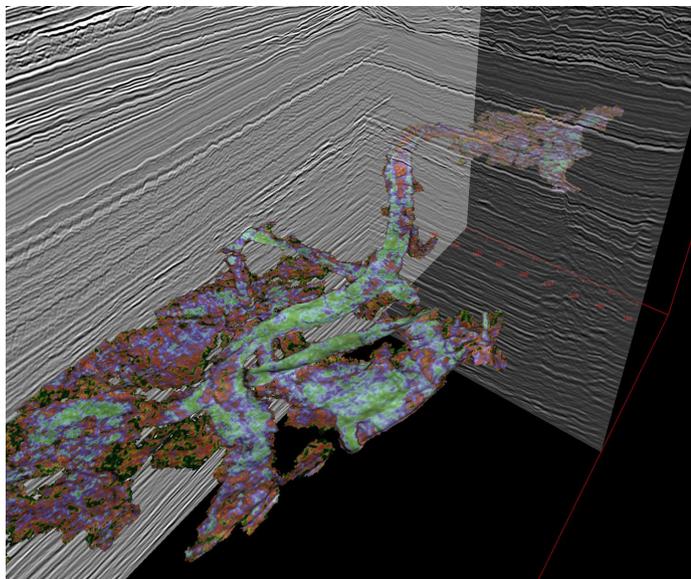


Seisnetics

When Artificial Intelligence & Genetic Decoding Work Together To Speed up and Augment Interpretation



Seisnetics™ is a pre-interpretation processing technology that unleashes the power of artificial intelligence and genetic segmentation on 3D seismic data. The fully automated process identifies, extracts and catalogues **100's of millions of seismic waveforms** into a queryable database creating thousands of genetically and spatially compatible GeoPopulations™.

The **high-quality** surfaces and attributes associated with each GeoPopulation contribute greatly to the mitigation of risk. The Fitness attribute, in particular, is a great indicator of **seismic waveform variability** and allows to discriminate confidently the most subtle features without any a priori knowledge.

Processing is **extremely fast** and independent of interpreter input so the results provide an **unbiased and consistent analysis** of entire 3D volumes or entire data libraries.

Seisnetics Benefits

Accelerates decision-making

Seisnetics allows a better utilization of resources and time thanks to a rapid analysis of 3D seismic volumes. The resulting queryable database of high-quality surfaces and Fitness seismic facies for every surface are created without a priori knowledge. This results in fast-track interpretation for Acquisitions, Divestments and Corporate Reviews.



Reduces risks and uncertainties

Armed with rapidly extracted features highlighting even the most subtle variations of the geomorphology, Seisnetics processing empowers interpreters by allowing them more time to focus on understanding the significance of the results. Therefore, more leads are identified, well placements are optimized, in the most complex geological environments, reducing considerably risks and uncertainties.



Maximizes profitability

While traditional interpretation methods extracts information from only 10% of a seismic volume, Seisnetics processing enables data mining of 100% of 3D volumes and detection of any significant lead within the entire volume. As a result, Seisnetics allows high Return on Investment on seismic acquisition and increases profitability on both new ventures and production fields whose prospectivity is often reinvigorated.



Fits easily into any workflow

Seisnetics integrates easily into any industry platforms, at every step of the seismic data lifecycle to augment interpretation. User-friendly navigation through the comprehensive surface database greatly facilitates collaborative work: one click in the area of interest of the seismic section allows the display of any or all of the GeoPopulations that have formed during processing.



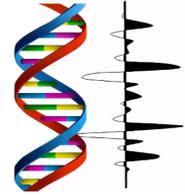


How does Seisnetics work?

A powerful approach

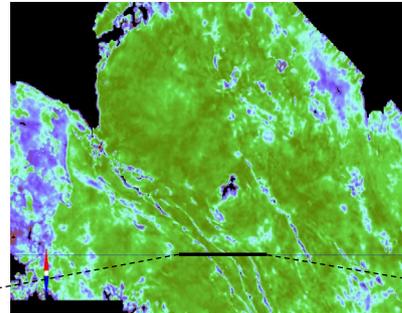
Genetic segmentation

Seisnetics pre-interpretation processing uses patented genetic algorithms based on the principles of natural selection and survival of the fittest in order to produce optimal solutions and determine the variability and size of a surface in a seismic 3D volume. Without human intervention, the volume is automatically segmented into waveforms and organized into populations of genetically related waveforms referred to as GeoPopulations.

