# Society of Exploration Geophysicists
Annual Conference and Exposition – Dallas 2003

Fancy espresso machine on the Landmark booth.

Introduction

Dallas is pretty much in terminal decline as an oil town so the turnout for this year's SEG convention was quite acceptable – although the exposition itself was rather sparsely attended. The mood of the show was similarly downbeat – with complaints from all and sundry about oil companies sitting on their hands (and their profits), not spending on geophysics, despite all the new technology. In fact the only apparent salvation for the geophysical industry would appear to come from the application of new technology – 4D, 4C, permanent sensors and sea bed recording. If the industry really does turn around into what Dalton Boutte calls the 'alpha and omega' of the reservoir, then maybe the SEG should change its name to reflect this expansion from exploration into the production business.

4D (time lapse) seismics continues to get good press. 4C (multi-component seismics), according to Raoul Restucci, has yet to prove its merits – although there was a plethora of developments in 4C hardware from companies such as Thales, Input/Output, ABB. The general impression is that if you are going to equip your 'e-fields' with permanent sensors, they might as well be 4C – after all by the time you have recorded a significant amount of data someone will have figured out what to do with it all!

Much work is in progress on computer-aided seismic interpretation with tools for seismic data mining, automated 3D voxbody tracking and seismic facies classification. Landmark's Dave Hale believes that while the human mind is very good at 2D pattern recognition, for 3D data, the computer may have the edge.

Highlights

TLE Forum – The Future of Petroleum
Earth Decision Sciences VolumeExplorer
Vibtech's WiFi-based data acquisition
Helical Systems HH Archive – N-dimensional SDO
SEG-'E' standard mooted
Papers of Note

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The Leading Edge Forum IV – The Future of Petroleum

Geophysics 'alpha and omega' of the reservoir. Dalton Boutte, Western Geco.

Boutte

Western Geco president **Dalton Boutte** described geophysics as becoming the 'alpha and omega' of the reservoir. Seismics has a big contribution to play in satisfying increased demand. 4D allows for mapping shallow hazards, escaped gas, checking fault seal and provides a 'robust estimate of rock and fluid properties'. But 'we are not yet ready to proclaim an end to well logging. We are Schlumberger after all!' Boutte emphasized the need for timely processing and delivery of survey results. The world's first 'Q-on-Q' surveys for Statoil were carried out at a 22 month interval. Results were available 10 days after the end of acquisition and showed a 'clear 4D signal' from water injection, allowing for mapping of the rising oil water contact. Statoil was able to react immediately with changes to the development program.

Oilfield service sector spend on R&D has risen as oil company sector spend declines. The 5 major oils spent $4bn on R&D in 1990. Today this has halved. Service sector spend over the same time frame has doubled – from $0.5bn to $1bn.

On the environment Boutte's message was that 'we are all in this together'. A lapse on the part of one player will impact everyone.

Independents can 'sweat' an asset better – Steve Farris, Apache Corp
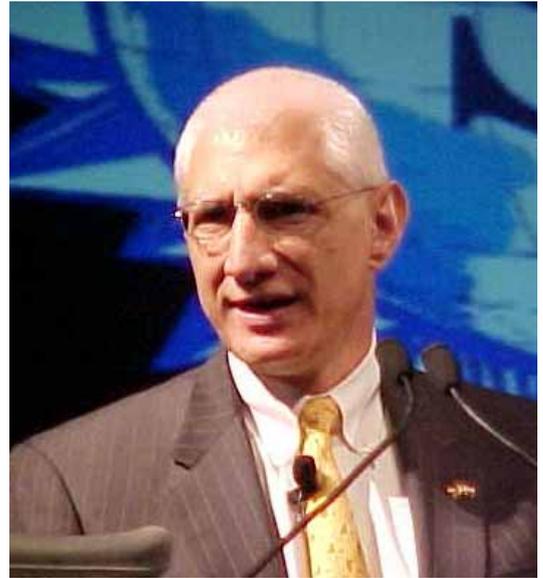
Farris

Apache president and CEO **Steve Farris** described how independents can 'sweat' assets better than majors. Examples of Apache's acquisitions from Shell Oil in Australia, the US and Canada showed how the smaller company's attention to detail has paid off. In one example, Apache has already made a return on investment over acquisition cost of 105% (since 1999) and there remain 70% of the reserves as estimated at the time of acquisition. Farris puts this down (charitably) to better seismics – but his real message is that these properties don't really interest the majors – and that the independents are the ones who know how to 'sweat' an asset and to add value to old fields.

Opportunities abound, just de-focus on technology – Peter Gaffney, Gaffney Cline

Gaffney

Gaffney came to bury Caesar (technology). He also decried the notion that the world has been fully explored. There are 'plenty' of exploration opportunities – half the world's basins have become available in the last decade. The trick is to 'concentrate on rocks', not software and tools. Rather than thinking '4D' explorationists should think 7 D seismics – rolling in 'how, when and why'.

Industry habitual under-performer – Peter Rose, Rose & Associates

Rose

Rose accuses the industry of 'habitual under-delivery'. Nearly all production forecasts fail to meet initial rates (although subsequent results may be better – but this is diluted in NPV calculations). In a study of 160 of BP's evaluations, the company only realized around 45% of the originally estimated reserves. This is partly a problem of technical forecasting but translates into financial underperformance. In the period from 1989 to 1999 the oil and gas industry returned a paltry 9% on capital as compared to 16% for the S&P 500[1,2]. A Wood Mackenzie study determined that the industry 'only' offers an 11% ROI. This is all due to 'chronic prediction bias' – the 'mortal enemy' of portfolio management. Rose believes that 'estimating is serious business – and we are lousy at it'. The problem is partly intuition, reinforced by ego, optimism and faulty incentive schemes. Rose advocates probabilistic analysis to 'dodge the bias of determinism'. Other contributory factors to the bias are our desire to avoid bad news – creeping optimism – and general disdain for rigorous project look-backs. There are good estimators – ChevronTexaco forecasts well as do Ocean Energy and Devon. Apache and Pioneer are working on this. It is a people problem (emphasis). Advancing geo-technology actually obscures the problem of biased forecasts. Rose believes that it 'would not cost much to fix this'.[3]

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[1] Perhaps not the most favorable period for such a comparison!

