D. DURICRUSTS

Field Note D4g. Non-pedogenic silcretes - C. Lakes and pans

Silcrete lumps on the shore of Soetendals Vlei.

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Introduction

There are *three* varieties of *non-pedogenic silcretes:*

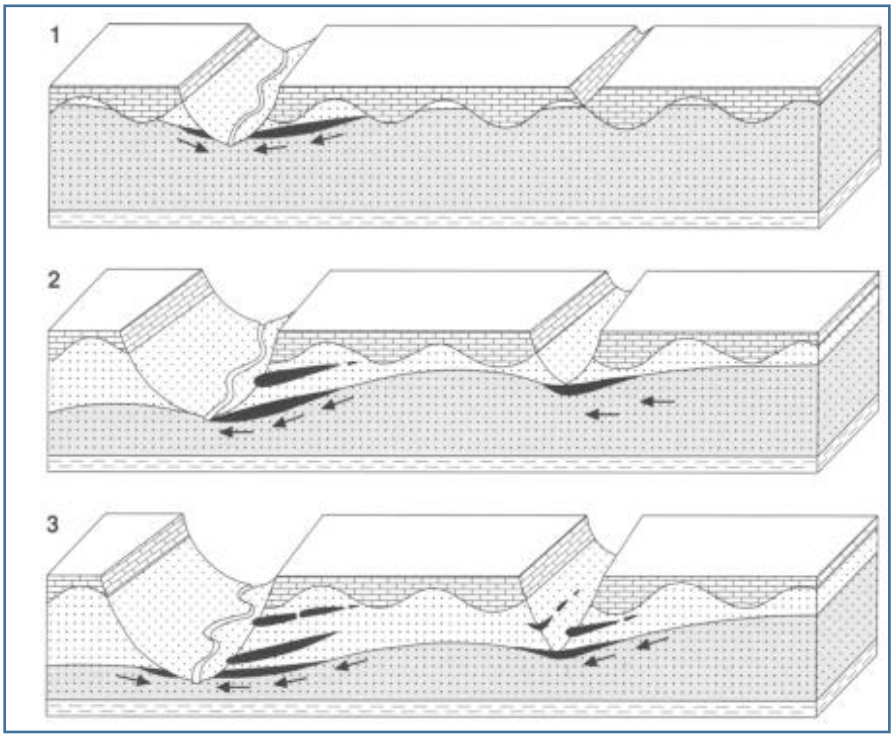
A. *Groundwater silcretes* are formed under phreatic conditions (in the zone of saturated groundwater; YE) through silicification at or close to a water table, or at zones of groundwater outflow.

B. *Drainage-line silcretes* develop as a result of the silicification of alluvial fills in contemporary or former fluvial systems.

C. *Pan / lacustrine silcrete,* forms as a result of the silicification of sediments at the margins of lakes and pans.

Non-pedogenic silcrete development may be more localised and is often controlled by the position of the local water table; while this would imply an overlying palaeosurface, the silcrete itself does not mark the position of the former land surface.

The formation of the above three types of non-pedogenic silcretes is illustrated in the diagram below:



Block diagram illustrating the formation of groundwater silcretes (in France). Silcrete lenses form close to the water table in zones of groundwater outflow (1) and superposed lenses develop (2) with valley deepening due to progressive landscape evolution (3).
Source: Ullyot at al, 1999, in turn adopted from Thiry et all, 1988.

The non-pedogenic silcretes in the Study Area can be grouped into the three types mentioned above. This Field Note is about the Group C silcretes (lakes and pans) which are described from southwest to northeast (Figure 1).

Figure 1. Satellite image showing the sites, where silcretes were formed around lakes and in pans, from southwest to northeast: 1. salt pan (Springfield); 2. lake (Soetendal Vlei); 3. lake relic (West Renoster Valley); 4. lake relic and salt pans (Bontebokvlei; Soutpanne); 5. lake relic (Ou Werf Valley).

The wetlands and the Nuwejaar River are outside the Study Area. Some observation were made, though, about the silcretes of the Springfield Salt Pan and the Soetendals Vlei (Figure 2).

1. Springfield Salt Pan

The Springfield Salt Pan (name given by the author) is ~2 km in diameter, and was used for salt production, about 10 m above sealevel (it is now part of the Agulhas National Park; read about this pan in Chapter I).

