

CREWES NEWS

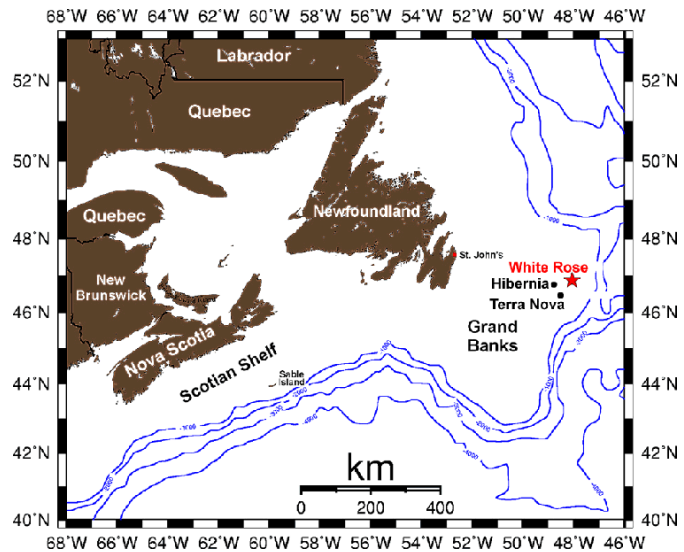
The Consortium for Research in Elastic Wave Exploration Seismology

White Rose 4C-3D Ocean Bottom Cable (OBC) Survey Proposed

CREWES is proposing an ocean-bottom cable (OBC) seismic survey in the White Rose field, Jeanne d'Arc basin, offshore Newfoundland, in a co-operative venture with Memorial University's MUSIC Project, Husky Oil and other interested industrial partners. The White Rose field has seismic imaging problems which might be better resolved via an four-component (4C) OBC approach. The major goal of this survey is to provide seismic structural and stratigraphic images that are superior to previous images obtained via 3D towed streamer. We anticipate improved P-wave images as well as augmenting converted-wave information.

This unique seismic survey would give the proposed industry-university alliance further experience in leading edge marine acquisition technology as well as better subsurface images. Involvement with such technology would be instrumental in establishing a foundation for the development of expertise in this rapidly evolving field. Also, data acquired under this survey would greatly aid in improving our understanding and the applicability of converted-wave exploration seismology in offshore regions. Finally, this survey could lay the cornerstone for a 4C OBC time-lapse (4C-4D) study which may have significant economic impact for all industrial partners involved.

A written proposal seeking financial support of this project will soon be released to interested CREWES sponsors and other possible industrial partners. This is the first of a number of proposals which will target developing oil and gas fields in offshore regions. For further information, please contact Brian Hoffe at bhoffe@geo.ucalgary.ca. The latest draft proposal can be viewed at <http://www.crewes.ucalgary.ca/4cproposal>.



1999 CREWES Sponsors Meeting - Room Reservations

As we announced last month, the 1999 Sponsors Meeting will be held at The Lodge at Kananaskis, Alberta, Canada, during 1-3 December. For the meeting, please make your own room reservations at the Lodge. To qualify for the group rate, \$133.00 per room, plus service charge and tax, please identify yourself as being with the University of Calgary, CREWES Project. The block of rooms for CREWES sponsors will be held only until October 15, and the group rate will not be guaranteed after that. If you wish to stay at the Lodge on the Friday night (December 3) it is strongly recommended a room is reserved before October 15.

An agenda is being prepared and will appear in a future newsletter. We look forward to seeing you in Kananaskis.

Welcome Back - Dr. Jim Brown

A warm welcome back to Dr. Jim Brown, a founding member of CREWES and an Associate Director up until 1996 when he departed on a three-year leave of absence from the University of Calgary.

During the three years, Jim was employed with PGS Reservoir AS in Oslo, Norway, with the group involved with acquisition and processing of four-component (4C) seafloor data. In general, his work involved quality control and analysis of the raw data and study of various preprocessing routines. In particular, Jim worked on problems involving seafloor geophone coupling, seafloor-acquisition footprints, the response of gimballed geophone systems, attenuation of water-column multiples and linear noise, imaging beneath basalt layers, and the question of polarity conventions for multicomponent seafloor data.

Jim plans to continue his research on these marine-seismic topics with CREWES.



The Weyburn Monitoring Workshop: a report

As many Sponsors are aware, CREWES has significant interest in the areas of multicomponent seismic analysis of subsurface fluid flow and lithology. Pursuing these interests, Jim Brown and Dave Henley attended the Weyburn Monitoring Workshop, 25-27 August, in Regina, Saskatchewan. This Workshop forms the initial stage in a planned enhanced oil recovery (EOR) project involving CO₂ and water injection at the Weyburn field, Saskatchewan, organised and sponsored by the International Energy Agency, the Petroleum Technology Research Centre (PTRC), the Saskatchewan Department of Energy and Mines, and PanCanadian Petroleum Ltd (PCP).

The objective of the Workshop was to provide the framework for a monitoring proposal, based on presentations given on regional geology, hydrology, reservoir characteristics, and CO₂ supply, as well as CO₂-based EOR, and CO₂ sequestration and monitoring. A small Project Team was then set up to propose a specific detailed monitoring programme. Jim Brown is representing CREWES in the Project Team to provide input on the geophysical component of the programme. CREWES is collaborating on this component with the University of Alberta and Lawrence Berkeley National Labs. At present, downhole methods are favoured to provide the resolution and signal-to-noise ratios necessary to yield meaningful results for time-lapse studies. We are looking to complement these with surface 4D seismic, and other geophysical methods such as geodetic, electrical, and electromagnetic.

