Australian
Society of
Exploration
Geophysicists
ACN 008 876 040

Preview

October 1997

Issue No. 70

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Print Post Approved - PP3272687 / 0052, PREVIEW is a publication of the Australian Society of Exploration Geophysicists, circulated to a membership of approximately 1350.

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Editor's Desk

In the past few weekends I have been involved in a couple of activities that were organised through volunteers namely a scout camp and a landcare project. Each of these good causes were very dear to the people that organised them and required a lot of preliminary work before I could join in. It reminded me just how much of what goes on in our communities is organised by non paid volunteers. Check it out the next time you go for a walk or a drive.

It caused me to think about my involvement with the ASEG and how much time I should be putting into this good cause as opposed to all those other good causes. Part of the answer came following the publication of the last *Preview*. In short time I received a number of communications. They were mostly complimentary and served to remind me how important *Preview* is to many members of our Society. At a conference I met one avid reader who told me that *Preview* was provided as reading material in the company toilet (talk about keeping your mind on the job). I'm not sure but I will include this as a complimentary communication. Thanks readers, this is the kind of feedback I need to keep going with this particular good cause.

At the FE we often receive suggestions that we should be trying to promote geophysics as a career to both high school and university students. I would like to encourage the more experienced members of our Society to recall some of their early experiences. These histories should help to show that geo-careers can be a lot more interesting than say accounting. So if you are on a plane reading this think about recording some of those great yarns you tell to your frequent flier lounge mates for the benefit of the next generation.

On another level I will publishing student abstracts in the February edition of *Preview*. In the past these have been received on a sporadic basis from state branches. By concentrating them into one issue I hope to create a student special edition. Please encourage students who make presentations at local branch level to contribute . Any other contributions will also be most welcome.

Finally please note the greatest errata of them all in the last two issues. On this very page we have given the wrong telephone number for the ASEG secretariat in Brisbane (but correctly on other pages). An editor's job is never done!

Regards
Henk van Paridon, Editor

Vice President's Verbiage

One of the major issues being tackled by the current federal executive is the future of the society's publications. Following some healthy debate during 1996, we decided to maintain separate identities for *Preview* and *Exploration Geophysics*. In the December 1996 issue of *Preview* I gave the background to that decision, and noted the inevitable need to move away from a volunteer-based approach to a more streamlined and commercialised publishing policy.

For the past six months we have been trialling a modified arrangement with our printers, whereby they play a more active role in editorial and advertising logistics. Over this period I've also had the chance to talk to the full gamut of editors, authors, printers and advertisers. It's always interesting to hear a variety of opinions on how people feel things are going. Obviously there are many other members who we don't get a chance to talk to, so it's timely to report on the current state of play regarding our publications. In this column I'll concentrate on matters relating to advertising.

From the perspective of our advertisers, the most radical aspect of the new system is that our advertising rates have gone up. In the case of *Preview*, the hike was significant. The fundamental argument for the rise was to bring our magazines closer to break-even point. A component of the increase was to cover a modest increase in production costs resulting from the printer's extra involvement. However, I want to emphasise that the perception of a sharp increase came about mainly because our rates were previously unrealistically low.

I'd encourage advertisers to do some comparisons with other magazines of similar quality and distribution. We think that even with our new pricing structure, we are still at the good-value end of the spectrum. I have to say that we have received minimal flak about these price rises. Perhaps this indicates that most advertisers could understand the inevitibility of a hike. We are strongly appreciative of this continued support.

I'd also like to make some comments about the different perceptions and problems applying to the two publications, again from the advertising point of view. Currently it appears to be slightly easier to sell advertising in *Preview* than in *Exploration Geophysics*. One might suspect that this relates to content. *Preview* carries more newsy material and fewer equations, and hence more members will tend to flick through it. However my discussions with advertisers over recent months suggest that content is not the primary reason for any preference.

I think most advertisers can, in theory at least, see the value of advertising in both magazines. Yes, *Preview* does have good instant-appeal value. On the other hand, *Exploration Geophysics*, with its more scientific slant and longer shelf life, has the potential for an advertiser to project an image of technical strength and stability.

However, the one big advantage that *Preview* has is that it tends to come out pretty much on schedule. On the other hand, *Exploration Geophysics* has to contend with the logistical nightmare of producing refereed technical articles, and unfortunately this is going to stress any publication schedule. We are fully aware that advertisers need greater reliability in this area. This will be a primary focus of the federal executive for the foreseeable future.

