

MESA[®] Illumination

ILLUMINATION ANALYSIS FOR SEISMIC ACQUISITION DESIGN AND PROCESSING

- Comprehensive tools for analyzing onshore and offshore seismic surveys
- Ability to import SEG-Y velocity volumes for honoring complex velocity variations
- Flexible and efficient ray tracing algorithm for accurate illumination results
- ION's computational resources for reducing turnaround time

Whether optimizing seismic acquisition designs or supporting imaging processes, seismic modelling is an essential geophysical tool for reducing both technical and economic risk in exploration projects.

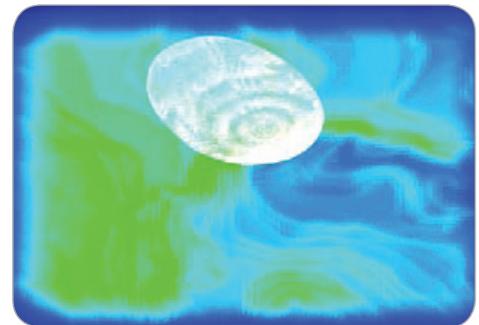
ION offers customized solutions for all geophysical studies that require seismic illumination analysis as a feasibility step. To achieve this, ION specialists utilize the MESA Illumination software, which combines comprehensive seismic acquisition design tools with a state-of-the-art ray tracing solution.

Seismic acquisition design

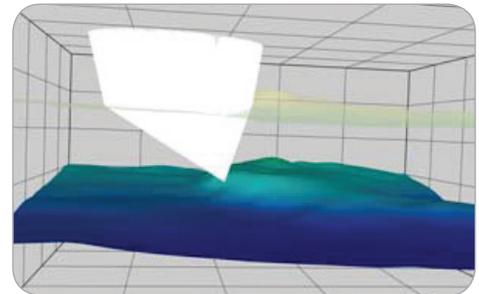
- Scenario modelling between the candidate acquisition geometries, including source and receiver locations, spread configuration and survey orientation
- Extensive attribute analysis for understanding CMP-CRP relationships, reflectivity and AVO incidence angles and seismic resolution
- Converted-wave illumination for land and OBS surveys
- Synthetic trace generation for basic processing testing
- Integrated geophysical consultancy services for seismic acquisition design, offering a combined overview of imaging and operational requirements

Seismic processing

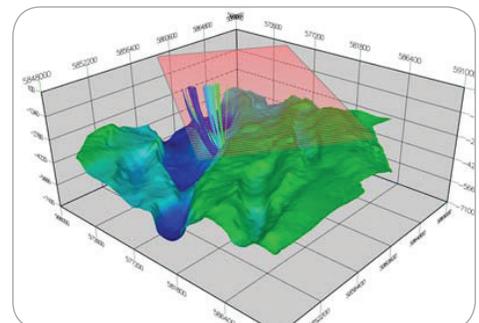
- Feasibility tool to assess potential seismic reprocessing results through illumination studies
- Allows differentiation between acquisition limitations and previous processing accuracy from an illumination point of view
- Delivery of a wide range of illumination attributes for optimizing imaging operators.
- Migration aperture definition through illumination testing



Illumination attributes



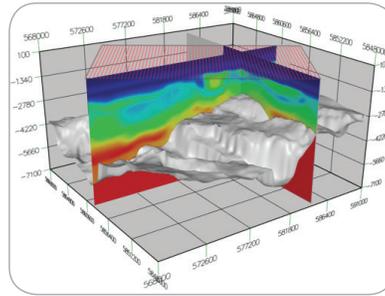
Interactive analysis



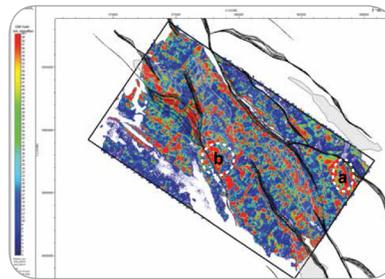
Powerful visualization capabilities

Wintershall Illumination case study

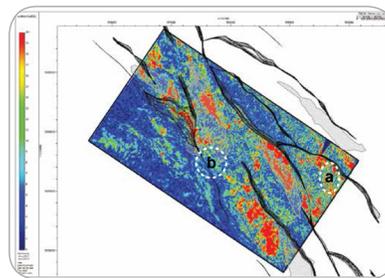
- A marine 3D seismic was acquired in 2002 over a prospect area in the Dutch North Sea sector for Wintershall
- However, the processed seismic volumes did not provide reliable amplitudes over the target, hence an illumination study was performed to better understand the issues
- The objective was to assess the seismic illumination over the geological target in order to evaluate if reprocessing the existing data could improve the continuity of the reflectors
- The ION specialist utilized MESA Illumination software for managing interval velocities and geologic horizons as part of the integrated geophysical model
- Once validated, ray tracing was undertaken on the model and the output prepared for interpretation
- In general terms, the results showed that there are challenges to achieve coverage at the target horizon but that the existing geometry should achieve this, providing Wintershall with a valuable reference for assessing a potential re-imaging in the area
- Alongside a detailed technical presentation, Wintershall were provided with the final illumination dataset and a temporary MESA Expert license, allowing full display and analysis of the ray tracing results



Input model for ray tracing



CRP coverage analysis



Field data RMS amplitude map over the target

Case study details

- 67 sail lines analyzed
- Sail line directions were 34° and 214°
- Study area of 225km²
- External interval velocity model (from previous PSDM) used as an input
- Lateral velocity variations honoured during the ray tracing
- 40,000 shots were processed, generating 90 million traces
- The ray tracing was optimized through parallel processing
- The total execution time was 48 hours
- Illumination attributes were produced
- Results were correlated with an actual amplitude map over the target for better interpretation

Analyzed attributes

- CRP fold
- CMP to CRP displacement
- TWT
- Average / maximum incidence angle
- Maximum recorded offset
- Offset gap
- Offset variability

ION has been delivering solutions to the oil and gas industry for over 40 years, and is the leading provider of real-time, multi-vessel positioning and control systems. For further information contact MESAsupport@iongeo.com

About ION

ION is a leading provider of technology-driven solutions to the global oil and gas industry. ION's offerings are designed to help companies reduce risk and optimize assets throughout the E&P lifecycle.