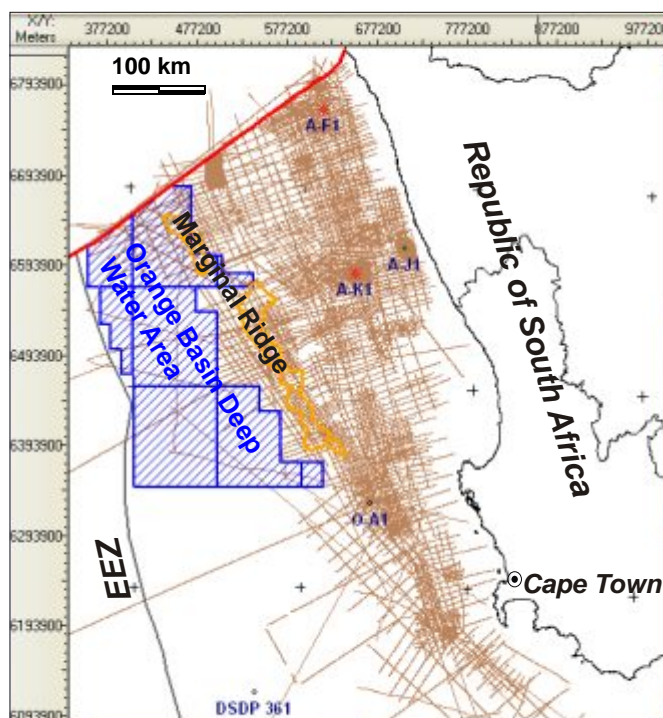


Exploration Opportunities in the Deepwater Orange Basin, off the West Coast of South Africa



INTRODUCTION

The Orange Basin Deep Water Licence Area covers an area of 43000km². It is bounded to the north by the international border between Namibia and South Africa, to the east by currently leased acreage, constrained to the south by the -33° line of latitude, and to the west by the 370 km extent of the Exclusive Economic Zone (EEZ). Water depth ranges from 2000m along the north-eastern boundary to 4000m in the south-west corner of the area.



Location of the Orange Basin Deep Water Licence Area off the South African west coast.

Licence blocks are one-degree by one-degree squares, defined in latitude and longitude according to the WGS84 ellipsoid. The licence blocks (or parts thereof) included in the area are as follows:
3013; 3014; 3015; 3113 ;3114; 3214; 3215; 3216.

The current seismic database of the area consists of 3124 km of migrated stack 2D data in Seg-Y format that range in vintage from 1987 to 2002. Forty exploration wells have been drilled in the basin south of the Namibian border, but none in the licence area.

REGIONAL GEOLOGY

South Africa's west coast is a divergent volcanic margin underlain by a rift basin complex of Late Jurassic to Hauterivian age. It consists of an inner and outer zone of predominantly coast parallel half graben, of which the latter extends westward into a marginal ridge and beyond into a series of wedges of seaward dipping reflectors. The synrift succession of one of the inner graben tested, contained lacustrine source rock and yielded an oil discovery.

