



PREVIEW

AUSTRALIAN SOCIETY OF EXPLORATION GEOPHYSICISTS

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Special PREVIEW Feature 11-20

Aeromagnetism in Petroleum

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Introduction

Greetings to all PREVIEW readers for 1993. The year has started well with the Editor of Exploration Geophysics, Don Emerson being honoured in the 1993 Australia Day Honours list for services to exploration geophysics. Terry Crabb and Roger Henderson pay tribute to Don this issue (p 3) and convey on behalf of all ASEG members our congratulations, vicarious pleasure and pride for this well-deserved honour.

Of special note in this PREVIEW is the colour feature article from World Geoscience on new techniques in aeromagnetism for basin exploration (p 11) illustrating how petroleum search can be enhanced by use of relatively low-cost state-of-the-art aeromagnetic techniques which can now better differentiate intra-basin and basement structure prior to or after more expensive seismic programs. Our thanks to World Geoscience for their support of PREVIEW.

ASEG Research Foundation news reports on model experiments for fault location using VSP (p7), research funded by an ASEG grant to Flinders University. ASEG 1992 Conference business news (p5); news of a distinguished lecture/workshop series by Prof. Robert Sheriff (p2 & p4); a call for ASEG and SEG award nominations (p26); notice of the AGM on April 20th (p21); a seismic activity report (p18); an update on ASEG funding initiatives (p22); and of course regular Branch reports (p4) provide further evidence of your ASEG at work. Members should be receiving first news of the 1994 Perth Conference shortly.

The SEG and the ASEG is moving to include e-mail addresses on the membership databases and recently the SEG Leading Edge (Sept. 1992, p37) featured an article on e-mail, which is commended to PREVIEW readers. This issue PREVIEW outlines e-mail service facilities in Australia (p22).

Charlie Barton of AGSO reports briefly on the April Geomagnetism Workshop and Palaeomagnetism in Australasian seminar in Canberra (p21).

Finally we profile the SAGEEP Conference in San Diego on environmental, engineering and groundwater geophysics (p27) which highlights the advances made in the US in this growing area of application of geophysics.

Remember that our efforts to further improve and make PREVIEW relevant start with you. Your ideas and contributions are needed and welcomed.

Editor

President's Piece

I was delighted to read that Dr Don Emerson, the honorary editor of our bulletin *Exploration Geophysics* has been appointed a Member in the General Division of the Order of Australia in the Australia Day Honours List this year for services to exploration geophysics. Congratulations Don, its good to see that your years of hard work have now been acknowledged by the whole of Australia and not only by those friends and colleagues who are well aware of your contribution over the years.

The year is now well underway and I note that the State branches are organising their AGMs. Whether you stand for election or not it may be time to take a more positive approach to your Society. You can assist with a state committee, or one of the many standing committees; regularly attend meetings; or perhaps write a letter to PREVIEW. Letters are important as they allow you to air your views to other members. PREVIEW has now been launched in colour and we hope this will be a continuing feature. It certainly adds brightness, and raises the publication to an international standard.

*Hugh Rutter
President*

ASEG People Profile

Greg Turner, ASEG Committee Member (Advertising) 1993

Greg Turner graduated with a B.Sc. in geology and applied maths followed by Honours in geophysics from Monash University in 1986. In his Honours year he wrote Tau-p software and investigated its potential for use on cross-hole seismic data sets.



After graduating, Greg moved to Sydney to join the Australian Coal Industry Research Laboratories (ACIRL). At ACIRL he initially worked on developing techniques for very shallow seismic reflection profiling for open cut mines and further developing in-seam seismic processing procedures. He also performed the Radio Imaging Method (RIM) and 3D seismic at Australian coal mines. Later he concentrated more on the introduction of Ground Penetrating Radar (GPR) to Australian underground coal mines.

During his time at ACIRL, Greg began studying part-time for a PhD in Earth Science (geophysics) at Macquarie University. His thesis is on subsurface radar pulse distortion and

looks in detail at the generation of very high frequency radio-waves close to the earth's surface together with the propagation and reflection of these waves within the earth. In the course of this study he has derived new methods for improving the resolution of subsurface radar data and for obtaining more information about the composition of subsurface materials. Most of the thesis is now written and Greg is looking forward to guilt-free weekends lying on the beach.

In 1990, Greg spent three months enjoying what the Scots call summer working for the British Geological Survey (BGS) as part of the Edinburgh Anisotropy Project. While at the BGS he investigated the possibility of determining anisotropy axes (and hence stress/cleaving directions) from borehole in-seam seismic surveys with some promising results.

On returning to Australia, Greg moved back to Melbourne where he began work at the CSIRO Division of Geomechanics. There he is involved in a joint project with the Division of Applied Physics and BHP to develop a new generation of totally Australian made subsurface radar equipment. He also performs contract subsurface radar surveys which have focussed on applications ranging from looking for buried pipes and cables and old underground mine workings, to looking through water for damage to weir structures and trying to win \$250,000 for an early retirement by locating the Mahogany Ship.

Away from the office, Greg is a keen tennis player and enjoys windsurfing, cycling, the odd body bash at Portsea or Gunnamatta and wiping out on the slopes of Mt Hotham.

Stop Press

Bob Sheriff - Distinguished Lecturer Tour

The ASEG Continuing Education Committee and Curtin University of Technology are currently negotiating a Distinguished Lecturer Tour by Dr. Bob Sheriff.

Cities to be visited are Melbourne, Sydney and Brisbane, where Dr. Sheriff will discuss Reservoir Geophysics for Engineers, Geologists and Geophysicists.

Tentative dates are:

Melbourne	May 6-7
Sydney	May 10-11
Brisbane	May 13-14

Stay tuned for more information

*Henk Van Paridon
Chairman Continuing Education Committee*

Australia Day Honours List - 1993



**D.W. Emerson, AM, BE, MSc, PhD,
FAusIMM, FAIG**

Editor, Exploration Geophysics

Don Emerson was appointed a Member (AM) in the General Division of the Order of Australia in the Australia Day Honours List of January 26, 1993, for service to geophysical exploration.

Our congratulations to Don on being such a worthy recipient of this distinguished award. All members of the ASEG could appreciate Don's major contribution to the Society - fourteen years as Editor of the prestigious geoscientific publication - *Exploration Geophysics*. He can be justifiably proud of his record of achievement with this publication, and in 1981, the ASEG conferred Honorary Membership upon Don for distinguished professional contributions to exploration geophysics.

It is gratifying to see that someone of his eminence and achievements has been recognised with the award of an AM.

Don holds a first class honours engineering degree in applied geology (University of NSW, 1962) and higher degrees in exploration geophysics (University of NSW, 1966; University of Sydney, 1973).

In 1993, he resigned from the University of Sydney after 28 years service in the Department of Geology and Geophysics including five years as Head of Department (1987-1991), five years as Director of the Earth Resources Foundation (1988-1992), and five years as a member of the Advisory Board of the Geotechnical Research Centre in the Department of Civil and Mining Engineering (1988-1992).

Don is now Managing Director of Systems Exploration (NSW) Pty Limited which was founded in 1970. Through its own resources, or in conjunction with professional associates, the company offers geophysical and geological consulting and advisory services and specializes in petrophysical measurements.

I am sure all members of the Society join me in wishing Don success in his changed circumstances.

Don can now be contacted at:

*Postal address: Box 6001, Dural Delivery Centre, NSW 2158
Office: "Coach Hill", River Road, Lower Portland, NSW 2756
Telephone: (045) 791 183 Facsimile: (045) 791 290*

Terry Crabb

More Tributes to Don Emerson

In the 1993 New Year Honours List, Don Emerson received the award of Member in the Order of Australia (AM). The decision to seek nomination emanated from the ASEG Federal Executive in 1991 when it resided in Western Australia. As well as the unanimous support of the ASEG Executive for his nomination, particular and valuable assistance was given by Dr. Ken McCracken.

The main purpose was to acknowledge Don's outstanding devotion to the Society and in particular, the tremendous amount of time and effort he has put into Editorship of our journal. Five of them served for a total of eight years and Don has fulfilled the role for the remaining 15 years and for the last 10 years in succession. During that time the journal has become one of the three most highly recognised journals in exploration geophysics in the world. In particular, Don has been personally responsible for generating a number of special issues such as the Elura Case History volume and other special issues on 2D gravity, applied magnetics and most recently on environmental geophysics and site characterisation. If that wasn't enough, Don has authored or co-authored a total of 21 papers in *Exploration Geophysics* on a wide range of subjects including magnetics, gravity, electrical methods, well logging and general interest papers on energy policy and mineral exploration speculation.

Don, who has been a member of the Society since its inception on 1970, took time out from the Editorship to be President of the Society in one year and in 1981 he was awarded Honorary Membership. Throughout all this period Don has busied himself at Sydney University, firstly as a lecturer in exploration geophysics and then Associate Professor, followed by four years as Head of the Department of Geology and Geophysics. Its no wonder that he's been heard to say that; "if there were 40 hours in the day, it wouldn't be enough for me to do all I want to do".

While Don has now retired from the University, he has fortunately pledged to continue to devote possibly even more than the usual time to the Editorship.

*Roger Henderson
Geo Instruments*

ASEG Branch News

Victoria

The first committee meeting was held on the 11 February 1993 with attendants: Greg Beresford, John Sumpton, Paul McDonald, Alan Willocks, Bruce Simons and Zis Katelis. ASEG meetings will reconvene on every second Tuesday of the Month (if possible) for 1993 with an emphasis on improving MEMBER PARTICIPATION. February meeting (which had a disappointing turnout) included an interesting talk on "Geophysical Techniques for the Detection of Fire Holes in Coal" by Blair Sands from the GSV. AGM (Federal and State) is planned for the 20th of April, so stay tuned. All are welcome.

Zis Katelis
Secretary

New South Wales

NSW membership started off the year with the Annual General Meeting, held on the 4th February. Nigel Jones, President since 1991, resigned from the position but will remain on the committee. Many thanks go to him for his enthusiasm and hard work over the past years. The newly elected President is Derecke Palmer (dressed appropriately in boardshorts!) from the University of New South Wales, and Maki Petkovski now holds the Treasurer's position. Next meeting (technical presentation) is scheduled for late March.

Attached an updated list of the committee/executive and their contact addresses.

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President Derecke Palmer	(02) 697 4275	(02) 313 8883
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Treasurer Maki Petkovski	(02) 364 4999	(02) 364 4930
Committee Len Diekman	(02) 713 7669	(02) 713 7669
Peter Eagleton	(02) 449 8777	(02) 449 9029
Richard Facer	(02) 692 2918	(02) 692 0184
Peter Hatherly	(02) 887 3777	(02) 888 9912
Roger Henderson	(02) 529 2355	(02) 529 9726
Wes Jamieson	(02) 263 6080	(02) 263 6077
Nigel Jones	(02) 263 6007	(02) 263 6077
John Peacock	(02) 418 8077	(02) 418 8581
Tim Pippett	(02) 529 2355	(02) 529 9726
Greg Skilbeck	(02) 330 1760	(02) 330 1755
Barry Smith	(02) 362 4233	(02) 362 4248
Mike Smith	(02) 221 3211	(02) 223 1975
Steve Webster	(02) 498 2299	(02) 418 1292

Juliet Salmon
Secretary

Western Australia

Happy New Year from ASEG (WA) to all ASEG members. ASEG (WA) finished up 1992 with a BBQ at President Kim's house. Everyone who attended was very sensible and drank only light beer, and not too much of it - which makes for very safe roads but unfortunately also little gossip to spread via ASEG branch news!