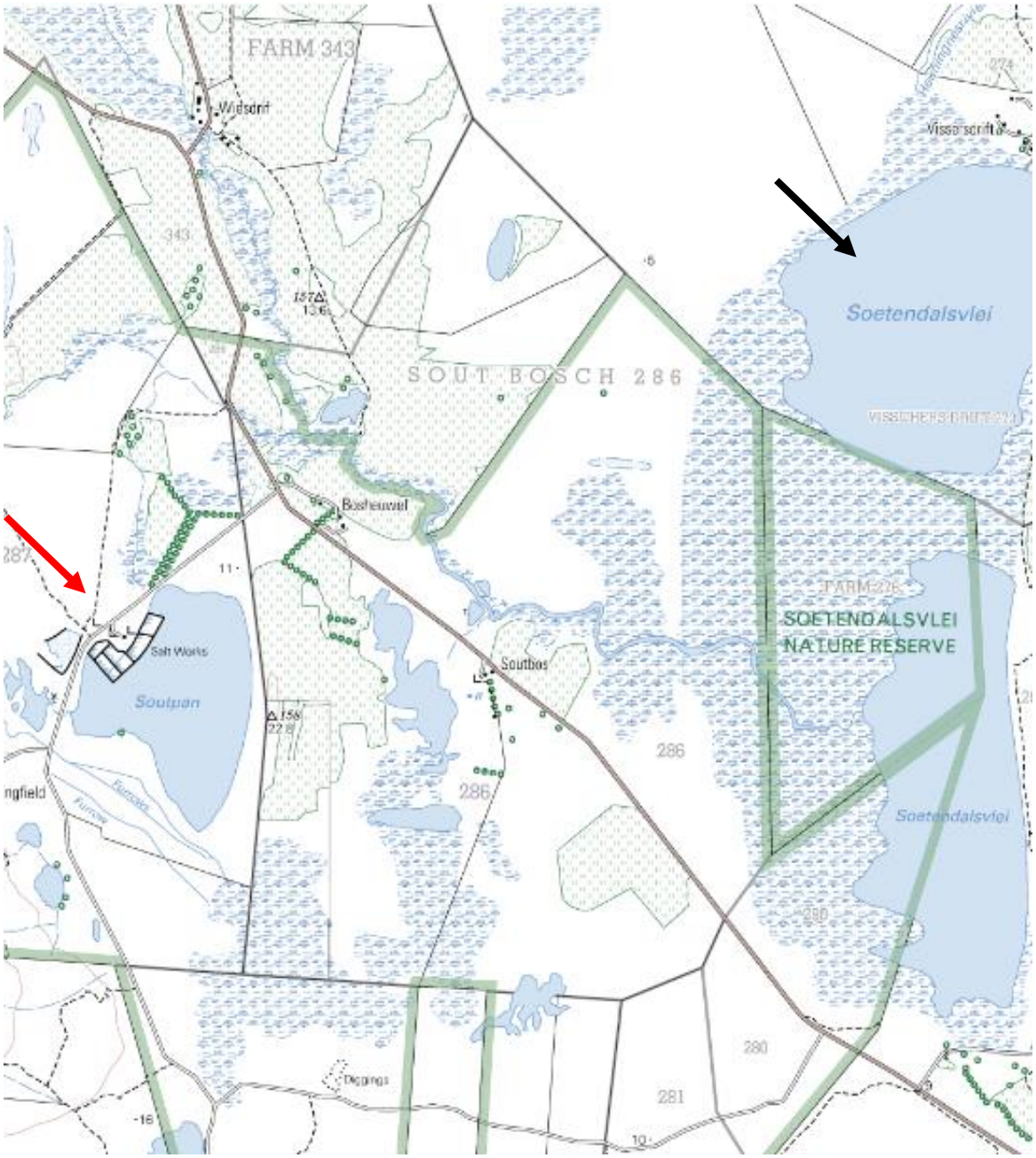


Figure 2. Topography map of the Springfield Salt Pan (red arrow) and of the Soetendals Vlei (black arrow).

The Springfield Pan is surrounded by many small pans (Figure 3). They are all relics of larger lakes, as many silcrete lumps are found between them.

Figure 3. Satellite image of the Springfield Salt Pan (red arrow) and is satellite pans.

Figure 4. The north shore of the Springfield Salt Pan. View to the south west.

Figure 5. Silcrete lump with conglomerate on the north shore of the Springfield Salt Pan.