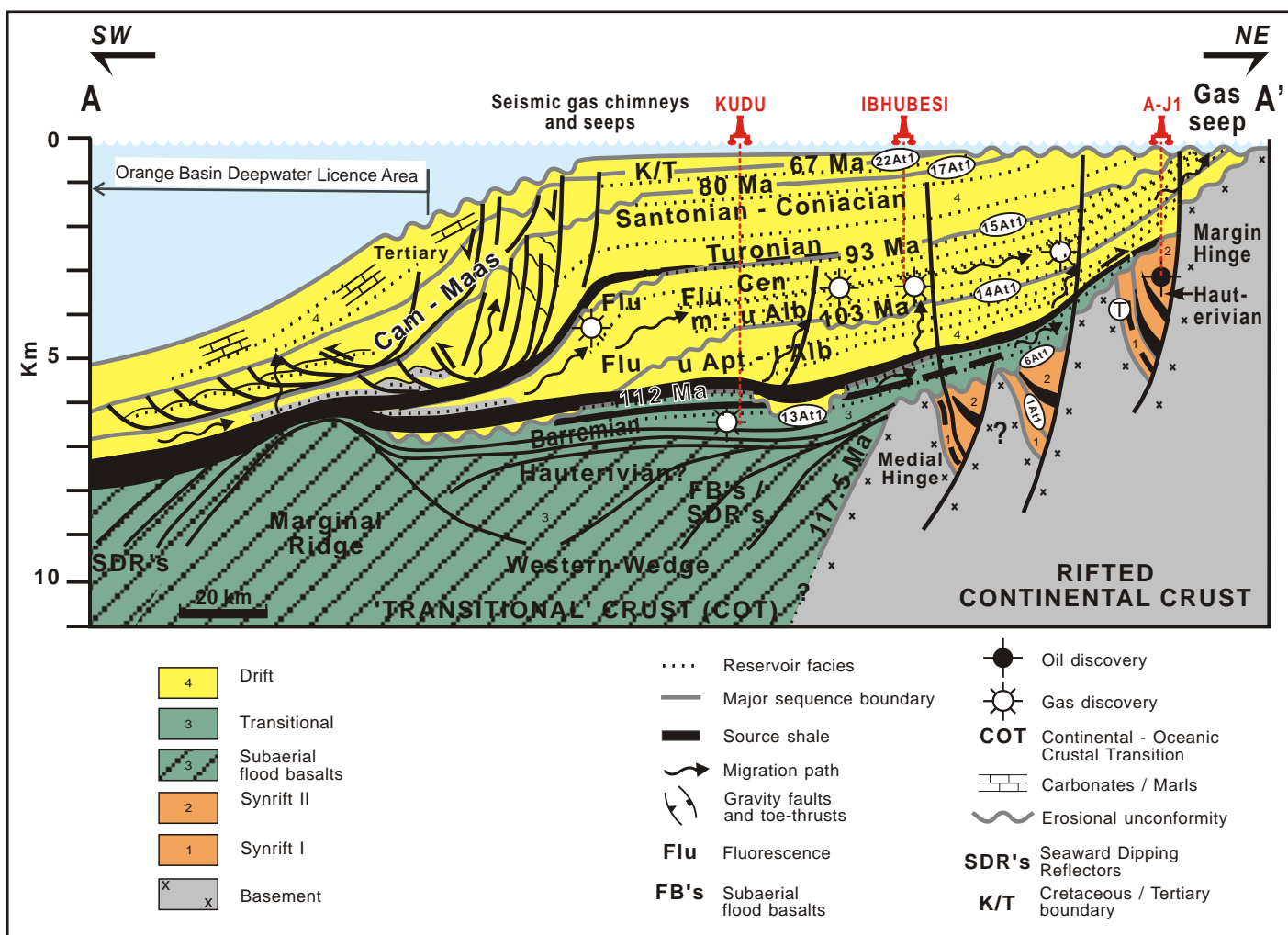
A Hauterivian age unconformity separates the rift geology from that of the post rift period.

The post rift section comprises a massive complex of delta sediments of more than 8000 m thick in places, which was transported into the basin by the westward flowing Oliphants, Berg and Orange Rivers and their related proto-river systems. Five super-sequences have been identified within the post rift Cretaceous succession, bounded by second-order Type 1 unconformities and characterised by major cycles of transgression and regression.

The first of these comprises siliciclastic continental and shallow marine sediments interbedded with basaltic lavas. The succession represents a late Hauterivian to early Aptian transgressive period, with marine incursion progressing from west to east across a ramp shelf, as the narrow basin opened up from the south. Numerous wells have intersected Barremian source rocks to the east of the licence area, ranging from tens of metres of gas prone clay stones in the south to over 100 m of originally oil prone source rocks in southern Namibia. The succession includes the gas charged Barremian aeolian sandstones of the Kudu gas field located just north of the South Africa - Namibia international border.

By the early Aptian the margin was fully flooded, marking the onset of the principal passive margin drifting phase, during which the second to fifth Super-sequences were deposited under conditions of relative sea level falls and erosion, followed by flooding and either progradation or predominant aggradation (Brown et al, 1995). Gas charged fluvial and deltaic sandstones make up the Ibhuesi gas field within the Albian succession beneath the present shelf just south of the South Africa - Namibia border. The periodic flooding events gave rise to the development of source rock sequences in the Aptian (thick, good quality, oil and wet gas prone), Albian to Cenomanian (thin, poor quality, gas prone), and Cenomanian to Turonian (gas prone) intervals, all of which have been intersected by numerous wells within the basin.

In the northern and central part of the basin, aggradation during the fifth Super-sequence was contemporaneous with the development of a spectacular gravity faulting and toe-thrust complex within the slope environments. In the southern part of the basin, the gravity faulting and toe-thrust complex is developed in the Tertiary succession, the bulk of which was deposited beyond the Cretaceous shelf breaks, and much thicker in the south than the north.

