



# Seismic Acquisition to New-Play Type Discovery in Less Than 12 Months, A Fast Track Approach to Exploration – Santos Basin, Brazil

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## Abstract

El Paso entered the BS-1 block offshore Brazil in the Santos Basin in June 2002 in a farmout from Kerr-McGee. The block expiration date was August 6, 2003. In July 2003 a gas and condensate discovery was made when a stratigraphic anomaly was penetrated. The first shot of the seismic acquisition program was in July of 2002 and in less than 12 months, a 900 km<sup>2</sup> 3D marine survey was acquired, the data processed through Kirchhoff pre-stack time migration, interpreted, and a well was permitted and drilled. A fast track interpretation approach was utilized incorporating AVO attributes and volume visualization techniques to quickly identify leads that were then risked and ranked. An off-structure Itajai age turbidite sand lobe with an AVO signature similar to the nearby Merluza field was chosen as the main prospect.

## Introduction

Veritas was contracted by El Paso to acquire and process a 3D survey to allow them to make a decision to drill or exit the block. The data were acquired, processed and interpreted in approximately eight months. Several prospects were identified, risked and ranked. Recommendations were made and it was decided that an off-structure stratigraphic feature be tested based on an AVO signature that was similar to known pay at the near by Meluza field. The well encountered high quality gas saturated sands as predicted by the pre-drill analysis.

## Acquisition

The "Santos Basin Phase IV" 3D seismic survey was acquired offshore Brazil by the SRV "Veritas Viking I" and "Veritas Viking II" vessels between July 8th and October 12th, 2002. The vessels are purpose-built, high capacity, multi-element seismic survey vessels. The 3D survey covered approximately 900 square kilometers. The primary objective was to produce accurate imaging of the subsurface using full 3D Kirchhoff pre-stack time migration. The water depth over the survey area was shallow and fairly constant from 100 to 200 milliseconds two-way travel time. The zone of interest ranged from 2 to 5 seconds over most of the survey area. To facilitate processing on shore some reformatting was done onboard the vessel.

## Processing

The 3D processing was carried out by Veritas GeoServices Ltd. in Calgary. Processing started in October 2002, and was completed in January 2003. Deliverables included a fast track volume with post stack migration, a pre-stack time migration volume with 3 angle stacks and nine AVO attribute volumes. A high resolution site survey volume was also created.

## Interpretation

Scanning of the post stack migration volume was done in December and initial surfaces identified. Interpretation of the pre-stack time migration data was carried out in three weeks starting in early January. Surfaces were mapped based on amplitude and waveform correlation criteria. AVO attribute volumes were used with the existing well control to identify pay and non-pay sands. Several leads at different intervals were identified and then ranked based on their AVO signature and similarity to known pay.

## Conclusion

A condensed time frame based on entry into the block and its expiration date necessitated that a fast track approach be taken to acquire, process, interpret and drill an exploration well in the Santos Basin. Coordinated efforts between the client and contractor enabled a discovery in a previously undrilled play type in the Santos Basin.



Figure 1. Two boat "undershoot" near a platform.

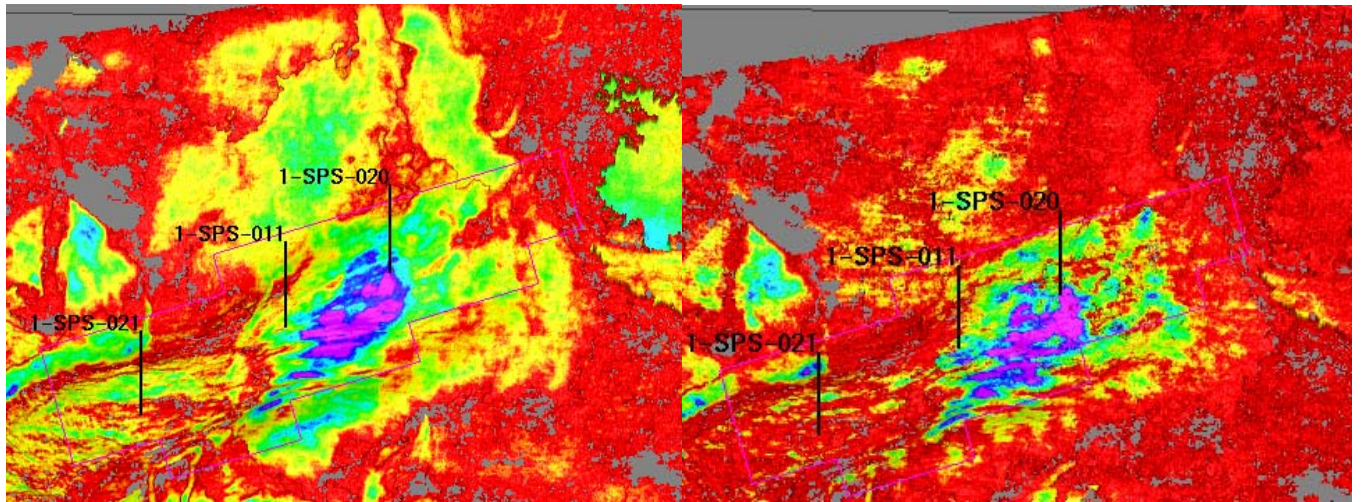


Figure 2. Amplitude map (left) shows sand deposition and AVO attribute map (right) shows fluid distribution.