

# 3. Braided Fluvial ("Ibhubesi") Play

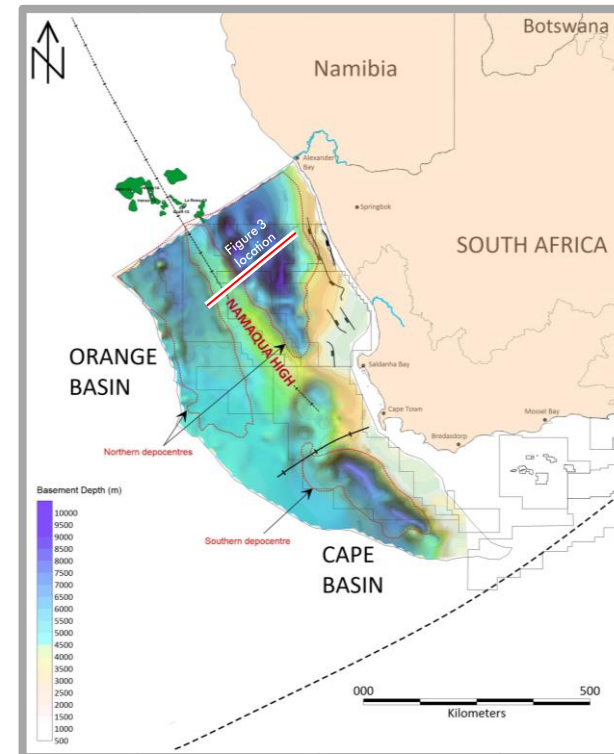
## Overview:

The Albian Stratigraphic-Structural Play has been identified in numerous gas discoveries off the coast of South Africa, with the most notable being the A-K1 (Ibhubesi) discovery. Key characteristics of this play, as demonstrated by the A-K 1 well, include stratigraphic trapping, exceptional porosity-permeability qualities, high flow rates within relatively thin sandstones, seismic amplitude anomalies associated with gas-bearing sandstones, and the absence of gas-water contacts suggesting the potential presence of large stratigraphically trapped systems (Jungslager, 1999).