[2] Study by Ed Merrow's IPA Institute.

[3] The 'downside' of Rose's analysis is that if the industry is to realize such ROI improvements, it will have to downsize even more – with consequent impact on a struggling service sector. On the other hand, it could be that in this post dot com boom age, an ROI of around 10% might be considered quite an attractive opportunity for some investors.

Self regulation is good for you. John Gibson - Halliburton

Gibson

Gibson described how snowmobile users in Maine are encouraged to 'slow down and avoid a speed limit'. Such self-regulation is applied by Halliburton to environmental issues and has produced benefits in enhanced safety. Apart from lives saved and less injuries, attention to safety reduces worker compensation and insurance premiums. Halliburton employees have driven 500 million miles without a fatality. A toxic chemical reduction program has actually improved the bottom line as well as the environment and diminished exposure to litigation.

The 'big crew change' – Raoul Restucci, Shell E&P America.

Restucci

For Restucci, today's big issues are technology, sustainability, the 'big crew change', heavy oil, gas and deepwater. For the US, access to federal lands is another issue which forces industry abroad. This is because we 'can't tell a story'.

On the technology front, Restucci offers encouragement to seismic contractors since 4D seismics needs high quality data not legacy or spec data. Implications of monobore wells are 'huge', offering dramatically smaller risers letting operators use a $200k/day rig as opposed to $500k/day. Shell's Real

Time operations from New Orleans are a real success story with up to nine wells around the world being controlled from the center. The integration of G&G software is critical – and Restucci gave a plug for Landmark's DecisionSpace environment. Shell is very committed to 3D/4D but 4C - multi-component is 'not yet mature – too slow and costly'.

On the 'big crew change' (demographics as industry ages) training and mentorship are proving essential in face of a collapse in geoscience degree intake.

Round Table

Q – Why do new companies venture into this money losing business?

Boutte – Entry barriers are quite low (unfortunately). Newcomers can use balance sheet 'elasticity' to turn over-capacity into spec data!

Farris – We have seen a huge transfer of wealth from service companies to oils. This is unsustainable – we need a new business model.

Q – What are companies doing about the graduate shortfall?

Restucci – There won't be enough graduates to go round. More and more will come from overseas. Shell has launched a national scholarship program for petroleum engineers.

Rose – One aspect of the problem is that academia is not interested in our industry.

Farris – Apache has a small trainee program.

Boutte - We are not the 'flavor of the day' and we are not doing enough to correct this perception. We need to embrace dual career lifestyles etc.

Gibson – With productivity gains we don't need so many folks – we can move work offshore.

Gaffney – G&G and PE used to get the pick of the crop. This is no longer the case – there are only around 300 PE grads in US today.

Gibson – I believe that we should back away from this emphasis on lifestyle. France is moving its working week back to 39 hours. Heck we used to work Saturdays! A return to the work ethic would be a good thing.

Restucci – it's no different in other industries.

Exhibitors - Recording

ABB PS3 permanent seismic monitor
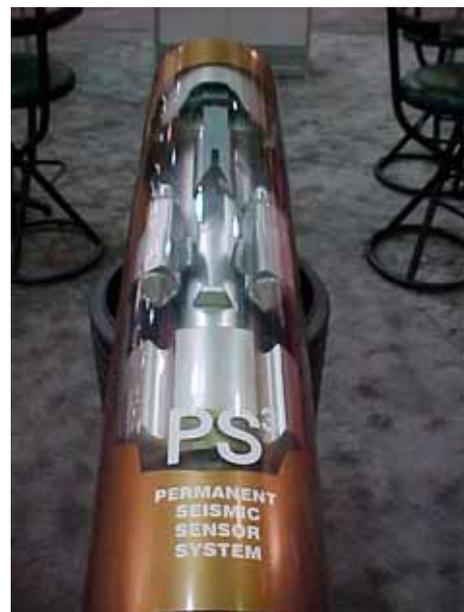
ABB's permanent seismic sensor

Permanent Seismic Sensor. Run in on tubing, decouple and leave in situ. High-end multi-component recorder developed by Cambourne School of Mines. See also impressive demonstration videos available from ABB. See also paper VSP 3.5.

Contact   Will Wason Will.wason@gb.abb.com.

URL   www.abb.com/oilandgas

ESG Paladin passive seismic monitoring
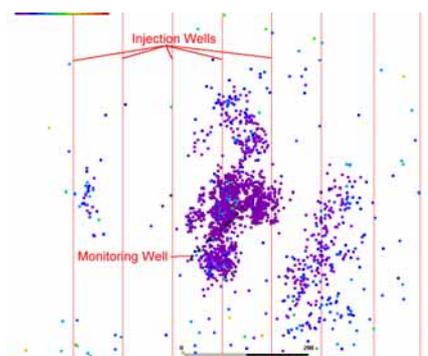
Real time fracture monitoring[4]

New passive seismic reservoir monitoring system. Permanent monitoring of production-induced microseismicity. Used to monitor steam flooding. Case history presented in CHI 5.4.