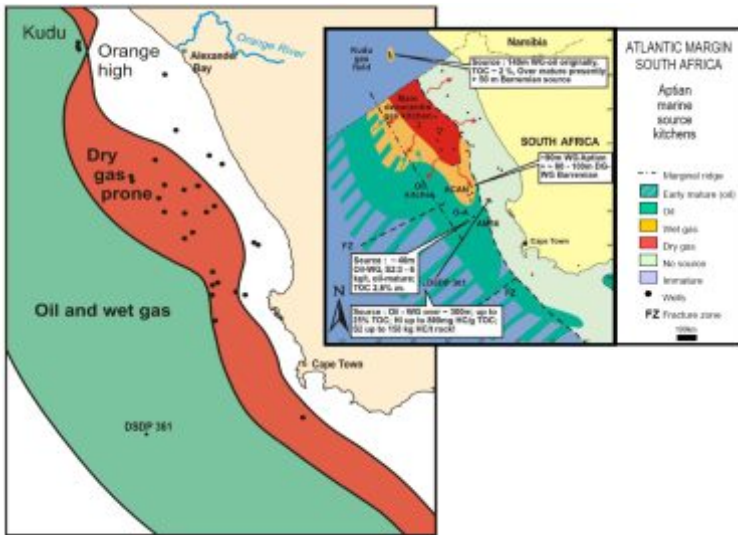


Schematic geological cross section through the central Orange Basin (after Jungslager, 1999)

PROSPECTIVITY

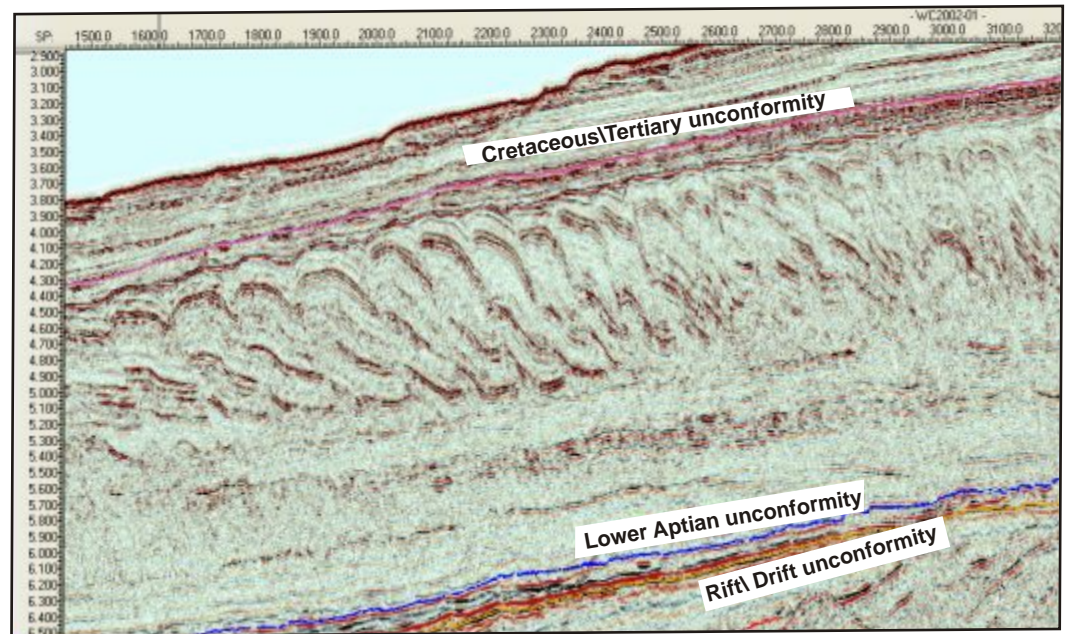
Source is expected to be regionally well developed (van der Spuy, 2003), potentially comprising the westward extension of the Barremian source shales, as well as the pro-delta shale correlatives of the Aptian, Albian to Cenomanian and Cenomanian to Turonian source shales that have been intersected within the delta complex to the east and south of the licence area.

Reservoir is expected to comprise submarine fans and turbidites, sealed by slope- and / or basin mudstones.

