

The software currently being developed, called SVI Pro, integrates NVIDIA CUDA technology to provide a scalable and portable solution to demands for high speed processing of large seismic data volumes.

One of the keys to the system is the multi-core Graphics Processor Unit (GPU), which works independently of the Computer Processing Unit (CPU) and allows much faster processing of highly complex data. SVI Pro software allows geoscientists to analyse seismic surveys covering thousands of square kilometres — and containing hundreds of gigabytes of data — on standard desktop workstations.

ffa claims its software can extract geological features from 3D seismic data, objectively and more rapidly than conventional techniques, helping geoscientists and engineers make better decisions, with higher confidence, in less time.

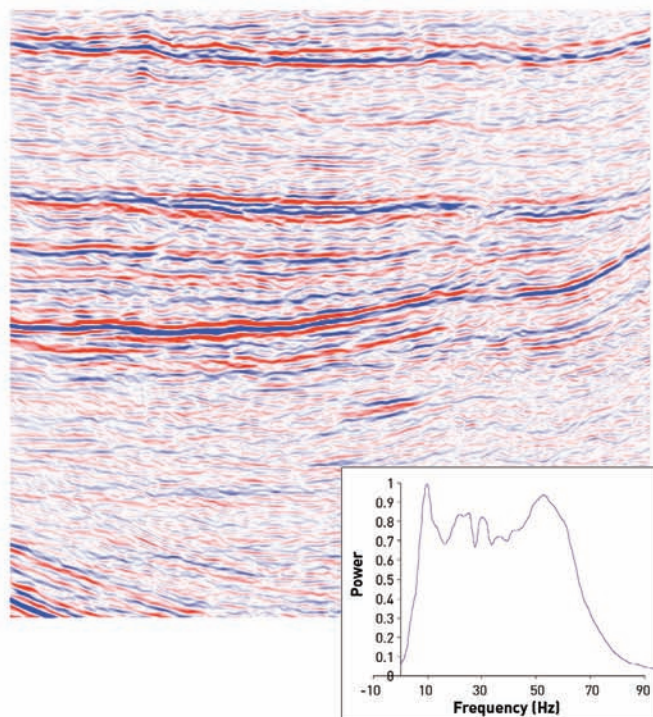
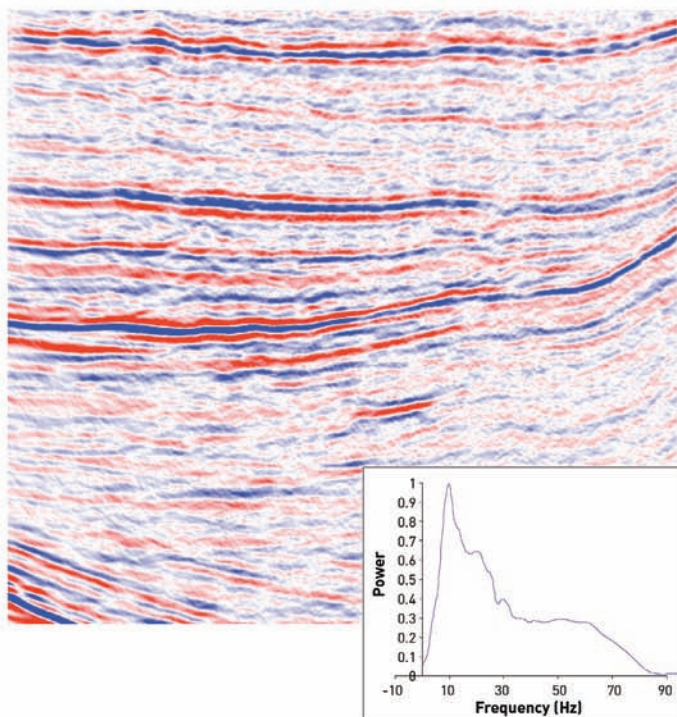
It believes this can facilitate a revolution in the way geoscientists work with subsurface data, allowing significant gains in productivity and risk reduction at all stages of the exploration and production (E&P) cycle, including seismic interpretation, prospect generation, target definition and well planning.

