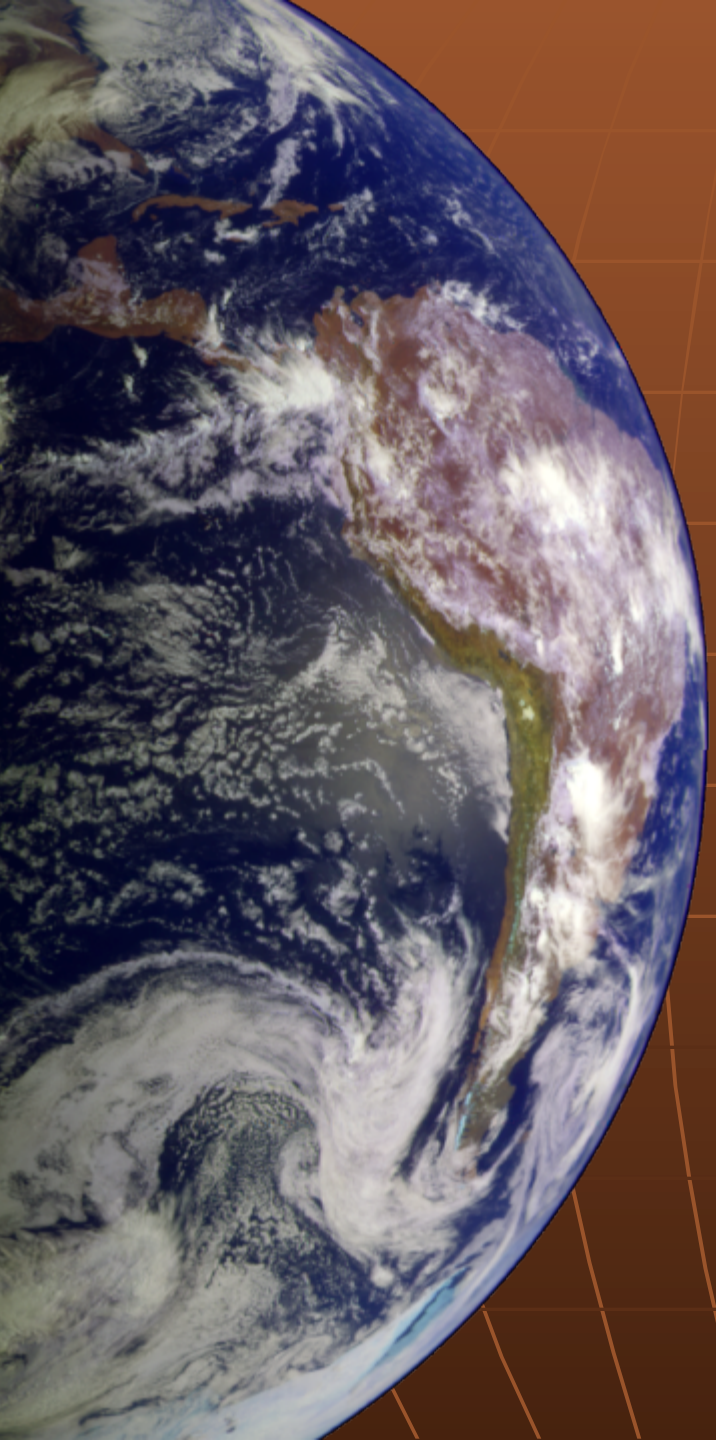


Status Report

of the

EDGER FORUM

Robert H. Tatham

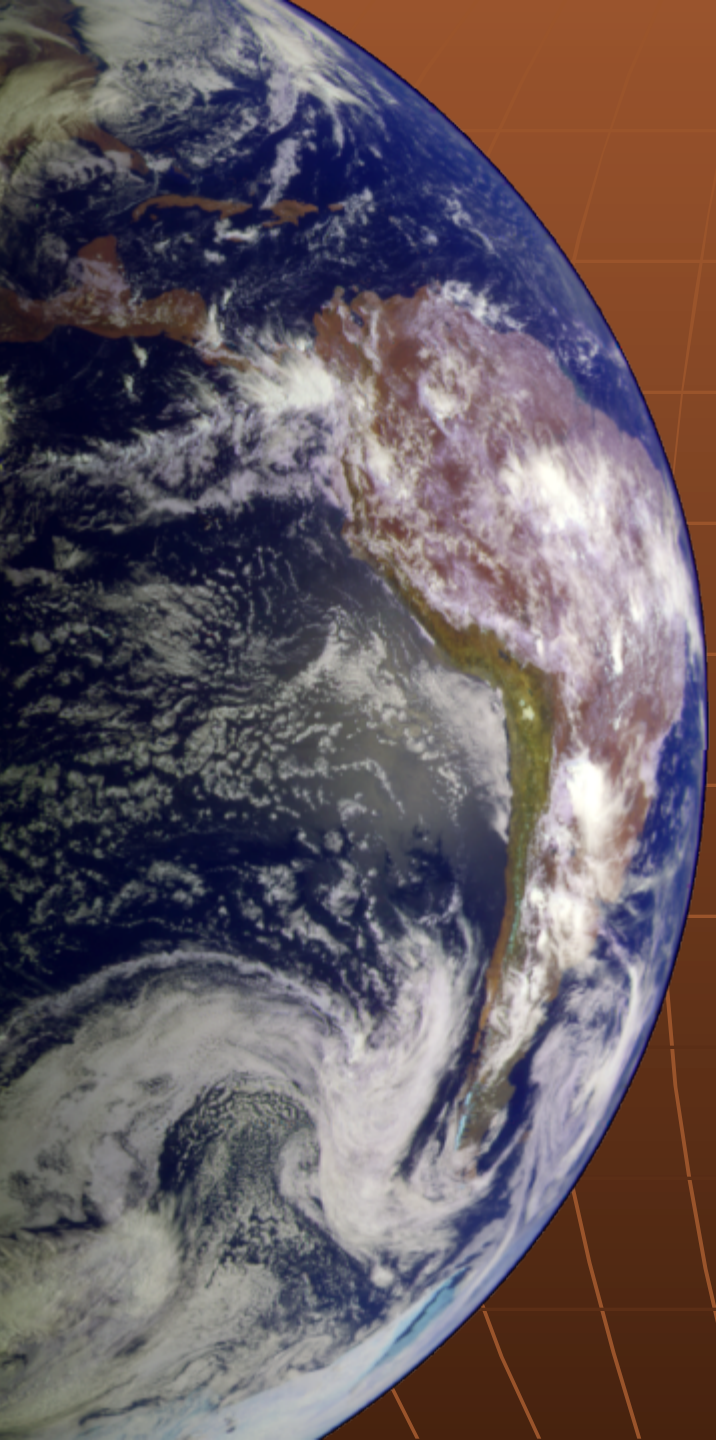
Mrinal K. Sen

Kyle T. Spikes

February 27, 2012

THE UNIVERSITY OF TEXAS AT AUSTIN

JACKSON SCHOOL OF GEOSCIENCES



UT-AUSTIN EDGER FORUM

Forum for Exploration and Development Geophysics Education and Research

Nurturing Education and Research for Tomorrow's Technology Needs at the Edge of Knowledge.

THE UNIVERSITY OF TEXAS AT AUSTIN

JACKSON SCHOOL OF GEOSCIENCES

The Exploration Geophysics Program

Leverage Industry support in the overall Exploration Geophysics Program.

- **Industry Supported Program – EDGER Forum**
- **Geology Foundation and Jackson School Support**
- **JSG and Department Support (T/A and other)**
- **Other Student Support (e.g. Scholarships, National Oil Companies)**
- **Other Research Contracts**
  - **Government and Research Support Agencies**
  - **Focused Industry Supported Projects (e.g., EGL)**

The Jackson School of GeoSciences

- Department of GeoSciences (DGS)
- Bureau of Economic Geology (BEG)
- UT Institute of Geophysics (UTIG)

An 'independent' school led by the Dean, Sharon Mosher, reporting to the Provost

The EDGER Forum

Education:

- **Emphasizes Education as well as Research**
- **Graduate Students employable by the industry**
- **Includes Post-doctoral researchers**
- **Focused Areas of Application offer educational context for research**

The EDGER Forum

Research:

- **Focused Research core element of the Forum**
- **MS Thesis projects coordinated to support larger research directions**
- **Sponsors coordination on MS Research Projects**
- **Includes Post-Doc Fellows**
- **Focused Areas of Application facilitate cooperative research with industry, student internships and recruiting by industry**

The EDGER Forum

Forum:

Third-party (Academic) Forum to coordinate technical activities between Industry Producers, Industry Contractors and Academia.

- **Focused Technical Symposia**
- **Interactive problem-focused workshops**