Contact   Shawn Maxwell Shawn.maxwell@esg.ca.

URL   www.esg-solutions.com

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[4] Image courtesy ESG.

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Thales ARMSS self-contained marine 4C recorder

ARMSS seabed 4C standalone geophone[5]

A new self-contained sea bottom multi-component recording system is placed on location by ROV. Can be deployed in hundreds (soon thousands) of meters water depth. Used to study gas clouds, salt plumes and super long offset acquisition. Can be deployed with USBL telemetry link or in stand alone mode – timing uses clock 'of known drift'.

Contact   Robert Dowle Robert.dowle@au.thalesgroup.com.

Vibtech 'Infinite Telemetry' system – WiFi-based seismic acquisition

Vibtech's WiFi Remote Acquisition Units.[6].

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[5] Image courtesy Thales.

[6] Image courtesy Vibtech.

New lightweight WiFi-based acquisition system. Allows for 'unlimited' number of channels. Uses COTS WiFi/Internet technology. Within the radio cells, digital data are transmitted between four channel Remote Acquisition Units (RAUs) and a concentrator using 802.11b WiFi – with up to 33 Mbps bandwidth per cell.

Contact   John Flavell-Smith info@vibtech.co.uk.

URL   www.vibtech.co.uk

Exhibitors - Storage

Adic Pathlight VX disk for tape

ADIC disk backup system.

The system makes disk drives 'look like' tape. Can be deployed to replace tape drives on acquisition system with disks without re-writing software. Also can be used to replace tape backup systems with disk. Up to 1TB/hour bandwidth. The disk provides rapid front end backup – prior to paging data to tape storage.

Contact   Bret Perkins Bret.perkins@adic.com.

URL   www.adic.com

DataDirect S2A3000 FiberChannel/Serial ATA storage appliance

FiberChannel gives 1.5 Gbytes/sec and 0.25 Petabyte Serial ATA storage per unit. Used in '15 of top 20' HPC sites. OEM to Pinnacle, Sony etc.

Contact   Jo Coral jcoral@datadirectnet.com.

URL   www.datadirectnet.com

DataFrameworks resource management

Hardware management software – interface between applications and storage resources. Imposes consistent naming conventions across files systems – workflow/project based. Offers user consistent, tree-structure interface to storage resources. Currently in Beta testing.

Contact   sales@dataframeworks.com.

URL   www.dataframeworks.com

FileTek StorHouse GeoCube seismic data management
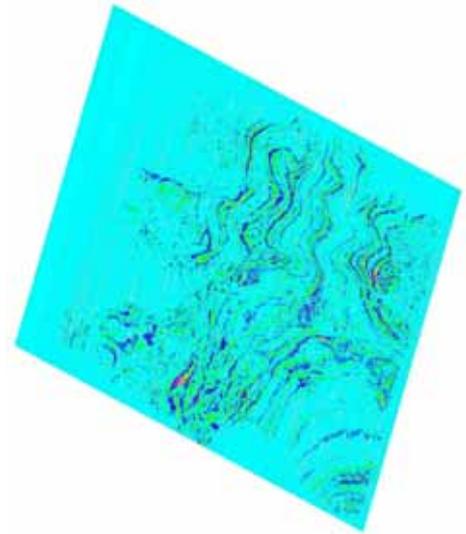
StorHouse GeoCube eliminates poly-cuts with row-level seismic access[7]

StorHouse GeoCube seismic data storage and management system. Allows for direct SEG-Y data load to workstation. Said to be ideal for managing 4D datasets with around 10TB per sweep.

Contact   Jeffrey Maskell jmaskell@filetek.com.

URL   www.filetek.com

IBM 3592 New Tape Drive & Format

New drive and cartridge with 100-300GB capacity and 40MB/sec transfer rate. A 3494-L22 robot holds 180 cartridges – works in STK Silos.

LSI Logic Storage Systems Serial ATA Storage System (SATA)

First enterprise serial ATA storage system. Uses cheap disks and FiberChannel interface.

Contact   Brad Elliot Brad.elliott@lsil.com.

URL   www.lsilogicstorage.com

Ovation Data Services New PetaSite configuration

100 TB PetaSite with 2 drive SCSI at around $100k (tape or disk).

Contact   Gerald Johnson Gerald.johnson@ovationdata.com.

URL   www.ovationdata.com

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[7] Image courtesy FileTek.

SpectraLogic Spectra 7950 Tape Library

Spectralogic Tape Library [8].

New multi-format (SAIT, LTO but not 3490) tape library. 500TB per cabinet – 5 cabinets can share common robot. Used by ExxonMobil in seismic processing. 'Expect seismic to move to SAIT and benefit from the 500GB tape capacity'.

Contact   Leigh Grace leighg@spectralogic.com.

URL

Spinnaker Networks Enterprise NAS

SpinServer 4100 and 3300 series Network Attached Storage (NAS) solution. Scalable from 2TB to 11 PB. Sold to GX-Tech. Ask for case history of deployment. First customer in oil and gas.

Contact   Jeff Tabor jtabor@spinnakernet.com.

