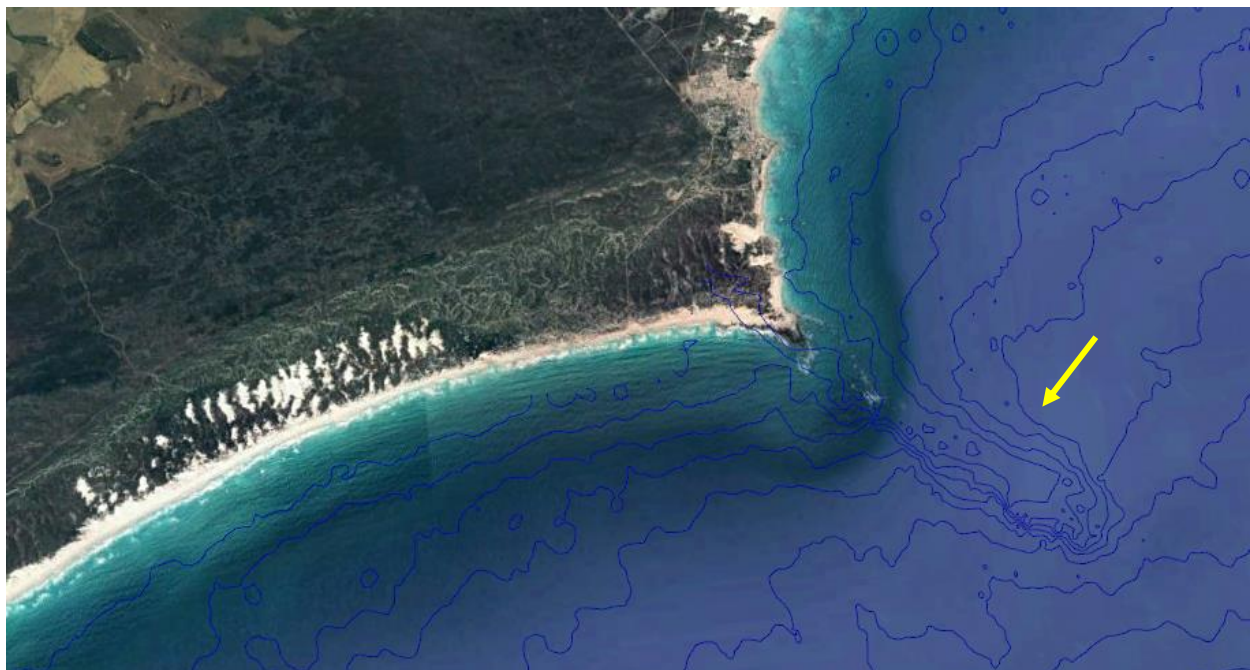
**Figure 3. Geology map (Geological Survey field sheet, J Malan, 1984) showing the TMG outcrops near Bredasdorp (black arrow) and near Arniston (yellow arrow). [The Bredasdorp - Struis Point outcrops are the eastward extension of the TMG mountains of the South Western Cape; see Field Note C2c1].**





**Figure 4. Satellite image showing the Bredasdorp Plain, the coast and the offshore area around Arniston. Arrows point to: white – Bredasdorp outcrops; light blue - Meulvlei outcrop; yellow – Struis Point outcrop; black – offshore extension. Dashed line represents possible trend of a buried TMG ridge.**

Bathymetry (water depth contours) courtesy SA Navy Hydrographic Office.



**Figure 5. Enlargement of the box in Figure 4. The submarine extension (arrow) of a possible TMG ridge is ~4.5 km long.**

Bathymetry (water depth contours) courtesy SA Navy Hydrographic Office.



The grey Rietvlei Formation rocks crop out in two locations near Arniston: the Meulvlei Ridge and Struis Point (Figures 6 to 11).

