Despite providing operators with critical information used on a daily basis for exploration and production activities, the oilfield service sector has borne the brunt of the current prolonged oil price downturn. I encourage readers of the RECORDER to support our seismic service providers (partners) as much as possible during these difficult times, so that they will be around and in a good health when activity picks back up.

This month we feature four articles on different aspects of seismic processing. As a whole they capture many of the recent advances in the field of seismic processing, which slowly but surely evolves as time goes by.

First up is an article on 6D interpolation by Mark Ng and Dan Negut of Divestco Inc. In a nutshell, they invoke a novel constraint in the 6th dimension (cool, I didn’t know there were so many) to reduce dip aliasing during interpolation. They test their workflow using real data, which was decimated before interpolation. Comparisons between the original un-decimated data and the new interpolated data show that their 6D interpolation code performs better than their industry-standard 5D interpolation code. They also advocate for interpolating and migrating to a finer bin spacing than the natural bin spacing, arguing that this reveals more spatial detail than is obtained when migrating to the natural bin spacing.

Regan Kennedy and other authors from Earth Signal contributed our second article, which describes how we can use well log data to drive better processing parameter decisions, and also to build better velocity models. This is a concept which has been kicking around for a while, and it’s great to see that it is becoming more widely used and continues to add value. Ultimately, our data is better conditioned for Quantitative Interpretation when processing decisions are made on the basis of something more than just a gut feeling or a somewhat subjective image comparison. I also really liked their velocity model comparisons, which demonstrate that a relatively simple tweak to the velocity picking workflow yields significantly more geologically plausible velocity models which have applications beyond just seismic data stacking.

Thrust Belt Imaging’s article drives home the point that incorporating additional constraints helps improve seismic imaging. In this case, they describe how geological constraints improve anisotropic depth migration velocity models in structurally complex areas. In these areas, our seismic data will never fully image the structural complexity of the subsurface due to either illumination holes, missing (unrecorded) reflections or wavefield complexity. Despite this, the complexity of the subsurface velocity field needs to be incorporated into the migration velocity model for optimal imaging. I particularly appreciated the authors’ honesty with respect to the comparison of the time and depth migrations of their 2D dip and strike lines. Whilst they always strive for their PSDMs to image better than their PSTMs, there are instances when this may not be possible, particularly when working with 2D seismic data.

The final article shows some results of recent Permian Basin reprocessing projects, which are being steered by yours truly. I have been fortunate to be involved in a large number of imaging projects since moving to Houston last November, and it is nice to see that imaging improvements are possible even in areas traditionally considered to be very challenging for seismic processing workflows. I credit the hard work and enthusiasm of our processing partners for the excellent results presented in this article. I believe that continued imaging improvement is possible, and look forward to the next generation of processing workflows. Who knows, perhaps we will boldly enter the 7th dimension before we know it?

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