URL   www.spinnakernet.com

Trango Technolgies seismic data manager
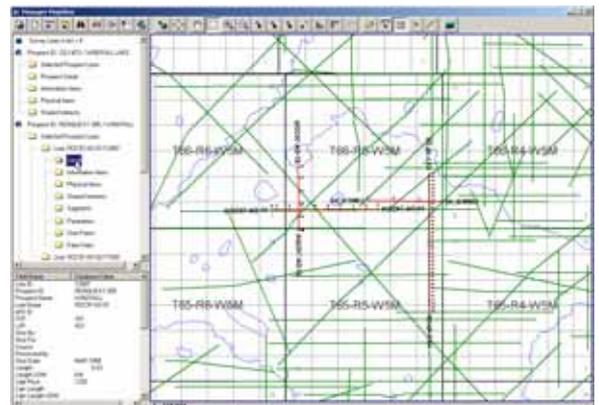
Trango Manager offers internet search for seismic data[9]

New version of Trango's seismic data management software Trango. Manager 4 will be a complete re-write based on Microsoft .NET framework. Good deployment thanks to Oracle .NET

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[8] Image courtesy SpectraLogic.

[9] Image courtesy Trango Technolgies.

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port. A web front end allows for map and text search of seismics by line name, date shot, fold or source. 4Site is a scaled-down version of Trango for use by smaller organizations.

URL   www.trangotech.com

Exhibitors - Processing

Aspen Systems Beowulf Cluster Management

Aspen Beowulf Cluster Management (ABC) system does cluster management, performance monitoring, configuration and alarms. Configuration data is stored in a database.

Contact   Leslie Cunningham-Cook lesliec@aspsys.com.

URL   www.aspsys.com

Boxx Technologies 3D Boxx workstation runs Geoprobe

Single or dual processor 64-bit Linux Workstation qualified with Magic Earth's Geoprobe. Uses AMD Opteron 200 series chips. Up to 16GB memory and various NVIDIA graphics cards.

Contact   Kelly Dove kdove@boxxtech.com.

URL   www.boxxtech.com

IBM Grid-based geophysical processing
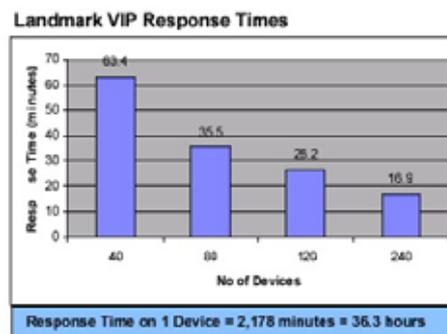
Scalability of VIP across multi-processors[10]

Service offering of grid computing based seismic processing – offering 'CPU cycles on demand'. Not sure if this is for real – but there is some collateral on grid-based reservoir simulation in collaboration with United Devices. Landmark's VIP has been ported to the GRID MP.

Contact   Basu Hurkadli

URL   www.lgc.com

Landmark Linux Processing Solution

Joint offering from Landmark, IBM and NetApp of scalable solutions to seismic processing. ProMax and SeisSpace run on IBM's Linux clusters with storage using NetApp's FAS960 filer. Supported by Landmark and IBM Global Services.

URL   www.lgc.com

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[10] Image courtesy IBM.

Landmark ProMagic Server

ProMagic Server connects ProMax 3D processing software with Magic Earth's Geoprobe so that interpretation software can be used in processing. This allows for high-end visualization to be used to control FK, Tau-p, scaling and other processing techniques. Accessing pre-stack data "brings the power of interpretation software to the processor." Dave Ellis (BP) is quoted as saying "seismic processors must use same tools as interpreters – you can't process what you can't see."

Dave Roberts (BP) showed Magic Earth usage in 'public relations' on Algerian assets. Combines surface and 3D seismic and drilling geometries. Core photos pop up at scale and in situ. Landsat imagery, flowline and facilities are displayed – including photos of construction work in progress. Zooming out, the whole of Algeria topography, roads (ex Michelin map) and surface geology (this is 'one of the most impressive images of my career'). Integrating all this into GeoProbe is 'work in progress' – will have regional interpretation surfaces, reservoir simulation results soon. A plea to vendors to 'make it easier to do this – so you don't have to mess around with pixels'. Also of note is a new video showing use of Geoprobe on BP's Wytch Farm field.

RackSaver HIVE

Small footprint PC cluster for in-truck mount with 66 node Opteron blades per cabinet. Also do 88 node Xeon cluster. RackSaver supplies Western Geco, Shell and Veritas (10,000 nodes worldwide). Leverages Gigabit Ethernet or Myrinet for high performance, low latency. Can mix Gigabit and Myrinet in same system. Opteron 'is being embraced by the programming community'.

Contact   Paul Mecucci paul@racksaver.com.

URL   www.racksaver.com

SGI Altix 3000

Linux-based supercomputer with shared memory across 64 processor nodes. Uses 2 Itanium 2 processors per node and 6.4GB/sec NumaLink interconnect.

Contact   Bill Bartling wbartling@sgi.com.

URL   www.sgi.com

Exhibitors – Visualization and Workstations

Appro Scorpion WH 300 workstation

Dual AMD Opteron-based workstation with up to 16GB RAM. From $2,000.

Contact   Maria McLaughlin mmclaughlin@appro.com.

URL   www.appro.com

California Digital Total Linux Solution

Hardware and Software service offering for Linux workstations or clusters. Also offer 'out-of-band' remote management tools for outsourced systems administration. Also offer such support as a 24/7 remote service offering.

Contact   Youhan Mubaraki Youhan.mubaraki@californiadigital.com .

URL   www.californiadigital.com

LeadingSoft Corp. HandyGeo

Mobile Seismic Visualization on Windows XP.

Contact   leadings@leadingsoft.com

URL   www.leadingsoft.com

ModViz Inc. Renderizer on Linux

Actually this is software – for controlling PC visualization clusters. Now runs on 64 bit Linux. Decomposes models and farms out rendering to the cluster. Offers 'unlimited' scalability and supports multiple scenegraph API's.

Contact   Shing Pan span@modviz.com .