2. Soetendalsvlei

Soetendals Vlei is the second-largest fresh-water lake in South Africa. The lake is located about sealevel (Figure 6), and its bottom, in the north part is about 5 m below sealevel. Silcretes on the shores are typical of lacustrine environment (Figures 7 to 15).

Figure 6. Satellite image of Soetendals Vlei (yellow arrow). Red arrow points to the Springfield Salt Pan.

Figure 7. Satellite image of the south-eastern shores of Soetendals Vlei.

Figure 8. Top and bottom – the southern shores of Soetendals Vlei.

Figure 9. Top and bottom – silcrete lumps on the south shores of Soetendals Vlei.

Figure 10. Silcrete lumps on the south shores of Soetendals Vlei. Top – rounded lumps; bottom – angular lumps.

Figure 11. Top and bottom – rounded silcrete lumps on the south shores of Soetendals Vlei. Note the imprints of shells (arrows) in the bottom photograph.

Figure 12. Top and bottom – silcrete lumps on the south raised shore of the Soetendals Vlei. The lumps are different from those on the shores and have various consistencies (see figures below).

Figure 13. Top and bottom – silcrete lumps on the south raised shore of the Soetendals Vlei.

Figure 14. Top and bottom – silcrete lumps on the south raised shore of the Soetendals Vlei.

Figure 15. Top, middle and bottom – silcrete lumps on the south raised shore of the Soetendals Vlei.

Silcrete was formed in the areas north of the current shores of the vlei, where lumps of silcrete are found (Figures 16 to 18).

Figure 16. Top and bottom – mammiform silcrete lumps northeast of the present north shores of the Soetendals Vlei.

Figure 17. Top and bottom: silcrete-calcrete intergrade lumps NE of the present north shores of Soetendals Vlei.

Figure 18. Top and bottom: silcrete – calcrete intergrade lumps NE of the present north shores of Soetendals Vlei.

3. West Renoster Valley

A small lake is periodically formed in the West Renoster Valley (see Chapter K) (Figure 19). The lake was probably larger in the past and occupied the whole valley. The valley is cultivated, and rocks, collected and heaped on the margin, contain silcrete and ferricrete lumps (Figure 20).

Figure 19. The West Renoster Valley Lake. Top – satellite image; arrow points to the lake. Bottom – the drying lake. View to the south.

Figure 20. Top and bottom – silcrete and ferricrete lumps of the West Renoster Valley Lake. Note the mammiform lump at the bottom photo.

4. Ou Werf Valley

A small periodical lake is formed in the Ou Werf Valley (see Chapter K) (Figure 21). The lake was probably larger in the past and occupied a larger part of the valley.