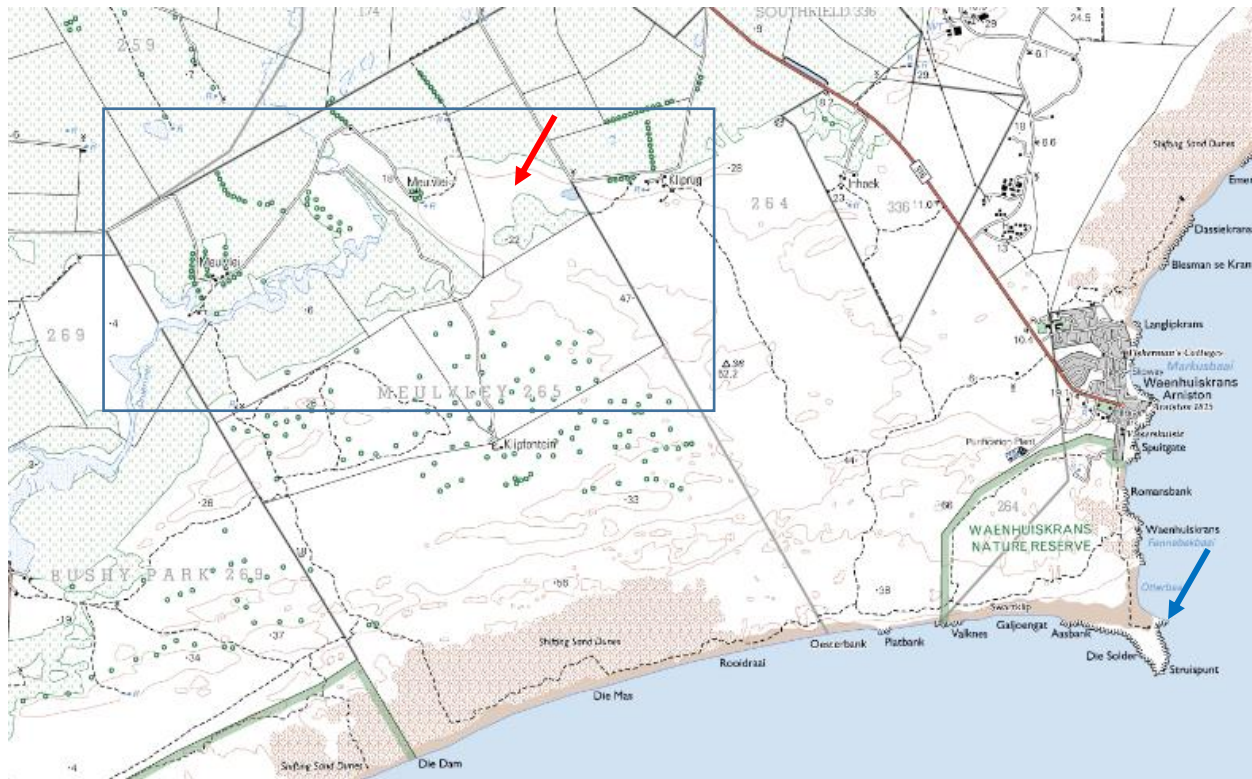


Figure 6. Topography map of the Arniston area. Red arrow points to the Meulvlei Ridge. Blue arrow points to Struis Point. Box enlarged in Figure 7.

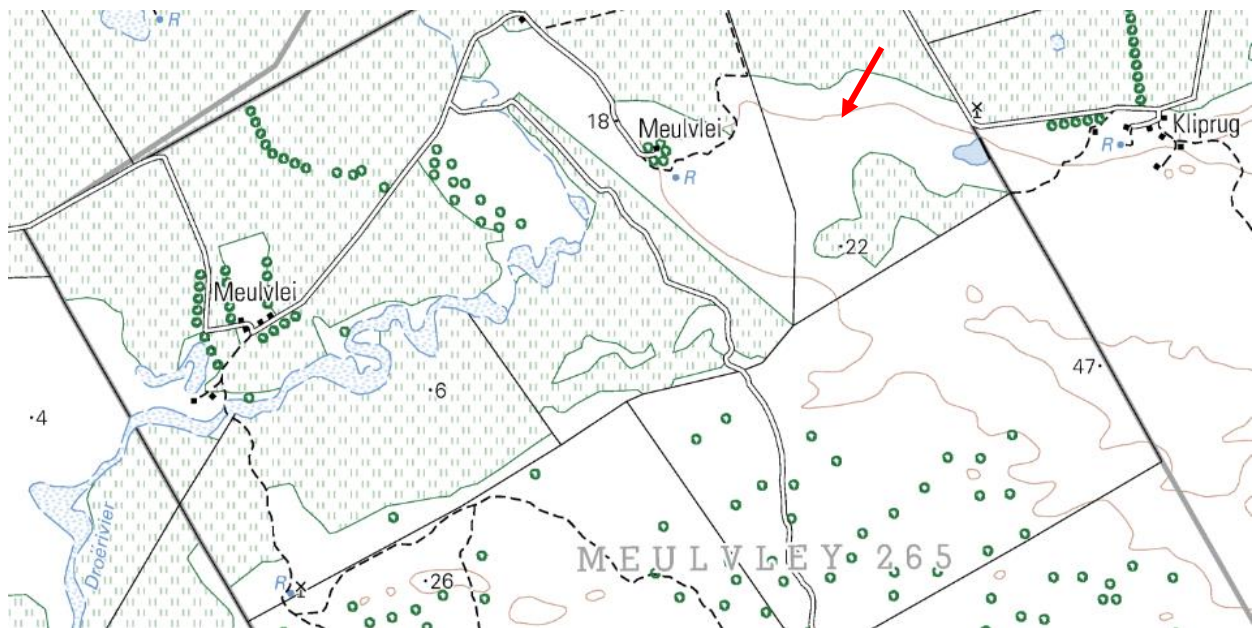


Figure 7. Enlargement of the box in Figure 6. Arrow points to the Meulvlei Ridge.





Figure 8. Geology map (Geological Survey field sheet, J Malan, 1984) showing the Arniston outcrops. Black arrow – Meulvlei Ridge; red arrow – Struis Point. The presence of the Reitvlei Formation rocks between the outcrops indicates possible buried ridge. (Note that ‘Klippe Rugt’ is the name of the parent farm, which may refer to the Meulvlei Ridge).