- **Develop and Maintain Objective Ordered D.B.**
- **Focused Areas of Application provide opportunity for additional workshops.**

Current Members of the EDGER Forum

- Anadarko
- BP
- Chevron
- Cimarex
- ConocoPhillips
- Devon
- ExxonMobil
- Nexen
- Statoil (Brigham)
- Dawson (Permanent Member)
- Landmark (In Kind)
- DrillingInfo (In Kind)

Sponsors


UT-AUSTIN
EDGER
FORUM


Anadarko


CIMAREX


devon


bp


Statoil


ConocoPhillips


nexen


Chevron


Human Energy


HALLIBURTON
Landmark Software
& Services


drillinginfo
Open To Explore


DAWSON
Dawson Geophysical Company

Benefits of Participation

Students

Professional MS and Research PhD students

- **Graduates employable by Industry**

Research

Research Focus on Inversion, Imaging, Analysis and Interpretation of Multi-component Seismic Data

Focused Areas of Application provide direction for research and transfer of technology to sponsors.

- **Provide direction to Research Projects**
- **Continuous Access to Research Results**

Forum

Advance technology for benefit of technical community

- **Annual Technical Symposium**
- **Problem-oriented Workshops**
- **Objective-Oriented M/C Inter. Data Base**

Benefits of Participation: Students

Professional MS and Research PhD students

- **Access to the Students themselves**
  (Graduates employable by Industry)

- **Sustainable supply of graduates**
  (Requires on-going support)

Target

- **Minimum 18 grad. Students in Exploration Geophysics**

- **Minimum Six advanced degree graduates per year**

Summary of Student Activities

Academic Year)	UGrad	New Gr. St.	Degrees (MS/PhD)	No. Interns
’99 – ’00	14	--	-	1
’00 – ’01	22	1	0 / 0	2
’01 – ’02	22	2	1 / 1	3
’02 – ’03	24	5	1 / 1	4
’03 – ’04	27	3	1 / 0	2
’04 – ’05	31	7	2 / 1	9
’05 – ’06	31	8	3 / 2	8
’06 – ’07	23	6	9 / 1	6
’07 – ’08	17	2	5 / 2	10
’08 – ’09	18	7	3 / 2	6
’09 – ’10	18	7	4 / 3	7
’10 – ’11	16	8	3 / 2	5
’11 – ’12	**17**	**3**	**(In Progress)**	

Report pg: 15-16

Students with Focus in Exploration Geophysics

Graduates since 1999:

