

# Increasing the Expert 'Bandwidth'

As oil deposits grow more difficult to find and produce, geoscientists analyze larger quantities of data in hopes of locating previously overlooked reserves, as well as tapping known reserves to their fullest.

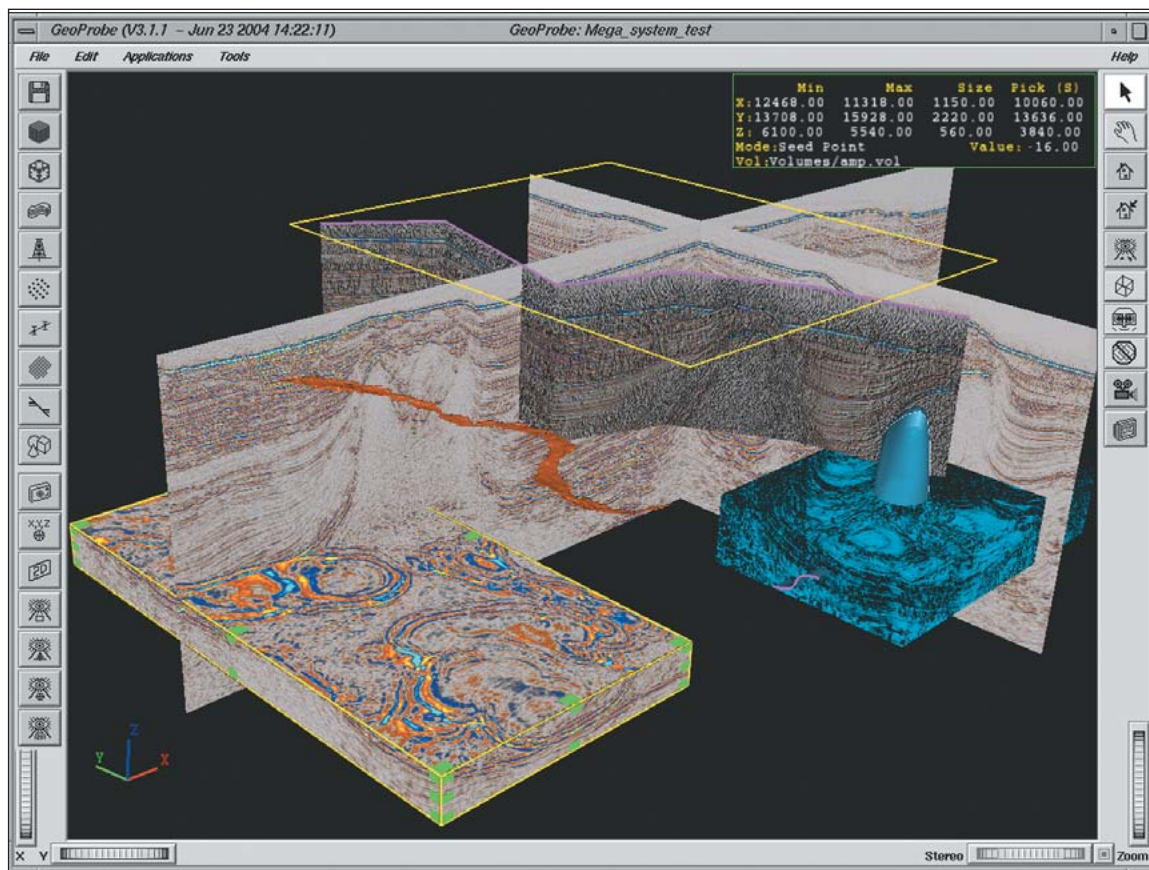
By Bill Bartling, Senior Director, Market Strategy, Silicon Graphics

In this new era, the ability to squeeze more information out of raw data can be key to major discoveries – enabling geophysicists to “see” underground and model the location, shape and distribution of suspected oil reservoirs.

The key to such data analysis is balanced information technology systems and the “collaborative visualization environment,” which has grown in popularity with the advent of 3-D seismic volumes. These massive datasets are subject to a litany of calculations, designed to produce rock and fluid properties. With the right combination of hardware and software, the attributes are calculated “on the fly,” making for a highly interactive environment. This leads to better decision-making because geophysicists can analyze more data. Indeed, the expert’s “bandwidth” has increased

dramatically during the past 10 years, from a historic norm of 800 KB/month to today’s standard 100 GB/month – a 100,000-fold increase in the rate an expert can visually analyze data, outrunning Moore’s Law by nearly 1,000 times.

New sensing technology, including fiber optic arrays and wireless battery-powered sensors will only increase the data onslaught delivering unprecedented volumes and rates of data at the interpreter’s digital doorstep. But there is still a



More than 400 GB of seismic data is rendered in the GeoProbe 64-bit application software using SGI scalable visualization technology. (Image courtesy of Landmark Graphics)

By expanding Marathon’s ability to visualize data, a greater region can be roamed and viewed.

limit on how much of this data can be interactively viewed and analyzed at once. Even the fastest computer systems can only process so much data. If the complete dataset for a project is large but the pro-

cessing is slow, the effect is like viewing a vast landscape through a narrow straw: it is all there, but difficult to piece together and interpret.

