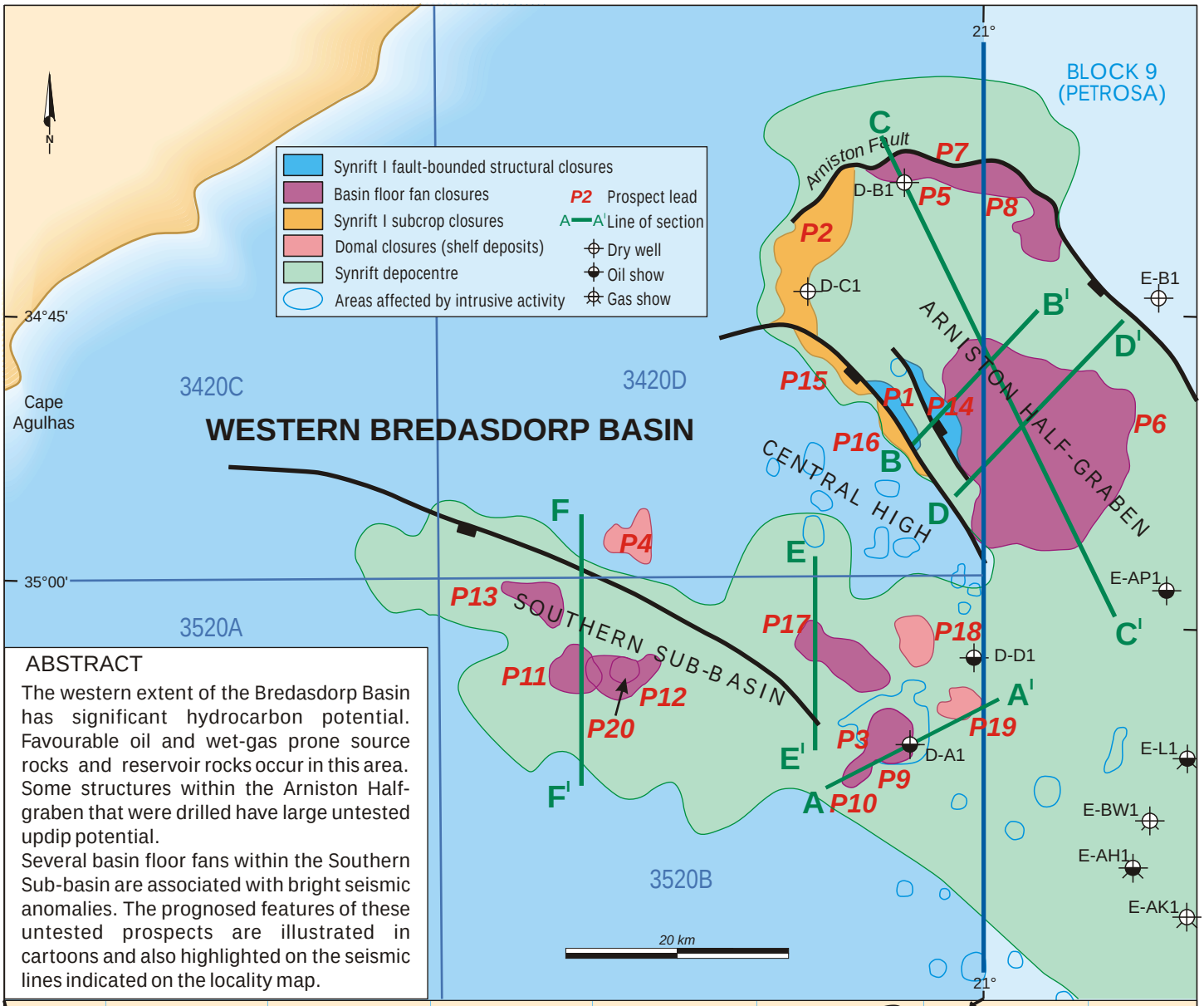
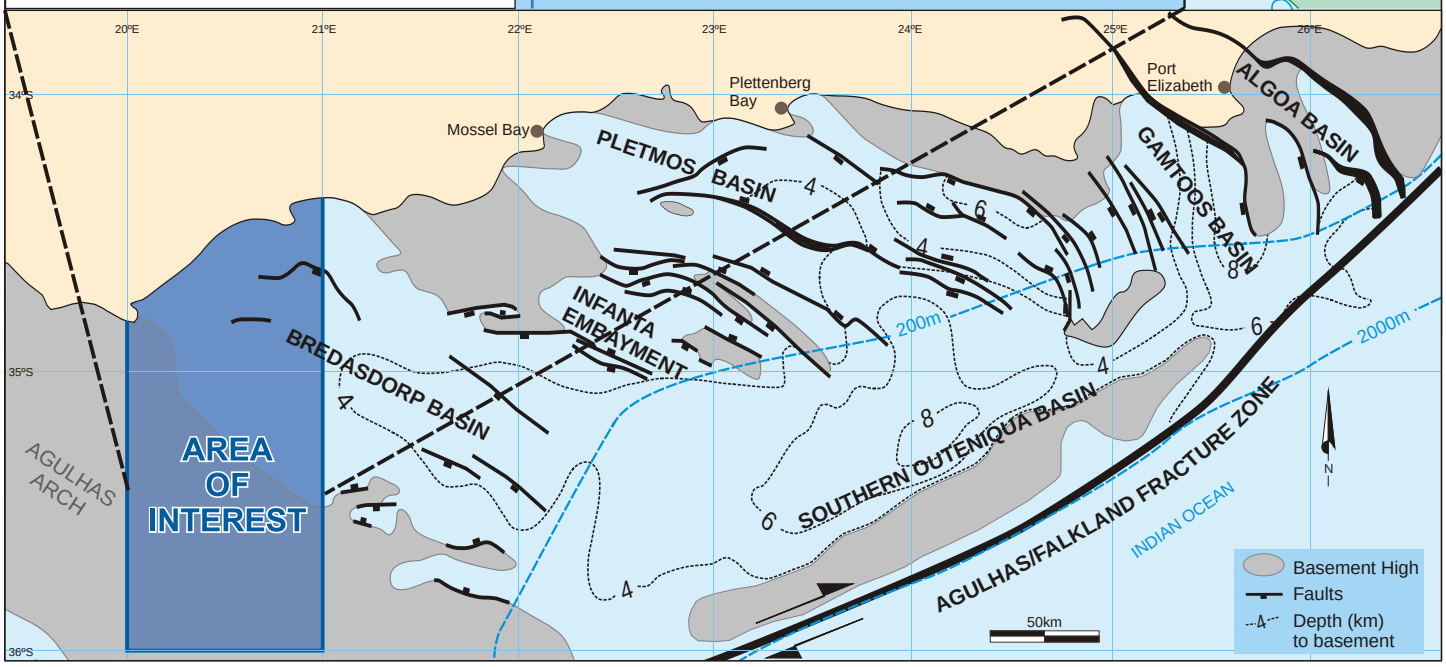
# REPUBLIC OF SOUTH AFRICA
# WESTERN BREDASDORP BASIN