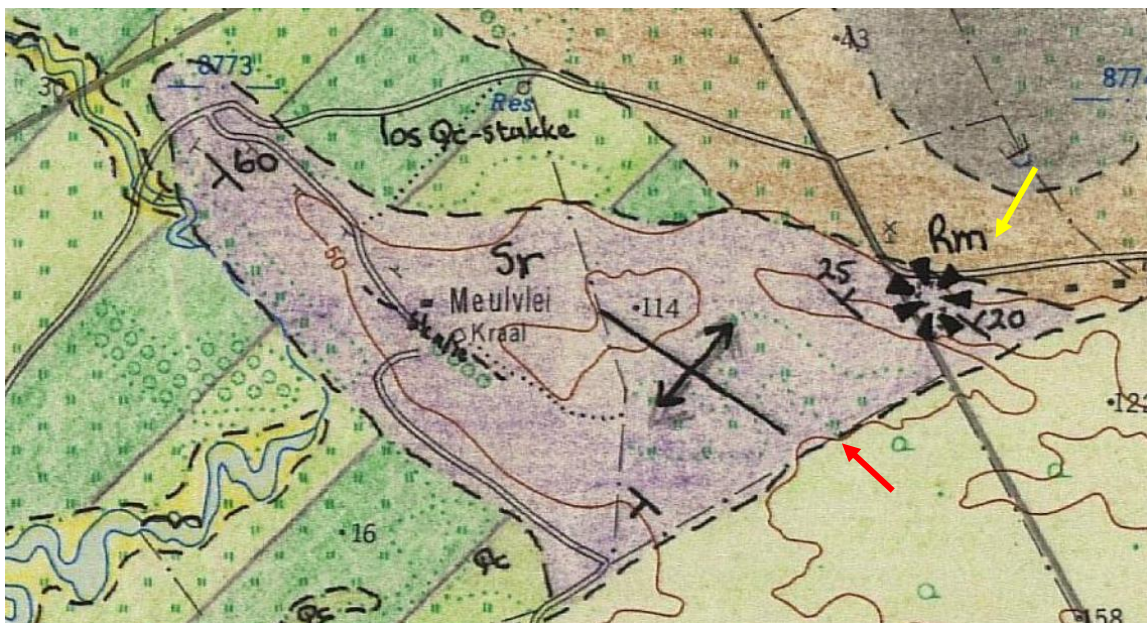


Figure 9. Geology map (Geological Survey field sheet, J Malan, 1984) showing the exposed (west) part of the Meulvlei Ridge (purple; the symbol Sr indicates the Rietvlei Formation rocks). Arrow points to a quarry. Red arrow points to the contact line between the exposed, west part of the ridge and the partly dune-covered, east part of it.



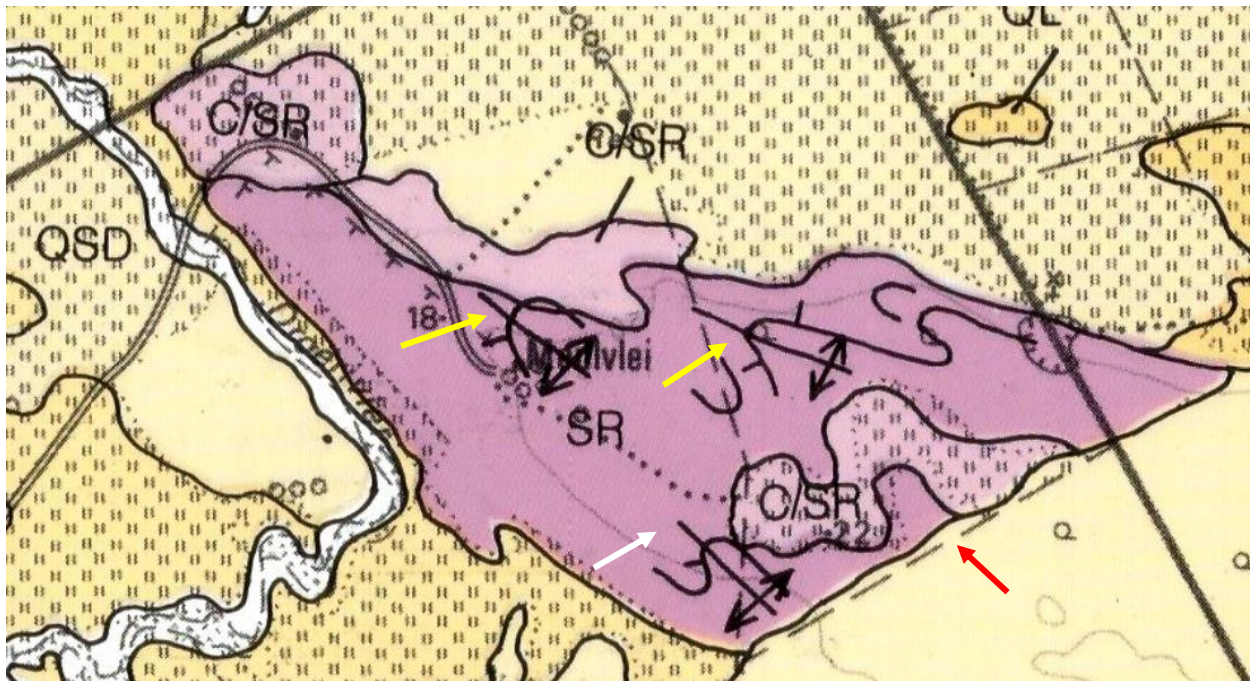


Figure 10. Geology map (AECSA Ltd, MAG Andreoli et al, 1988) of the Meulvlei Ridge. Red arrow points to the contact line between the exposed, west part of the ridge and the partly dune-covered, east part of the ridge. Symbols - SR Rietvlei; C/SR - colluvium\* over the SR. Yellow arrows point to the western anticlines, white arrow to the eastern anticline\*\*.

\*Colluvium is a general name for loose, unconsolidated sediments that have been deposited at the base of hillslopes by either rainwash, sheetwash, slow continuous downslope creep, or a variable combination of these processes.

\*\*Anticline is a ridge or fold of stratified rock in which the strata slope downwards from the crest.