URL   www.modviz.com

Orad Inc. DVG

Graphic card cluster-based visualization hardware. Trialed by Shell on its 123DI system. Developed for broadcast industry. Uses 'standard' ATI or NVidia graphics cards and up to 2GB of texture memory. Windows and Linux graphics code supported.

Contact   Miki Tamir miki@orad.tv.

URL   www.orad.tv/pdf2/dvg_vizsim.pdf

Schlumberger LiveQuest – serving GeoFrame to tablet PC

WiFi-based GeoFrame

Schlumberger was showing '3D LiveQuest' – its ASP service with a demo over wireless, serving GeoFrame to a tablet PC (actually a Panasonic Toughbook). LiveQuest solves the remote visualization problem with a combination of Mercury International Technology's ThinAnywhere and GeoViz. Access is secured by SPYRUS/DexaBadge one-time smart card and Citrix Secure Gateway with 128 bit encryption. LiveQuest has been deployed by Sasol to equip its London unit with GeoFrame served from Aberdeen. ThinAnywhere resolves bandwidth issues of high-end hosted graphics.

Schlumberger was also showing 'next generation' seismic interpretation with 'ant tracking' autopicking. Starting with a coherency volume – the software sends out 'ant' agents to seek out best paths along faults. The ants 'deposit pheromones' as they go, and more ants follow and strengthen up fault pick[11]. Detected faults are collated in a Wulf diagram (polar plot) structural editor. The interpreter can edit and delete faults and artifacts from Wulf diagram to discriminate tectonic overprinting and to manage and group fault planes. Also showing new extended SeisClass automated interval-based tracking.

TeraBurst Wide Area Visualization System (WAVS)

TeraBurst, HP and ModViz demonstrate real time collaborative visualization. Users share data and high resolution graphics over the network or internet. Uses TeraBurst's video to optical (V2O) and video to data (V2D) products.

Contact   info@teraburst.com.

URL   www.teraburst.com

TeraRecon Inc. VolumePro 1000

Graphics cards for 3D real time rendering. Up to 2GB of memory on card. Also various packaged from Net Server to Visualization workstation. Windows, Solaris, Linux, Irix.

Contact   Frank Baker baker@terarecon.com.

URL   www.terarecon.com

Exhibitors - Studies and Interpretation

4th Wave Imaging C02 Sequestration Study

4th Wave has received a $780k grant from the DOE National Energy Technology Lab. (NETL) for use of 4D seismics to study CO2 sequestration.

Contact   Ray Ergas rae@4thwaveimaging.com.

URL   www.4thwaveimaging.com

Rock Solid Images Lithology and fluid prediction project
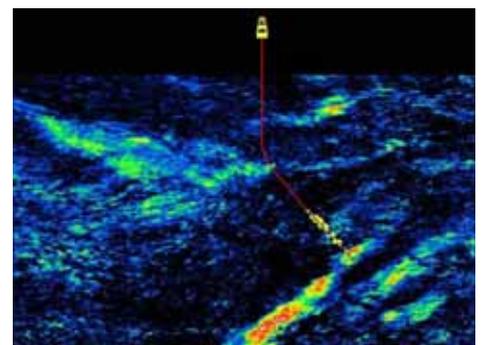
Gas Indication from Seismic Q[12]

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[11] This may be one of those analogies which is harder to understand than a straightforward explanation!

[12] Image courtesy Rock Solid Images.

LFP merges two previous projects – the Seismic Attribute Consortium and the Q-Project. LFP uses AVO classification and seismic facies mapping to reduce DHI risks such as tight gas sands, shales and 'fizz water'. LFP will commence in 2004. Collaboration with Rose Associates.

Contact   Joel Walls j.walls@rocksolidimages.com.

URL   www.rocksolidimages.com

Rose & Associates SAAM V2.0

Direct Hydrocarbon Indicator risking tool and DHI Consortium - 13 members meet monthly to evaluate DHI prospects and drilling results. SAAM stores archive of analog DHI prospects for risking.

Contact   Mike Forrest Forrestm@airmail.net.

URL   www.roseassoc.com

Exhibitors - Software

BGP (China National Petroleum Corp. Unit) GeoEast V1.0

A major development which sets out to integrate seismic processing and interpretation in a single environment. BGP is a major seismic contractor with around 100 crews. It has developed GRISYS seismic processing and GRIStation interpretation system. GeoEast V1.0 will be released year end 2004.

Contact   Wu Haibin wuhaibin@bgp.com.cn.

URL   www.bgp.com.cn

BP Center for Visualization Interactive Drilling Planner

Well planning software developed by consortium including BP, CTC, Exxon Shell etc. To be commercialized by Earth Decision Sciences. 'Proactive' well planning anticipates uncertainty in formation tops – so that well path updates can be made 'realistically'. Also working on geo-body extraction with neural nets – 'not just voxel-based classification'.

Contact   Geoff Dorn gdorn@colorado.edu.