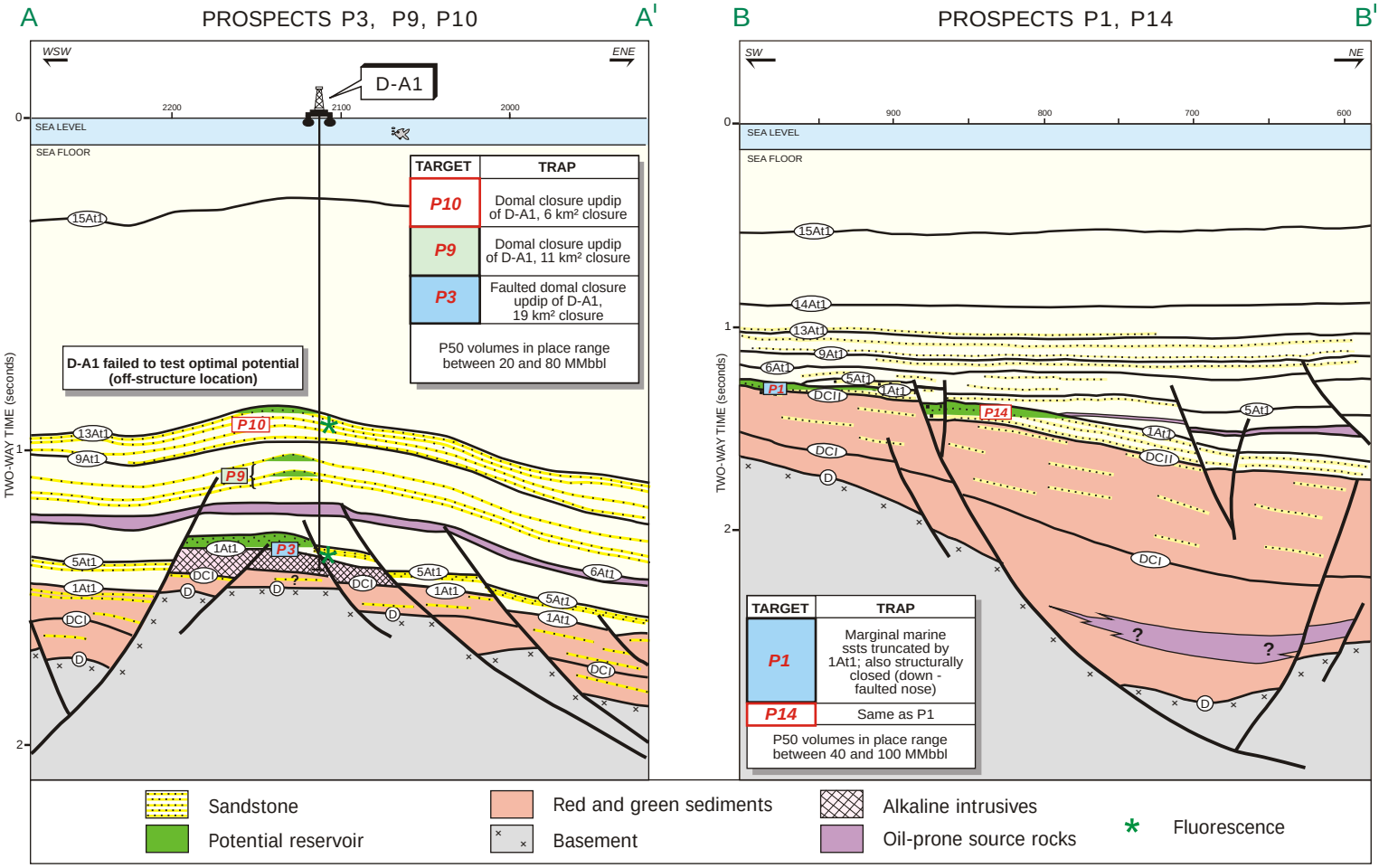

## ABSTRACT


The western extent of the Bredasdorp Basin has significant hydrocarbon potential. Favourable oil and wet-gas prone source rocks and reservoir rocks occur in this area. Some structures within the Arniston Half-graben that were drilled have large untested updip potential.

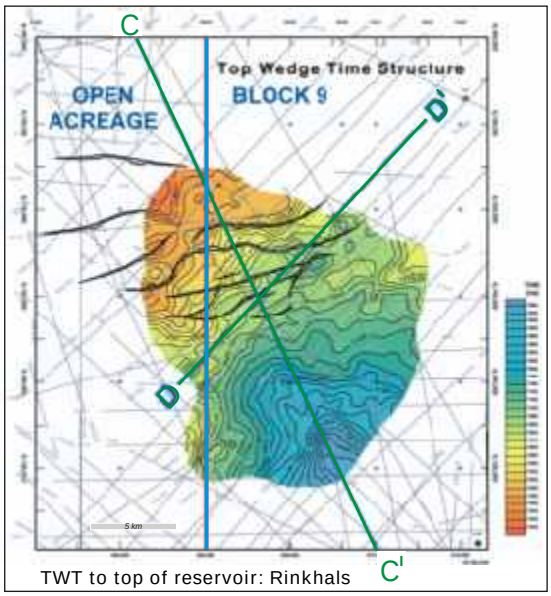
Several basin floor fans within the Southern Sub-basin are associated with bright seismic anomalies. The prognosed features of these untested prospects are illustrated in cartoons and also highlighted on the seismic lines indicated on the locality map.