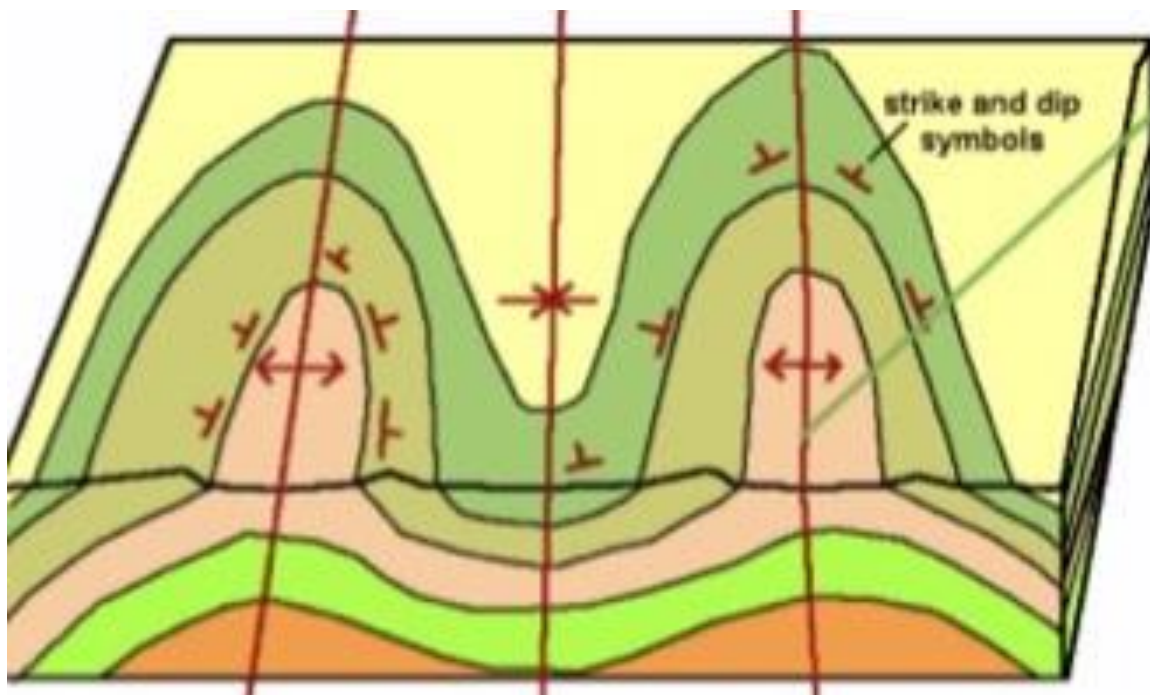
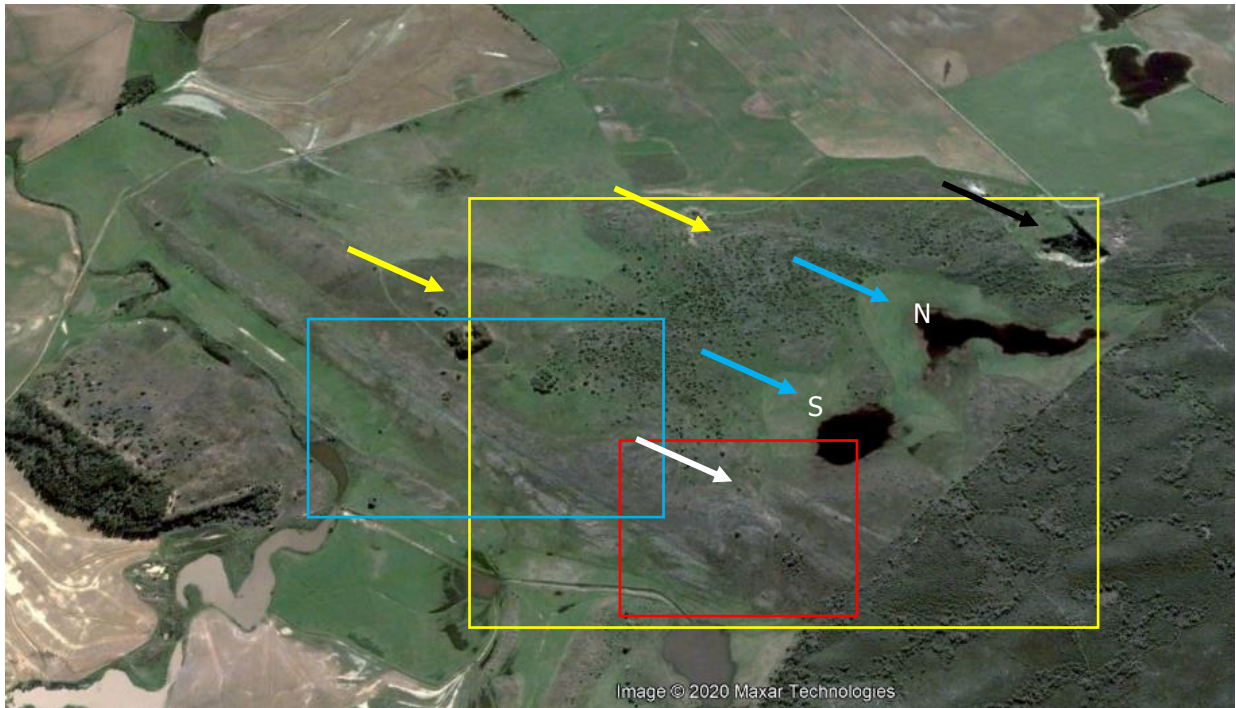