URL   www.bpvizcenter.com

Earth Decision Sciences Volume Explorer
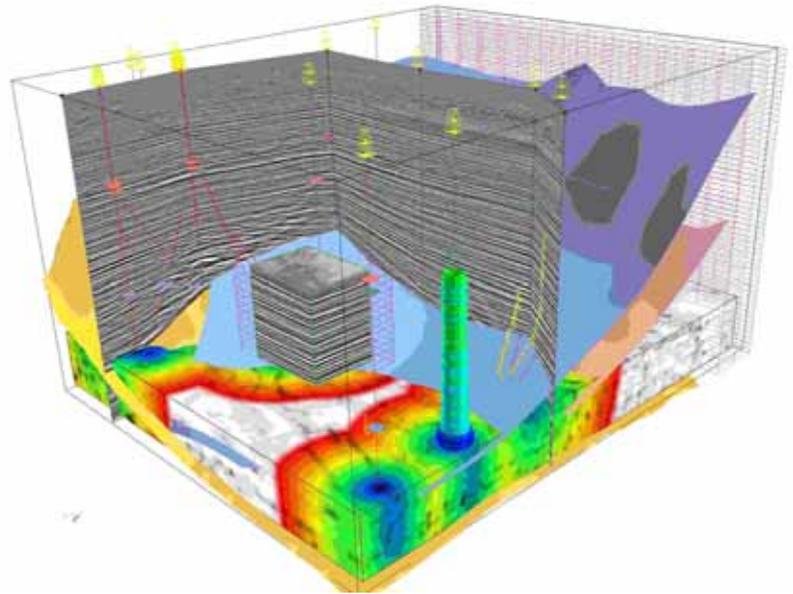
EDS Volume Explorer.[13]

EDS (formerly T-Surf) is expanding its flagship GOCAD suite to include 'full featured' 3D seismic interpretation with VolumeExplorer. A data access strategy pages 'bricks' of data off disk to track cursor movement. For 6GB of data, only 1.5GB need to be in memory. Features include GeoProbe-like 'cursor' functionality, horizon picking and gridding, feature extraction and fault picking. Runs on Windows and 64 bit Linux.

Contact   Fabien Bosquet bosquet@earthdecision.com.

URL   www.earthdecisionsciences.com

Genetek EarthWorks Real-Time Prospect Generation

Enhanced, integrated synthetic seismic matching and AVO modeling from within Genetek's EarthWorks seismic interpretation package. A correlation window evaluates the well tie as a synthetic is projected onto line at various locations. Tests AVO effect in real time.

Contact   Mark Sun marksun@genetek.com.

URL   www.genetek.com

Geomodeling Corp. VisualVoxAT

New functionality in VisualVoxAT includes horizon (waveform picking) and fault interpretation and seismic facies classification with neural nets. VisualVoxAT is described as an attribute-guided seismic interpretation system centered around its StrataCube flagship which ensures horizon-consistent attribute analysis.

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[13] Image courtesy EDS.

GeoTomo ThrustLine

New workflow-oriented software for pre-processing seismic data preparation. First break picking, near surface tomography and migration velocity determination.

Contact   Oz Yilmaz info@geotomo.com .

URL   www.geotomo.com

Geovariances Isatis 4.2

New version of Isatis now allows for SEG-Y export of geostatistical results for import to interpretation and visualization systems.

Contact   Viviana Alderete valderete@geovariances-americas.com.

URL   www.geovariances.com

GMG Axis Interpretation Ready Processing

Moves geological and geophysical integration 'back up the food chain' – so that processing and interpretation are more closely knit. Also rolls-in high density velocity analysis and 'advanced well log calibration'.

Contact   marketing@gmg.com.

URL   www.gmgaxis.com

Helical Systems HHArchive 1.0
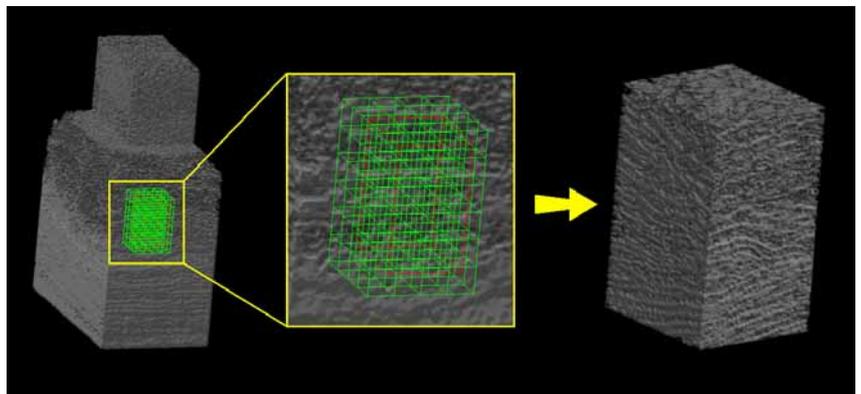
Helical's extraction process – full data set is 34GB.[14].

HHArchive is a storage system for large multi-dimensional data sets. It uses technology similar to SDE/SDO. In fact the brains behind Helical System's Self Defining Structure (SDS) technology is Herman Varma – who was also involved in Oracle SDO and helped ESRI embed HHCode in SDE. HHArchive works within Oracle. An API will be available real soon now. Helical has partnered with TeraRecon to provide a data visualization bundle for HHArchive. Leverages ISO/TC211 standard for model and meta data.

Contact   Mark James mjames@helical.ns.ca.

URL   www.helical.ns.ca

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[14] Image courtesy Helical Systems.

INT BHPViewer
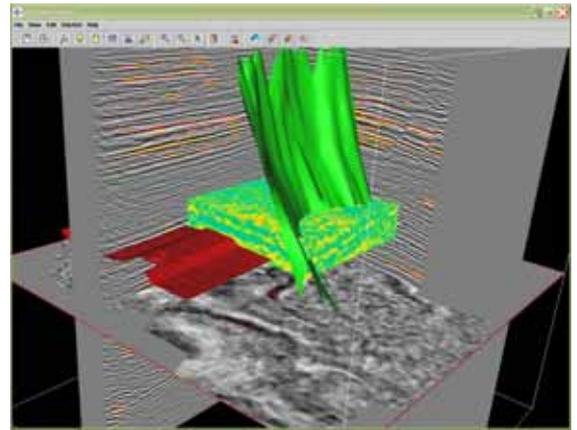
Int's BHP Seismic viewer in action.[15].