Steve Hearn
First Vice President

Australian Society of Exploration Geophysicists

The Federal Executive has heard from several members that the existing ties are just plain... well... plain.

Accordingly we hereby invite members to design a new tie.

A design that can be used for all occasions and by all members will receive the judges favour.

PRIZES

Besides the ensuing fame no prize has been decided. However a complementary tie in the new design (if it reaches production) will be awarded.

Designs should be sent to the Editor, Preview in some kind of reproducible format. ie no serviettes.

The judges decision will be ***FINAL*** *unless altered.*

Executive Brief

Secretariat

We are very happy with all the work from our new Secretariat, Enterprising Events. The membership database is now on their system and regular membership updates will be available for State Branches.

Storage of Publications

There has been much debate about the fate of the masses of publications the society currently has stored in Melbourne. These include *Preview, Exploration Geophysics,* Conference Publications and Special Publications. We have finally decided to have a clearance sale to try to move the 25 pallet-loads of material! Any remaining publications will be sent to Lindsay Thomas for teaching purposes (pending copyright inquiries). The Secretariat will retain four full sets of publications for any photocopying needs and we will consider the possibility of later scanning the full set.

Corporate Membership

We are continuing to review corporate membership with the aim to giving our corporate members some choice as to how there subscription is spent. At this stage we are proposing two levels of corporate membership. One will offer a commercial package including advertising at conferences, on the Web and discounts in the society's publications and the other membership will help support the Research Foundation. Letters have been sent to several companies to canvass their opinions.

Web Site

The society has been asked to look into promoting geophysics in high schools via our Web site. Koya Suto is curently looking into this and liaising with Education Departments.

Financial Status

The Sydney Conference final proceeds have been received and banked. The profit was in the order of $80,000 which pushes the net cash total over $400,000.

Membership Directory

A new format for the directory has been designed which requires information that will be collected with the renewal forms. The membership directory will be issued in the new year.

Robyn Scott
Honorary Secretary

Personality Profiles

NAOMI KELLY
ASEG SECRETARIAT OFFICE

Naomi is a Queenslander with over eight years of experience in secretariat management or as a personal assistant. Her role at Enterprising Events includes event management as well as her duties to the ASEG. Naomi is the person with the greatest working knowledge of day to day activities of the ASEG secretariat.

Naomi has attended all of the FE meetings and this has proven to be of great assistance. She has instituted a system of membership updates with the state branches so that they will no longer need to rely on announcements in *Preview*.

Naomi's interests include the martial arts, music and running. She was a concert pianist at the age of 17. In addition she was a Miss Australia Quest Finalist in 1989.

SANDRA DUNNE
ASEG SECRETARIAT OFFICE

Sandra initially hails from Victoria. She has an Advanced Certificate in Office Management and has 5 years of experience in conference and event planning and office management including a 6 month period in England. Her role at Enterprising Events includes event and secretariat management.

Sandra's main role within the ASEG is database and membership co-ordination. These duties also include financial record keeping.

Sandra's interests include dancing, swimming and netball. Her dancing experience includes involvement in a dance production for World Expo in 1988.

Members contacting the Secretariat are likely to deal with either Naomi or Sandra.

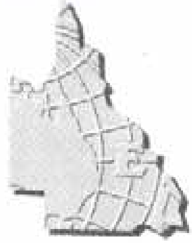
ERRATA

Letters to the Editor, *Preview 69*, August 97, p30

A footnote to John McDonald and Brian Evans letter was lost. John wishes it to be known that the views expressed were those of the authors and do not represent the views of the WA branch of the ASEG.

ASEG Branch News

Queensland



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The Branch held one technical meeting on Wednesday, 3rd September. We were fortunate to have two speakers presenting papers that were to be presented at "Exploration 97", an international conference held in Toronto later that month.

Andrew Mutton from Rio Tinto presented his paper on the application of geophysics during the evaluation of the Century deposit, a fascinating insight into the role of geophysics in the evaluation of this renowned deposit. Although discovered by surface expression over a century ago (hence the name), geophysics played a fundamental role in the discovery of significant reserves at depth in an adjacent fault block.

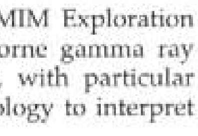
Dr Prasantha Jayawardhana from MIM Exploration presented a paper on the use of airborne gamma ray spectrometry in the Mount Isa Inlier, with particular emphasis on the benefits of GIS technology to interpret the vast datasets.

