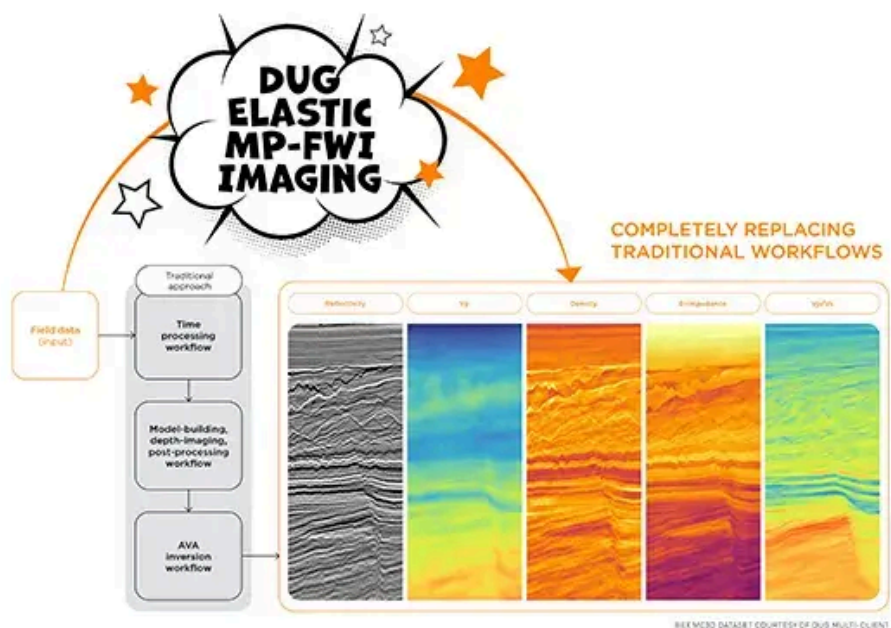




DUG's elastic MP-FWI imaging reveals powerful data

CREATED: 03 JUNE 2025



DUG has released the latest results from its elastic multi-parameter full waveform inversion (MP-FWI) imaging technology which it launched in 2022, since when more than 70 successful projects have been completed worldwide

DUG Elastic MP-FWI Imaging is a unique approach to seismic processing and imaging which is not only a complete replacement for the traditional processing and imaging workflows, it also replaces the subsequent inversion workflow for elastic rock properties.

With the traditional processing workflow, projects can take many months to years to complete. It involves the testing and application of dozens of steps such as deghosting, designature, demultiple and regularisation, all designed to overcome the limitations of conventional imaging. These workflows are complex, subjective, and very time-consuming and they rely on many assumptions and simplifications. All of these issues impact the output data quality. The resulting, primary-only data then undergoes a similarly complex model-building workflow to derive an estimate of the subsurface velocity, which is used for depth imaging. Post-migration processing is performed before the pre-stack reflectivity undergoes another workflow to derive rock properties that feed into interpretation, also relying on simplifications of the actual physics.

As well as three-component reflectivity and velocity, DUG Elastic MP-FWI Imaging enables the estimation of fundamental rock properties like P-impedance, density and V_p/V_s from field data, without the need for a secondary amplitude variation with angle (AVA) inversion step. DUG Elastic MP-FWI Imaging simultaneously resolves not only subsurface structural features but also quantitative rock property information while avoiding the need for extensive data pre-processing and (post-imaging) AVA-inversion workflows.

“Elastic MP-FWI Imaging accounts for both compressional and shear waves, handling variations in seismic wave dynamics as a function of incidence angle, including in the presence of high impedance contrasts and onshore near-surface geological complexity,” said Tom Rayment, DUG

chief geophysicist. "Multiples and converted waves are now treated as valuable additional signal, increasing sampling, resolution and constraining the inverted parameters."

DUG managing director, Dr Matthew Lamont, added, "We have invested over a decade of R&D to realise this opportunity. Our new Elastic MP-FWI Imaging technology is the product of a multi-year, significant and ongoing R&D effort, which has seen the continuous integration of complete-physics FWI imaging including viscoelasticity, anisotropy and multi-parameter updates. When using the full wavefield for simultaneous velocity model building, rock property inversion and true-amplitude imaging, a multi-parameter solution is a necessity."

"The fact that DUG MP-FWI Imaging is delivering material imaging uplifts using field-data input is very powerful, but to couple this with high-resolution elastic rock property outputs for quantitative interpretation is even more exciting, providing immediate opportunities for new surveys and maximising the value of legacy datasets," said Martin Stupel, geophysical manager, Geophysical Pursuit Inc.