Helena Zirczy MS 2000
Chau Ao BS (Hon) 2001
Fernando Cerda MS 2002
Patricia Montoya MS 2002
Chengshu Wang PhD 2003
Matt Morris MS 2003
Jason Stine MS 2004
Carmen Gomez MS 2005
Dhananjay Kumar PhD 2005
Sharon Goehring MS 2005
Kim Kumar MS 2006
Chandan Kumar PhD 2006
Jason Gumble PhD 2006
Eric Lyons MS 2006
Matt McDonald MS 2006
Kathryn Young MS 2006
Russ Young MS 2007
Kevin Bain MS 2007
Chris Sine MS 2007
Samarjit Chakraborty MS 2007
Reeshidev Bansal PhD 2007
William Burnett MS 2007
Engin Alkan MS 2007
Nedra Bonal PhD 2007
Emily Pangborn MS 2007
Particia Yu MS 2007
Sanjay Sood MS 2007
A. AlMuhadib MS 2007
Ali AlJadhar MS 2007
Tiancong Hong PhD 2008
[illegible] MS 2008
Chaoshun Hu PhD 2008
[illegible]erez MS 2009
Samik Sil PhD 2009
Jonas de Basabe PhD 2009
Jeffrey Kao MS 2009
Chunlie Chu PhD 2009
Fang (Fiona) Ye MS 2010
Diego Valentin MS 2010
Na Shan MS 2010
Alireza Shahin PhD 2011
Sun Phan MS 2011
Corey Joy MS 2011
William Burnett PhD 2011

44 Total: 30 MS, 14 PhD. 1 BS (Hon)

Report pg: 16-20

Students with Focus in Exploration Geophysics

Current Graduate Students:

Jason Stevens (PhD Cand.)
Sandy Suhardja (PhD Cand.)
Vladimir Bashkardin (PhD Cand.)
Yang Wang (PhD)
Mohammed Aissaoui (PhD)
Xiaolei Song (PhD)
Yi Tao (PhD)
Yu Xia (MS)
Terence Campbell (PhD Cand.)
Yang Xue (PhD)
Engin Alkan (PhD)

Russell Carter (PhD)
Kumar Das (PhD)
Meijuan Jiang (PhD)
Alexander Lamb (MS)
Sharif Morshed (PhD)
Kwon Taek Oh (MS)
Shaunak Ghosh (PhD)
Yawen He (PhD)
Zeyu Shao (PhD)
Jiau Xue (PhD)
Qi Ren (PhD)

21 Total: 3 MS
19 PhD

Report pg: 17-18

Students in the Department of Geological Sciences

	US	Visa	Total
Undergrad:	270	12	282
Grad:	173	86	259
Total:	443	98	541

Fall '11

Report pg: 16

Recruiting Students

2010 SEG in Denver:

Special Session: Interaction between Academia and Industry

Dozen panelists:

Follow-up ad hoc committee

Problem identified—get more people into Geosciences.

Call to action paper on "U.S. human resources challenge for Earth Science Education and Energy Exploration and Exploitation"

To appear in The Leading Edge this year.

Report pg: 8

Recruiting Students

"U.S. human resources challenge for Earth Science Education and Energy Exploration and Exploitation"

- ***Majority of Earth Scientists will retire in 15 years***
- ***30-40% working are currently retirement eligible***
- ***40-50% of workforce has less than 5 years of experience.***

Report pg: 8

Benefits of Participation: Research

Research Focus on Imaging, Analysis and Interpretation of Multi-component Seismic Data

This includes addressing problems with possible solutions in P- and S-wave data applications and P-P and P-SV AVO analysis.

- **Provide direction to Research Projects**
- **Access to Research Results**
- **Focus Areas of Application tie together a variety of MS research projects.**

Research Topic Areas
(Historical)

- Interpretation of Multicomponent data
- Direct Shear vs. P-SV data comparisons
- Effects of Fluids on Seismic Response
- Direct Inversion of P-P and P-SV data
- Imaging—with the flexibility to focus on anisotropy and P-SV data
- Reservoir Modeling and Time Lapse Seismic
- Other topics

Report pg: 17-20

Earlier Research

- Vp/Vs interpretations for Lithology
-
- Time-Lapse Vp/Vs to monitor gas expansion in reservoir
- AVO vs. Azimuth, Fracture parameter estimation.
- Full elastic inversion of P-P and P-SV data (PhD)
- P-P and P-SV AVO Coefficients (MS)
- P-P (Biot) and sensitivity to Fluids (viscosity)

Focus Areas of Application

- **Problems in Unconventional Resources and Resource Plays (Shales)**
  Very actively growing
- **Time-Lapse Seismic and Reservoir Monitoring**
  In line with broad theme
- **Numerical Techniques & Simulation**

Report pg: 29

Cooperative Research Projects

Focus Area of Application	Project	Student/Faculty	Partner
Unconventional Resources	Bakken Shale	Kyle Spikes & Sarah Coyle	Statoil (Brigham)
		Fiona Ye (MS 2010)	Oasis (Kerogen)
	Woodford Shale	Alexander Lamb	Devon / Cimarex
		Na Shan (MS 2010)	BEG
	Haynesville	Kwon Taek Oh & Meijuan Jiang	BP
		Qi Ren	Chevron
	East Texas Bossier	Diego Valentin (MS 2010)	Anadarko
	Marcellus Shale	Sharif Morshed	Anadarko
Time Lapse Seismic and reservoir monitoring	Time-Lapse Seismic Response to Changes in Fluid Pressure & Saturation	Alireza Shahin (PhD 2010)	ConocoPhillips
	Cranfield Carbon Sequestration Project	Russell Carter	Evolving
Inversion of Seismic	Stochastic Inversion	Yang Xue	Shell

Report pg: 29

49 Pubs. Year to Date:

Geophysics / Geophy Prosp.	**12**
Other Refereed Journals	**14**
SEG / EAGE Expanded Abs. *	**23**

***Expanded Abstracts included in Appendix of Interim Report**

Report pg: 32-34

Benefits of Participation: Forum

- Annual Technical Symposium
- Workshops in Application Areas
- Objective-Oriented and Geographically Project-Oriented M/C Interpretive Data Bases
- UT-Austin is the depository for the 4C 4D Teal South 4C 4D data
- UT-Austin will display GSH and O. S. PettyMuseum Artifacts in Dawson Geophysical Training Center