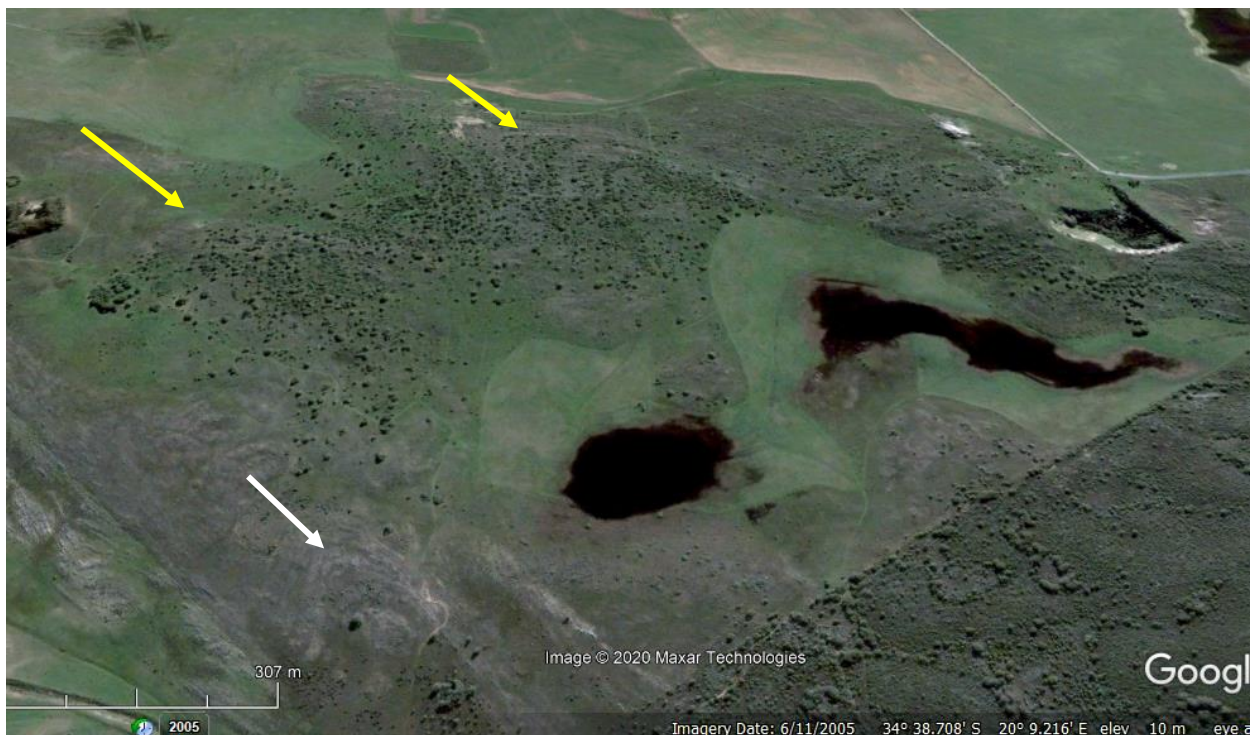
Figure 11. Schematic drawing of the two western anticlines. View to the NW.

Source: The Internet, from an article on anticlines.



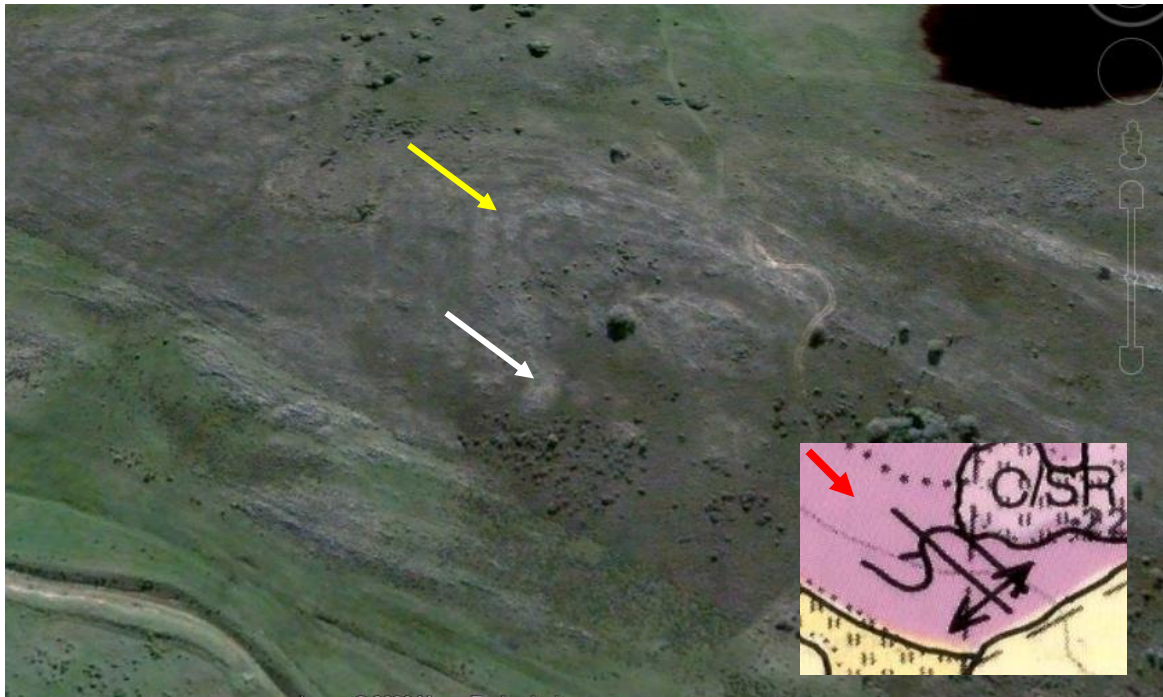


**Figure 12. Satellite image of the exposed part of the Meulvlei Ridge. Boxes are enlarged in the figures below. Yellow arrows point to the western anticlines. White arrow points to the eastern anticline. Blue arrows point to shallow depressions (south and north), black arrow points to a quarry. The depressions, the quarry and other depressions in the area contain water after heavy rains; they are usually dry.**