On the social front, our Vice President Howard Bassingthwaite has been organising the inaugural ASEG Golf Classic, scheduled for October 3 at St Lucia Golf Club. The event has been well supported with sponsorship from a number of contracter companies, including a crystal decanter donated as a perpetual trophy by Schlumberger Geco-Prakla. The event seems destined to become a regular part of the geophysical social calendar.

Plans for the Christmas party are well under way. Thursday the 18th December is the date to mark in your diaries. Watch this space for further details.

Andrew Davids
Branch Secretary

New South Wales



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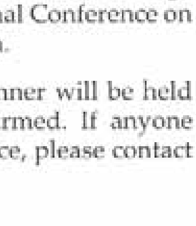
The regular monthly meetings of the NSW branch continues to hold at the Rugby Club in Sydney. The September meeting was addressed by Steve Webster (of Steve Webster Pty. Ltd.) on the "Developments in Modern Airborne Geophysics to assist Regional Geological Mapping programmes in SE Australia. The talk was extremely well attended, even with a large number at the 4th. Decennial International Conference on Mineral Exploration in Toronto, Canada.

The Annual ASEG NSW Branch Dinner will be held on 15 October at a venue to be confirmed. If anyone wished to come and have not got a notice, please contact either Tim Pippett or Dave Robson.

Timothy Pippett
NSW Branch President

ACT



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People

David Howard, formerly acting as General Manager for airborne contractor Kevron Geophysics Pty Ltd, has returned to the Western Australian Department of Minerals and Energy and the position of Chief Geophysicist. Meanwhile, there is much movement in the Kevron camp as they position themselves for the Philipines Aeromagnetic Survey Project.

There has also been a major upheaval at World Geoscience Corporation which would justify them hanging out a shingle on their door announcing "Under New Management".

ASEG-WA/PESA GOLF DAY has been scheduled for Friday, 5 December 1997 and is to be held at the Vines Golf Club. Fees are $35 for ASEG/PESA members; and $40 for non-members. Members will have priority to enter, thereafter non-members will be offered entry. Expressions of interest (or sponsorship) should contact David Howard [Tel.(08) 9222 3331].

TECHNICAL

SEG Distinguished Lecture

Arrangements are being made for Dr Leon Thomsen [AMOCO] to be in Perth For a presentation to the ASEG but the exact timing is undecided.

SEG Distinguished Instructor Presentation

Rumour has it that Ian Jack [BP] will also come to Perth, on 18 Jun 1998, to present:

- Time Lapse 3D Seismics for Reservoir Characterisation ... keep an eye open.

Australian Institute of Geoscientists [AIG] half day Seminar

The W.A. Branch has organised the Freeway Hotel as the venue for this course to be held on Friday, 21 November 1997. The theme is entitled "Setting Up Your Own Business".

Registration on the day is $105 but discounts are available. Promotional literature and bookings are available through Jocelyn Thompson [Tel/Fax: (08) 9310 8405, email: aigwa@opera.iinet.net.au].

Brian Russell Short Course

Another point of interest to the Oil Industry is highlighted with this $150 one day course scheduled for 25 November 1997. The theme is entitled "Reservoir Parameter Estimation Using 3D Seismic Multiattribute Analysis". Promotional literature and bookings are available through: The Branch Secretary, Tel/Fax (08) 9370 1273, Email: BobGroves@bigpond.com

South Australia

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Things have continued to move along smoothly for the South Australian Branch of the ASEG since our last report two months ago. We have in that time had one technical meeting and two committee meetings. With any luck you already received order forms in your August *Preview* (and placed orders) for this year's ASEG Wine of the Year.

Our September general meeting featured Oz Yilmaz of Paradigm Geophysical, who spoke on efficient inversion of seismic data. Turnout for this meeting was quite good.

Also this month we continue to keep you posted on who is moving around the industry (especially in the Adelaide area). In no particular order: Neil Gibbins has moved from SANTOS to Beach Petroleum. Paul Walshe has moved from Boral to SANTOS. Andy McGee has moved from SANTOS to First Sourcenergy. Andrew Oldham has moved from SANTOS to Woodside Petroleum (WA). Bob Lawrence has moved from SANTOS to Gulf Canada (WA). Paul Siffleet and Melanie Jane Richardson have moved from SANTOS to Shell (VIC). Nick Dunstan has finalised his move from MESA to Beach Petroleum.