# General description of prospects

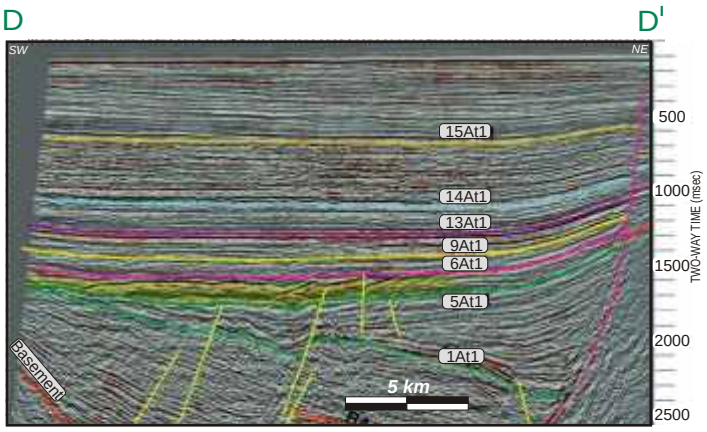


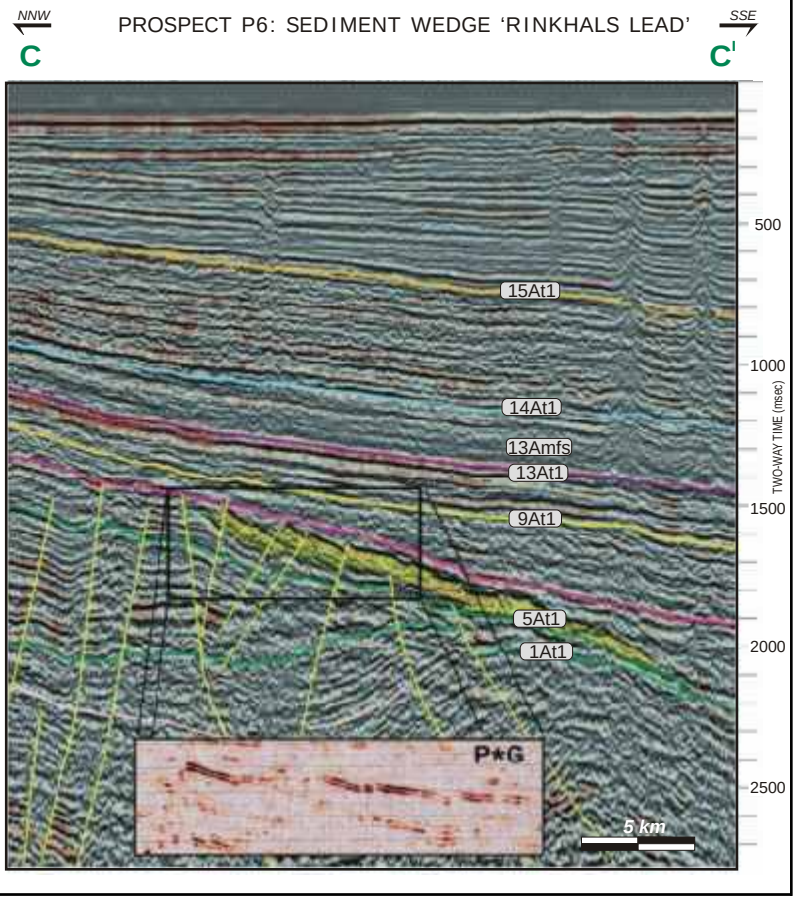

## PROSPECT P6



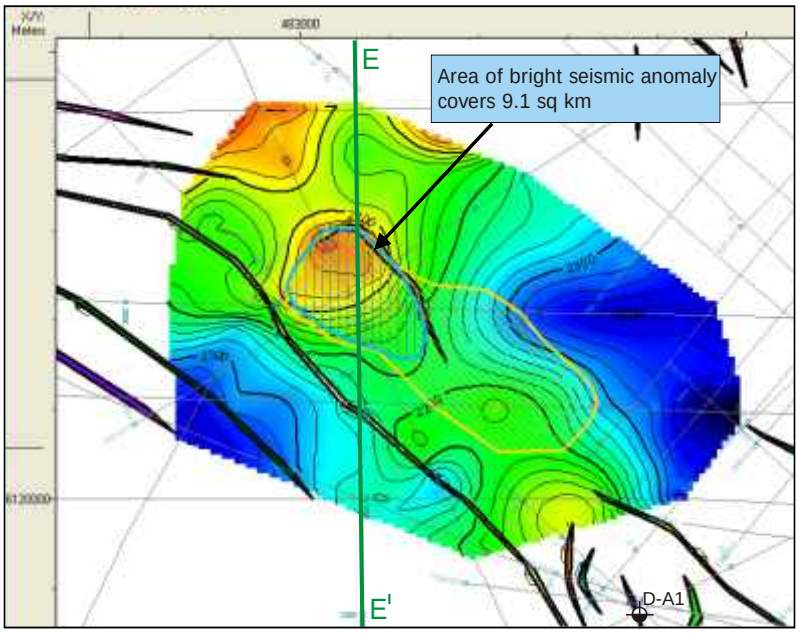

TWT to top of reservoir: Rinkhals

Prospect P6: ie. 'Rinkhals' is a Hauterivian age depositional feature within the 5A sequence, which primarily lies within Block 9, but extends westwards and up-dip into the Arniston half-graben. The trapping mechanism is a stratigraphic pinch-out against the Central High. P50 estimate of STOIIP is calculated at 129 Mmbbl and lies entirely within the area under study.