**Figure 13. Enlargement of the yellow box in Figure 12. Yellow arrows point to the western anticlines. White arrow points to the eastern anticline. The folded strata of the Rietvlei Formation are clearly discerned.**





**Figure 14. Enlargement of the red box in Figure 12. Yellow arrow points to the eastern anticline. White arrow points to a fold. Red arrow points to these two features in the inset. The strata are clearly discerned.**



**Figure 15. Enlargement of the blue box in Figure 12: the south slope of the Meulvlei Ridge. The strata are easily discerned.**





**Figure 16. The northern depression. View to the west from the top of a calcrete-capped dune (read below, page 13).**



**Figure 17. The quarry. View to the southeast. The materials from this quarry were used in the construction of the nearby air force base.**





**Figure 18. Top and bottom: outcropping Rietvlei Formation rocks. White boulders in the foreground are quartz.**





**Figure 19. Top, middle and bottom: outcropping Rietvlei Formation rocks.**





**Figure 20. Top and bottom: Rietvlei Formation rocks.**



The east part of the ridge (which is up to 25 m higher than the west, exposed part), is largely covered with low dunes of wind-blown sand, which are capped with calcrete (a limestone duricrust; see Chapter D) (Figures 21 and 22).



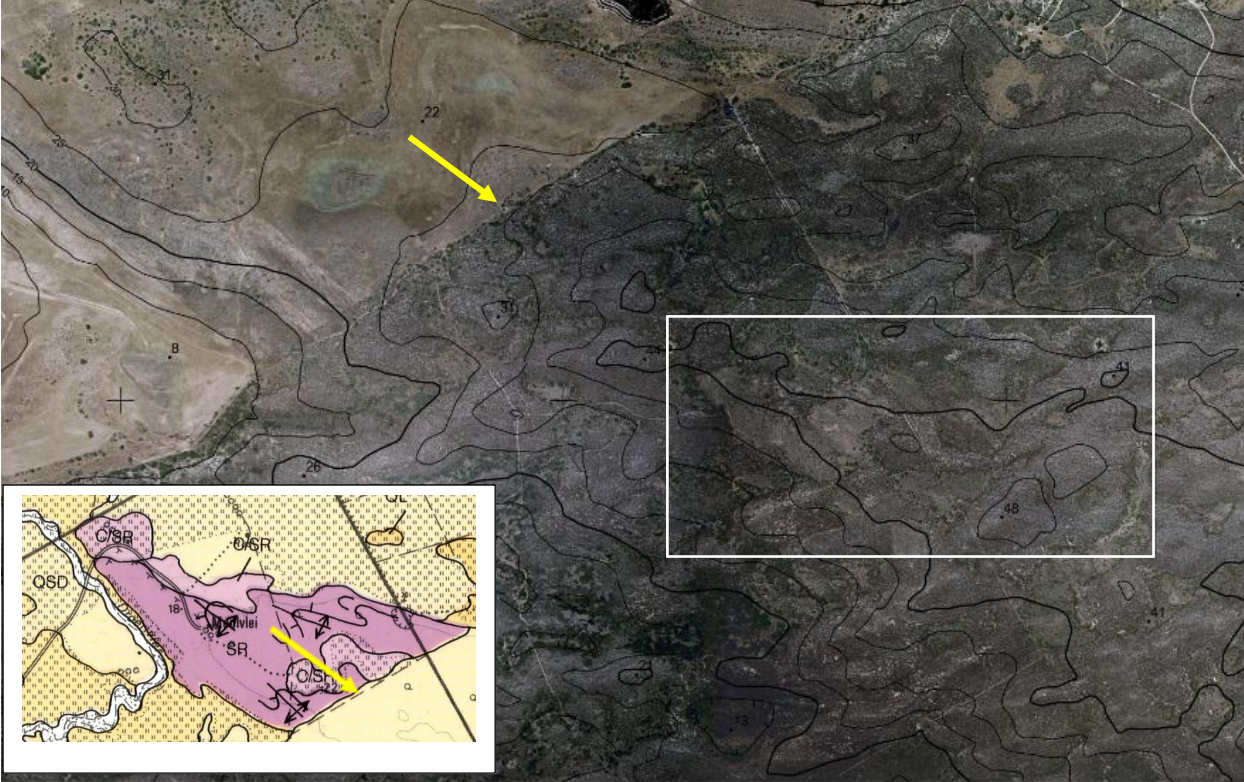
**Figure 21. The area southeast of the exposed part of the ridge. The dunes are capped with calcrete.**



**Figure 22. Some dunes were not completely capped with calcrete.**



A barbed wire fence coincides with the line on the geology maps, which demarcates the contact of the exposed, west part of the ridge with the east part of the ridge, which is partly covered with calcrete-capped dunes (Figure 23).



