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# Delineating deeper events– A Case history

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***Summary***

*The area under discussion is situated towards east of Diu arch in west coast of India. Events below trap could not be mapped with 2D data available in the area. 3D seismic data acquired recently is processed with specific geological understanding and velocity behavior with variable geological conditions is adopted during picking. Longer apertures could take care of deeper structural events.*

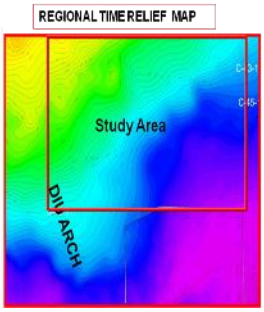
***Keywords****: Diu arch, Processing, Interaction, trap, Velocities, aperture.*

## Introduction

The study area is situated towards east of Diu arch in west coast of India. The Diu arch is considered to be NNE-SSW trending basement high plunging southwards as is evident from seismic as well as gravity data.

## Geological Setting

The area under discussion is around Diu Arch. The Diu Arch as a dominant element in restricting Paleocene and Eocene sediments. These sediments are more towards east in Surat depression. The Diu arch appears to have played a role in restricting marine incursions into the Surat Depression thereby creating environment of source rock development. During Oligocene, sediment thickening has occurred to the west. The earlier authors have reported a westward tilt of the basin in the Late Oligocene resulting in reduced subsidence of the Surat Depression and increased subsidence in the Saurashtra and Shelf Margin Basins.


The Daman and Mahuva formations of Oligocene age which are gas bearing and Panna formation of early Eocene age which has gas indications in the eastern part.(i.e. Tapti-Daman area). Towards the south of the Diu arch, lies Surat depression. The graben part mapped in the area holds good source potential.

## Exploration Objective

So far, the exploratory efforts have been mostly concentrated on the tertiary sequence. Few wells drilled on the flanks of Diu Arch for tertiary have not proved to be successful.

The absence of hydrocarbons in tertiary sequences in these wells has led to rethink about possible hydrocarbon potential of Mesozoic sequence analogous to Kutch area and Saurashtra arch area.

To understand the trap thickness of the area, imaging the trap bottom and deeper events corresponding to Mesozoic sequences, 3D seismic data was acquired using 6.0 Km streamer length having nominal fold 60. All acquisition parameters were designed to have optimum source energy below trap.

Fig below has been interpreted as the dikes originating below trap appears to be very thick and there are possible Mesozoic sediments below the trap. The dikes appear to have been originating from the possible granitic basement(?).

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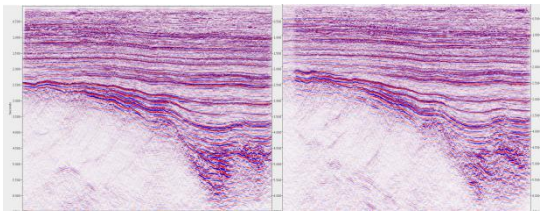


Substantial improvement in the standout of deeper reflections over Diu arch has given an impetus to redefine the Mesozoic sequences and given a ray of hope to reinterpret the area and explore the hydrocarbon potential for the Mesozoics deposited over Diu arch and re-orient drilling objective accordingly.

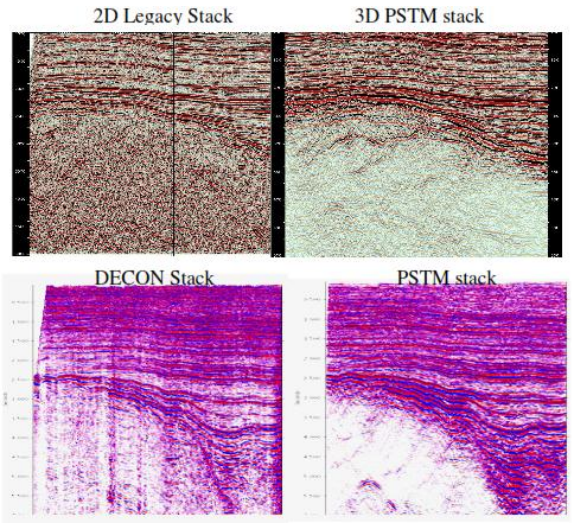
2D seismic data of earlier vintages acquired over Diu arch could not bring out any mappable deeper event below trap top. Almost no reflection zone below trap top led to the interpretation that Diu arch is having very thick trap which possibly does not allow the seismic energy to penetrate through it.

Recently 3D seismic data was acquired towards eastern part of Diu arch using 5000 cu.in gun volume, 6 Km. streamer length and 2.0 ms sample interval. The data was processed with utmost careful selection of parameters after number of interactions at every stage.

## Methodology

Conventional processing without any interpreter intervention may not be a solution. In-time quality output in complex areas needs special attention while processing itself.

Velocity function was picked with right understanding of geology for possible events up to deeper level. Selection of migration aperture turned out to be very crucial and was set to 9 Km and final section brought out the much needed deeper events clearly. This has given the thought for identification of Mesozoics and possible granite basement and the limited trap thickness as against the earlier thought that the trap may be very thick which might be preventing the imaging of deeper information.




## Conclusions

Velocities picked with specific understanding of geology, depositional environment and considering the behavioral aspects of velocities during the variable geological conditions have brought out a better processed data which is clear representative of subsurface as input to the interpreter. Selection of sufficient aperture for deeper objective is the key for authentic delineation of deep structural reflections. Authors could prove the fact that in this fast computing capability environment, effective interaction with interpreter during processing will definitely give best possible results.

The views expressed in this paper are exclusively of the authors and need not necessarily match with official views of ONGC.

## References

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