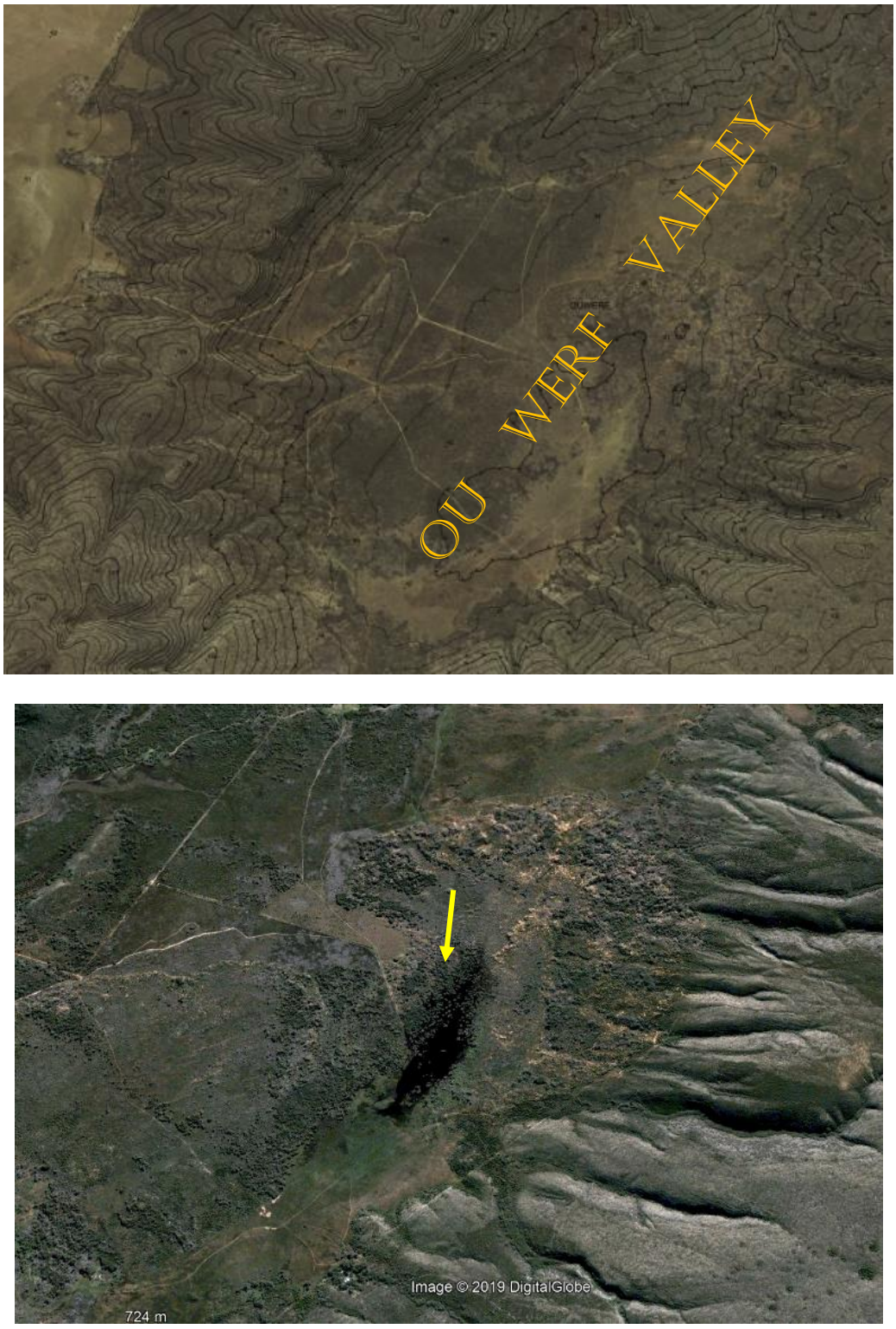


Figure 21. The Ou Werf Valley Lake. Top – topographical map. Bottom - satellite image; arrow points to the lake.

Silcrete is found in many forms on the floor of the valley (Figures 22 to 26).

Figure 22. Top and bottom – silcrete-calcrete intergrade lumps on the floor of the Ou Werf Valley Lake.

Figure 23. Top and bottom – spherical silcrete lumps on the floor of the Ou Werf Valley Lake.

Figure 24. Top and bottom - silcrete lumps on the floor of the Ou Werf Valley Lake.

Figure 25. Top and bottom: silcrete-calcrete intergrade lumps on the south side of Ou Werf Valley Lake.

Figure 26. Top and bottom: silcrete-calcrete intergrade mushroomy and mammiform lumps on the floor (now dry) of the Ou Werf Valley Lake.

On a terrace, 4 m above the current vlei, the silcrete lumps contain rounded clasts and fossils (Figures 27 to 28). These silcretes are unique to this valley.

Figure 27. Top and bottom – silcrete lumps with fossils and pebbles on a terrace on the south side of, and a few metres higher than, the floor of the Ou Werf Valley Lake.

Figure 28. Top and bottom – silcrete lumps with fossils and pebbles on the south side of the Ou Werf Valley Lake.

5. Soutpansvlakte Pans

In the Soutpansvlakte area, between Patryskraal Farm and the Hard Dunes, there are several salt pans. In years of heavy rainfalls, periodical lakes are formed (Figures 29 to 31).