PROPOSE: Working groups of sponsors and Student/Faculty Researchers on Bakken as a documented model of shale

Technical Workshops

December 10, 2003 **Hosted by Shell**	**Current Problems in Acq., Proc. & Interp. of M/C Seismic Data**
December 2, 2004 **Hosted by ConocoPhillips**	**Continuation of previous workshop**
Sept. 2005	**EAGE / SEG Summer Research Workshop—Pau, France**
Dec. 16, 2009 **Hosted by BP**	**Workshop in Houston focused on Shale plays**
June 6-9, 2010	**SEG/SPE/AAPG Summer Res. W/S Shales: Reservoir/Source/Seal (Austin)**

Report pg: 21-25

Past Forum Activities

Annual Technical Symposium

1999- 2000 – Future of Exploration Geophysics

2000- 2001 – Assessment of Stratagraphic Seals
2001- 2002 – New Directions in AVO
2002 - 2003 – Seismic Attributes
2003 - 2004 – Successful Applications of M/C
2004 - 2005 – Partial Gas Saturation
2005 - 2006 – Seismic Response to Fluid Properties
2006 – 2007 – Problems in Land Applications
2007 – 2008 – Unconventional HC Resources
2008 – 2009 - Seismic Response in Resource Plays
2009 – 2010 - Unconventional Resources & Shale Production
2010 – 2011 - Seismic Characterization of Resource Shales

2011 – 2011 - Seismic Characterization of Producing Shales

Report pg: 21-25

1999-2000 Direction in Exploration Geophysics

The University of Texas at Austin
Department of Geological Sciences

The Future of Exploration Geophysics: Meeting the needs of Industry and Academia

A Symposium honoring **Professor Milo Backus**
And his career in **Exploration Geophysics**

Monday, December 6 and Tuesday, December 7, 1999

Keynote Speaker: Dr. Thomas Barrow, Chairman of GX Technologies, and former president of Humble Oil & Refining

Dinner honoring Prof. Backus at the Texas Memorial Museum on Monday, Dec. 6 hosted by Dept of Geological Sciences.

The outcome of this symposium will play a major role in the evolution of the Exploration Geophysics program in the Department of Geological Sciences and encourage further cooperation among various elements of the university and with the petroleum industry.

The symposium will include:
Keynote Address by Mr. Thomas Barrow
Session of educational and research activities at The University of Texas at Austin from the
- **Department of Geological Sciences**
- **Institute for Geophysics**
- **Bureau of Economic Geology**
- **Texas Institute for Computational and Applied Mathematics (TICAM) associated with**
  - **>The Department of Computer Sciences and the**
  - **> Department of Petroleum and Geosystems Engineering.**

Session of presentations from industry representatives
- **BP/Amoco on 'Directions in Exploration Geophysics'**
- **Texaco on 'Risk Evaluation for Exploration'**
- **Baker Hughes on 'Resource Needs of Contractors**
- **GeoQuest on 'partnerships between Industry and Academia'**

Co-operative sessions between industry and university participants to address joint needs.

For information contact:
Dr. Robert H. Tatham
Dept of Geological Sciences
The University of Texas at Austin
Austin, Texas 78712-1101
Phone 512 471-9129
FAX 512 471-9425

Forum Activities: Petty Geophysical Museum

Museum of Geophysical Artifacts now located on 4th floor (near Walter Library) of the Jackson Geoscience Building, UT-Austin.