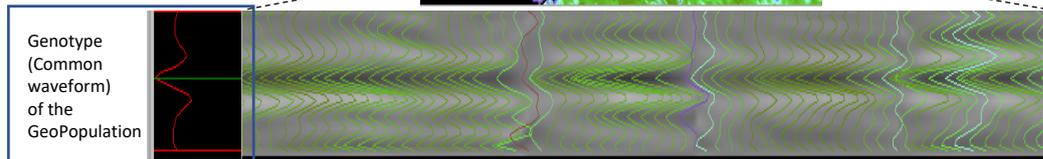


Fitness & Genotype

The Fitness attribute captures the genetic similarity of each individual waveform in a GeoPopulation against the common waveform referred to as Genotype (Figure opposite), and thus goes beyond traditional similarity or coherence attributes that compare neighboring traces. Variability in Fitness highlights very subtle changes in reflector geometries.



Fitness map at a particular GeoPopulation (surface)



Waveforms at the Geopopulation

Benefits of Genetic Segmentation vs Auto-Tracking

Extremely fast waveform mining

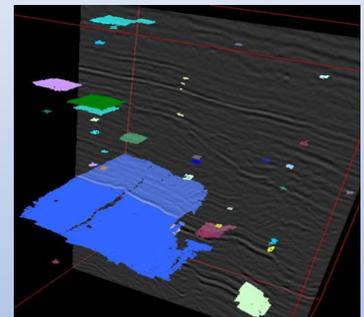
Seisnetics algorithm performs a full examination and data mining of every single waveform of a 3D volume in unprecedented turnaround time, making the data extraction entirely data-driven.

True 3D screening

Seisnetics processing performs a true 3D volume screening unlike many auto-trackers. Traditional auto-trackers look through the data only in one direction at a time using only local information to decide how to continue on neighboring traces, and therefore, are unable to find a globally coherent solution.

Global approach

With Seisnetics processing, the segmented waveforms join together into groups at different locations of the volume based on their fitness (Figure opposite). Waveforms only join with another waveform population if there is sufficient spatial and genetic compatibility.



Unsupervised/No a priori knowledge

While auto-trackers need guidance and seeds to start, leaving next the algorithm looks for similar features on the neighboring traces, Seisnetics does not require any a priori knowledge to perform the genetic segmentation. Seisnetics provides a new approach for seismic facies analysis with the Fitness attribute highlighting subtle features quickly without prior information.

Robust seismic data processing bringing exceptional geological relevance

Unbiased pre-interpretation data processing

Relying on its fully automated and robust genetic segmentation algorithms, Seisnetics allows unbiased seismic pre-interpretation: GeoPopulations (surfaces) extraction is 100% data-driven eliminating any subjectivity in the process. Surfaces are catalogued into an easily queryable database that all interpreters can access and use as a reference to build collaboratively scenarios and enhance the reservoir knowledge.

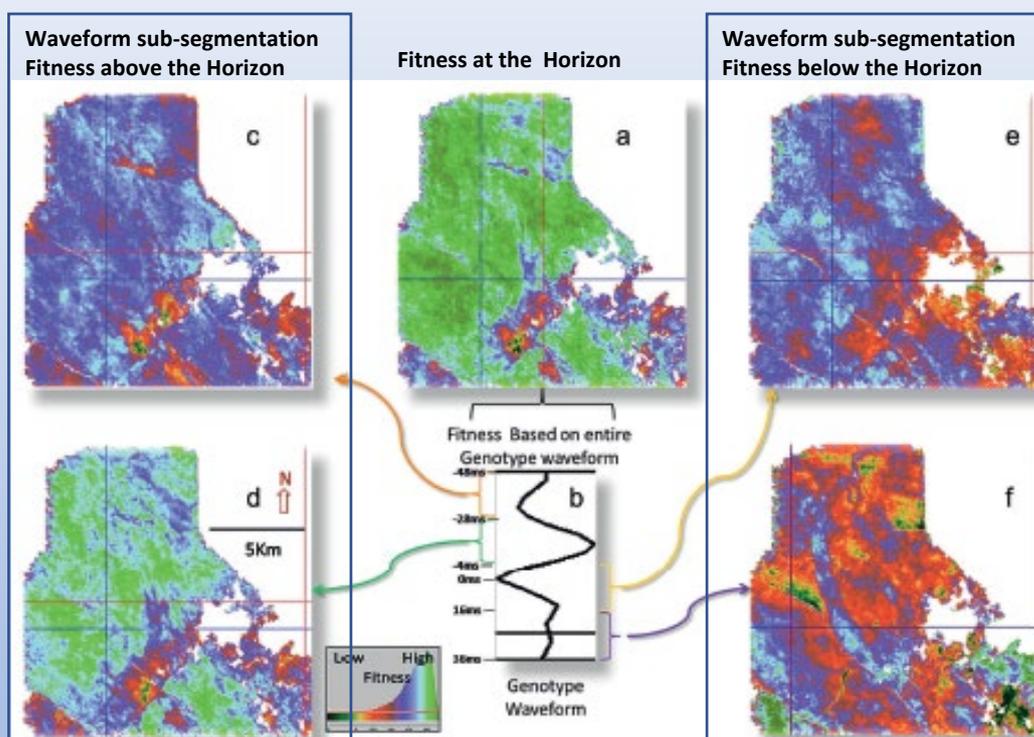
Geological details beyond standard resolution

