

Reducing the ambiguity in seismic data processing through the use of well data: a case study from offshore UAE

Oleg Khakimov¹, Mark A. Benson², Frantisek Janik¹, Grzegorz Kwasny¹, Roger J. May¹

¹Seismic Imaging, CGG, Abu Dhabi, UNITED ARAB EMIRATES

²ADMA-OPCO, Abu Dhabi, UNITED ARAB EMIRATES

ABSTRACT

When the geology of a seismic survey is flat or near flat, the selection of imaging parameters in data processing can be notoriously difficult. Parameters affecting near surface velocity, multiple content, phase, amplitude stability and stacking velocity become both more critical yet more ambiguous. When making processing parameter decisions, the geophysicist typically applies a process as a trial and looks at the results before and after application. This sort of visual inspection is problematic and decisions are often subjective based around geophysicists' personal preference and expectation. For a scientific industry, it is remarkable how many technical decisions are made on this basis. In the Arabian Peninsula this ambiguity is particularly evident in processes such as refraction statics, where one often has uncertainty in the long wavelength solution, deconvolution, where the question of spiking vs predictive is very much a personal or even an individual company choice, and demultiple, where the primaries and multiples are so difficult to identify and separate that often interpreters ultimately receive data where the majority of deep reflections are multiples.

The ambiguities of flat geology can be mitigated through the careful use of well data. Fortunately, with many fields in the Arabian Peninsula being mature, these large fields often have many wells with good log measurements available. For the processing geophysicist 'good' well data is defined as the availability of density and sonic logs from surface to reservoir. Well data can be used in the selection of the fundamental basics of our data processing sequence, velocity, mute and statics. It can also be used in the selection of many processing parameters through the use of measureable attributes that provide definitive evidence-based data to make informed scientific decisions, rather than subjective judgements.

In this paper we describe a case study from offshore Abu Dhabi where the available well data was used to mitigate this ambiguity, improving data quality and interpreter confidence in the seismic image. The reduction in ambiguity also improved the project turnaround. The conclusions are applicable for all areas but are particularly relevant in the Arabian Peninsula.