Over the last 30 years, seismic interpretation has gone from manual hand drawn interpretation on paper sections to interpretation of large 3D survey using computer aided tools. The more sophisticated these tools become, the less time consuming the interpretation task becomes.

# Processing on a seismic scale

A 3D seismic analysis software and service provider to the global oil and gas industry, ffa, is developing high performance computing (HPC) capabilities for its advanced seismic volume imaging and 3D visualization software, in conjunction with visual computing technology company NVIDIA. Once released, the software looks likely to revolutionise the way the data is handled, in some cases reducing interpretation times from months to days

**Today, successful exploration requires recognising the subtle features imaged in seismic data that can indicate significant hydrocarbon accumulations. ffa's 3D seismic analysis techniques incorporate advanced data enhancement techniques that improve the clarity and detail with which geological features are imaged. This can allow new insights to be achieved even with legacy seismic data (left original seismic data, right ffa enhanced data)**



SVI Pro 2008.1, the latest version of the software, is now available for Windows and Linux and contains advanced tools designed to enable fast screening of 3D data sets and robust delineation of complex geological entities. It also includes CarbApp, a set of techniques aimed specifically at the analysis of carbonate intervals. Other newly developed tools include ScanInterp and Iso Proportional Slicing.

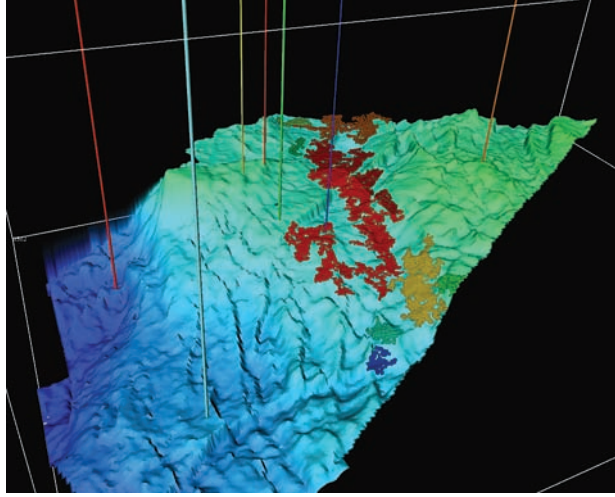
The company claims information about the subsurface provided by its software enables geological factors that have a material impact on oil and gas exploration and production - such as the presence and linkage of small scale faults and the geometry and connectivity of hydrocarbon reservoirs — to be understood much more thoroughly than using conventional techniques.

Whether working to extend the life and productivity of existing fields, searching for overlooked hydrocarbon accumulations in mature basins, or working on frontier exploration, the information provided by ffa's seismic analysis tools, it claims, can directly impact the likelihood of drilling successful wells and maximising recovery from producing fields.

The power of these seismic analysis techniques is said to arise from the way in which the software is configured to enable highly computationally intensive mathematical algorithms to be applied to extremely large quantities of data using standard PCs.

The computational performance provided by NVIDIA CUDA technology looks set to significantly enhance SVI Pro's existing Seismic Attribute and Object Delineation workflows, enabling ffa to deliver the interactive and advanced seismic volume interpretation tools that will be a central requirement in the next generation of seismic data interpretation software.

Steve Purves, ffa's Technical Director, said: 'The system is in development right now and that development is taking a number of different directions. Development of SVI Pro over the next 12 to 18 months will involve significant integration with CUDA. We are developing functionality under our ongoing R&D collaborations with StatoilHydro, Gaz de France and others and that will see a significant increase in capability because of the integra-



tion of GPU based computation.

