INV

Inversion

Improve reservoir delineation and property estimation

Seismic inversion transforms reflectivity data into 3D property volumes that are used to evaluate reservoir distribution and estimate porosity, fluid fill, net-to-gross, and other key parameters. Sharp Reflections takes a gathers-first approach to inversion, integrating data conditioning, interpretation and inversion into one seamless workflow. Users can evaluate multiple inversion constraints quickly and efficiently to acquire geologically meaningful results and manage predrill risk.

Sharp Reflections **INV** toolkit features two modern geostatistical inversion technologies—CRAVA* and PCube+*. The two methodologies work differently and can be used separately or together. Users can carry out inversions with both methods and select the results that best reduce key reservoir uncertainties.

CRAVA: Model-based geostatistical inversion for elastic properties

CRAVA is a model-based geostatistical prestack Bayesian amplitude versus offset (AVO) inversion method taking uncertainty in seismic amplitude data into account. It incorporates a low-frequency prior model resulting in elastic property cubes expressed in absolute values that, ideally, match the actual elastic properties measured in wells.

CRAVA results provide good quality full bandwidth estimates of elastic properties that may be used in subsequent reservoir interpretation and analysis.

CRAVA and PCube+ are developed by Norwegian Computing Center (NCC) and commercialized by Sharp Reflections. Together we are continuing to develop both technologies.

PCube+: Direct, one-step prestack inversion to predict lithology fluid class probabilities

PCube+ is a modern, one-step probabilistic prestack inversion that predicts probabilities of lithology fluid classes (LFC) and their associated elastic properties. The technology performs integrated inversion of a facies-based prior model and the given seismic amplitudes to estimate the most likely lithology fluid rock types. The results may be used to derive tightly defined estimates of reservoir properties (e.g. porosity and net-to-gross).

PCube+ can incorporate geological constraints in the inversion. For example, a brine sand is never expected immediately above a gas sand, and this situation can be prevented in the prior model. Such constraints help to ensure geological plausibility while extracting information from the seismic data.

PRO   QAI   INV   AZI   4D

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Key capabilities

CRAVA

→ Model-based geostatistical prestack Bayesian AVO inversion

→ Built-in model builder to create low frequency prior model from horizons and wells

→ Uses partial angle stacks to exploit amplitude versus offset amplitude variation with angle (AVA) information

→ Robust well tie and wavelet estimation

PCube+

→ One-step prestack inversion directly to LFC probabilities

→ Fast and robust results using geological knowledge to constrain inversion results

→ Proper handling of uncertainty in rock physics relationships

→ No separate classification step

→ Uses partial angle stacks to exploit AVA information

→ Built-in parameterization QCs: LFC probability, wavelet scaling, signal/noise (S/N) ratio, etc.

→ Statistical analysis of logs to create discrete lithology and fluid classes

→ LFC depth/time trends can incorporate compaction trends

→ Anisotropic (VTI) LFCs for accurate forward modeling

All the data for the best decisions

Sharp Reflections is the industry's only software platform built on a powerful compute and display engine designed specifically for HPC, for use on your premises or in the cloud.

Our integrated platform enables you to start analyzing and interpreting seismic data as soon as post-migration processing begins. No information is wasted as you reduce uncertainty and fine tune your reservoir characterization to help achieve trustable exploration, drilling and production decisions.

PRO	**QAI**	**INV**	**AZI**	**4D**
Prestack data enhancement	Quantitative amplitude interpretation	Inversion	Azimuthal	4D time-lapse

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