Your WA committee will be meeting soon to organise a technical program for the coming year.

Prof. Robert Sheriff of "Encyclopedic Dictionary of Exploration Geophysics" fame - and a world renowned leader in our profession is currently the holder of the Curtin University Haydn Williams Fellowship. Brian Evans assures me that Prof. Sheriff would be pleased to host an evening at the Raffles sometime to be advised. Stay tuned. Prof. Sheriff will also be running a short course entitled "Reservoir Geophysics for Engineers, Geologists and Geophysicists" 23 to 25 March 1993, through Curtin University - details are available from Brian Evans (09) 351 7092 or Amanda Thompson (09) 351 7674.

Andie Lambourne
Secretary

South Australia

The South Australian Branch began 1993 in much the same way 1992 finished. The 1992 Branch finished 1992 with the traditional Christmas BBQ, held at Neil Gibbins' on 8 December. This was a very enjoyable evening with an excellent spread of meats and salads and some interesting ASEG wines of years gone by. The AGM/Annual Dinner was held on 10 February at the Botanic Hotel. This was an outstanding success with 59 present to enjoy the food, wine and a very encouraging talk by Dr Ross Fardon, the new Director General of the SA Dept. of Mines & Energy. All present were very impressed with what they heard, which, coming on the heels of the recently announced South Australian Exploration Initiative, augurs well for exploration, both for minerals and petroleum, in South Australia. The 1993 Committee was also elected at the AGM and comprises the following:

	Phone	Fax
President Craig Gumley	(08) 224 7682	(08) 224 7145
Secretary Ashley Duckett	(08) 235 3764	(08) 223 1851
Treasurer Mike Brumby	(08) 363 0922	(08) 362 1840
Committee Andy McGee	(08) 224 7317	(08) 224 7145
Neil Gibbins	(08) 224 7305	(08) 224 7145
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Alan Appleton	(08) 274 7630	(08) 272 7597
Dr John Parker	(08) 274 7615	(08) 272 7597
Rod Lovibond	(08) 235 3762	(08) 223 1851
Doug Roberts	(08) 235 3757	(08) 223 1851
Murray Symonds	(08) 234 5229	(08) 234 5876
Shanti Rajagopalan	(08) 228 4698	

Ashley Duckett
Secretary

ASEG Conference Business News

A request to ASEG sub-committees to report significant news items from the ASEG 1992 Conference business meetings has produced the following items. More detailed reports will be tabled at the ASEG AGM (p3) and appear in coming PREVIEW issues. A special report on seismic survey activity is featured on page 18.

ASEG Continuing Education Committee

- The CEC had its inaugural meeting at the ASEG 9th Conference
- The need to establish a contact network for fast information distribution was identified.
- Some possible course leaders were suggested.
- There was a feeling that many seismic courses were already available from various sources and that some of these could be contracted.
- In the minerals area there was a strong need for an introductory type course in ground geophysics. Since there was no such course readily available, (a) suitable leader/s would need to be found.
- The need to educate the educators was felt and it was generally agreed that university staff should be encourage to participate in ASEG activities by reducing costs to them.
- The 3D Seismic Workshop was successfully conducted in Perth and Melbourne.
- We are currently exploring the possibility of a distinguished lecture series by Bob Sheriff with Curtin University during his stay there early this year. (Editors Note - See page 2)

Henk Van Paridon

Chairman Continuing Education Committee



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Publications Committee Meeting

Many matters were discussed, but two items of note were:

1. For the first time, the huge task of editing the papers for the Conference issues of Exploration Geophysics was paid for. Jim Dooley received \$10,000 for his excellent efforts. Such a move was long overdue. The strain on previous Conference editors was legend. Jim tabled his report which is available for those interested.
2. The ASEG WA Branch (via Kim Frankcombe) are providing editorial input to the University of WA's publication of Geophysical Signatures of Western Australian Mineral Deposits. The ASEG has missed the opportunity in WA - it shouldn't miss the opportunity in the other States.

Terry Crabb

Chairman Publications Committee

Exploration Geophysics

Publications Schedule

Further to the notice on Page 6 of December's Preview, the contents has been expanded to include:

Addendum:

Is forward modelling as efficacious as minimum variance for refraction inversion? - D. Palmer.

Discussion:

"The application of a joint MT CSAMT survey to oil exploration" (L.M. Hastie, C. Cevallos and I.J. Chant) by K. Vozoff, with reply by senior author.

These late inclusions have delayed the printing of this September 1992 issue to early March 1993.

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ASEG Research Foundation News

Report on the ASEG Research Foundation 1991 funded project: Imaging of subsurface faults walkaway waveguiding - model experiments.

This work was carried out at Flinders University of South Australia by N. Sike as an MSc project under the supervision of Dr S. Greenhalgh. The project contributed to the work on fault imaging which was recognised at the ASEG Conference 1992 by receiving the Laric Hawkins Award (PREVIEW 40, October 1992, P8) and is reported in the Conference Volume (Exploration Geophysics 1992, No 23, pp 47-50).

Introduction

Hydrocarbon reservoirs and coal seams often occur within low velocity channels, thus forming potential seismic waveguides. It is possible that faults and other structural disturbances in the guide might be mapped by studying the pattern made by mode-converted channel wave arrivals at a borehole geophone as the seismic source walks about the surface. A disruption in the low velocity layer (LVL) will act as a secondary source when an incident (downgoing) P or S wave strikes it. Some of the energy re-radiated from the secondary source will be captured by the LVL and will propagate horizontally as channel waves, guided by total internal reflection within the LVL. The waveguiding principle is exploited in-seam seismology, but there the source is placed within the LVL rather than outside of it.

The hybrid surface-to-borehole seismic mapping technique is illustrated schematically in Figure 1. The accompanying time section shows the moveout of arrivals in space-time. The direct P and S arrivals define two hyperbolic events of dissimilar curvature, both having their apex at the borehole position. Scattered mode-converted channel wave arrivals from the fault, track along the secondary hyperbolae. Apices lie beneath the point at which the shot line crosses the fault.

The resolution and sensitivity with which faults can be mapped by a walkaway VSP waveguiding survey should be significantly higher than that possible with surface reflection profiling because the waves pass only once through the overburden, and the resulting channel waves spread in only two dimensions.

In order to improve our understanding of the phenomenon and to determine the efficiency of fault scattering/channel wave mode-conversion, we have conducted a series of physical (laboratory) and numerical seismic model experiments.

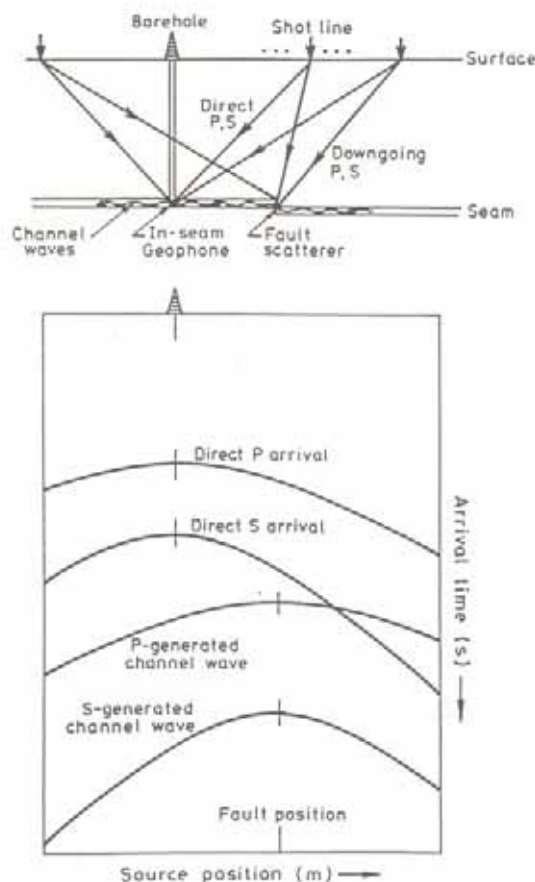


Fig 1. Schematic illustration of scattering of downgoing P and waves at a faulted LVL, for a walkaway VSP survey. The channel waves move out along displaced hyperbolae (corresponding to the direct P and S waves); the apices occur where the source is vertically above the fault.

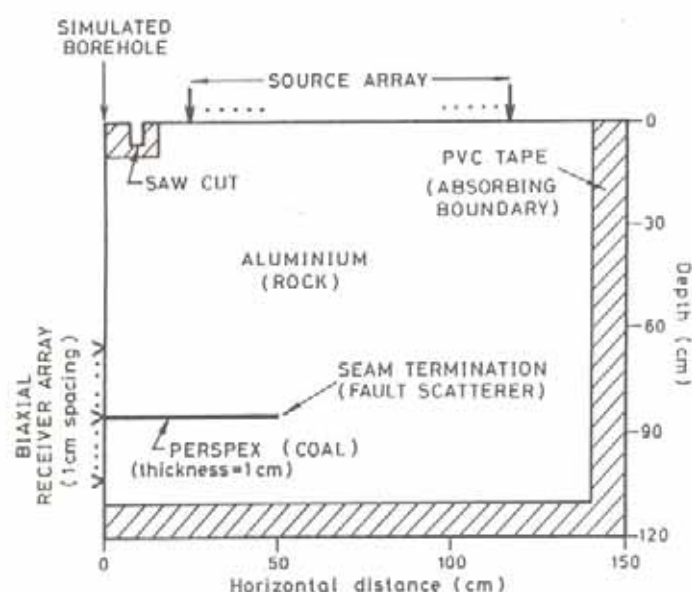


Fig 2. Coal seam termination model used in physical and numerical model experiments. For walkaway VSP survey, receiver is fixed in mid-seam position and the source is walked over the surface. For the offset VSP survey, the source is fixed at a given offset and the receiver moved along the borehole (left edge of the model).

Physical Modelling

The laboratory seismic experiments were performed on a two-dimensional, vector scale model facility using the ultrasonic pulse technique (Pant et al, 1988). Figure 2 shows one such model of a coal-seam termination. The model materials were aluminum (country rock) and perspex (coal). Assuming a distance scaling factor of 300 between the model and the real (field) situation, the laboratory set-up simulates a 3m seam at a depth of 255m. The fault (or seam termination) has a throw of 3m (one sixth of a wavelength).