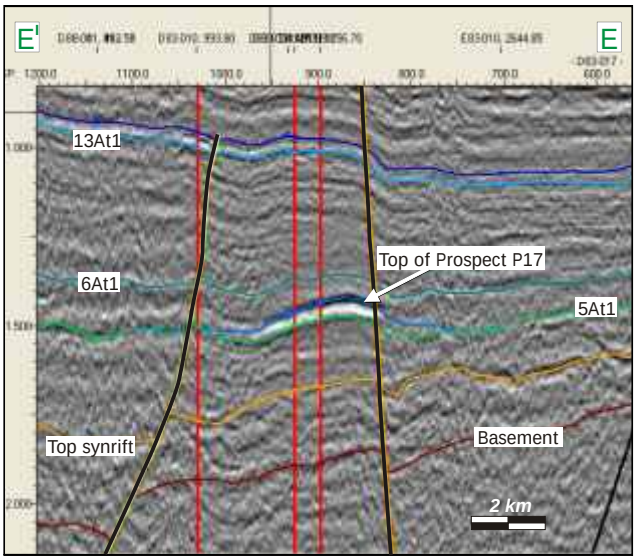



PROSPECT P17:
Depth map to top of 5A basin floor fan



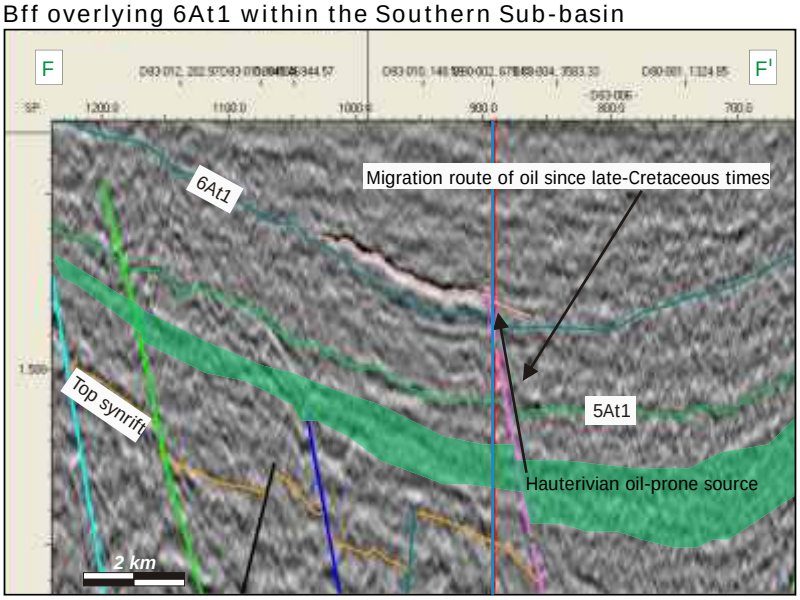

Assumptions:
20% porosity, 30m ave net pay,
70% oil saturation
Upside estimate of STOIIP
= 168 MMbbls

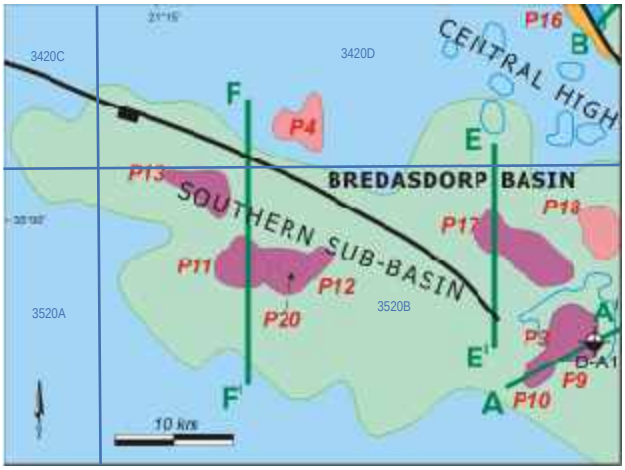
Seismic profile through 5A basin floor fan




During the Hauterivian and Barremian 5At1 and 6At1, basin floor fan sandstones were deposited in an easterly direction down the axis of the Southern Sub-basin in a 'base of slope' setting. Later displacement on existing faults resulted in structural closure of sections of these deep-marine channels. These faults also acted as conduits for oil migration from the deep-seated source kitchen. Bright seismic anomalies associated with these structures suggest areas of potential hydrocarbon accumulation as highlighted in prospects P11 and P17.