Michael Hatch
Branch Preview Scribe

Victoria

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August Meeting

In August, ESSO distinguished lecturer Bob Sneider gave an interesting talk demonstrating the value of geophysics in increasing recovery from late mature and marginal oil and gas fields. Bob's presentation provided examples of the application of 3D seismic interpretation to help design wells targeting pools of previously unidentified hydrocarbons. Such wells have seen significant turnaround in field prospectivity. Bob's own company has generated billions of dollars in revenue by purchasing marginal fields in the U.S. and reinvigorating these fields using such methods. One unorthodox exploration method used by Bob in some of his previous ventures was the deliberate drilling of aquifers to help understand the hydrodynamics in a reservoir. A retrospective technique I'm sure explorationists have been using for decades!

Ciaran Lavin

September Meeting

The State Branch's September meeting incorporated the Annual Wine Tasting Night and the recently topical subject of Registration. Lew Knight from the Granite Hills Winery provided us with an overview of their operations and backed this up with an excellent selection of his wines. The timely inclusion of the 1995 Mica was greatly appreciated by all members!

Preceding the wine tasting was the presentation by Ian Levy (President - Australian Institute of Geoscientists) regarding the well publicised issue of registration for Geoscientists. He informed us about the rigorous selection and validation criteria used for an individual to be registered with the AIG and illustrated the key benefits for the individual and the profession as a whole.

The 1997/1998 Victorian ASEG Committee are:

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Treasurer:	Dave Gamble	(03) 9684 4925
Committee:	Geoff Dunn	(03) 9478 3415
	Mark Dransfield	(03) 9230 1261
	Suzanne Haydon	(03) 9412 7843
	Ciaran Lavin	(03) 9412 5676
	Trevor Lobo	(03) 9799 2192
	Paul McDonald	(03) 9412 7866
	Ron Palmer	(03) 9863 5208

Insights from Laboratory Mass Property Crossplots

"The Rock Doctor"

D.W. Emerson, Systems Exploration (NSW) Pty Ltd
Y.P. Yang, Macquarie Research Ltd, Macquarie University, NSW 2109

Introduction

A rock mass is an aggregation of minerals forming a coherent body of indefinite shape. The constant of proportionality between its mass and volume is its density which is a physical property of basic importance to geoscientists concerned with gravity geophysics, geotechnics, ore reserves and mineral processing. Most rocks are defective in the sense that porosity occurs as intergranular voids or is developed by brittle structural processes such as faulting, fracturing, jointing and brecciation, by ductile features such as shearing and by the chemical processes of hydrothermal alteration.

Porosity is often ignored in hard rock studies, even in weathered materials. It is preferable to think of a rock's mass property (Emerson, 1990) rather than its density because massiveness subsumes density and porosity and the two are logically linked. A density measured without considering porosity is really an apparent density. A partially dried out rock sample, as often encountered in the field where appproximate densities may be carried out, will have a mass exceeding the dry mass and a volume, if by water displacement, that is either too low or too high depending on the action of open or occluded voids. Also the important dimension of porosity is not assessed by such rough and ready techniques. The measurements yield apparent densities of limited, if any, use and certainly not suitable for the checking or the calibration of density logs or the computation of accurate rock mass figures, especially in the weathered zone.

In assessing measured physical property data in interpretation and modelling it is very useful to reference the physical property to dry bulk density so as to see the spread of property values in an understandable perspective.

Porosity-Density Crossplots

Porosity may be interconnected or through (apparent), blind or dead end, and enclosed or occluded. Irrespective of the type of porosity, as a zero porosity mineral grain assemblage develops inter-and intra-grain void space its density is diminished from its nominal grain density (the SGG as cited in mineralogy books). This is conveniently viewed as a crossplot of porosity (P) and dry bulk density (DBD) as shown in Figure 1 whereon the trends for some common minerals are shown. The trend lines run from the DBD x axis (where, at zero porosity, DBD= SGG) to the zero density, 100 percent porosity point on the y axis (DBD=SGG-SGGxP. The pore fluid density is regarded as neglible). For the basic measurements of DBD, P and SGG, see Emerson (1990). Some parts of the crossplot would rarely if ever be occupied by measured data. An amphibole, such as hornblende, is unlikely to exist in the fresh state with a very large porosity, for the processes which induce the porosity would also alter the amphibole to clay. A crossplot of P and DBD allows mass properties to be seen in overview. It also gives an independent indication of mineralogy from the rock's grain density that may be easily gauged from the sample's position with respect to the mineral trend lines, or simply calculated. The grain density is a composite quantity if the rock is not monomineralic.