The resulting walkaway VSP seismograms are given in Figure 3. Offsets range from 24cm (72m) to 116cm (348m). The fault lies at trace 27, 50cm (150m) from the borehole. The direct P wave and the direct S wave between source and receiver dominate the display. The strong arcuate event, which interferes with the direct S wave and has its apex at trace 27 (fault location), is the channel wave generated by the incident P wave striking the fault. It is strongest on the horizontal component, as expected for the first symmetric channel mode. The downgoing S wave from the source does not produce a noticeable channel wave because of the unfavourable polar pattern of S at this range of angles relative to the fault.

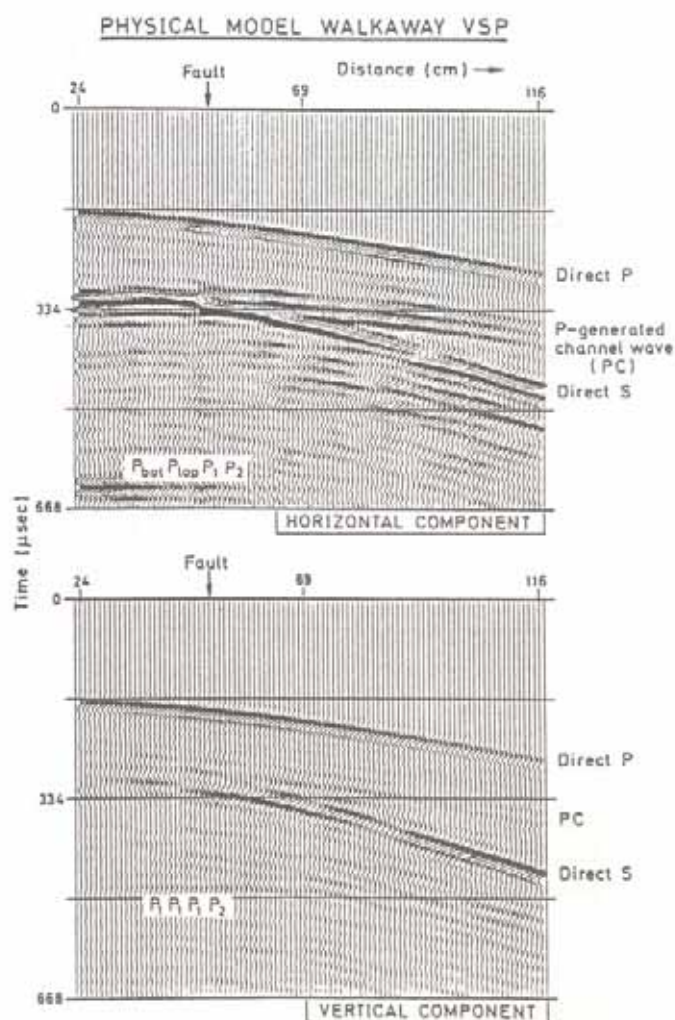


Fig 3. Scale model VSP seismogram for walkaway experiment. The P-wave generated channel wave can be clearly seen.

Numerical seismograms

Finite difference synthetic P-SV seismograms were computed for the model of Figure 2 using a new displacement-potential algorithm for 2-D inhomogeneous media, formulated by Cao and Greenhalgh (1992). A combined P + S unidirectional source was used.

The horizontal and vertical component seismograms are shown in Figure 4. Each of the main P and S wave arrivals has associated with it near-receiver reverberation within the LVL. The P-wave generated channel wave and the S-wave generated channel wave are the two hyperbolic events on the section, with the apices at the fault position (trace 14). These two events have distinct moveout patterns; they are simply displaced versions of the primary P and S wave curves.

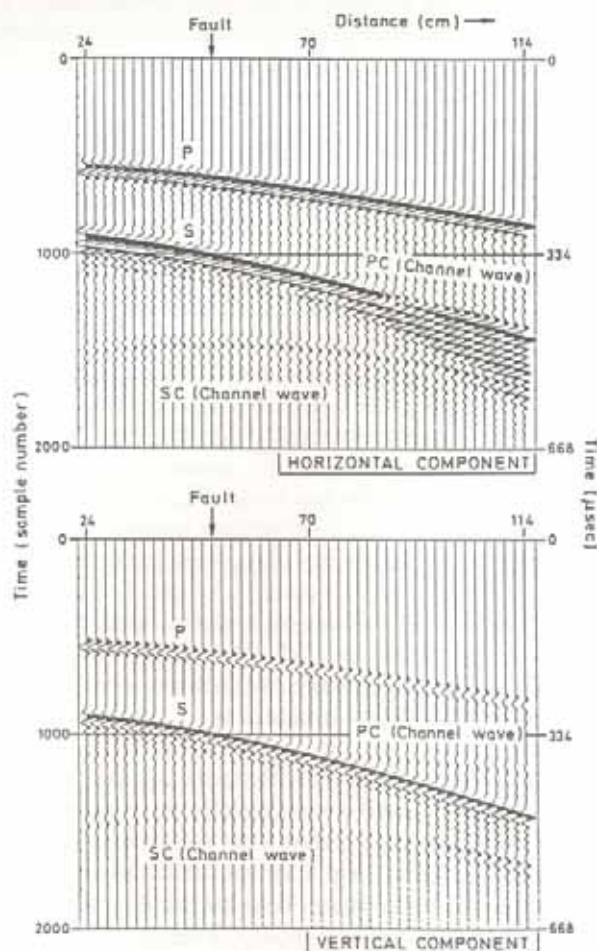


Fig 4. Horizontal and vertical component seismogram obtained by numerical walkaway VSP experiment. The moveout pattern of the two channel waves (PC and SC) parallel those of the primary downgoing P and S waves.

Multi-component seismograms for an offset VSP experiment (offset 116cm) are shown in Figure 5. The receiver occupied 39 positions along the borehole over the depth range 65.5cm (1.965m) to 103.5cm (310.5m). The depth spacing was 1cm (3m). Only one trace, at 84.5cm, lies within the LVL.

The various arrivals - direct P, direct S, reflected P, reflected S, converted reflections and transmissions - PS and SP - are identified on the figure. The plot resembles a ray diagram in the subsurface.

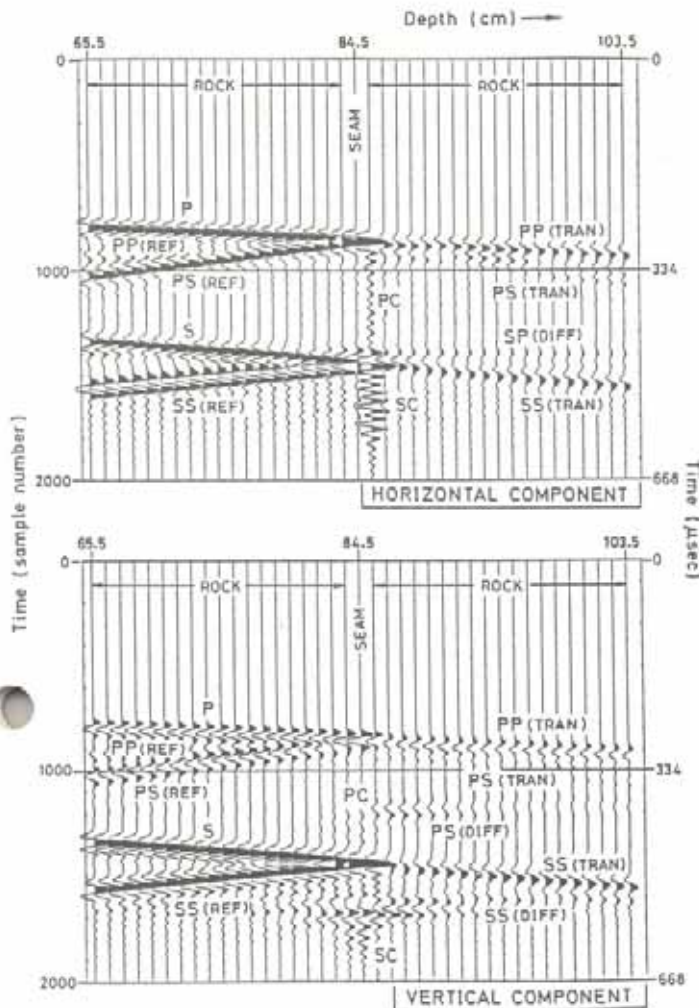


Fig 5. Two-component offset VSP synthetic seismograms for P-SV scattering at a faulted coal seam. The P and S reflections and mode conversions at seam/rock boundaries can be clearly observed. The two channel waves are visible on trace 21, with the receiver mid-seam.

The two sets of channel waves, PC and SC, produced by the incident P and incident S striking the fault, are also marked. Energy is not confined to the seam; rather it is channelled by it. Diffracted body waves, which travel direct paths outside the LVL, constitute a continuation of the wave motion due to waveguide arrivals.

Conclusions

This study has shown that guided seismic waves are generated at lateral discontinuities in low velocity layers, such as coal seams and reservoirs, as an integral part of the mechanics of scattering downgoing body waves from a surface energy source.

Numerical and scale model laboratory experiments confirm that even small faults (throw less than one-tenth of a wavelength) can be mapped by recognising diffraction patterns made by the mode-converted guided waves at borehole geophones on a walkaway VSP profile. Walkaway waveguide surveys may be able to reveal structures at considerable distance from a well, with a resolution that is otherwise unattainable.

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The units are Regolith Geology, Exploration Geochemistry, Orebody Models, Gravity and Magnetic Techniques, Electromagnetic Techniques, Resistivity and Induced Polarisation Techniques, Radiometrics and Remote Sensing, Data Processing, Imaging and Image Processing, Numerical Modelling and Inversion, Borehole Methods, and an Interpretation Project. Lecturers in the first year include Dr. Tom Whiting (Chief Geophysicist, BHP Minerals), Prof. Ray Smith (CSIRO and Curtin University), Prof. Ross Large (University of Tasmania), Dr. Jim Macnae (Macquarie University and Lamontagne Geophysics) and Dr. Art Raiche (CSIRO). The first three units begin 8 February (Regolith Geology), 15 February (Exploration Geochemistry), and 22 February (Techniques in Exploration Geology, on orebody models), 1993.

The fee for the full Course is \$12,000 for Australian residents, and \$14,000 for others. Units can be done individually if desired, subject to availability of places, and will be charged on a pro rata basis.

For further information and application forms please write The Director, Cooperative Research Centre, Macquarie University, NSW 2109 or fax (02) 805 8428. (From overseas, fax +61-2-805 8428.)

References

Cao, D. & Greenhalgh, S.A. 1992. Finite-difference simulation of P-SV wave propagation: a displacement potential approach, *Geophysical Journal Int.* (in press).

Pant, D.R., Greenhalgh, S.A. & Watson, S. 1988. Seismic reflection scale model facility, *Exploration Geophysics* 19, 499-512.