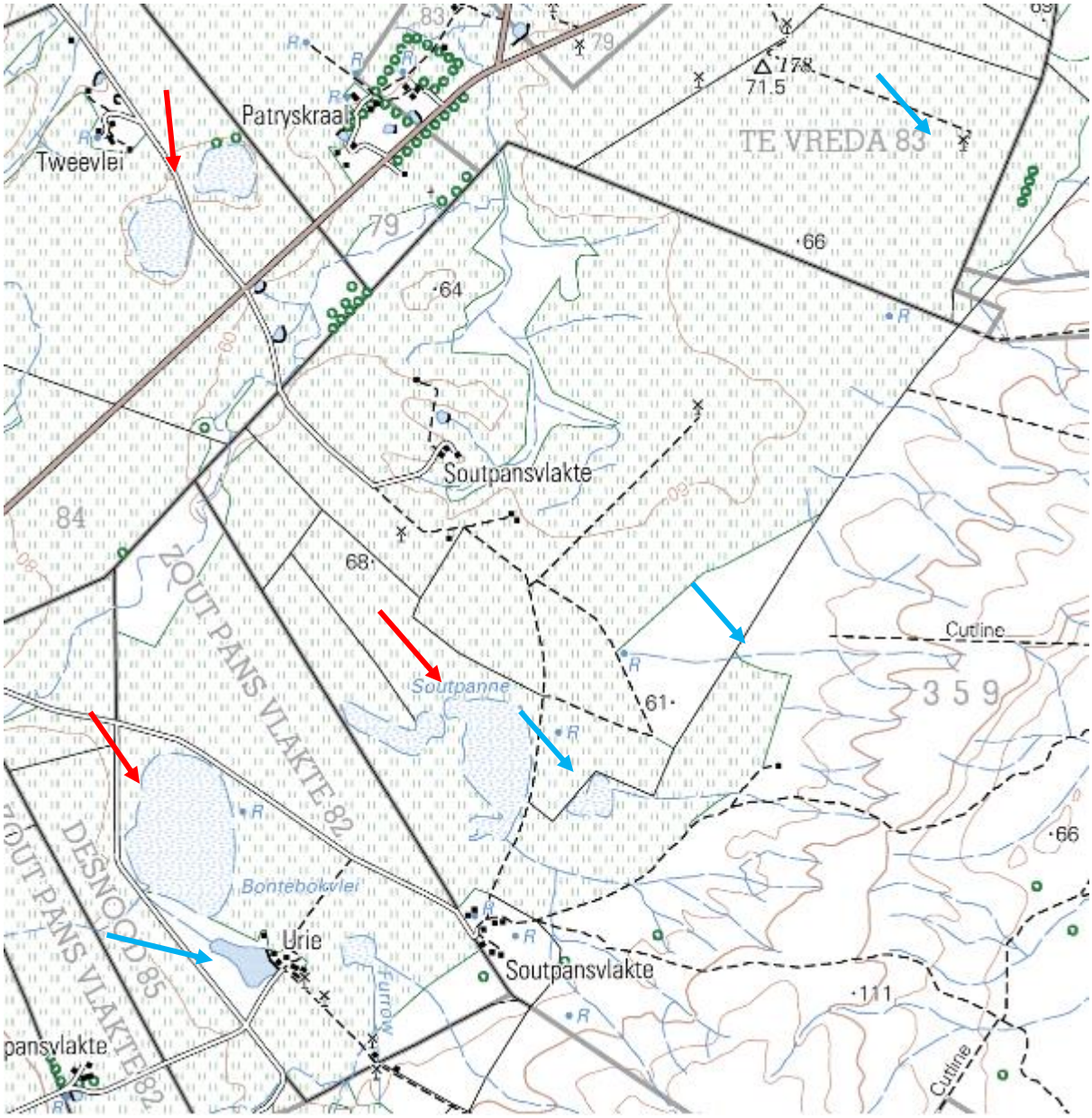


Figure 29. Topography map of the Soutpansvlakte area. Red arrows point to periodical lakes and pans. Blue arrows point to temporary lakes.