The results of our collaboration in this project will no doubt be of interest to many of our Sponsors and lead to further research developments in seismic exploration. We will keep you posted as and when they happen.



Map of Saskatchewan, showing Saskatoon, Regina and Weyburn

Personnel Update

CREWES Director, Rob Stewart, is in England this Fall, on sabbatical at Schlumberger Cambridge Research Centre. He will be working on multicomponent seismic instrument design and 4-C processing techniques - both topics of great interest to us at CREWES. He will be returning to Calgary prior to the SEG and for the Sponsors Meeting, and resuming his full-time duties at CREWES and the University of Calgary in January 2000.



CREWES Abstracts at the SEG

CREWES will be presenting papers outlining a year's worth of research at the SEG International Exposition and Sixty-Ninth Annual Meeting in Houston, Texas; October 31 – November 5, 1999. As a preview for Sponsors, below is a list of CREWES abstracts that have been accepted for presentation:



Analysis of the effectiveness of 3-C receiver arrays for converted wave imaging.

Brian H. Hoffe, Henry C. Bland, Gary F. Margrave, Peter M. Manning, and Darren S. Foltinek

Anisotropic depth migration using the equivalent offset method (EOM).

John C. Bancroft and Robert Vestrum

AVO analysis by simultaneous P-P and P-S weighted stacking applied to 3C-3D seismic data.

Jeffrey A. Larsen, Gary F. Margrave, and Han-xing Lu

Common-offset-vector gathers: an alternative to cross-spreads for wide-azimuth 3-D surveys.

Peter W. Cary

Equivalent offset migration (EOM) applied to a synthetic foothills data set: A case study.

John C. Bancroft and M. Graziella Kirtland-Grech

Equivalent offset migration for vertical receiver arrays.

John C. Bancroft and Yong Xu

An explicit, symmetric wavefield extrapolator for depth migration.

Gary F. Margrave and Robert J. Ferguson

The ghost in the spectrum.

Nasser S. Hamarbatan and Gary F. Margrave

A practical implementation of depth migration by nonstationary phase shift.

Robert J. Ferguson and Gary F. Margrave

Prestack migration residual statics analysis using equivalent offset mapping.

Xinxiang Li and John C. Bancroft

The radial trace transform: an effective domain for coherent noise attenuation and wavefield separation.

D.C. Henley

Rayleigh wave modelling by finite difference.

Peter M. Manning and Gary F. Margrave

Prestack V(z) f-k migration for PP and PS seismic data.

Xinxiang Li and Gary F. Margrave

Quantifying uncertainties in AVO forward modeling.

Ayon K. Dey, Chandra Rai, and Carl Sondergeld

CREWES NEWS by Email

As mentioned last month, we are making CREWES NEWS available by email to those Sponsors who wish to receive it as an attachment in Adobe Acrobat (.pdf) format. We ask that you confirm with your System Administrator that you are able to receive email attachments before making your request. Sponsor representatives who choose this method of delivery will no longer receive copies of the newsletter by fax.

To request this delivery method, please send an email to crewes@geo.ucalgary.ca.

Students at CREWES - Todor Todorov

For this month's student profile, we turn to Todor Todorov, an M.Sc. student who joined CREWES in September 1996, after graduating with a Diploma for High Education in Applied Geophysics from University of Mining and Geology, Sofia, Bulgaria. During his studies in Bulgaria, Todor worked on projects in different areas of geophysics, including: seismic, gravity, electrical, and magnetic methods.



Todor is studying under the supervision of Robert Stewart, while also working for Hampson Russell Software in Calgary as a Special Project Geophysicist.

His research work is focussed on the integration of well log information and 3C-3D seismic data: geostatistics, prediction of reservoir properties using seismic attributes, application of artificial neural networks in reservoir characterization, converted wave inversion. Todor has presented this work at the annual SEG and CSEG meetings.

Fall Graduate Courses

The University of Calgary Department of Geology and Geophysics has announced a series of graduate courses to be conducted in the Fall term that may be of interest to local Sponsors.

GLGY 699.05: Topics in Reservoir and Aquifer Characterization

Lecturers: Dr. L. Bentley, Dr. M. Best

Time: Lec 01: Tuesday and Thursday 17:00-18:15; Lab 01: Thursday 18:30-20:30

GLGY 699.07: Reservoir Geology

Lecturer: Dr. R. Meyer. **Time:** TBA

GOPH 645: Seismic Wave Propagation

Lecturer: Dr. E.S. Krebs. **Time:** Lec 01 Monday 16:00-19:00

GOPH 657: Seismic Signal Analysis

Lecturer: Dr. G. Margrave. **Time:** Lec 01 Monday 17:00-20:00; Lab 01 Thursday 17:00-20:00

GOPH 659: Practical Seismic Modelling, Migration and Inversion

Lecturer: Dr. J. Bancroft. **Time:** Lec 01 Wednesday 17:00-20:00

Unclassified students who have the educational prerequisites or equivalent experience are welcome to register for this course, but must have their registration approved by the Department. Contact Marg Graham at (403) 220-5850 for registration information.

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