Web-based viewer for large amount of seismic data and visualize, navigate. Access by offset, shot, inline, crossline etc. Currently 2D – 3D real soon now. A free version is available from the Colorado School of Mines Seismic Unix project. Paper Thursday AM

Contact   Oliver Lhemann olivier.lhemann@int.com.

URL   www.int.com

Landmark Graphics Seismic interpretation with global image segmentation
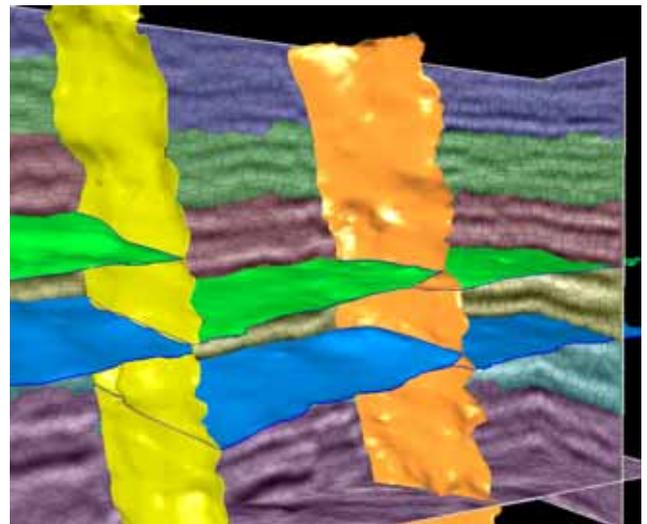
Atomic mesh and 'segments' derived from 3D volume.[16].

Last year, Landmark's atomic mesh specialist Dave Hale used seismic meshes for flow simulation. Now these same meshes are used to segment seismic images into geologic layers and fault blocks. Hales says "The similarity between numerical methods we use for seismic image segmentation and those we use for flow simulation is uncanny – and was unexpected". An expanded abstract of Hale's paper is available from: http://www.lgc.com/aboutus/research+fellows/dave+hale.htm.

Contact   Dave Hale dhale@lgc.com.

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[15] Image courtesy INT.

[16] Image courtesy Landmark Graphics.

Norsar 2D Ray Modeling

New Release (V5.0) of Norsar's 2D raytrace modeling package. Used by Fairfield for PSDM data preparation (velocity model building) – also for survey planning. OpenSpirit link. (Also see a good review paper on ray tracing in Stud. Geophys. Geod. 46(2002), StudiaGeo s.r.o. Prague).

Contact   Anders Dahle sales@norsar.com.

URL   www.norsar.com

OpenSpirit 'pervasive' deployment by SIS?

According to Open Spirit, Schlumberger are on the point of announcing a 'pervasive' deployment of OpenSpirit. Drilling extensions (developed for Total) and .NET/Project Ocean development. Also a new SMT data server – driven by Kerr McGee who will us it to link to TerraScience. OpenSpirit leverages COM, Java, .NET C++ and 'still has some CORBA'.

Contact   Trish Lambert trish.lambert@openspirit.com.

URL   www.openspirit.com

Paradigm

Paradigm was showing 'across-the-board' integration through Epos, its middleware layer – accessing multiple data stores. Epos 3.0 uses dynamic search, retrieval and publishing – 'translating' from one domain to another – such that petrophysical 'language' is accessible say to a geophysicist. Also new is 'SeisEarth', a 2D/3D line-based interpretation system, 'iMap' a mapping tool and a geocellular model viewer – FlowView. Red Hat Linux 8.0 is announced for Q4/2003 on blade-based clusters systems (vertical racking) offering higher cluster density. These will use a 2 GB interconnect. Paradigm also runs on SGI Altix 3000 – for PSDM apps that mandate NUMA (itself moving to Linux).

Contact   Arita Matsoff aritam@paradigmgeo.com.

URL   www.paradigmgeo.com

Paulsson Geophysical Services. Multi component VSP software

$2 million DOE NETL funded development of VSP processing software for multi-component acquisition.

Contact   Paul Heuermann Paul.heuermann@paulsson.com.

URL   www.paulsson.com

Schlumberger Information Solutions SMART automated structural interpretation

'Next Generation' seismic interpretation include 'smart', automated structural interpretation, and a new vehicle for distributing interpretation results – an 'Adobe Acrobat' for seismic interpretation.

Contact   Phil Trayner trainer@houston.oilfield.slb.com.

SMT Tunnel O

Open Spirit Link – complements SMT's Tunnel L Landmark data link. Also of note is SMT's post RC2 acquisition new presentational brochure.

**URL**   www.seismicmicro.com**.**

Miscellaneous

Concept Systems Pytheas

Seismic navigation data management system. New upgraded version released to Total E&P UK. Enhanced QC and UKOOA P6/98 grid file load.

Contact   John Barrat jbarratt@csl.co.uk.

URL   www.csl.co.uk

OpenIT monitors software usage with IT License
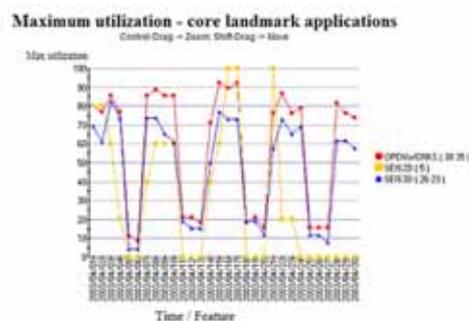
Landmark license use monitored by Open IT[17]

OpenIT continually monitors software usage allowing for fine tuning of license purchase and management. Case history of license management at Statoil and SEG paper from ConocoPhillips describing OpenIT usage to measure usage and deliver information to management.

