

Advanced Seismic Techniques to Enhance Exploration in the Eastern Mediterranean Basin

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ABSTRACT

In recent years the search for more efficient marine exploration has pushed the seismic community to look forward to new technologies to better understand complex geological settings, such as the ones present in the Levant Basin.

As a foreword, there are some things one needs to be aware of regarding seismic technologies:

- Seismic data acquired is generally noisy, band-limited, sparse and it's resolution decreases with depth.
- Seismic data is sensitive to velocity and density variations. Seismic reflections are proportional to changes in velocity and/or density across a boundary/interface/layer.
- Processing and interpreting seismic data produce an abstract model of the subsurface that is coherent geologically (i.e. a GeoModel, that includes understanding of the petroleum reservoir, source rock, reservoir rock, seal and trap).
- The GeoModel is biased, uncertain, and non-unique.

It can be seen from these assumptions, that an increase of quality of the seismic data, whether it comes from; innovative acquisition systems, innovative processing techniques & concepts, or imaging techniques will have a major impact on the quality of the GeoModel.

Different approaches to enhance the quality of the seismic data are currently being developed by universities, contractors and oil companies. Extensively tested, these techniques prove in most cases to be effective. In this paper we will present and describe some of the tested innovative approaches and respective results:

- Acquisition Broadband techniques that will allow better imaging and more precise images of the subsurface.
- Advanced processing techniques that allow broadening the spectrum of the vintage seismic data.
- Innovative imaging and velocity model building techniques which help detection and precise delineation of plays.

We will show that we can effectively enhance the genuine quality of the seismic data, to improve the exploration workflow effectiveness and that seismic technology is rapidly evolving (thanks in part to increasing HPC power) allowing us to address more challenging complex exploration plays, and narrowing the gap between the GeoModel and reality.