For further information contact:

Dr S.A. Greenhalgh
School of Earth Sciences
Flinders University of South Australia
GPO Box 2100
Adelaide SA 5001

Award to David Boggs - ASEGRF Funding Recipient

David Boggs of the University of New England, was the recipient of an ASEG award of \$5,000 to assist with his B.Sc (Hons) studies in 1991. Under the leadership of Dr John Stanley at the Geophysical Research Institute (GRI) David conducted a series of "special application" magnetic surveys with the GRI's rapid sampling caesium vapour magnetometers.

One survey investigated the temporal and spatial variations in the 50Hz magnetic field associated with high voltage power transmission lines. The second survey investigated the effects of diurnal variations of the magnetic field on the observed anomalies associated with electrically conductive magnetic bodies. (Editors note - See PREVIEW 41, December 1992, page 25)

David was awarded 1st class honours and the University Medal for his work.

He is currently employed at the GRI and working with John Stanley's team on some new developments in rapid sampling magnetometer technology and contemplating PhD studies in exploration geophysics.

Congratulations to David for a fine effort and thanks to John Stanley for refunding the unspent portion of the grant!

Stephen Mudge
ASEG Research Foundation

Since the last issue of PREVIEW the following have contributed to the ASEG Research Foundation:

Western Mining Corporation	\$5,000
ASEG	\$15,000

☆☆☆☆☆

New Developments in the Aeromagnetic Technique for Sedimentary Basin Exploration

The traditional application of the aeromagnetic technique is focussed on the "magnetic" basement. Determination of the depth to, and structure within, the basement has been historically the major task for aeromagnetism in basin exploration. The result is a model for the gross structure and geometry of the basin.

Recent developments in aeromagnetic data collection and processing technologies have increased the sensitivity of the technique to the point where important structures within the basin sequence are detectable.

The 1980's witnessed the development in Australia of high resolution aeromagnetic survey techniques for geological mapping and mineral exploration purposes. In this context the term "high resolution" is applied to surveys with a flight line spacing of 250m or less and a flying height of 60-80m. This is to be compared with the 1-2km line spacing and flying height of 120-300m which was typical of the pre-1980 era. When old and new data sets over the same area are compared, the improvement in resolution and geological detail of the new data is significant. Plates P1.1 and P1.2 show results from an aeromagnetic survey in South-East Asia. The two images are of the same area, but illustrate the increase in resolution achieved by a closer line spacing (5km versus 1km) - the data illustrated in Plate P1.2 was collected in a new survey at 1km spacing. The broad trends in the area are seen in both displays, but the closer line spacing has allowed smaller scale features to be mapped and has more clearly defined geological structure in the survey area.

Today's explorers are experiencing major advancements in the application of "high resolution" aeromagnetism for oil exploration. Nowadays the term "high resolution" refers to the ability of the data to resolve very low amplitude (nT) magnetic features originating from structures within the essentially non-magnetic sedimentary column as well as the conventional high amplitude features from the crystalline basement.

There have recently been a number of technological advances which, when integrated together, have made an enormous improvement to the overall effectiveness of aeromagnetism, particularly in sedimentary basin evaluations. These advances have been made in data acquisition, data processing, imaging and data integration.

A fundamental requirement of all survey flying is for the exact position of the aircraft to be known at all times. Real-time differential GPS satellite positioning, the navigation system of choice for modern high resolution aeromagnetic surveys, uses a fixed ground-based GPS satellite navigation receiver to transmit positional corrections to the airborne GPS receiver via a radio communications link. This enables absolute positional accuracies of better than 10m to be achieved with 1 second updates. Figure F1 is a photograph of a modern aeromagnetic survey aircraft - the tail boom, or "stinger", housing the magnetometer sensor is clearly seen at the rear of the aircraft.



Figure 1. Airborne data acquisition aircraft

Aerodata

AERODATA

(Contact: Greg Reudavey or Bill Witham)

- Low noise high resolution aeromagnetism.
- Calibrated multi-channel radiometrics.
- QUESTEM digital airborne electromagnetics.
- Horizontal magnetic gradiometry.
- AEROTRAC videography (visible & thermal IR).
- Helicopter Geophysics (mag/rad/HEM).
- Syledis and differential GPS navigation.
- Multi-client data sales.

WORLD GEOSCIENCE CORPORATION

(Contact: Dave Isles or Kathy Norman)

- Interpretation and consulting services.
- Geophysical image processing.
- Geospectral Imaging Services (with CSIRO).

TIMMINS GEOPHYSICAL SERVICE

(Contact: Greg Street)

- Ground and down hole geophysics.
- High resolution magnetics; micro gravity.
- Electrical/EM (TEM, IP, CASMT, SP, radar).
- Seismic (reflection, refraction, shear wave, cross hole, high resolution).

AERODATA

17 Emerald Terrace Ph: (09) 322 1799
West Perth, WA 6005 Fax: (09) 481 0709

State-of-the-art cesium vapour magnetometers have a resolution of one thousandth of a nanotesla (1 picotesla) sampling at ten times per second. Importantly, the interference caused by the presence of the aircraft can be reduced to very small levels. This is of great importance to sedimentary basin exploration as intra-sedimentary features may now be mapped. These were previously assumed to be non-magnetic but are proving to have weak magnetic properties which can be detected. These magnetic amplitudes were, in the past, obscured within the noise envelope of magnetometer systems.

In parallel with advances in data acquisition, innovative data processing and image processing of aeromagnetic data sets has enabled significantly more information to be extracted from the data.

Magnetic images, particularly in areas of low magnetic relief, often display a streakiness parallel to the flight line direction which may be caused by :

- imperfect removal of diurnal magnetic field variations;
- imperfect correction of variations in the orientation and altitude of the aircraft;
- minor positional errors.

Micro-levelling refers to a variety of new schemes which attempt to minimise small (nT) line-to-line level shifts in the magnetic response. In practical terms, if good data was capable of being contoured at a 1nT interval 5 years ago then it can be contoured at 0.1-0.2nT intervals today. The success of micro-levelling has only been achieved because of corresponding improvements in conventional 'macro-levelling' software using tie line/flight line intersections. It is essential when magnetic signatures of sedimentary features are weak that data is micro-levelled. Subtle features become more coherent after this process.

The sensitivity achievable in an appropriately processed grey scale or colour image is superior to that which can be obtained through contouring aeromagnetic data. In addition, the ability to display both amplitude and gradient information in images (shaded relief displays) and the flexible, user-friendly nature of modern imaging systems has reduced the level of skill required to extract structural and lithological information from data sets.

Plates P1.3 and P1.4 illustrate multi-client aeromagnetic data from the Canning Basin in Western Australia, displayed respectively as a colour image of total magnetic intensity (in some ways equivalent to the traditional colour contour map), and as an enhanced image designed to reveal subtle detail.

Three geological provinces are clearly identified on the enhanced image. The Broome Platform in the SW half of the image is an area of relatively shallow basement. The Jurgurra Dampier Terrace to the NE of the Broome Platform appears as a region of uniform response clearly fault bounded. Further to the NE, the Fitzroy Trough with sediment thickness typically over 6km appears as a third distinct province. A number of structures parallel to the trough margin are evident in the data. The wavelengths of these features indicate a shallow, intrasedimentary origin.

A good example of the role played by image processing in the analysis of high resolution aeromagnetic data is shown in Plate 2. This example is from a region on the North Slope of Alaska. Plate P2.1 is a NE sun angle display of the data set - that is, the total magnetic intensity is effectively illuminated by a false light source from the NE. Plate P2.2 uses a high frequency enhancement of the magnetics as the grey scale component of the image - the total magnetic intensity is represented in colour. This calculated 1st vertical derivative of the magnetic field images the magnetic stratigraphy within the sediments of the Umiat Oil Field. The structural interpretation in Plate P2.3 shows the anticlinal structure clearly seen on Plate P2.2.



Fig F2.1 Depth Slice 3

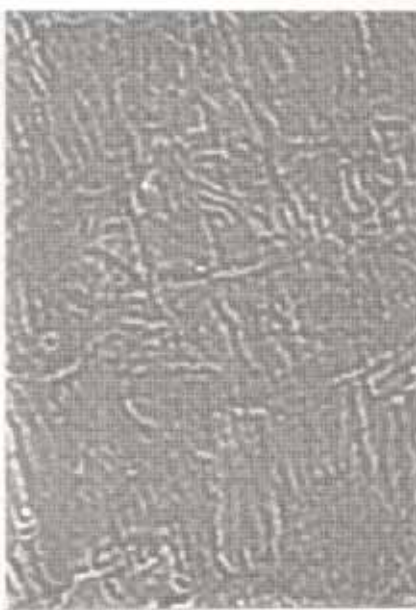


Fig F2.2 Depth Slice 2



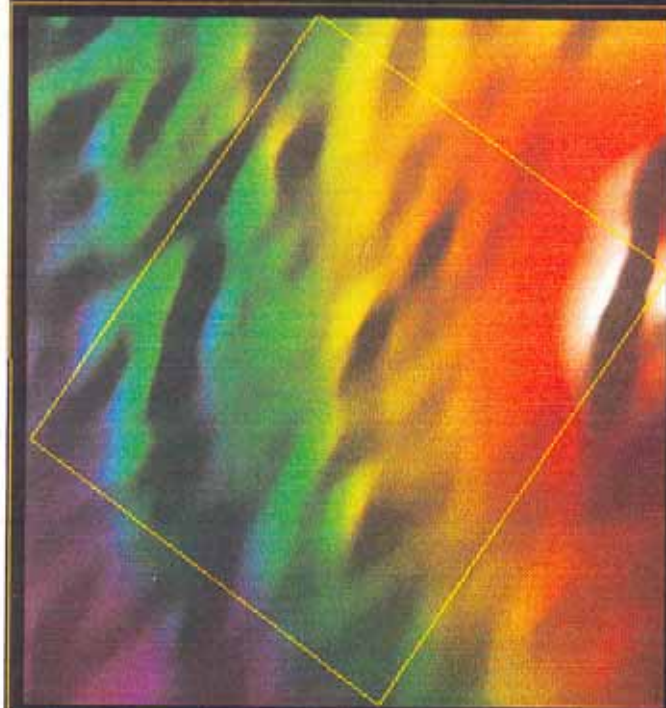
Fig F2.3 Depth Slice 1

Figure 2. Depth Slicing Examples

PLATE 1

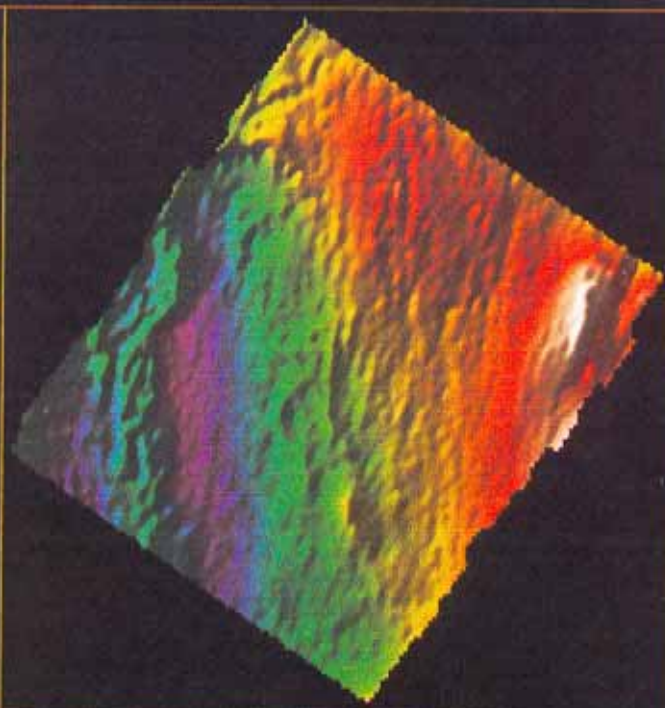
High Resolution Aeromagnetic Data
South-East Asia