Seisnetics' Fitness is a great indicator of the waveform variability along a surface. Outlier values have geological meaning and can be further investigated in the viewer whose high-performance Graphical User Interface allows seamless data mining and visualization. Geology-oriented questions such as "What is the significance of the observed fitness variability? Does it reflect changes in the overlying or underlying layers?" can be quickly addressed through waveform sequencing on the fly.

Genotype Sequencing

Seisnetics' Genotype Sequencing is a powerful waveform analysis tool. By examining the portion of the waveform above and below a particular surface, Genotype Sequencing:

- Allows the examination of different depositional domains captured within a single waveform.
- Helps to identify subtle stratigraphic variability below the resolution of standard seismic attributes.



- Map (a) shows the fitness at a particular surface which is considered to be the interface between top reservoir and base regional seal. It has predominantly high fitness values. The central portion of the map show lower fitness.
- Fitness attribute maps were generated from sub-segments of the common waveform (b).
- In the overlying seal, maps (c) and (d) show a channeling trend similar to the one at the horizon, raising the point of possible sealing inefficiencies.
- In the upper portion of the reservoir, (e) and (f) show a different channeling trend which could be investigated as trapping opportunities.

A wealth of experience through hundreds of projects worldwide

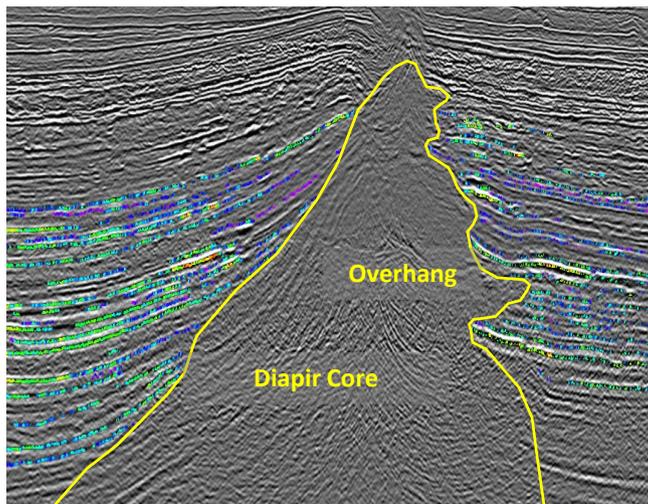
From basin analysis to development optimization

Result of 10 years research protected through international patents, Seisnetics software has been operated as Software As A Service since 2014. Approved by IOCs & NOCs, Seisnetics increased the profitability on more than 400 projects spanning:

- Fast-track screening of large datasets for New Ventures
- Impartial interpretation for Final Investment Decision
- New prospect identification and reservoir delineation for exploration in complex geological environments
- Identification of additional field potential, hazard surveys and optimization of well location on field development

Beneficial at every step of the seismic data lifecycle

Extremely fast, robust and easy to use, Seisnetics' genetic segmentation empowers geophysicists and geologists to gain more interpretation insight at every step of the seismic data lifecycle. From processing QC to interpretation through velocity model building and Time-Lapse seismic, Seisnetics has been proven highly valuable.



Accelerate Decision Making

In the adjacent example, Seisnetics rapidly delineated traps associated with diapirs and identified clearly the edge of the diapir and all the continuous markers in the packages.

With traditional workflows, to discover new reservoirs that are not in intervals previously identified by wells considerable time would have been spent mapping reflectors, including all those which do not have proper trapping geometries in order to identify the prospective traps.

With Seisnetics all the surfaces were generated, and then prospective trapping geometries were identified quickly.

Contact us to try Seisnetics on your own dataset!

info@seisnetics.com