In cooperation with the Geophysical Soc. of Houston

Petty Geophysical Museum

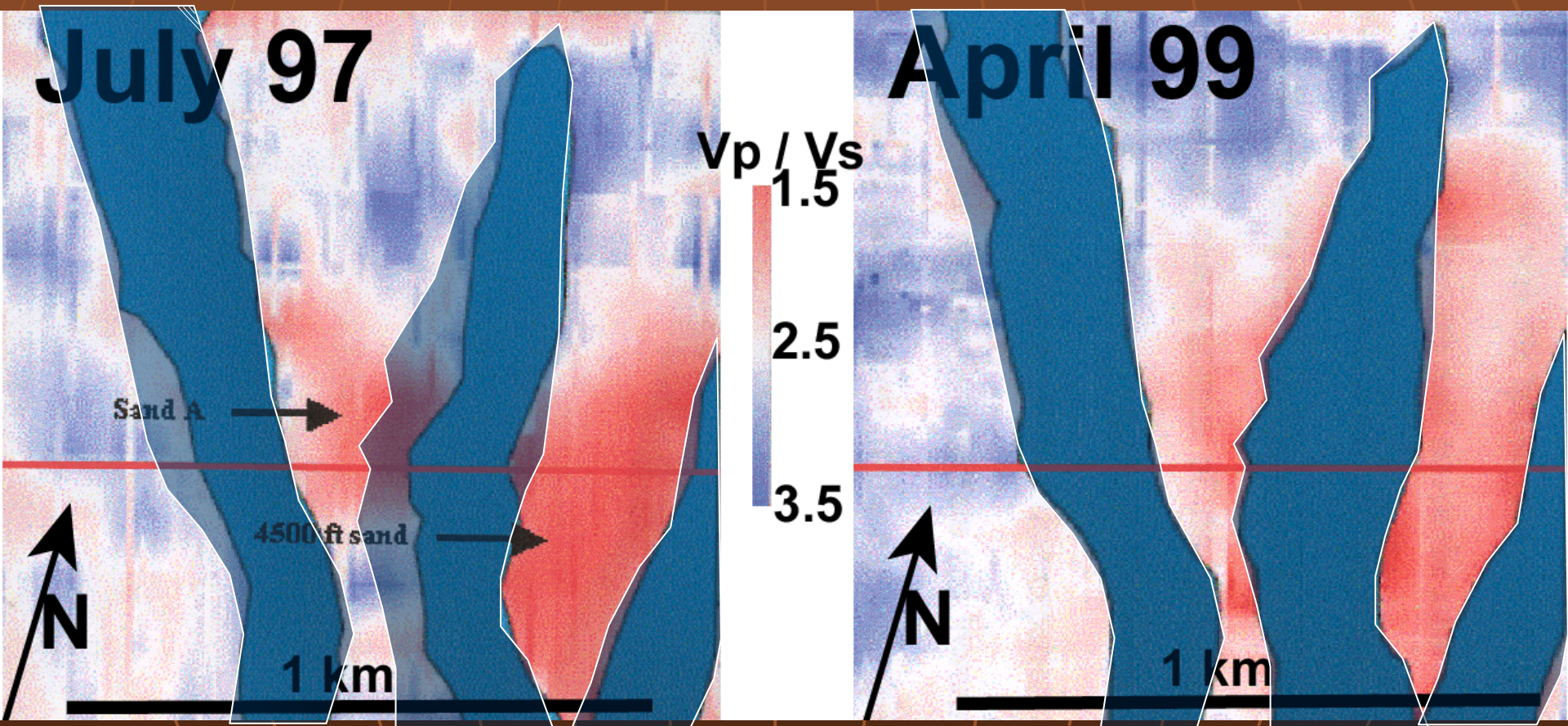
Teal South 4C 4D OBS data

UT-Austin has become the depository for this historic 1997 data set.

Seismic Data are available to any interested investigator.

Teal South 4C 4D OBS data

Time-Lapse Vp/Vs to monitor gas expansion in reservoir



Cerda (2001)

Summary of Educational Activities

- Five Graduate Students finished last year.
- Forum is a focus for admitting new students to JSG
- Focused Area of Application for MS Stud.

Challenges

- Balance of MS and PhD Students
- **Recruiting** and **Funding** applicants (Grad Student cost is M$ 74.7 /yr.)
  Matching funds from JSG?

Typical cost of a PhD graduate student at UT in 2011-2012

9-Month stipend as a Research Asst.	17,946
Fringe Benefits (Health Ins.)	4,845
Tuition & Fees (*12 hrs*)*	9,782
3-Months summer (40 hrs)	*11,964*
Fringe Benefits	*3,230*
*Tuition & Fees (3 hrs)**	*3,455*
Misc. (Thesis copying, Travel to meetings)	3,000
Overhead (50%)	20,492
Total cost per student	**$ 74,714**

*Not subject to overhead
Summer Expenses

Summary of Research Activities

- 49 Publications since June 1, 2011
- Focus Areas of Application
- Seven cooperative projects in progress

Challenges

- Balance of MS and PhD students
- Balance focused research / broad research directions.

Summary of Forum Activities

- Technical Symposium
- MC Interpretive Data Base
- Petty museum in JGB
- Data Depository

Challenges

- Provide more workshops
- Develop Working Groups w/Sponsors
- Balance of 'Community' Service and Forum Members interests

We look forward to continued growth and development with the Jackson School of GeoSciences and the Energy Industry

Access to Problem Oriented M.C. Application Database

Value-added data base catalogue of successful multicomponent seismic interpretations from published sources focused on problem (or objective).

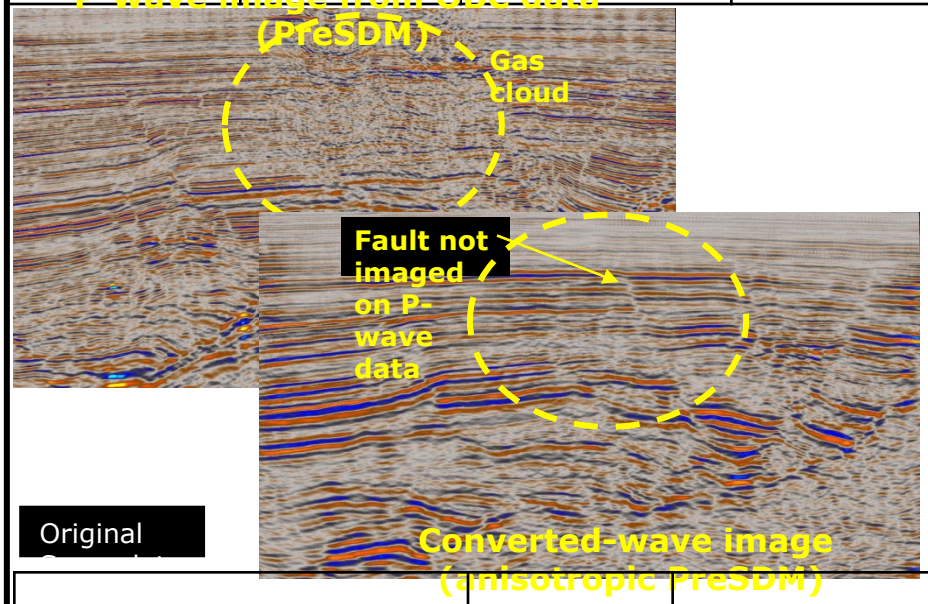
Content: 500 complete entries—target 1000.