Aeromagnetic Data : Low Resolution vs. New High Resolution



5km Line Spacing

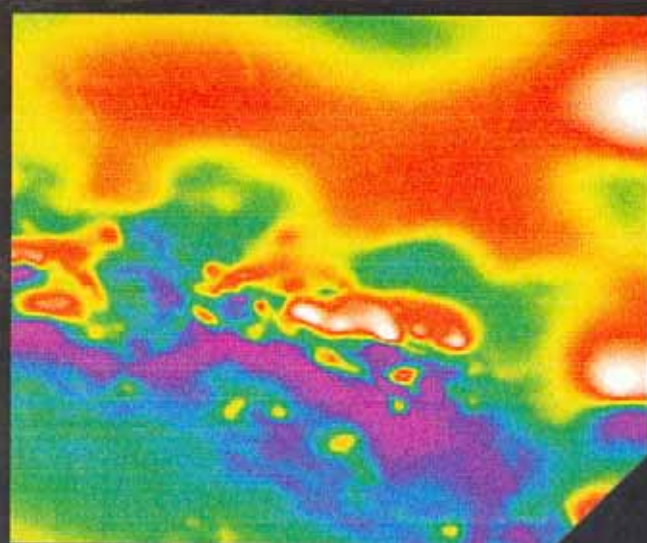
Fig P1.1



1km Line Spacing

Fig P1.2

Aeromagnetic Data
Canning Basin, Western Australia



Conventional Colour Image

Fig P1.3



AGC Enhancement of Magnetic Data

Fig P1.4

Transfer
Fault

Fitzroy
Trough

Broome
Platform

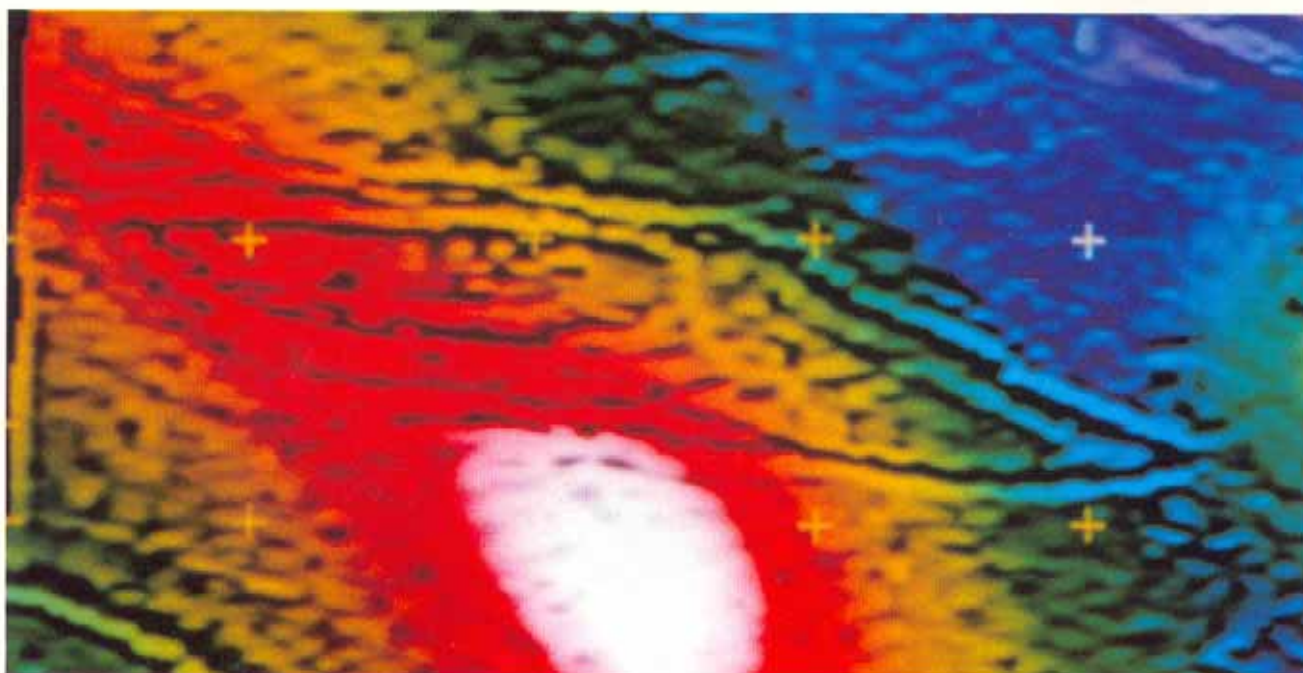


Fig P2.1 Grey Scale AGC Enhancement of Magnetics with Colour Total Magnetic Intensity

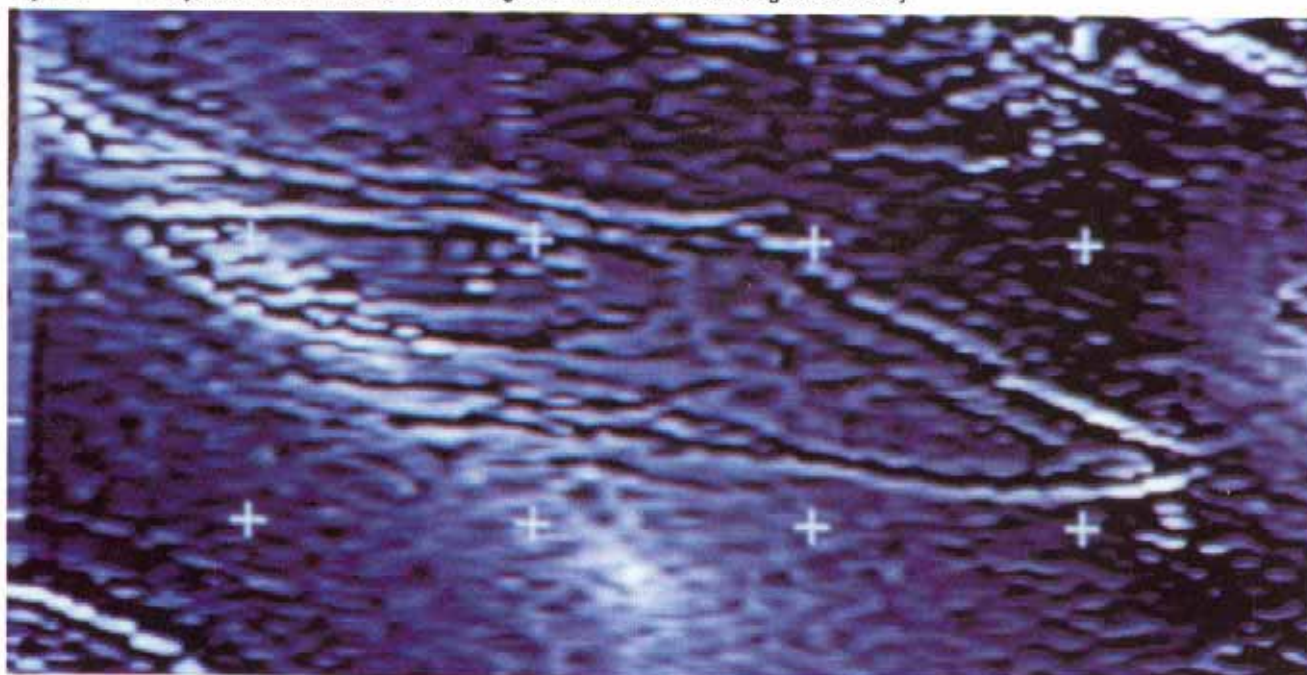


Fig P2.2 Grey Scale AGC Enhancement of Magnetics

PLATE 2

North Slope of
Alaska

High Resolution
Aeromagnetic
Survey

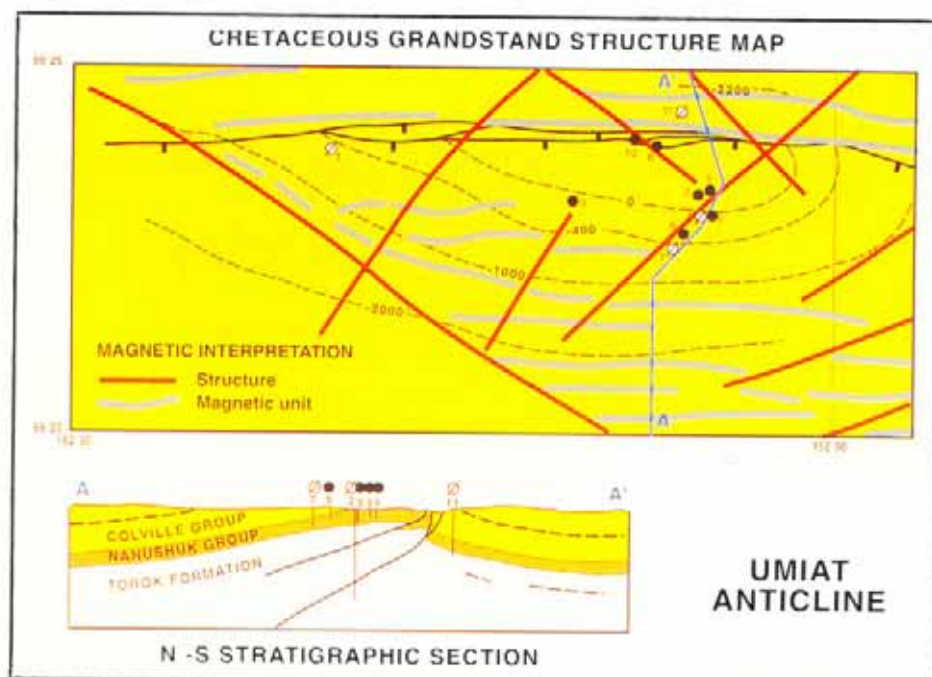


Fig P2.3 Structural Interpretation of the Umiat Oil and Gas Field From Seismic Data

Modern high sensitivity aeromagnetics is a powerful complement to seismic exploration for the mapping, in plan, of structures identified on seismic data. Plate 3 illustrates an example taken from the Vulcan Sub-Basin Study*. Plate P3.1 shows an image of high frequency enhanced aeromagnetic data from the Vulcan survey. Plate P3.2 shows an image of two-way travel time to the Hyland Bay formation at the near top Permian. The blue colours represent longer times and the red and white areas represent short times. Plate P3.3 shows a seismic section from a line trending NW and crossing the main NE trending faults imaged both on the magnetic data and the seismic data. The correlation between the seismic and magnetics is clearly seen in Plate P3.4 where the two-way travel time is imaged in colour with the aeromagnetic data in the grey scale giving the shaded effect. Clearly, the distinct colour break on the NE trending faults coincide with the linear magnetic features.