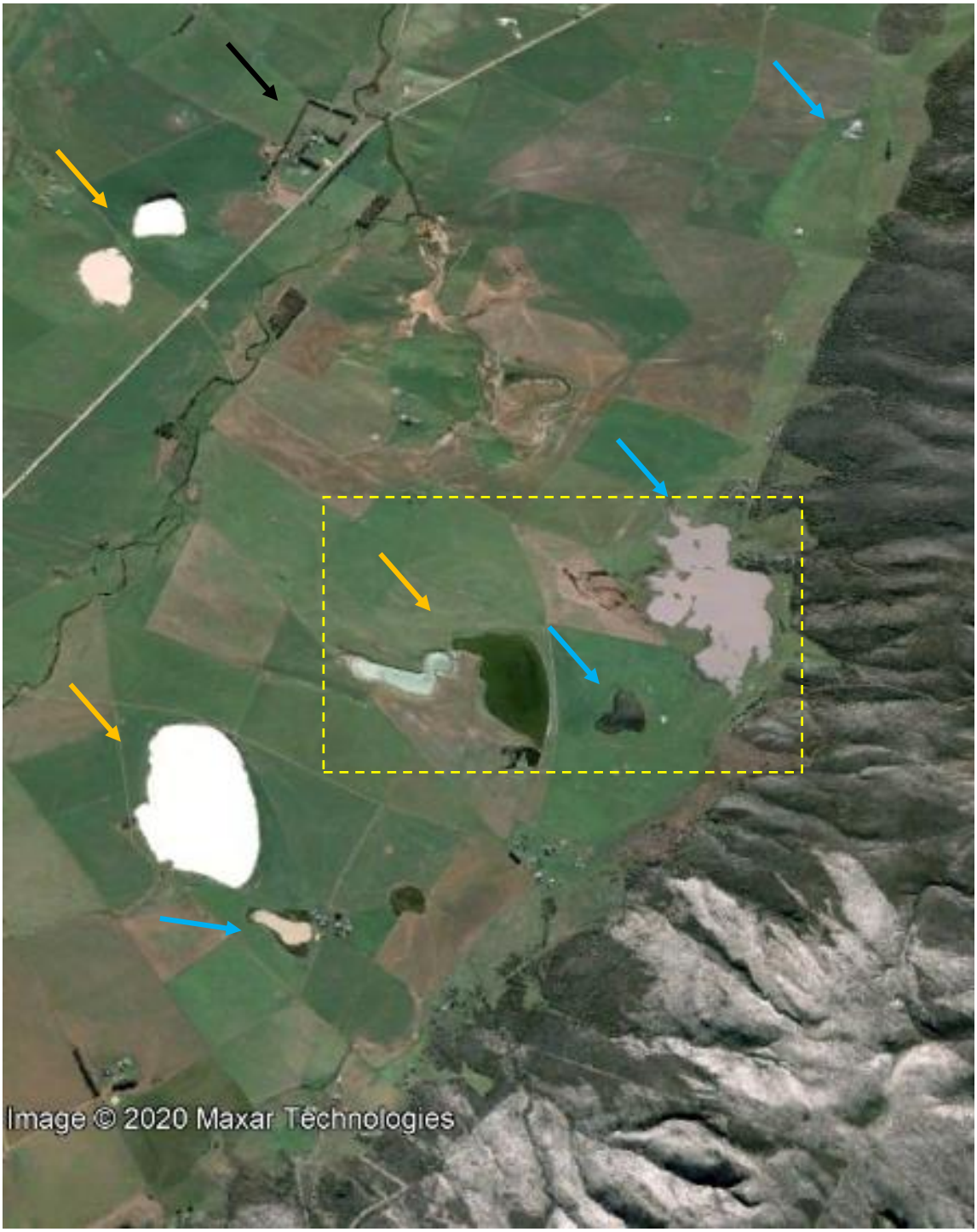


Figure 30. Satellite image of the Soutpansvlakte area. Black arrow points to Patryskraal. Orange arrows point to permanent lakes and pans. Blue arrows point to temporary lakes. Box enlarged in Figure 31, showing the drying periodical lake.

Figure 31. A periodical lake forms east of the salt pan after heavy downfalls. Top – satellite image. Bottom – view from the Hard Dunes, south of the lakes.

Silcrete lumps, typical of a lacustrine (lake) environment are found in the Soutpansvlakte area. They are ploughed out and heaped. (Figure 32).

Figure 32. Silcrete lumps in the Soutpansvlakte area. Top – an individual lump. Bottom – lums were cleared from the field and heaped in the middle of it. The Hard Dunes at the background.

Silcrete lumps, typical of a lacustrine (lake) environment, are found around the salt pans (Figures 33 to 35).

Figure 33. The salt pans in the Soutpansvlakte area. Top – the west pan (Bontebokvlei). Bottom – the east pan.

Figure 34. Top and bottom - silcrete lumps around the pans.

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Figure 35. Top and bottom - silcrete lumps around the pans.

After heavy downfalls, periodical lakes are formed some 4 km north-east of the salt pans, where silcrete lumps are found (Figures 36 and 37).

Figure 36. Top and bottom - periodical lakes 4 km north-east of the Soutpansvlakte salt pans.

Figure 37. Periodical lake 4 km north-east of the Soutpansvlakte salt pans. Top – satellite image; yellow arrows point to drying periodical lakes shown in Figure 36 when full. Middle - the north-west, tiny lake; view to the east. Bottom - silcrete lumps around the lake.