Brief demo of web-accessible data base available

Sample Data

Field Name	Objective	Sub-Object. 1	Sub-Object. 2	Method
Sorrento	Lithology	Discrimination	SS/SH	Vp / Vs
Sorrento	Lithology	Discrimination	Type II Sand	P&S Amp.
Sorrento	Lithology	Discrimination	SS/SH	Vp / Vs
Sorrento	Lithology	Discrimination	Type II Sand	P&S Amp
Alba	Lithology	Discrimination	Type II Sand	P&S Amp
Alba	Lithology	Discrimination	SS/SH	Vp / Vs
Blackfoot	Lithology	Discrimination	Type II Sand	P&S Amp
Blackfoot	Lithology	Discrimination	Type II Sand	P&S Amp
Blackfoot	Lithology	Discrimination	SS/SH	Vp / Vs
Blackfoot	Lithology	Discrimination	SS/SH	Vp / Vs
Cataract Colliery	Anisotropy	Stuct. Imag		Structural
Chapman Ranch	Overpressure			Vp / Vs
Church Butte	DHI	Detection		P&S Amp
Defour Gas Field	HCI	Gas Detection		P&S Amp
Bluebell	Fracture	Param Est		S1 / S2
Donald	Gas Cloud Im			Structural
Donald	Gas Cloud Im			Structural
Empire Abo	Lithology	Discrimination	SS/SH	Vp / Vs
Horse Butte	Lithology	Discrimination	SS/SH	Vp / Vs
Lomond	Gas Cloud Im			Structural
Midland Basin	Lithology	Discrimination	SS/CO3	Vp / Vs
Midland Basin	Lithology	Discrimination	SS/CO3	Vp / Vs
Natih	Fracture	Param Est.		S1 / S2
Oseberg	Lithology	Discrimination	SS/SH	Vp / Vs
Paloma	Lithology	Discrimination	SS/SH	Vp / Vs
Prudhoe Bay	Lithology	Estimation		Vp / Vs
Second Wind	Lithology	Discrimination	SS / SH	Vp / Vs
Putah Sink	DHI	Gas Thick. Est.		Vp / Vs

Objective:
Gas Cloud Imaging



Browser


UT-Austin | Jackson School
DoGS | UTIG | BEG
Exploration Geophysics Program
at The University of Texas at Austin
About Us
Home
Mission Statement
Research Projects
Infrastructure
Software Donors
Geology Foundation
About
People
Faculty
Students
EDGER Forum
EDGER Home
Current Proposal
Annual Meetings
Technical Symposia
Sponsorship
P-S Research
Workshops
Student Research Results
Faculty Research Results
JACKSON SCHOOL OF GEOSCIENCES
Forum for
Exploration and Development Geophysics Education and Research
at UT-Austin
Multi-component seismic interpretation browser
This objective-oriented exploration application provides the user with a searchable database of published examples of case histories in multi-component acquisition, processing, analysis, and interpretation. Database entries may be sorted on any number of criteria, such as 'objective', 'geographic area', or 'data type.' These examples may serve as analogs for current exploration targets or as educational resources for oil & gas exploration with multi-component seismic.
Browse the entire database
Historical Multi-component seismic projects
As multi-component seismic technologies mature, successful projects will have been archived here. This browser is organized by specific multi-component projects organized by geographic area, date of acquistion, data type, operator and project impact. Each entry leads to a document summarizing the project and includes links to individual summaries of published resources.
View all Historical Projects
Select an area from a map
Comments/Suggestions? Please contact Bob Tatham at tatham@mail.utexas.edu.
admin

Shear wave Data Base Guidelines

Objectives:

Objective	Sub-1	Sub-2
Lithology	Estimation	---
	Discrimination	SS/SH
		Type II Sand
		Dol/LS
		Dol/Any
HCI	Gas Detection	---
	Gas Thickness Estimation	---
	Liquid Hydrocarbon	---
Gas Cloud Imaging	---	---
Fracture	Detection	
	Parameter Estimation	
Anisotropy	---	
	Fracturing	
	Depth Conversion	
Shear Wave Reflectivity		
Improved Structural Imaging		
	Azimuthal Anisotropy	
Reservoir Monitoring	CO2 Monitoring	

	Time Lapse	
S-wave Vel. Est.	---	
	VSP	
Gas Hydrate		
Porosity		
Overpressure		
Processing	---	
	Statics	

Project Name	Objective	Sub Obj. 1	Sub Obj. 2	Method Name	Data Type
Colliery 1		Imaging			
Cameron South 1	Gas Cloud Imaging			Structural	3D 4C
Cymric 1	Anisotropy			S1/S2	VSP
Dara 1	Gas Cloud Imaging			Structural	2D 4C
Defour 1	Hydrocarbon Indicators	Gas Detection		P and S Amplitudes	2D P-P,SH-SH
Deleware Basin 2	Improved Structural Imaging			Structure	P,SH
Eastern Goldfields 1	Improved Structural Imaging			Structural	9C
Emilio 1	Fracture	Detection		S1/S2	3D 4C
Empire Abo 1b	Lithology	Discrimination	Sandstone/Shale	Vp/Vs	P-P,SH-SH
Empire Abo 2	Anisotropy	SS/SH Discrimination		Vsh/Vsv	P,SH 3C
Erawan 1	Lithology	Discrimination	Type II Sand	P and S Amplitudes	2D 4C
Faeoroes Island 2	Improved Structural Imaging			Structure	2D 3C
Horse Butte 1	Lithology	Discrimination	Sandstone/Shale	Vp/Vs	2D P-P,SH-SH
Joffre 3	Lithology	Discrimination	Limestone/Shale	Vp/Vs	3D 3C
Kingfisher 1	Lithology	Estimation		Vp/Vs	P-P,SH-SH
Lomond 1	Gas Cloud Imaging			Structural	3D 4C
Natih 3b	Hydrocarbon Indicators	Gas Detection		Vp/Vs	3D 9C

Field Name: **Lomond**

Objective: **Gas Cloud Imaging**

Area: **North Sea**

Age of Target:

Comment:

Type of Interpretation: **Structural**

Sub-Objective 1:

Sub-Objective 2:

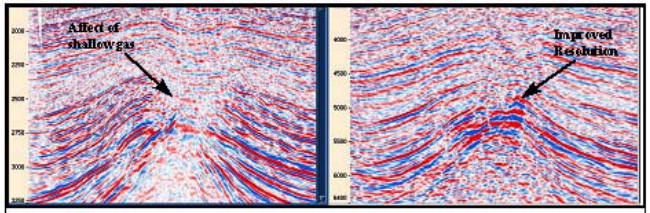


Figure (2) 3D 4C time domain processed data. Left : Inline from pp data through the gas affected area. Right : Equivalent inline from ps data through the centre of the gas affected area.