Magnetic depth slicing is a technique that allows the magnetic response of different levels within the sedimentary and basin sections to be identified, extracted from the total data and displayed as images or contour maps. The power of the method lies in examining how the trends in lithology and structure vary as a function of depth. Typically, two or three slices can be identified within the sedimentary section, with the deepest slice being associated with magnetic crystalline basement - called the 'basement slice'.

Depth slicing has a number of advantages over conventional high pass, low pass and band pass filtering of magnetic data. It attempts to extract information from a particular depth interval and both the extracted data and the residual data can be meaningfully interpreted in terms of geology. The approach can be described as an holistic or natural way to analyse magnetic data.

Figures F2.1, F2.2 and F2.3 illustrate magnetic depth slices of multiclient aeromagnetic data from a survey in the Irish Sea, ranging from deep to shallow respectively. It is interesting to note the textures and strike directions of the dominant features in each image. As the slices become shallower, the major trend is from north-south to slightly west of north and then finally, an east-west grain is evident. This is entirely consistent with the seismic time horizon mapping carried out over the survey area. As seen from the images, the trend directions can be identified in plan and with the aid of seismic data, be extended into the third dimension.

The World Geoscience group, based in Perth, the largest airborne geophysical contractor in the world, are currently offering this state of the art acquisition, processing and interpretation package for a number of sedimentary basins throughout the world.

- World Geoscience wishes to thank the Australian Geological Survey Organisation with whom the Vulcan Sub-Basin Study was undertaken, for allowing the publishing of data.

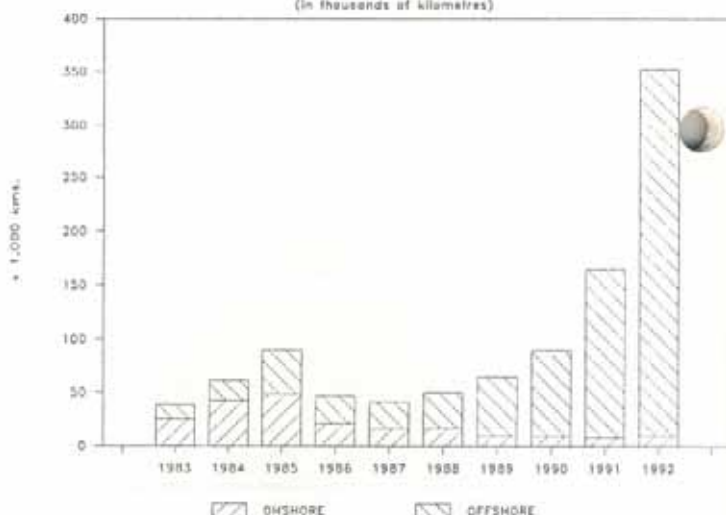
*Cathy Norman,
World Geoscience Corporation*

Seismic Activity Exceeds all Forecasts

Offshore seismic activity in 1992 increased by 120% over the previous year to a total of 342,000 line kms. It is interesting to note that 70% of this, or 244,000 line kms, was using 3D seismic.

Onshore seismic activity also increased slightly over the previous year for a total of 10,000 line kms and also 1,635 line kms of this was 3D.

AUSTRALIAN SEISMIC ACTIVITY
(in thousands of kilometres)



The accompanying graph shows that the offshore seismic in particular has increased dramatically over the last few years. This, however, is forecast to drop this year.

As Mr Dick Wells, the Executive Director of APEA, reported in the Australian on January 8, the 1993 petroleum exploration program is good when considered against the oil price outlook and the competition in the region for exploration dollars. But it is inadequate to find the oil and gas reserves necessary to assist in turning around Australia's ongoing parlous balance of payments position.

*Roger Henderson
Chairman
Geophysical Activity Committee*



PLATE 3

Vulcan Sub-Basin Integrated Aeromagnetic Study

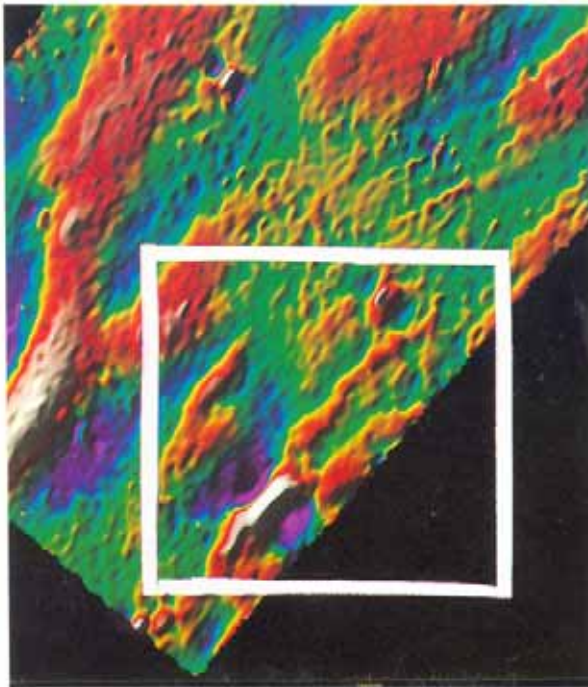


Fig P3.1 Aeromagnetic Data Showing Area of Seismic Coverage

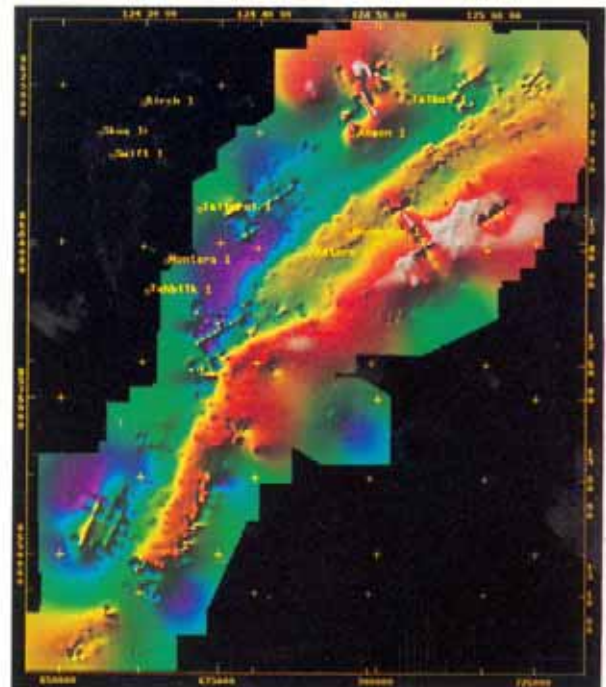


Fig P3.2 Seismic Time Horizon Data

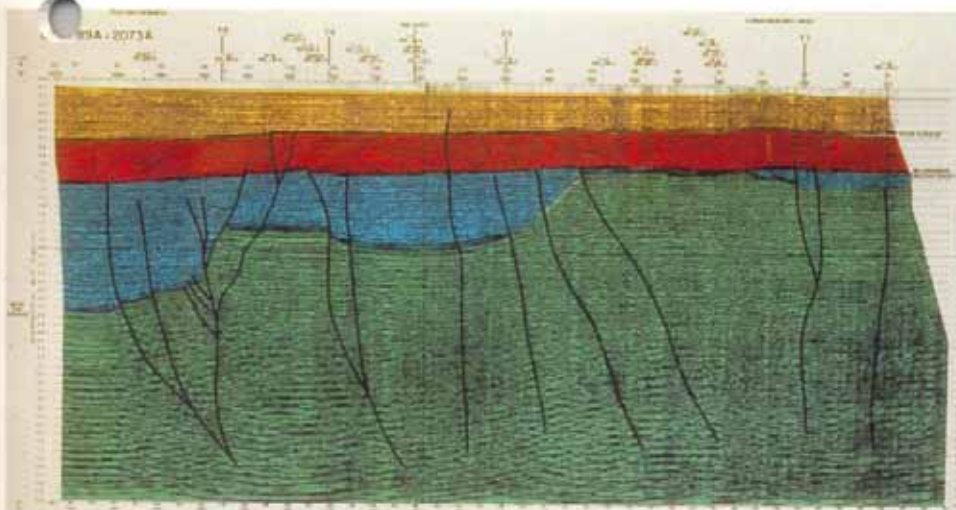


Fig P3.3 Seismic Section

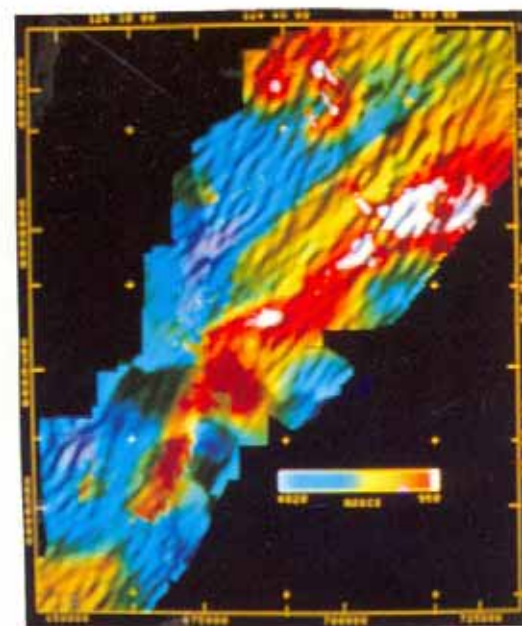


Fig P3.4 Coloured Time Horizon Data
Grey Scale Aeromagnetic Data

ASEG Federal Committee Notice of Annual General Meeting

Date and Time: 20th April, 1993 5.30pm for a 6.00pm start

Venue: Kelvin Club, Melbourne Place, Melbourne

Agenda:

1. Welcome to members
2. Apologies
3. Minutes of the previous AGM
4. Matters arising from the minutes
5. President's Report
6. Treasurer's Report
7. ASEG Sub-committee reports
8. Election of Office Bearers for 1993
9. Items of General Business
10. Close of meeting

Refreshments will be served prior to the meeting. The Federal AGM will be followed by the Victorian Branch AGM and a brief technical presentation.