Some measured DBD and P data have been plotted in Figure 1 to illustrate the procedure. The straight cross represents a tight mafic rock of low porosity; the angled cross: an Archaean auriferous sulphidic quartz reef; the asterisk: a fairly porous altered Tertiary tuff; the dots: Tertiary terrigenous quartz sandstone, and dolomite; the circle: a Tertiary laterite; the diamond: Proterozoic goethitic iron ore; and the triangle: Proterozoic hematitic iron ore. The grain densities are readily estimated from the plot positions and these provide some idea as to likely mineralogy in the absence of petrological input (or even

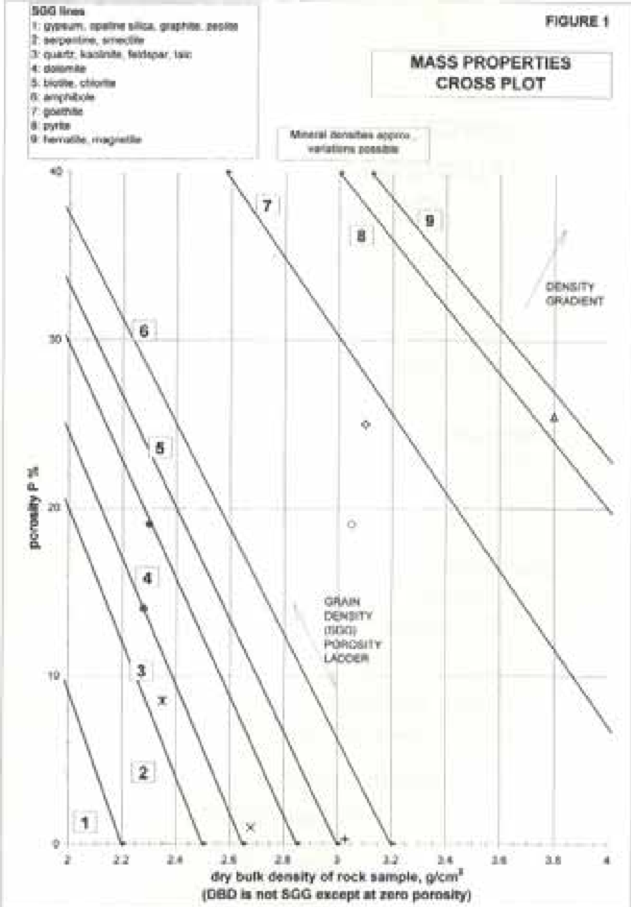

Figure 1.

with it). The SGC's also provide a quality control on the measurements. The hematite and goethite obviously are not very pure as can be seen from their grain density positions, whereas the sandstone and dolomite lie on their respective grain density lines. The altered tuff tends to a low grain density on account of alteration products such as smectite or zeolite. The laterite has clay and iron oxides as its main components.

Detailed studies of mass properties for particular rock conditions or rock regions can assist in categorising rock types in a systematic and consistent manner and give some clues as to key controlling properties e.g. velocity and water saturated resistivity may depend on porosity. Investigations by Systems Exploration on weathered rocks ranging in age from Tertiary to Archaean and located in Australia and overseas have shown the importance of an understanding of the porosity picture.

Figure 2 shows a mass property crossplot for data from the Cahill Schist and overlying Kombolgie Sandstone at the Koongarra Uranium deposit in the Northern Territory (Emerson et al, 1993). The porosities are apparent or interconnected values. The weathered schist zone can be quite clayey and samples show porosities ranging from moderate, about 4%, to high, nearly 30%, as weathering effects range from transitional (at depth) to extreme (near surface); the dry bulk densities are low but the grain densities can be seen to be appropriate to the mineralogy i.e. mainly quartz, kaolinite and mica. The fresh schists show higher densities and lower porosities (under 4%) except for