PROSPECT P11:
Bff overlying 6At1 within the Southern Sub-basin

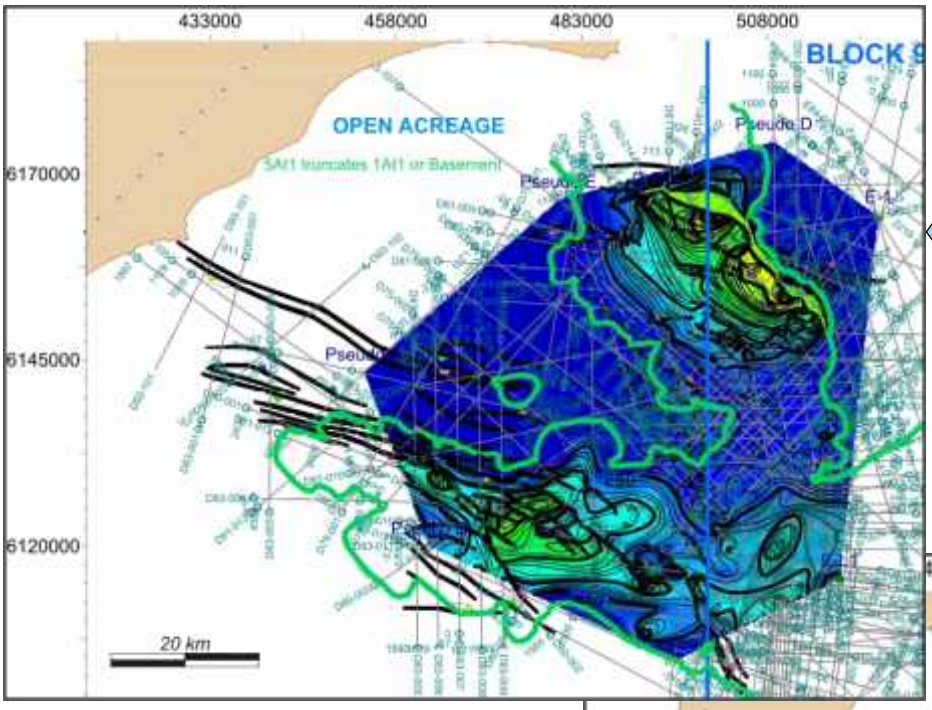



## Structural development of the Western Bredasdorp Basin

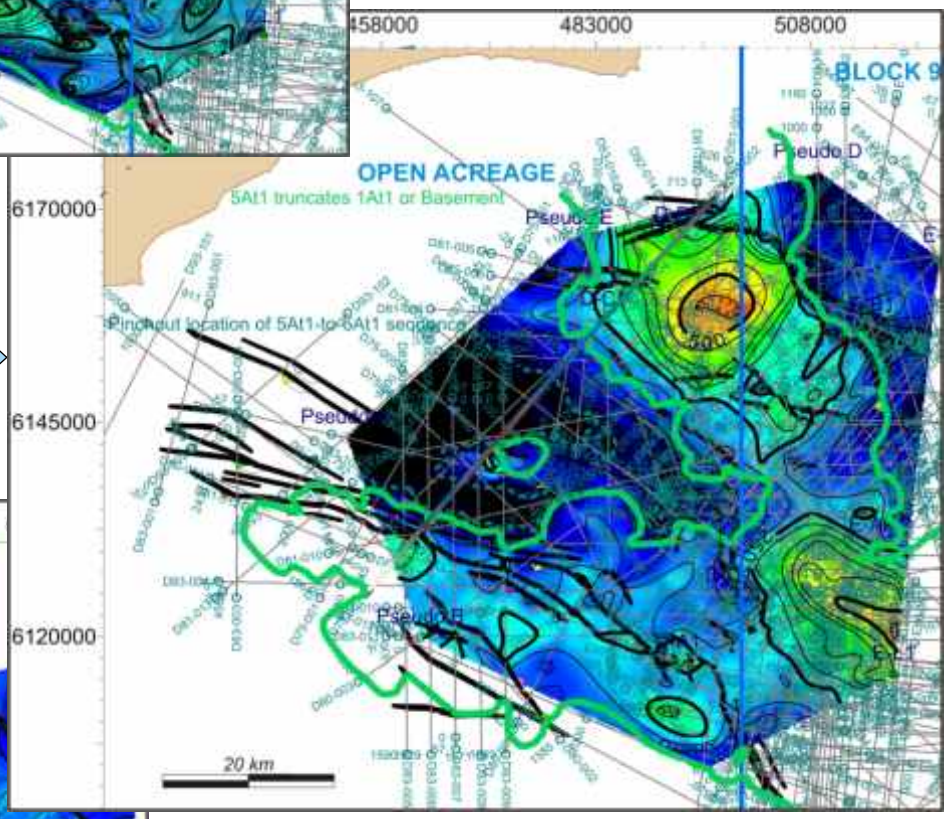
| | |
|---|---|
| I. Mid-Jurassic to Valanginian : (Basement to 1At1) | SYNRIFT I PHASE Extension-driven subsidence and synrift basin fill. Isostatic uplift on both flanks of the half-graben resulted in erosional truncation of Synrift I sediments. Extreme marginal uplift and erosion of the northern flank removed the entire Synrift I succession in places. |
| II. Late Valanginian to Hauterivian : (1At1 to 6At1) | SYNRIFT II PHASE Rapid subsidence and widespread flooding. Continued uplift resulted in further truncation of structural highs. Deposition of deepwater sequences occurred within rift depocentres (Arniston Half-graben and Southern Sub-Basin) resulting in source rock deposition. |
| III. Hauterivian to Aptian : (6At1 to 13Amfs) | TRANSITIONAL (EARLY DRIFT) PHASE Progradational expansion of shelf in the northern part over the Arniston Half-graben, combined with a continued deepening of the Southern Sub-basin. |
| IV. Albian to Maastrichtian : (13Amfs to 15At1) | DRIFT PHASE Regional subsidence driven by thermal cooling and sediment loading. Continued movement on the Arniston Fault. |
| V. Paleocene to Present Day : (15At1 to Seafloor) | UPPER DRIFT PHASE Oil-prone source in synrift depocentres as well as Central Bredasdorp Basin entered main stage of oil generation. Continued minor subsidence disrupted by Early Tertiary alkaline intrusion activity over the Central High. Late tilting of the Bredasdorp Basin combined with uplift of the northern flank resulted in late erosion of up to 600m in places. |