Incumbent Officer Bearers of the Federal Committee

President	Hugh Rutter
1st Vice President	Mike Asten
2nd Vice President	Robert Singh
Treasurer	Lindsay Thomas
Secretary	Brenton Oke
Committee	David Gamble
	Geoff Pettifer
	Andrew Sutherland
	Koya Suto
	Greg Turner

All officers have expressed a willingness to continue in their current capacities for a further year, thereby giving continuity of operations after a somewhat "shaky" start following the move from Perth.

Additional nominations for the above positions may be made in writing signed by three or more members and bearing the consent in writing of the nominee. Such nominees must be received by the Secretary no later than 16th April. For practical reasons, nominees should reside in Melbourne.

(Editor's Note: Updated ASEG Office Bearer's List to be published next PREVIEW).

Brenton Oke
Secretary

Meetings on Geomagnetism and Paleomagnetism in Australasia

A two day meeting in the "Geomagnetism Workshop" series will be held in Canberra on Tuesday 20th and 21st April, 1993. The meeting will continue the tradition of the two previous meetings (1985, 1987) and provide a focus for users of geomagnetic information, those who provide the data, and those who study the geomagnetic field. Session topics will cover the behaviour and origin of the main field, applications of geomagnetic phenomena (particularly for direction-finding), magnetic observatory science, production and usage of global and regional magnetic field models, high frequency geomagnetic variations and their effects, diurnal corrections to aeromagnetic data, geomagnetic induction studies, external field effects and biomagnetism. The meeting is organised by the Australian Geological Survey Organisation and the Australian National University, and sponsored by the Australian Society of Exploration Geophysicists and the Specialist Group on Solid-Earth Geophysics, Geological Society of Australia.

For information contact

Charles Barton,
AGSO,
GPO Box 378, Canberra, ACT 2601
(Tel: +616 249 9611; Fax: +616 249 9986),
or Ted Lilley,
Research School of Earth Sciences,
Australian National University, Canberra, ACT 2601
(Tel: +616 249 4174; Fax: +616 249 0738).

The Geomagnetic Workshop will be followed by a two day seminar, 22-23 April 1993, entitled "Palaeomagnetism in Australasia: Applications to Dating, Tectonics and Environmental Studies". The main aim of the seminar is to stimulate interaction between earth scientists who use, or are interested in using palaeomagnetic information, and workers from palaeomagnetic groups in Australia and New Zealand. Topics to be covered will include the status of APWP's for the region and their applications - regional tectonics, palinspastic reconstructions, dating of mineralization events and the regolith; magnetostratigraphy; the magnetic record of environmental change; magnetic fabric analysis; ground truthing for aeromagnetic interpretation; and ODP results.

For information contact

Chris Klootwijk,
AGSO,
GPO Box 378, Canberra ACT 2601
(Tel: +616 249 9324; Fax: +616 249 9986).

Charlie Barton
AGSO

ASEG Funding Initiatives - Update

Five suggestions have been received by the ASEG executive sub-committee considering ASEG funding initiatives (PREVIEW 41, Dec 1992, p3). These are:-

- ASEG Research Foundation Grant - \$15,000/year for 2 years - 1993 and 1994 academic years.
- ASEG - GDF airborne data software implementation.
- PREVIEW colour features budget subsidy for tutorial/review articles for Continuing Education purposes.
- Free ASEG membership for 1st year postgraduate geophysics students.
- Robert Sheriff Distinguished Lecture/workshop Tour - April 1993 - Joint ASEG/Curtin University initiative underwriting of costs.

If members have any comments on these initiatives or other ideas please promptly contact:-

Geoff Pettifer

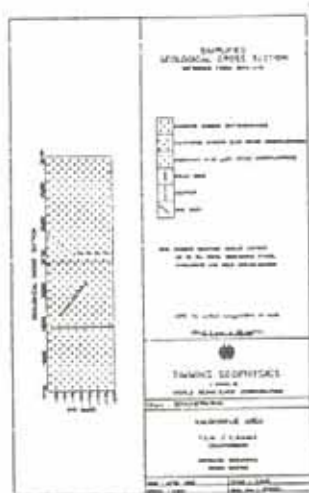
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"Well Connected"

Hooking up to the global network of
electronic mail and news.

David Hayward
Earth Resource Mapping.

(Reproduced with permission of the Editor ER Mapper
Users Group Newsletter).

Throughout the world there are thousands of computer networks connected together to form a giant network called the Internet. The latest estimates indicate that there are 780,000 systems connected to the Internet with between 7 and 14 million people having access to it.

If you do not yet have network access, it is an option definitely worth considering. Many different types of services are available to Internet users depending on the type of connection they have. The two key services used by Earth Resource Mapping (ERM) are electronic mail, and the electronic news service.

Electronic Mail

Electronic mail (or email) is a convenient and efficient way to communicate between individuals in the same office or across the world. It is easier and (usually) cheaper than a fax or phone call and automatically provides an electronic record of all communication. It reduces interruptions and improves information flow.

Everyone on the Internet has their own "address" to which other users can send mail. Earth Resource Mapping's addresses for customer support are:

support@erm.oz.au (Australia)

support@ermusa.com (U.S.A.)

There are also addresses for each individual at ERM as well.

Email works as following:

1. A user uses a mail editor to compose a message.
2. The user then sends the message to one or more individuals or groups of individuals. The recipient can be anywhere in the world. A copy of all outgoing messages can be stored automatically.
3. The recipient receives the message, reads it, and can reply if desired. A copy of all incoming messages can be stored automatically.

Electronic News

There are approximately 1500 news groups available for Internet users. They range from technical, scientific, and research topics to things like jokes, recipes, and movie reviews. Much public domain software is available from the source code newsgroups.

News is accessed by a piece of software called a news reader. Users specify the groups in which they are interested, and can scan through and read the latest postings. Users can also submit their own postings which then get sent to all other systems in the relevant areas of interest (news groups can be set up to be distributed within a organisation, city, state, country or worldwide).

Getting your connection

To get access to the Internet you will need:

- 1) A computer
- 2) A modem
- 3) Email, news, and network software
- 4) A system on the network to connect to (gateway)

The type of modem and software required will depend on who you connect to and what type of connection you get. The options available for connecting to the Internet are discussed below.

AARNet

The primary component of Internet component in Australia is AARNet (The Australian Academic and Research Network). AARNet is a private telecommunications network owned and operated by the Australian Vice Chancellors Committee (AVCC) as a common service provided to the member institutions of the AVCC, the CSIRO and other organisation who have entered into an AARNet Affiliate Membership Agreement with the AVCC.

In order to get a direct connection to AARNet, you must agree to their conditions

of use. The key points regarding acceptable use are:

-The primary function of AARNet is to support the open academic and research enterprise of Australia.

-The use of AARNet in connection with the administrative activities of the member organisations of AARNet, use for institutional support services, and use in support of the various infrastructural service support activities associated with the academic and research enterprise, are considered to be acceptable use of AARNet.

-Traffic relating to the national academic and research enterprise and related commercial traffic is considered acceptable use of AARNet.

What this means is that you have to be able to justify your usage as being of benefit to the Academic or Research

communities. For example, ERM is an Affiliate member because we provide support to the CSIRO and various Australian universities as well as doing research of our own.

The guidelines are broad and there is a large grey area. In practice, they seem to be fairly lenient, although the AVCC has the final say in all circumstances and can sever the connection of anyone who is misusing the network. You are most likely to come under close scrutiny if you have large volumes of data to transmit.

There are two types of Affiliate membership: Mail Affiliate and Network Affiliate.

The Mail Affiliate membership is less expensive and easier to get and is most appropriate for a new site interested only in mail and news. The costs are as follows:

Membership This is the AARNet mail affiliate fee.
\$1,000 p.a.

Gateway service This is the charge levied by the organisation that you actually dial up (via modem) to get access to the network. Varies (we pay \$150 per month).

Software This is the messaging software needed to support the connection to the gateway. Two options are SLIP (free but requires time and technical knowledge to set up), or MHSnet (\$995 from Message Handling Systems Pty Ltd, 1st Floor, 2 King Street, Newtown NSW 2042, Phone 02 550 4448).

Telecommunications The phone company charges.

To become a AARNet Mail Affiliate, do the following:

1) Contact AARNet and ask for an application for an Affiliate Membership.

AARNet
GPO Box 1142
Canberra ACT 2601
Tel: 06 249 3542
Fax: 06 249 1369

email: QR-subscription@arnaud.edu.au

2) A list of gateway service providers is included with the application (various commercial organisations and universities).

Contact your local gateway to get details about hardware and software requirements, gateway service charges, and to establish an email address for your organisation.

3) Complete the application and send it to AARNet.

If setting up an AARNet seems too hard or too expensive, other alternatives are listed below.

DIALix

The following is from Jeff Johnson of DIALix:

DIALix offers E-mail and newsfeed to individuals and small companies who are unable to obtain or afford a direct AARNet connection.

Users connect to DIALix through multiple dial up lines on 1200/2400 modems to send and receive E-mail or browse newsgroups and post news items (9600 in a few weeks). The usual range of terminal emulations are supported (ie vt100, vt220, wyse60 and many more).

UUCP connections are also available. PD software to emulate uucp on IBM compatibles, Apples, Amigas and Ataris is available for download.

The general public are actively sought to participate in reading newsgroups and receiving E-mail and posting to local newsgroups and E-mailing other DIALix users. Clubs and organisations are catered for in creation of special interest newsgroups and free login during club meeting hours (fortnightly or monthly:-).

Schools and other special interest groups are encouraged to join and local newsgroups can be added (ie school.ggs school.hale adawa wafi) so members and staff could have a "customised" bulletin board without the need for a local person to maintain the equipment and service.

Net write access is provided to users who meet the requirements of the Australian Vice-Chancellors Committee ("some benefit to the higher education and research sector") with each applicant being considered on their merits. Users who have write access, may have that access terminated at any time, if they abuse the resources of the AARNet (or Internet).

DIALix has been established in Perth for over 12 months and will be installed in Sydney in 2 - 3 weeks (Sep '92) then Melbourne in 2 months (Nov '92). Email connections via trunk dialup has proved to be affordable for mail service (small articles can be "posted" for a local call fee).

Charges for DIALix are:-

All connect time 1c/minute (\$10 minimum [Corporate \$25]).

Temporary hard disk storage space up to 1Mbyte. Additional storage space available at \$10 per Megabyte per annum.

Net write access for messages sent including the first megabyte.

Individuals (user@DIALix.oz.au) \$80/annum (\$10/month)

Corporate connect (users@site.DIALix.oz.au) \$225 per annum per host

Interstate or overseas traffic in excess of 1Mbyte per annum costs 1c/Kbyte.

All fees are "in advance".

Visa, Bankcard and Mastercard are accepted via E-mail or phone.