**Figure 23.** Topography map of the area east-southeast of the contact line (arrow); the inset shows the geology map, with the arrow pointing to the fence. Box indicates an area, which is enlarged in Figure 24. The grey areas are calcrete-capped dunes.



**Figure 24.** Enlargement of the box in Figure 23: a small plateau, about 700 m across. The blue and yellow boxes are enlarged below.



On the partly-covered part of the ridge, lineaments (linear features), which are discerned from the satellite images, trend on a similar direction (WNW- ESE) as the strata on the west part of the ridge (Figures 25 and 26).



**Figure 25. Enlargement of the blue box in Figure 24 – the western section of a small plateau. The dotted line indicates the general direction of the lineaments. The calcrete-capped dunes are covered with thick vegetation and tall bushes, whereas the gaps between them are typically covered with grass and low shrubs.**



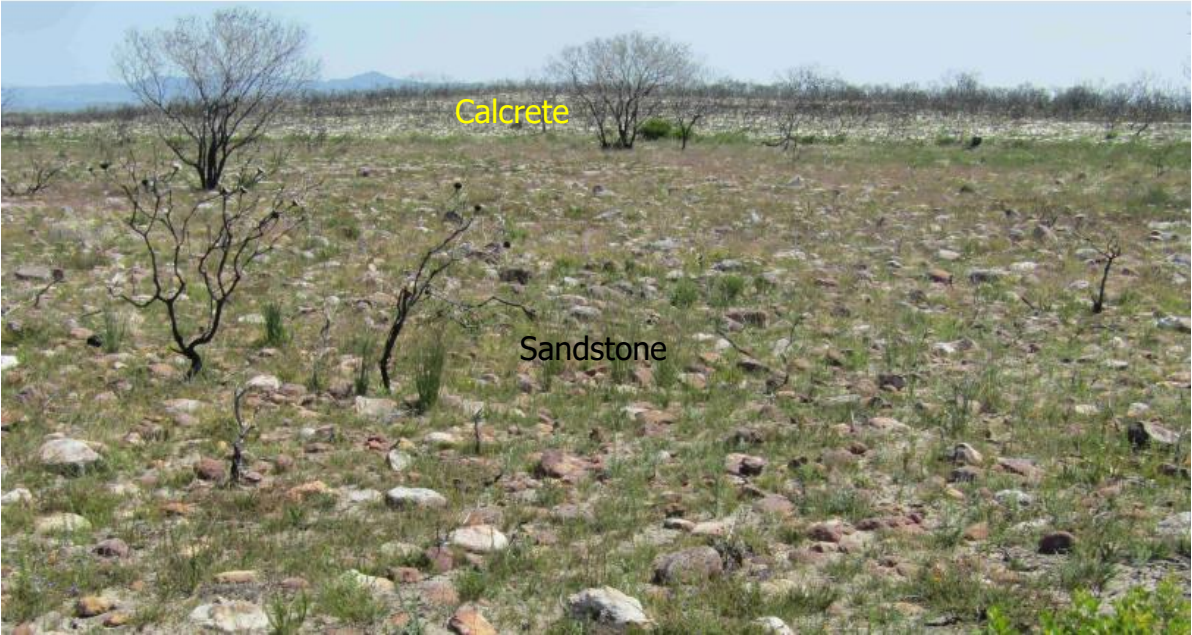
**Figure 26. Enlargement of the yellow box in Figure 24 - the eastern section of a small plateau. The dotted line indicates the general direction of the lineaments. The calcrete-capped dunes are covered with thick vegetation and tall bushes, whereas the gaps between them are typically covered with grass and low shrubs.**



The lineaments seen on the satellite images are the extensions of the strata of the western part of the ridge; they protrude the sandy, grassy gaps between the dunes (Figures 27 to 29).