# HAUTERIVIAN TO EARLY APTIAN DEVELOPMENT OF BASIN FLOOR FANS AND SOURCE ROCKS



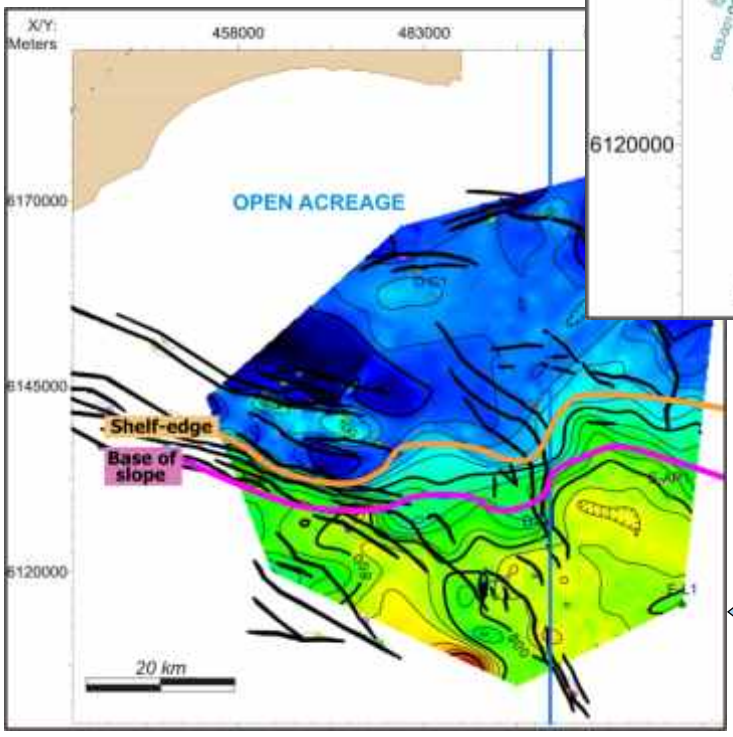

Early Hauterivian isopach (5At1-to-1At1)

The Arniston Half-graben as well as the Southern Sub-basin indicate major thickening resulting from subsidence of these depocentres during this Synrift II stage, which favoured the deposition of Hauterivian age oil prone source rocks as intersected in the Arniston Half-graben.




Late Hauterivian isopach (6At1-to-5At1)

The Arniston Half-graben shows further deepening with slope deposits comprising interbedded sandstones and claystones as intersected in the D-B1 well. The Southern Sub-basin seems less developed, but several bright seismic anomalies indicate possible basin floor fan development.




Barremian to Early Aptian isopach (13At1-to-6At1)

The Southern Sub-basin shows further deepening in conjunction with the rest of the Bredasdorp Basin to the east. This period also favoured the deposition of basin floor fan complexes in the Southern Sub-basin as was the case in Central Bredasdorp Basin.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