Jeff Johnson (jeff@DIALix.oz.au) DIALix Services
Phone (09) 244-3233 modem Box 371
Phone (09) 244-2433 voice (All Hours) South Perth 6151

Pegasus

The following information was provided by Pegasus Networks:

Pegasus Networks
PO Box 424
Byron Bay
N.S.W. 2481
Australia.
Phone: 066 856 789
Fax: 066 856 962
e-mail: (apc) peg:support (AARNet)
support@peg.pegasus.oz.au

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Pegasus allows you to participate in worldwide and Australia-wide discussions on the most vital issues of our time. Through Pegasus you can stay in touch and influence what actually does happen.

Electronic Mail: Pegasus allows you to send written messages to other users instantly. Mail can be sent to a single destination or simultaneously to several.

Conferencing: Instead of sending a message directly to another user, you can send it to a Pegasus conference. Others can reply, within the conference, in their own time. All messages remain visible to all users, or to a preselected group.

There are hundreds of public Pegasus conferences on relevant subjects, full of news, controversy, and accumulated information. Many organisations maintain private conferences for internal administration and discussions.

Calendars, News Services:

Some conferences are used as diaries, so you can let people know about your events and campaigns, and find out what others are doing.

Education:

Pegasus offers special packages for the application of computer-text based communication in education. Please contact Dr. Gert Gast, the Pegasus education coordinator, for further information.(peg:gast)

What kind of computer do you need?

Via Pegasus, all brands of computer can talk to each other. Virtually any personal computer connected to a modem is compatible with Pegasus. If you don't have a modem, we can supply them at low cost. You don't have to dedicate your computer or phone line to use Pegasus. A few minutes each day will enable you to send and receive mail and participate in conferences.

How much does a Pegasus subscription cost?

JOINING FEES

A subscription to Pegasus costs \$ 70 and includes our new easy-to-follow User's Manual, Macintosh or IBM communications software, a Reference Card, and two hours free off-peak time (or one hour free during peak-time) during the first month.

Group accounts are charged \$ 175 plus \$ 35 per mailbox.

MONTHLY ADMINISTRATION CHARGES

The basic monthly administration charge is \$12, for a group mailbox \$ 6.

USAGE (PER MINUTE RATES)

Connect time is charged at 20 cents per minute off-peak and 40 cents per minute peak time. Peak is 8 am - 6 pm, Monday to Friday (Victorian time), off-peak is 6 pm - 8 am, Monday to Friday, all weekends, and any national Public Holiday (as celebrated in Victoria) Local lines are charged 15 cents per minute (066 area code)

Your phone bill shows one local call each time you connect. It is the same from anywhere in Australia. In one minute you can send or receive up to 3 full pages of information.

Messages to overseas destinations are charged from 25 cents per page, according to the destination, but there is no extra charge for mail within Pegasus.

FAX CHARGES

Overseas Fax - \$ 4.00 per page. Telex 60 cents per line

Australian Fax - \$ 2.00 per page. Telex 20 cents per line

STORAGE

Storage Charges: Every user gets 50 pages of free storage. Excess storage costs 2.5 cents per page per month. Private conferences incur a \$50 establishment fee.

ASIAN PACIFIC USERS GET A 50 % DISCOUNT ON THE ABOVE RATES

THERE ARE NO OTHER EXTRA CHARGES OR HIDDEN COST !

There are NO annual fees - No STD or AUSTPAC charges - NO frame or basic information charges - NO kilosegment or volume charges - NO basic storage charges - NO extra charges for Pegasus mail.

Telecom Keylink

Keylink users can send email to/from AARNet and connected networks using Telecom's Keylink electronic messaging service. Contact:

Telecom Plus
Phone: 008 032 333

Editors Note: Email addresses will be introduced into the ASEG database this year. ASEG members are encouraged to contact the ASEG Secretariat (Fax: 818 1286) and give their email address, or email a brief message containing their email address to:

Geoff Pettifer: grp@minesvic.gov.au
or Lindsay Thomas:
lindsay_thomas@muway.unimelb.edu.au

Membership

CHANGE OF ADDRESS

The following changes need to be made to the relevant State Branch Databases:

Victoria

Lorraine MITCHELMORE
From: BHP Petroleum, 35
Collins Street
To: BHP Petroleum
120 Collins Street
Melbourne VIC 3000

James KEMMIS
From: U10, 5 Denham St
Hawthorn Vic
To: Unit 16, 5 Denham St
Hawthorn Vic 3122

PASMINCO
EXPLORATION
From: 290 Burwood Road
Hawthorn
To: GPO Box 1291K
Melbourne Vic 3001

Ron PALMER
From: Stockdale Prospecting,
Darwin NT
To: Stockdale Prospecting
P.O. Box 126
South Yarra Vic 3141

Tom EADIE
From: Pasminco Exploration,
Hawthorn
To: Pasminco Exploration
GPO Box 1291K
Melbourne Vic 3000

Bob CASTLEDEN
From: Pacific Oil & Gas,
Box Hill
To: Pacific Oil & Gas P/L
826 Whitehorse Road
(Private Box 509)
Box Hill Vic 3128

Christopher KERNICK
From: L 2, 476 St Kilda Rd
Melbourne
To: 7 Odessa Street
St Kilda Vic 3182

Andrew BARRETT
From: GPO Box 146B,
Melbourne
To: BHP Petroleum
GPO Box 1911R
Melbourne Vic 3001

Mike HAEDERLE
From: Lot 1030 Anderson Rd,
L.L.A. Karratha Wa
To: Rio Tinto Indonesia
C/- CRA Exploration
P.O. Box 509
Box Hill Vic 3128

Dr Greg BLACKBURN
From: Young St Cremorne
To: 9 Balmerino Ave
Toorak Vic 3142

Jeremy James READ
From: Moresby St Mitcham
To: BHP Minerals
P.O. Box 619
Hawthorn Vic 3122

New South Wales

Derecke PALMER
From: NSW Geological
Survey, St Leonards
To: Dept Applied Geology
University of NSW
Kensington NSW 2033

Dr David BLAIR
From: Underwater Systems
Division, MRL
To: Maritime Operations
Division, MRL
Defence Science &
Technology
P.O. Box 44,
Pyrmont NSW 2009

Peter CARVER
From: HGS, North Ryde NSW
To: 1/37 Waterloo Road
North Ryde NSW 2113

John HOLLIDAY

From: Newcrest Mining,
Blayney NSW
To: "Homeleigh"
Huntley Via Orange
NSW 2800

Peter GOYNE
From: HGS, North Ryde
To: HGS
P. O. Box 106
North Ryde NSW 2113

David KIRKHAM
From: Petroconsultants
Digimap, North Sydney
To: Level 4, 39 Chandos St
St Leonards NSW 2065

Shane WRIGHT
From: Robson Place
Gerrigong NSW
To: Suite 21, 14 Edgeworth-
David Ave
Hornsby NSW 2077

South Australia

Seismograph Service
(Corporate Member)
From: P.O. Box 732
Cowandilla Sa
To: Mr Alan JONES
(Active Member)
65 Ridgway Drive
Flagstaff Hill SA 5159

Ahsan ABURAS
From: 5/2E Fifth Ave St
Peters SA
To: Sagasco Resources Ltd
60 Hindmarsh Square
Adelaide SA 5000

Gary REED
From: SADME, 29 Jade Cres,
Happy Valley SA 5159
To: 42 Torrens Street
Happy Valley SA 5159

Sarah RYAN
From: Schlumberger Seaco
Inc, North Adelaide
To: P.O. Box 36
South Glenelg SA 5045

Western Australia

Allan TRENCH
From: Geology Department,
Nedlands WA
To: Exploration
Kambalda Nickel
Mines/St Ives Gold
Mines
Western Mining Corp
Kambalda WA 6442

Mr M.J. FLYNN
To: Woodside Petroleum
1 Adelaide Tee
Perth WA 6000

Geoff GATTI
To: 33 Coronation St
Doubleview WA 6018

Bill WALLWORK
From: 41 Beatrice Road,
Dulkeith WA
To: 1-148 Broome Street
Cottesloe WA 6011

Geoffrey HINES
From: 46 Roseberry Ave,
South Perth
To: 18A Cargill Street
Victoria Park
WA 6100

EARTH RESOURCE
MAPPING
From: 316 Churchill Ave,
Subiaco Wa
To: Level 1, 87 Colin St
West Perth WA 6005

Philip WOLTER
From: Lasmo Oil, W Perth
To: 76 Glenelg Street
Mt Pleasant WA 6153

Richard HAREN
From: 1/45 Bower St
Double View WA
To: R.S. Associates
41 Turnball Way
Rigg WA 6029

Guy PATERSON
From: Woodside Offshore
Petroleum, Perth
To: Ampoex Ltd
4th Floor,
40 The Esplanade
Perth WA 6000

John TAYLOR

From: 1/45 Bower St Double
View WA
To: R.S. Associates
41 Turnball Way
Rigg WA 6029

Jonathon ROOT

From: CRA, P.O. Box 175
Belmont Wa
To: CRA Exploration P/L
P.O. Box 410
Karratha WA 6714

Richard BUNT

From: Houtmans St Shelley
To: Carnarvon Petroleum NL
P.O. Box 7360
Cloisters Square
Perth WA 6850

Stephen LYNCH

From: Bristol St Merrylands
To: World Geoscience
17 Emerald Terrace
West Perth WA 6005

Paul HARRISON

From: Lasmo Oil West Perth
To: Lasmo Oil
253 Hawtin Road
Forrestfield WA 6058

Vince ROBERTS

From: Booragoon WA
To: 54 Hatfield Way
Booragoon WA 6154

Queensland

H C BASSINGTHWAIGHTE

To: Velseis Pty Ltd
P.O. Box 118
Darra Qld 4074

Michael RICHARDS

From: 12 Tuart Street
Yorkine, WA 6060
To: CMB 3
Mt Isa Qld 4825

Denis SWEENE

From: Lot 31 Collins St,
Mocrina Qld
To: Geco-Prakla (Aust) P/L
20 Aldinga Street
Brendale, Qld 4500

Ric SMIT

From: Santos Ltd, Adelaide St
Brisbane
To: Santos Ltd
GPO Box 1026
Brisbane Qld 4000

John DONOHUE

From: P.O. Box 82, Ashgrove
To: 98 Stephen Street
Toowoomba Qld 4350

Gary FALLON

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Star Gully Qld
To: MIM Exploration P/L
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Brisbane Qld 4004

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To: 16 Pinecone Street
Bunya Downs Qld 4055

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To: Placer Exploration
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Brisbane Qld 4000

Stephen BUSUTTIL

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Brisbane Qld 4001

Tasmania

John BISHOP

From: Buggs Lane, Elliott Tas
To: 121 Nelson Road
Mt Nelson Tas 7007

ACT

Robert HARMS

From: Tensor Pacific, Port
Melbourne Vic
To: 3 Barcoo Place
Kaleen ACT 2617

Paul WILLIAMSON

From: AGSO, Canberra ACT
To: Bureau of Resource
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Parkes ACT 2600

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Andrew Thomas BISSET

From: P.O. Box 1623,
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Overseas

Hans LINDBERG

From: Sveriges Geologiska
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To: Geo Vista AB
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