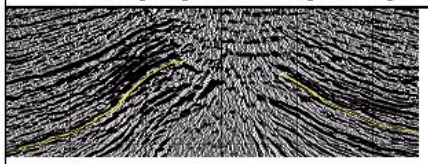
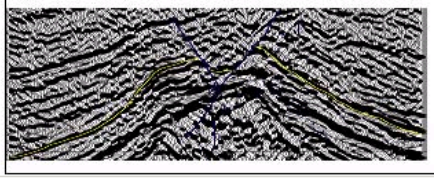


Figure (5)

Comparison between a streamer seismic line (above) and equivalent ps-seismic line (below) which has been translated to pp-time.



The crest of the anticline which is obscured on the streamer line is clearly imaged on the ps - seismic with key faulting also delineated.

Resolution: **Structure**

Data Type: **3D 4C**

Date of Acquisition:

Interval Thickness:

Objective Thickness:

Source Type: **Airgun**

Receiver Type: **4C OBC**

Reference: **Pope et al. (2000)**

Browser

- **Interpretive based browser is developed, and content is continuously being added.**
- **A project-oriented browser is operating.**
- **A project/geographically oriented browser has been added.**

Project-Oriented Browser

Project Name	Data Type	Operator	Acq. Date	Region	Basin
Scipio	**2D 9C**	**Texaco**	**1986**	**USA-Michigan**	**Michigan**
Lousana	2D 3C	CREWES	1987	Canada-Alberta	
Silo Field	3D 9C	RCP Phase II	1987	USA-Wyoming	
Carrot Creek	2D 3C	CREWES	1989	Canada-Alberta	
South Casper Creek	3D 9C	RCP Phase III	1989	USA-Wyoming	
Springbank	2D 2C	CREWES	1990	Canada-Alberta	
Cochrane	2D 9C	CREWES	1990	Canada-Alberta	
Wildesden Green	2D 3C	CREWES	1990	Canada-Alberta	
Natih	3D 9C	PDO / Shell	1991	Oman	
Cedar Hill Field	3D 9C	RCP Phase IV	1991	USA-New Mexico	San Juan Basin
Cold Lake	4C 3C	CREWES	1993	Canada-Alberta	
Joffre Field	**3D 9C**	**RCP Phase V**	**1993**	**Canada-Alberta**	
Olds	2D 9C	CREWES	1993	Canada-Alberta	
Bluebell-Altamont	2D 9C	Lynn / DOE	1994	USA-Utah	
Sorrento Field	3D 9C	RCP Phase V	1994	USA-Colorado	Morrow Chanel
Vacuum	**4C 9C**	**RCP Phase VII**	**1995**	**USA-New Mexico**	**Permian Basin**
Vacuum	**3D 9C**	**RCP Phase VI**	**1995**	**USA-New Mexico**	**Permian Basin**
Stratfjord	**3D 4C**	**Statoil**	**1997**	**Norway**	**North Sea**
Teal South	**4D 4C**	**ERCH**	**1997**	**USA-Offshore Louisiana**	
Alba	**3D 4C**	**Chevron**	**1998**	**UK-North Sea**	
Texoma	3D 9C	UT-BEG / EGL	1998	USA-Texas	Morrow Chanel
Black Bear Creek	3D 9C	UT-BEG / EGL	1998	USA-Oklahoma	
Weyburn	4D 9C	RCP Phase VIII	1998	Canada-Sask.	
Second Wind	3D 9C	UT-BEG / EGL	1998	USA-Colorado	Morrow Chanel
Shaganappi	2D 3C	CREWES	1998	Canada-Alberta	
Valhall	**3D 4C**	**bp Amoco**	**1998**	**Norway**	
Donald	**2D 4C**	**Texaco**	**1998**	**USA-Offshore Louisiana**	
Ashland South	3D 9C	UT-BEG / EGL	1998	USA-Kansas	Morrow Chanel
West Cameron	**3D 4C**	**WesternGeco / Seitel**	**1999-2000**	**USA-Offshore Louisiana**	
Weyburn	4C 9C	RCP Phase IX	2001	Canada-Sask.	
Qatar	**3D 4C**	**Occidental**	**2003-2004**	**Qatar**	

Bookmarks | Thumbnails | Comments | Signatures

Alba Field

Central North Sea
UK Block 16/26
3D – 4C (OBS) Survey
67 square kilometers acquired in 1998

Impact of Multicomponent Seismic Survey:
Credited with the initiation of a new drilling phase resulting in booking an **additional 100 million Barrels of reserves**

Operator: Chevron

Partners: Arco, Conoco, Fina, Petrobras, Saga, Statoil and Unilon/Baytrust

Reservoir Description: **1984** Discovery
Estimated 1 billion barrels of oil in place
1994 Initial production: 80,000 BOPD of 20 API oil.
Reservoir 2000 meters deep in 140 m of water.
Eocene age unconsolidated channel sands (Type II) sealed by low permeability shales. Channel system approx. 12 km long, 1.5 km wide and 100 m thick. The low impedance contrast between the Type II sand and shale resulted in poor imaging with conventional P-wave seimic.
$\phi = 35\%$, Perm = 2700 mD

Acquisition: **1989** 3D Streamer survey conducted (Used for a base survey for time-lapse studies with the '98 OBS data.)