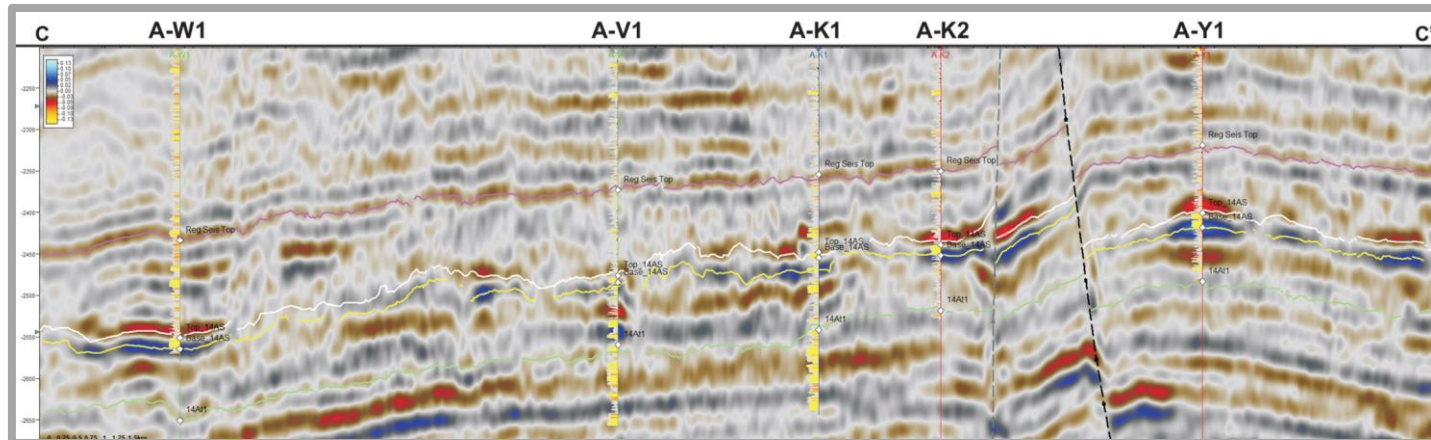
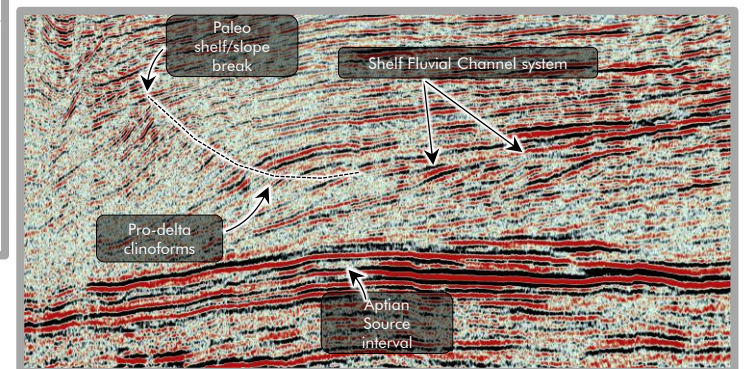
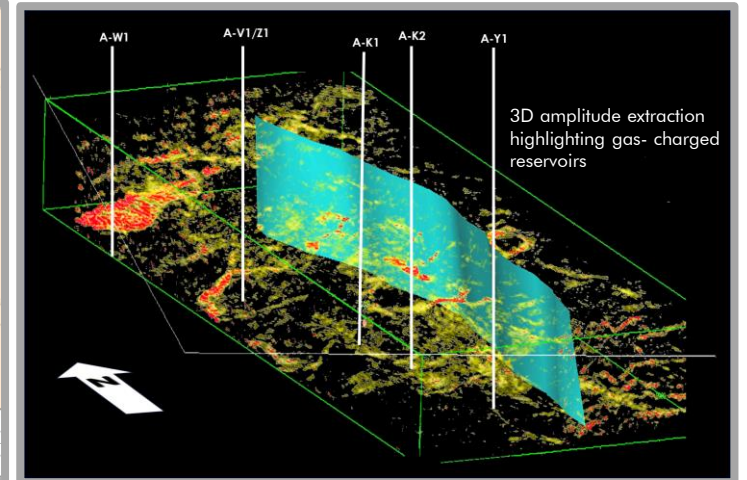
Although the Albian Stratigraphic-Structural Play can be reliably identified through seismic mapping across the primary depocenter area between the A-K1 location and the Namibian border, pinpointing individual traps remains challenging due to the minimal structural features. Based on sequence stratigraphic mapping, it is proposed that these reservoirs developed within broad compound incised valley systems, with optimal development occurring off-structure along the valleys' thalwegs, which seem to align with underlying graben systems (Jungslager, 1999).

The A-K 1 trap manifests as a compactional drape formed over a low relief basement high, with closure dimensions ranging from a minimum of 36 sq km to a maximum of 125 sq km. The sandstone reservoirs exhibit porosity levels ranging from 9% to 24%, with an average of 20%, and permeabilities averaging between 79mD and 145mD. A normal fault seems to provide the lateral seal to the northwest.

The trapping mechanism of A-F 1 occurs against an east-west trending normal fault with a stratigraphic component in the Albian (14A) sequence. Faulting also acts as the lateral seal to the north. This reservoir consists of two sandstone intervals with a combined net thickness of 13m, porosity ranging from 20% to 26%, and an average permeability of 296 mD.