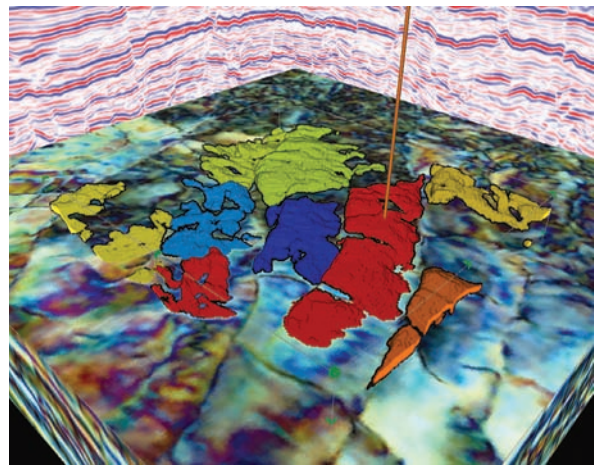
'The advanced processing capabilities in our SVI Pro and SEA 3D software applications, together with the HPC capabilities provided by NVIDIA CUDA-enabled GPUs, will have a direct impact on hydrocarbon exploration and production by changing the way in which geoscientists work with and analyse 3D Seismic data.

'If you put the computation on the GPU it can work independently of the CPU. The faster the computation can be done, the more money companies make. The GPU can be up to 200 times faster than the CPU and therefore real time data calculation is a possibility.

'I expect GPU-based computing to spread to all sectors of the industry requiring computation at present. The result of more people having access to significantly more computing power will fundamentally change the way people work and mean much more than just getting the job done more quickly.

'For example, in seismic interpretation it will become possible to develop and analyse multiple scenarios rather than be limited to the one best, subjective estimate of what the available data is telling us about the subsurface. This will have a major impact on our ability to find new hydrocarbon reserves and develop those reserves effectively and efficiently.

'Chevron, Schlumberger, Total and CGG Veritas have all shown interest, with the cost of a high end workstation at around £6000.'



**Composite visualisation in SVI Pro of potential reservoir geometries, associated faulting and the variations in data characteristic that often relate to changes in reservoir properties**

**In mature areas comparison of information extracted using ffa software with previous interpretation results often provides the fresh insights required to develop new exploration plays (data courtesy of Quadrant Hydrocarbons)**

One very good illustration of the advances the new system brings, Purves added, is in fault interpretation.

He said: 'In one case study, SEA 3D — a version of SVI Pro which connects to interpretation applications such as GeoProbe and GeoViz — was used to perform an automated fault imaging workflow to extract fault structures from a dataset. The SEA 3D Processing work took days to complete. The results it generated correlated very well with a manual interpretation that took experienced interpreters three months to build and in areas the fault imaging results highlighted details that were not picked up from manual interpretation of the seismic data alone.'

'This represents a significant reduction in the time needed to get to a fault interpretation. The results of the fault imaging process still needed to be reviewed, and surfaces needed to be generated but with access to these results, the interpreter is working with a detailed picture highlighting the majority of potential fault structures within the volume and can build a conventional surface interpretation more easily and more accurately using simple tracking tools on ffa fault imaged data.'

'The next wave of GPU-enabled tools will allow us to take the next step, linking up the generation of surface based interpretation with our fault imaging algorithms. The result will be a sophisticated fault extraction system that can work directly on seismic data. This has the potential to further accelerate the interpretation process and give users greater control over the managing the uncertainties inherent in interpreting seismic data.'

'The result: user friendly, data driven interpretation tools.'