**Figure 27. Rock strata (arrow) protrude the sand cover between the calcrete-capped dunes.**



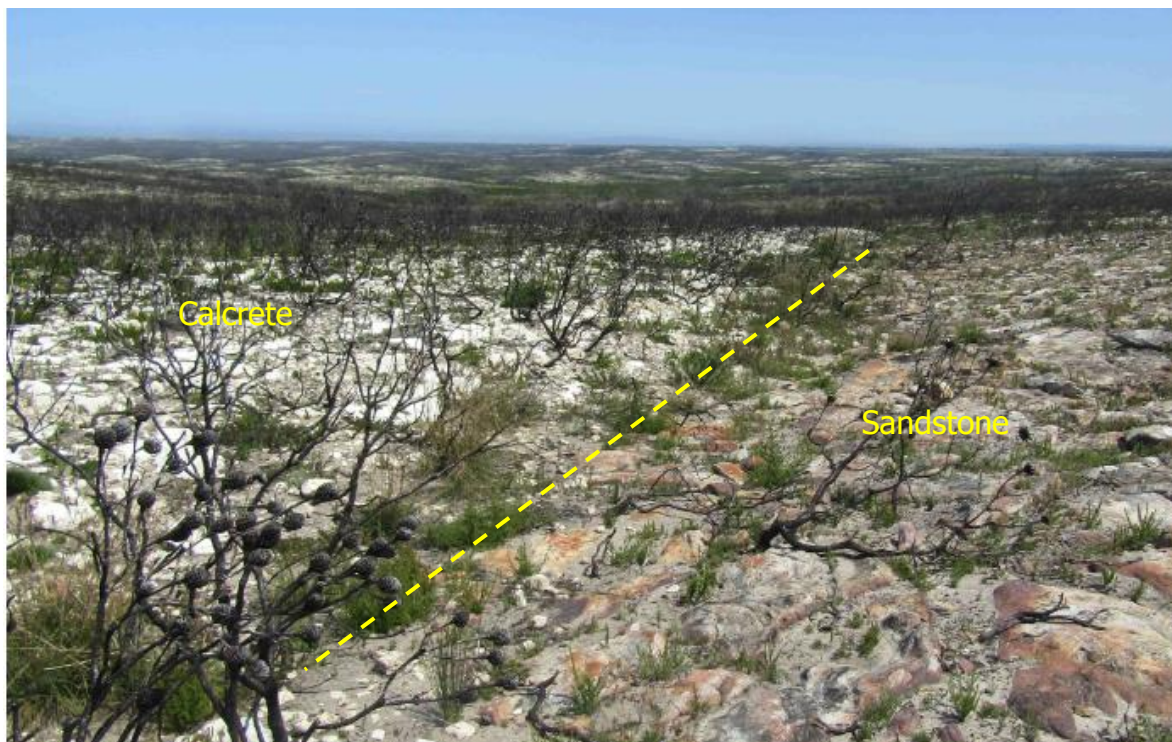
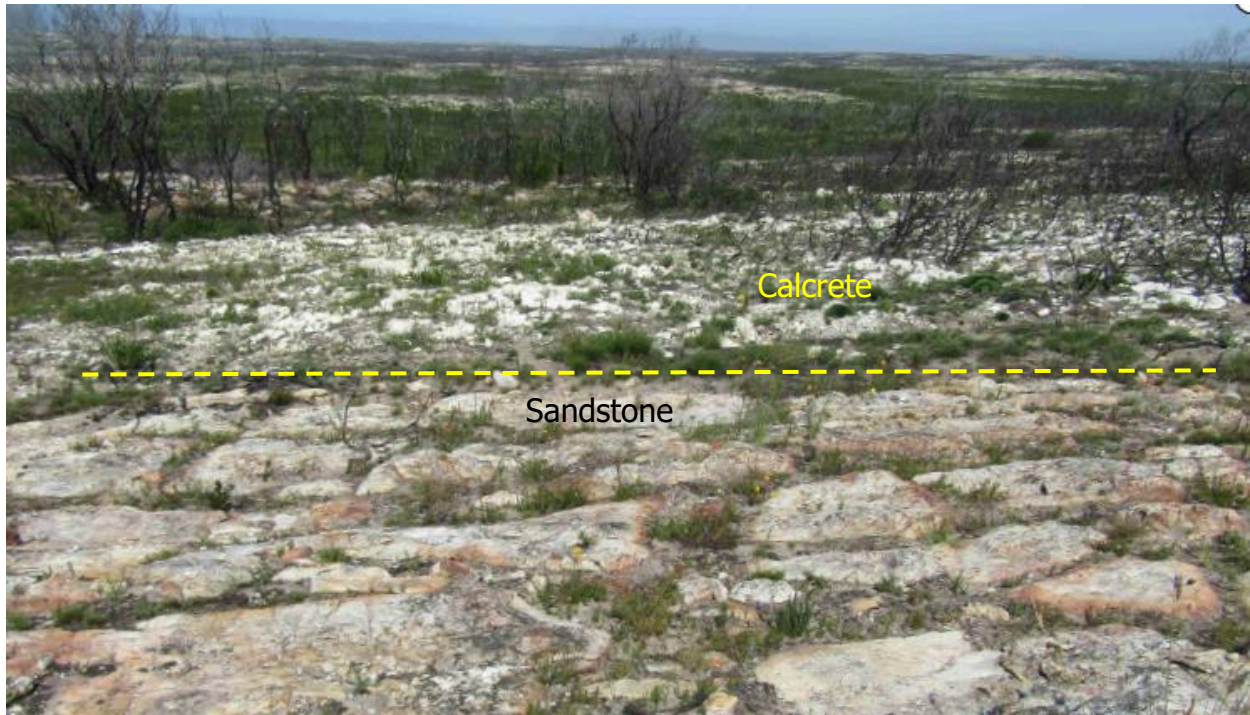
**Figure 28. A small Rietvlei Formation rocks plateau, devoid of sand cover, is indicated on Figures 24 to 26.**



**Figure 29. In some areas the sandstone clasts are rounded to very well rounded (they could be conglomerate clasts of the of the younger Enon Formation).**



The sand dunes were encrusted with calcrete. The contacts between the dunes and the exposed Rietvlei Formation rocks are easily recognised (Figure 30).



**Figure 30. Top and bottom: the contacts between the calcrete and the sandstone (dashed line). The ground is exposed after a fire, which burnt the entire vegetation in the area in December 2018.**



Preliminary mapping of the exposures of the Rietvlei Formation strata on the east part of the Meulvlei Ridge was conducted during February and March 2020 (Figure 31).



**Figure 31. Rietvlei Formation outcrops on the east part of the Meulvlei Ridge. Yellow box indicates the mapped area (mapping has not been completed). White box is enlarged in Figure 32.**

The mapping of the outcrops was stopped due to the lockdown and will hopefully be resumed when it is over. Lineaments can be discerned from the satellite images in an area southeast of the mapped section (Figure 32).



**Figure 32. The area in the white box in Figure 31. Dashed lime indicates the general direction of the lineaments.**