Meeting the challenge to deliver increasingly larger data to the interpreting geoscientist, a new hurdle has been cleared, visualizing and interacting with more than 400 GB of seismic data for the first time. Collaboration between Marathon Oil Co., Silicon Graphics and Landmark Graphics created this new capability, decimating the previous world record of less than 100 GB. These unprecedented levels are far larger than those typically processed on PC-based systems, which usually handle less than 2 GB. This test was conducted using an Silicon Graphics® Onyx4™ visualization system with 64 processors, four graphics processing units, and 512 GB system memory, with Landmark Graphic’s 64-bit interactive interpretation GeoProbe® application.

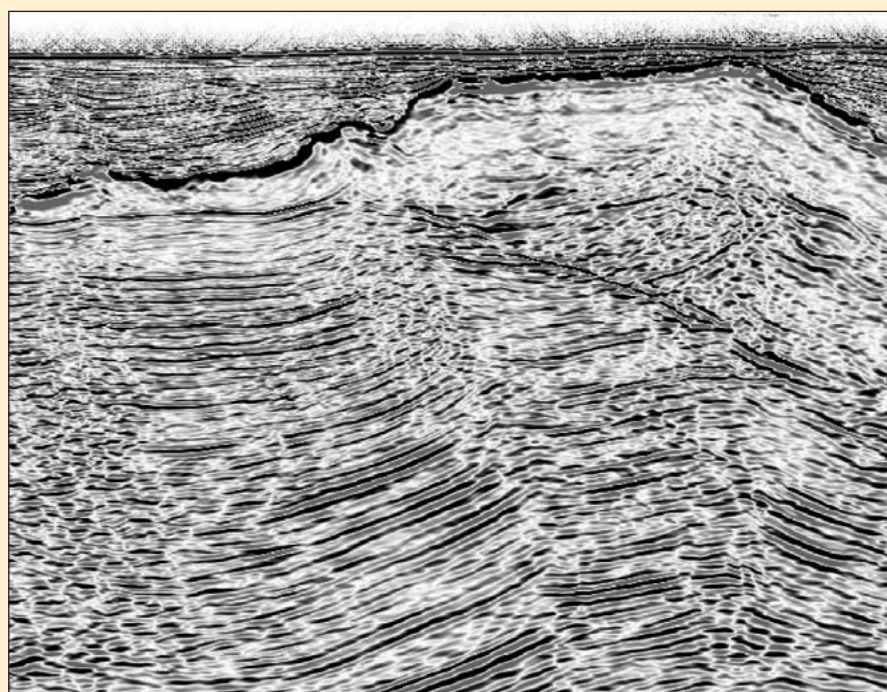
Marathon’s latest major discoveries have been made in offshore locations, where data analysis is critical. By expanding Marathon’s ability to visualize data to at least 400 GB, a greater region can be roamed and viewed, using additional rock and fluid properties to give fresh insight into the details of underground rock formations. This also allows trends to be highlighted that might otherwise have been missed when geophysicists are forced to view the same data in much smaller-sized sessions. ●

## Setting the Pace in Wave Equation Market

CGG intends to set a new trend at the Society of Exploration Geophysicists annual convention in Denver by officially announcing its decision to offer its WaveVista Advanced Wave Equation Migration for the same economic terms and turnaround as the Kirchhoff method.

WaveVista is a high-end no-compromise wave equation migration solution, delivering superior quality depth images. Applicable to all acquisition geometries, it addresses the complex wavefronts associated with high-velocity layers, such as the salt in the Gulf of Mexico, and also delivers improved quality and resolution in less complex environments. A significant feature is the ability to produce full pre-stack angle gathers to allow amplitude analysis with angle, velocity model update and post-migration processing. The benefits for imaging are improved resolution, clearer fault definition, greater signal continuity and accurate positioning, leading to reduced uncertainty in defining reservoirs.

“As the search for reservoirs moves into deeper and more complex environments, wave equation migration offers superior imaging results over the previous state-of-the-art Kirchhoff method, and generates a much clearer window into the realm of subsalt geology. Our



The above is an example line from the Green Canyon area of the Gulf of Mexico demonstrating improved subsalt imaging. There are clues that can be gleaned from the post-salt geologic image that help predict the nature of the presalt, but it is only prestack wave equation depth migration that really defines the detail necessary to explore for the hydrocarbons in this arena.

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—Guillaume Cambois, CGG’s executive vice president for Data Processing & Reservoir Services

harnessing of PC cluster technology has not only made it affordable on routine projects, it has paved the way for it to be the new standard. Our decision to offer our wave-equation solution for the same conditions as Kirchhoff is in direct response to the needs expressed by our clients. It further underlines our commitment to setting the pace in the seismic data processing and reservoir services market,” said Guillaume Cambois, CGG’s executive vice president for Data Processing & Reservoir Services. ●