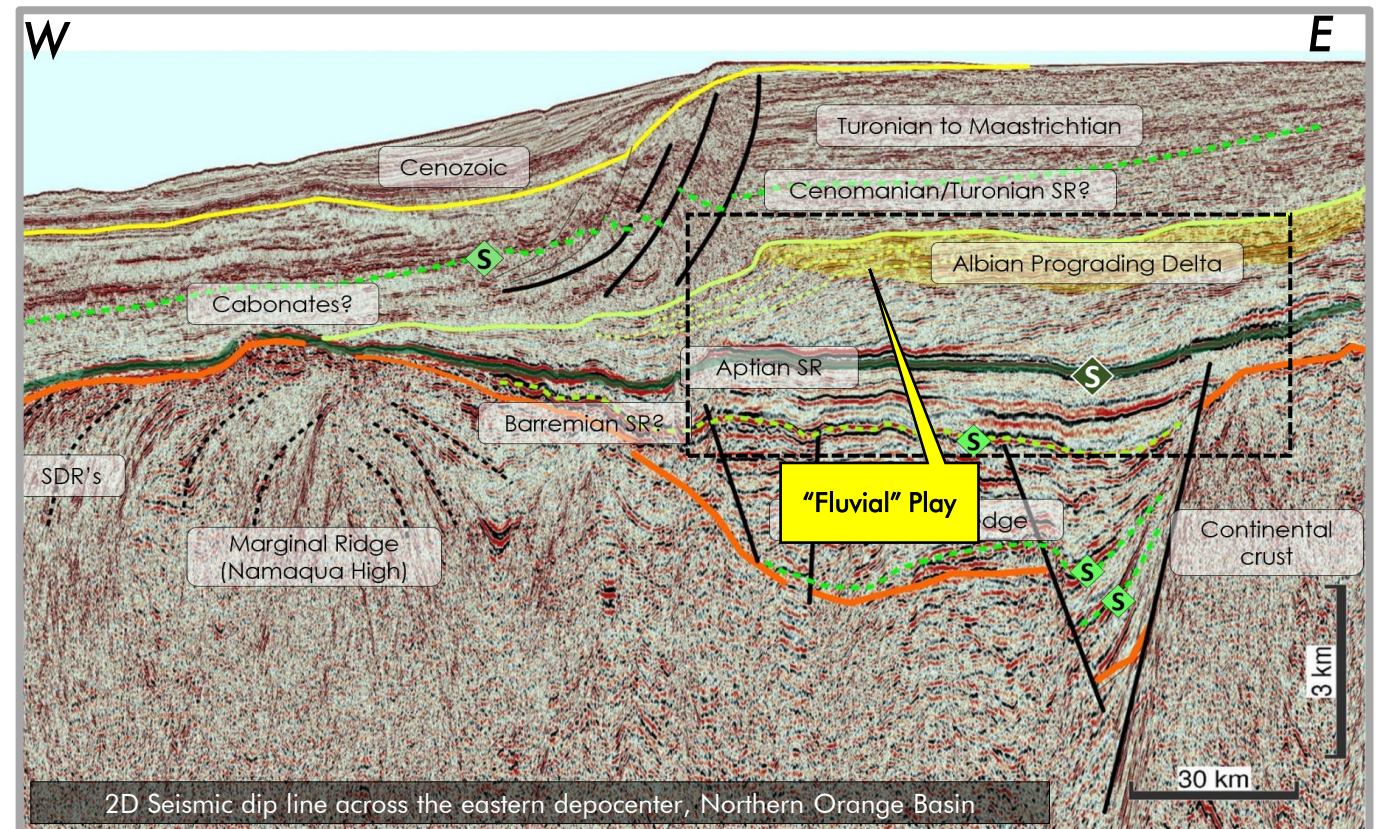
Map showing location of 2D seismic line below



3D arbitrary seismic line clearly showing amplitude anomalies at the reservoir interval ( Skosana, 2019)

## Exploration Opportunities

The braided Albian aged fluvial channel play is well studied over the Ibhubesi gas field with good quality 3D and 2D seismic data with a fair number of wells drilled. The system clearly continues towards the Namibian border in the north, judging from seismic data covering the area. Detailed 3D attribute studies are important to highlight the complex nature of the compartmentalized fluvial reservoirs, as recognized in the Ibhubesi gas field. This is a highly prospective system over a vast area of the eastern depocenter across the broad northern shelf.



2D Seismic dip line across the eastern depocenter, Northern Orange Basin