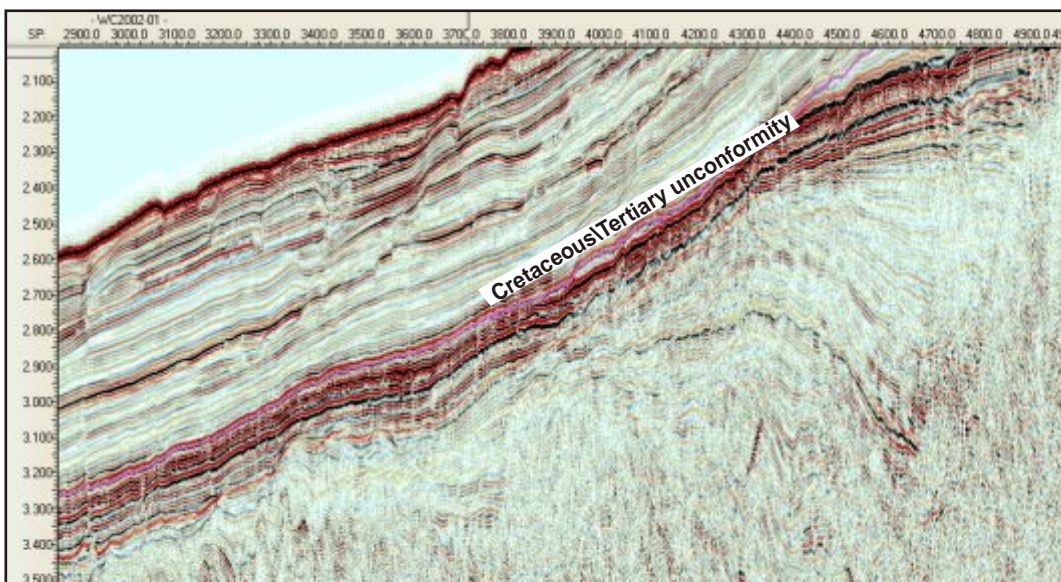


Distribution of Aptian source rocks in the Orange Basin.

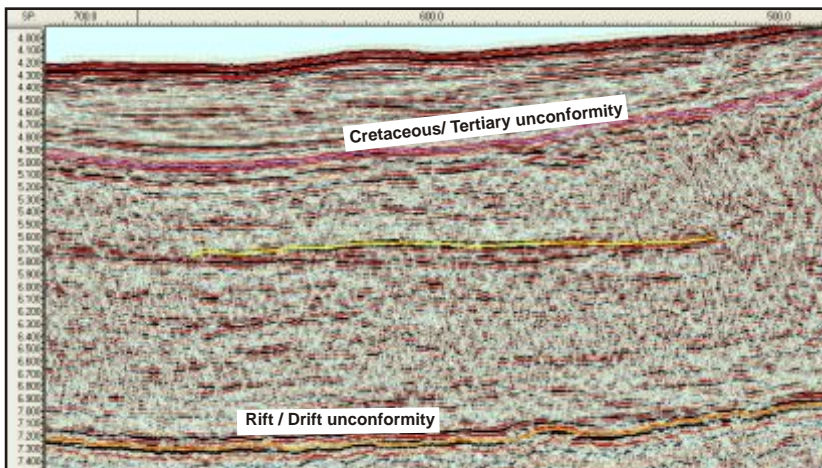
The following plays have been identified from the sparse seismic coverage within the licence area:



Toe-thrusts and anticlines

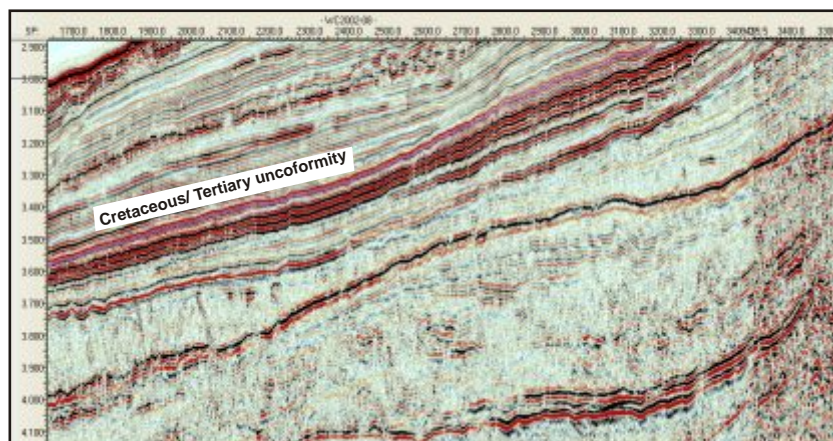


Late Cretaceous growth-fault rollover.



Upper Cretaceous basin floor fan.

Upper Cretaceous basin Slope fan and chanel.



CONCLUSION

Exploration of the shelf has proven the existence of two working petroleum systems and gas and oil discoveries in the Orange Basin. The sparse data coverage to the west of the shelf reveals many exciting structures and amplitude anomalies and indicates that viable deepwater oil plays are present in this large and un-drilled Deepwater Licence Area.

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