1992 Britannia 3D streamer survey

1996 Reprocess '89 streamer survey
Oil-water contact defined very clearly.

April **1998** for the **full field 3D – 4C survey** by GecoPrakla
(This is one of the World's first full-field 3D-4C Surveys)

2D – 3C test surveys: were gathered by two different contractors to confirm the possibility of gather P-SV data. GecoPrakla was selected as the contractor for the full 3D survey.

VSP data show upgoing an downgoing converted waves, with some of the strongest from the top of the reservoir.

2002 Long-offset streamer survey by Veritas (Britannia initiative)

1 of 4 8.5 x 11 in 43

Project-Oriented Browser

Project Name	Data Type	Operator	Acq. Date	Region	Basin
Silo Field	2D 9C	RCP Phase I	1985	USA-Wyoming	
Lost Hills	2D 9C	KimTech	1986	USA-California	San Juaquin Valley
Scipio	**2D 9C**	**Texaco**	**1986**	**USA-Michigan**	**Southern Michigan**
Lousana	2D 3C	CREWES	1987	Canada-Alberta	
Silo Field	3D 9C	RCP Phase II	1987	USA-Wyoming	
Carrot Creek	2D 3C	CREWES	1989	Canada-Alberta	
South Casper Creek	3D 9C	RCP Phase III	1989	USA-Wyoming	
Cochrane	2D 9C	CREWES	1990	Canada-Alberta	
Wildesden Green	2D 3C	CREWES	1990	Canada-Alberta	
Springbank	2D 2C	CREWES	1990	Canada-Alberta	
Natih	3D 9C	PDO / Shell	1991	Oman	
Cedar Hill Field	3D 9C	RCP Phase IV	1991	USA-New Mexico	San Juan Basin
Olds	2D 9C	CREWES	1993	Canada-Alberta	
Cold Lake	4C 3C	CREWES	1993	Canada-Alberta	
Joffre Field	**3D 9C**	**RCP Phase V**	**1993**	**Canada-Alberta**	
Bluebell-Altamont	2D 9C	Lynn / DOE	1994	USA-Utah	
Sorrento Field	3D 9C	RCP Phase V	1994	USA-Colorado	Morrow Chanel
Vacuum	**4C 9C**	**RCP Phase VII**	**1995**	**USA-New Mexico**	**Permian Basin**
Vacuum	**3D 9C**	**RCP Phase VI**	**1995**	**USA-New Mexico**	**Permian Basin**
Stratfjord	**3D 4C**	**Statoil**	**1997**	**Norway**	**North Sea**
Teal South	**4D 4C**	**ERCH**	**1997**	**USA-Offshore Louisiana**	
Texoma	3D 9C	UT-BEG / EGL	1998	USA-Texas	Morrow Chanel
Black Bear Creek	3D 9C	UT-BEG / EGL	1998	USA-Oklahoma	
Second Wind	3D 9C	UT-BEG / EGL	1998	USA-Colorado	Morrow Chanel
Donald	**2D 4C**	**Texaco**	**1998**	**USA-Offshore Louisiana**	
Weyburn	4D 9C	RCP Phase VIII	1998	Canada-Sask.	
Alba	**3D 4C**	**Chevron**	**1998**	**UK-North Sea**	
Shaganappi	2D 3C	CREWES	1998	Canada-Alberta	
Valhall	**3D 4C**	**bp Amoco**	**1998**	**Norway**	
Ashland South	3D 9C	UT-BEG / EGL	1998	USA-Kansas	Morrow Chanel
West Cameron	**3D 4C**	**WesternGeco / Seitel**	**1999-2000**	**USA-Offshore Louisiana**	

Bookmarks | Thumbnails | Comments | Signatures

94%

Scipio Trend

Southern Michigan
North-Central US
2D – 2C (P-P, SH-SH) Survey
Four 2-D lines acquired in 1986

Impact of Multicomponent Seismic Survey:
Girard Prospect identified as an analog to the Albion-Scipio field
Texaco No. 1-14 Morick drilled
Encountered 150 ft. of reservoir dolomite—Water saturated.
Geologic Success: Predicted reservoir encountered
Economic Failure: No hydrocarbons present in reservoir

Operator: Texaco

Partners: None

Reservoir Description:
1956 Discovery of Albion Scipio Field
Cumulative production 122 million barrels of oil
Over 200 billion cubic feet of gas
Produces from 600 feet of dolomitized limestone
Ordivician Trenton-Black River dolomite
(Dolomitization generated reservoir porosity)
The field is about 1 mile wide, and trends nearly linearly for 45 miles.
Reservoir depth is less than 5000 ft.

Acquisition: **1986** 4 2D lines of P-P and SH-SH data gathered with Bolt Omnipulse source.

Summary of Data Base entries	Project Sheet Reference:
Preliminary Paper: Pardus et al (1990) Discussion of entire project	Scipio 1
Used in larger book Tatham and McCormack (1991) Includes example from Pardus et al., and uses as a basis for further discussion of interpretation details, included event correlation and reconciliation of errors in picking P and S wave data.	Scipio 2
Users' Discussion:	
Last Update: Dec. 24, 2003 RHT Includes Scipio 1-Scipio 2 project entries.	

1 of 1 8.5 x 11 in

Geophyscis “Curricular” Group

DGS:

- Clark Wilson
- Steve Grand
- **Bob Tatham**
- **Kyle Spikes**

BEG:

- Sergey Fomel
- Bob Hardage

UTIG:

- Don Blankenship
- Cliff Frohlich
- Clark Wilson
- **Mrinal Sen**
- **Paul Stoffa**

Industry Consortia

BEG:

- EGL (Hardage)
- Frac City (Laubauch)
- Marine Margins (Wood / Mann)

UTIG:

- Gulf Basin (Galloway / Bulffler)
- Gulf Intraslope (Olson)
- Plates (Lawver/Dalziel)

DGS:

- EDGER Forum (Tatham/Sen/Stoffa)
- Ron Steel