Contact   Leslie Butterfield lbutterfield@open-it.com.

URL   www.open-it.com

Papers of note

We strongly recommend the acquisition of the SEG's CD-ROM of the 2003 Conference proceedings. The CD-ROM contains expanded abstracts. Unfortunately, the space previously occupied by a useful full text index has been replaced by a commercial video from Paradigm – making the CD-ROM rather unwieldy for research. Here follow some papers of particular interest from the information technology perspective. The proceedings CD can be obtained from www.seg.org.

Detail-in-context visualization for data exploration – David Baar, IDELIX (ANI 1.8)

Something of an infomercial for Pliable's display technology. This allows for simultaneous, variable scale views of maps and other data types. Used in pipeline planning to offer high detail at center of map and overview toward edges. Now supports rectangular 'lenses'. *A curiosity or a mission critical application – the jury is still out.*

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[17] Image courtesy OpenIT.

Structural model to reservoir grid workflow – Karen S. Hoffman, Dynamic Graphics (SM1.1)

New geologic modeling properly represents sloping faults. This improves accuracy and reliability of volume calculations and allows the same model to be used reservoir simulation.

Seismic Data Mining – R.Uden, Rock Solid Images (RCT 5.4)

Data mining 'seeks to establish patterns in data' and to 'provide understanding of the parameters controlling the data being mined'. The process uses progressive steps, gradually reducing the volume of data samples being mined. Lithology, porosity and fluid type data mining process are presented – avoiding manual or visual inspection of large volumes of 3D data.

Virtual Core Laboratory – Christoph Arns, Australian National University (RCT 5.6)

Properties of reservoir rock are determined from digital X-ray CT images. Accurate prediction of transport (formation factor and permeability) and elastic properties can be made directly from digitized tomographic images.

Seismic classification for prospect evaluation – Fangjian Xue, Schlumberger (RCT 5.8)

3D seismic classification is used to determine the distribution of pore fluid and lithology from multiple seismic attribute volumes. Supervised classification defines classes of fluid and lithofacies based on knowledge of well production, lithology and seismic amplitude. Another infomercial for Schlumberger's SeisClass/ClassCube.

PetroSPIRE: Indexing and retrieval of seismic data – Matthew Hill IBM (SM 2.3)

A seismic data archive is treated as a database to support retrieval of seismic features of interest. The technique could be used to screen large volumes of seismic data in an exploration context. Data features are classified by texture or variance. The prototype system centers on a novel indexing technique for seismic data which supports tasks such as finding zone intervals between strong horizons and faults.

Ekofisk VectorSeis Test – Grant Byerley, ConocoPhillips Norway (MC 3.1)

ConocoPhillips Norway performed a 2D ocean bottom cable (OBC) seismic test over Ekofisk using Input/Output's VectorSeis system – its first offshore deployment. The tests indicate that VectorSeis should result in a more accurate recording of the seismic wave field and improved imaging of 4C data.

Optimizing IT budgets – Leslie Butterfield, Open iT, Inc. (SS 6.2)

Open iT's software which monitors license use of upstream applications. Good stuff for those who like metrics[18].

A new paradigm for rapid technology 'onboarding' – Mike Glinsky BHP Billiton (SS 6.3)

Describes the emergence of Java as a 'serious numerical and 2D graphics language' and the 'general acceptance' of open source maintenance agreements. Java's floating point speed now rivals that of Fortran. BHP leverages Seismic Unix and proprietary modules for wavelet-based lithofacies identification and stochastic inversion. An open source Java-based data viewer is presented.

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[18] The assumption behind these tools is that the software is a commodity whose use can be rationalized. By optimizing license use, costs can be 'driven out' of the system. But upstream software is not a commodity, and driving costs 'out' will take money from vendors – who may react by upping prices.

Geovolume visualization and interpretation – Tatum Sheffield, Magic Earth (SS 6.4)

Describes an attribute-based auto-tracker combining trace and voxel-based auto tracking. The technique was deemed promising for regional horizon mapping when combined with the ability to limit the auto-tracker by faults and geobodies.

Seismic interpretation with global image segmentation – Dave Hale, Landmark (SS 6.5)

The disadvantage of global image segmentation methods has been their relatively high computational cost. The paper describes how a 'space-filling, feature-aligned mesh' makes global segmentation of 3-D seismic images feasible. Unlike local event tracking or region growing methods, these methods work with the entire image. The techniques do not completely automate seismic interpretation – correlation across fault blocks requires user interaction. But the authors 'speculate that further automation is possible'. In fact for 3-D images automated techniques may improve on human interpretation.

Standards Committee – SEG-'E' mooted

The Standards Committee began with an 'action replay' of last year's discussion on the use of the EPSG[19] survey data embedded into the SEG standards. The latest recommendation is that this dataset be hosted by the SEG with care taken to synchronize the standard with other mirrors. A platform-independent SQL version of the EPSG database is published this month.

Draft proposals are under examination for fixes/updates to SPS and SEG-D. The consensus is that SEG-D is probably beyond a 'fix' – and that there is a better case for a new SEG-'x' (presumably SEG-E) format – to move away from the 'shot domain' focus of prior standards. At the same time such a new format will be designed to integrate modern computer data standards and will likely move away from the tape focus of the older standards[20].

Technology Watch Reporting Service

This report was produced as part of The Data Room's Technology Watch service. For details, please contact:

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[19] The European Petroleum Survey Group.

[20] With the blurring of the boundaries between acquisition, processing and interpretation, it might be a good time to expand the scope of the SEG recording format – or perhaps data format – to support more downstream activities.