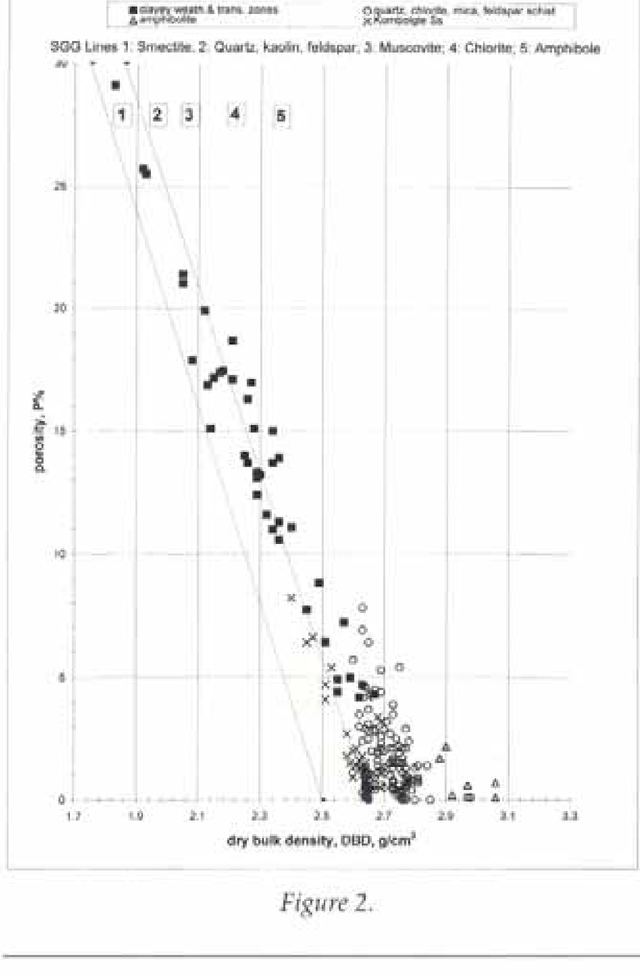

Figure 2.

those from shear or fracture zones. The fresh schist mineralogy comprises quartz, mica, chlorite and feldspar as the inferred grain densities attest. The amphibolites have high densities and low porosities and a mafic mineralogy. The sandstones being mainly quartz follow a similar trend to the weathered materials but with lower porosities. Figure 2 shows at a glance, and for a typical Australian exploration and mining environment, the essential mass properties of 200 samples in a detail that would not be comprehensible in a bunch of tabulated numbers. Figure 2 shows the desirability of using the three basic quantities, DBD, P, SGG in a consideration of rock mass properties, especially in highly weathered areas.

Other Properties and Density

Measured densities also provide a useful basic reference quantity with which to view other physical properties. This can be achieved graphically by crossplotting. By this means physical property data are rendered easier to assess and use in an easy-to-appreciate physical perspective. Tabulations do not elicit relationships, and mean values, whether arithmetic or geometric, can be misleading when applied to lumped populations.

Broken Hill Ore

The data in Figure 3 are for ultrasonic Pwave velocities (measured under uniaxial load) and densities of 12 cores of coarse grained (1mm) massive B lens Zn-Pb mineralisation from the Proterozoic granulitic metamorphics at Broken Hill, NSW. Porosities of these materials are quite low. The sphalerite (ZnS) content of the cores ranged from about 15 to over 90% by volume and the galena (PbS) content ranged from very low to about 45% by volume. Sphalerite is an insulating sulphide, even when iron rich as at Broken Hill; its density is 4.0 g/cm^3. Galena has a crystal conductivity up to about 50 000 S/m and a density of 7.5 g/cm^3. Gangue (waste mineral), comprising high density garnet (4.2 g/cm^3), pyroxenoid (3.4 g/cm^3), quartz and carbonate, was present to a varying extent in the cores. Chalcopyrite and pyrrhotite were also present but in trace to minor amounts. Magnetic susceptibilities were low.

The plot in Figure 3 shows three groupings: Zn rich ore dominated by framework sphalerite, Zn-Pb ore, and Pb-Zn ore with abundant galena dominating the rock framework. The Zn ores plot near sphalerite's nominal Vp - DBD point (5100 m/s, 4.0 g/cm^3); the Pb ores trend towards the galena point (3100 m/s, 7.5 g/cm^3). The influence of high velocity and high density gangue minerals (e.g. spessartine garnet 8500 m/s, 4.2 g/cm^3) can be seen in some of the samples where gangue contributes significantly to the rock framework. Fracturing occurs in some of the cores and this, combined with heterogeneity and textural effects, shifts the four sphalerite rich ores a little away from the nominal sphalerite point.