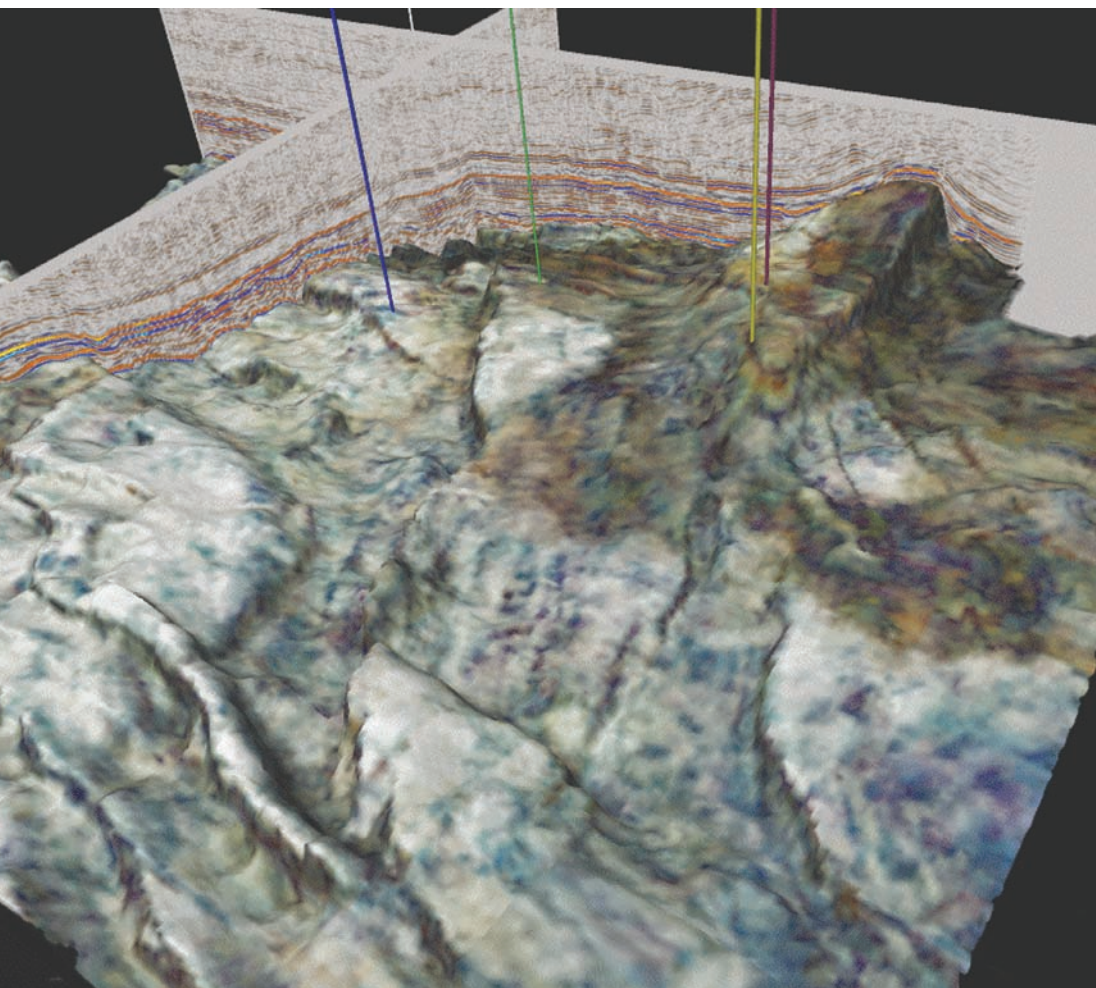
The GPU computing platform that was announced a year ago and there are now over 60 000 CUDA downloads. To date, over 70 million CUDA enabled GPUs have been sold into the market.

Jen-Hsun Huang, president and CEO of NVIDIA, said: 'The GPU is taking high performance computing in a fundamentally new direction. Now, hundreds of processor cores are able to work together to give scientists and engineers massive jumps in performance, while dramatically reducing the footprint in their data centre.'

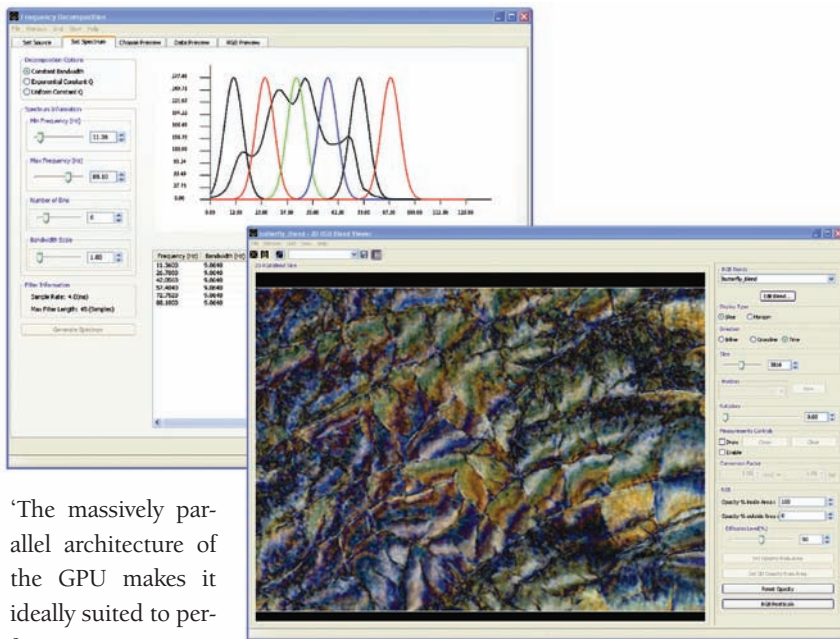
Andy Keane, General Manager of NVIDIA's GPU Computing Group, added:



**General Manager of  
NVIDIA's GPU Computing  
Group Andy Keane**



***Sophisticated visualisation techniques allow intuitive understanding of the variations in seismic response that may indicate differences in reservoir properties that are important for optimal development and production planning (data courtesy of Quadrant Hydrocarbons)***



'The massively parallel architecture of the GPU makes it ideally suited to perform computationally intensive seismic applications at much higher speeds than were previously possible.'

'We're very pleased to be working with ffa in combining SVI Pro with the power of CUDA to deliver enhanced functionality and exceptional performance for the oil and gas industry.'

ffa will integrate NVIDIA CUDA technology with SVI Pro on both Windows and Linux platforms over the next 18 months.

This year at the International

**The ability to make fully informed decisions quickly is of vital importance in today's E&P industry. SVI Pro improves productivity by combining sophisticated analysis techniques with access to quantitative and qualitative (visual) information in an easy-to-use framework**

Supercomputing Conference, NVIDIA Corporation strengthened the CUDA and Tesla technology platforms with the introduction of its second-generation platform, the new Tesla 10 series computing solutions. Binary compatible and supporting the industry standard language of C, the new products enable developers to solve their computational challenges in a common and familiar development environment that scales effortlessly from one generation to the next with no re-coding required.

When combined with the CUDA C-language development software for parallel computing, the new Tesla products extend the reach of GPUs to any computationally intensive applications requiring double precision accuracy.

The new Tesla product family includes the Tesla S1070 1U computing system and the Tesla C1060 computing processor and delivers:

- Double the performance: up to 4 Teraflops per 1U system
- Double precision: IEEE 754 arithmetic support
- Double the memory: with 16 Gigabytes of memory per 1U system
- Up to 3x the power efficiency: for a more efficient computing environment. JOT

## Partnership continues

Wavefield Inseis has announced it has received a letter of intent from StatoilHydro to award a full season of work next year in the North Sea to the *Geowave Master*.

The work will include a number of projects offshore Norway that will require up to 10 streamers. This will be the fourth season in a row that Wavefield Inseis has worked for StatoilHydro in the North Sea.

Wavefield Inseis CEO Atle Jacobsen said: 'StatoilHydro awarded us our first ever 3D in 2006 and we very much appreciate their continued business. The *Geowave Master* will be the third vessel of ours that will have worked for them. We look forward to this new opportunity to deliver an excellent service and many more years of cooperation.' JOT

## OBC to reduce drilling risks

MultiField Geophysics announced today that it has successfully completed field tests conducted in May over the Peon hydrocarbon reservoir, offshore Norway for its ocean bottom cable (OBC) technology, which combines both seismic 4C and EM sensing technology to help reduce risks associated with drilling operations.

The OBC application has been developed through a two year joint research and development program with its key industry partners.

The field tests involved deploying a series of seabed sensor segments to acquire EM and seismic data. The proprietary EM source, towing a horizontal electric dipole (HED), was used to transmit various GPS synchronised arbitrary waveforms.

Data were acquired and compared with a reference station deployed to monitor the spread, and acoustic data collected simultaneously on selected acquisition lines.

Preliminary processing of the EM data by MultiField shows successful delineation of the gas field, and an analysis of the test data has confirmed the excellent performance of the integrated EM and seismic sensor system. The first full-scale commercial operation using the innovative technology is expected to commence in Q1 2009.

Established in November 2006, MultiField Geophysics has its headquarters in Bergen, Norway and is backed by Wavefield Inseis ASA, StatoilHydro Venture AS and the Norwegian Geotechnical Institute. JOT