In Figure 4 the conductivities of these ores are plotted against dry bulk density. The data show an increase in conductivity as density increases. Three of the samples are sphalerite with minor gangue and these ZnS insulators have very low conductivities. Two of the samples have very coarse grained galena as the dominant mineral, indeed it forms the rock framework, and they

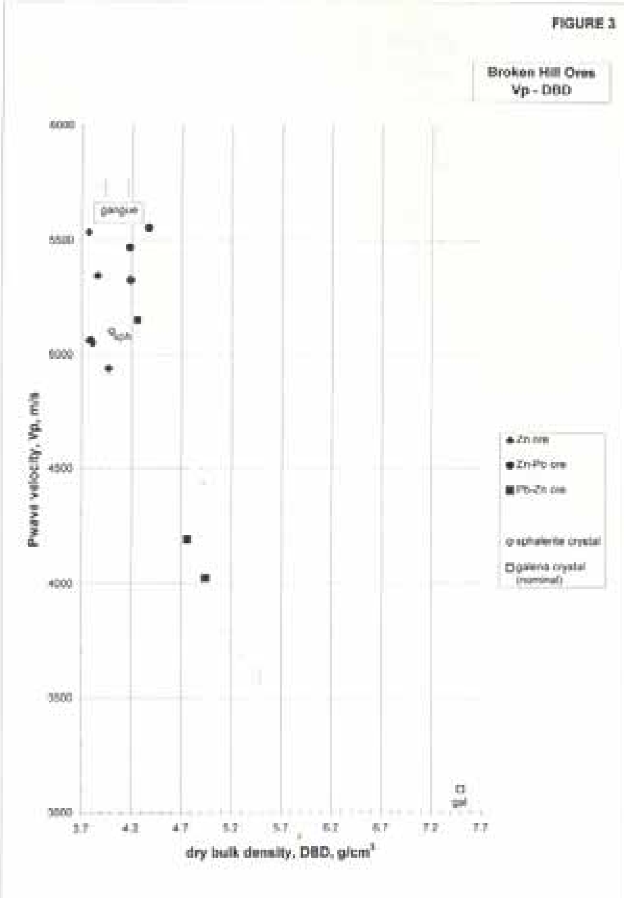

Figure 3.

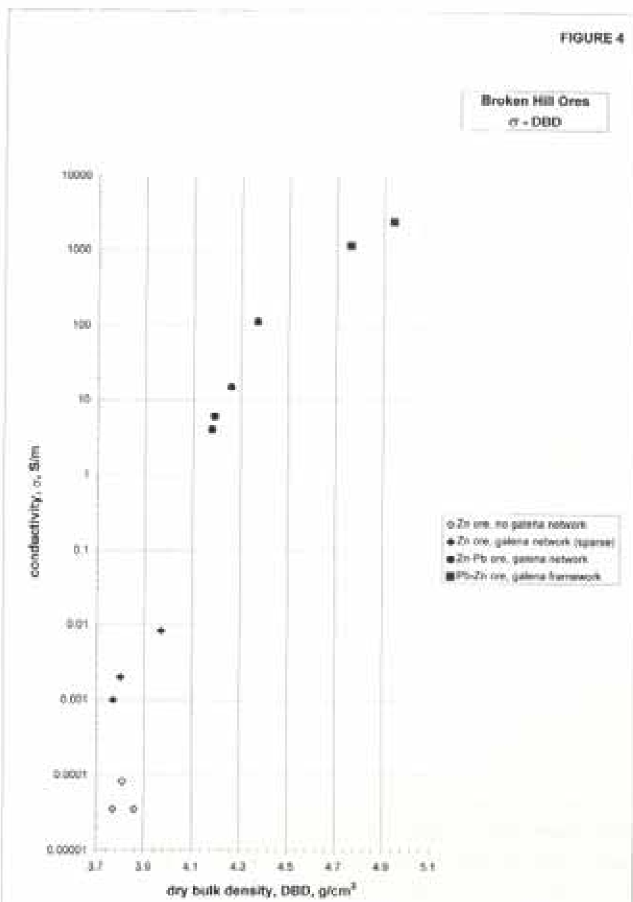

Figure 4.

exhibit quite good conductivities, 1183 to 2485 S/m. These two Pb-Zn samples occupy a distinctive position in Figure 3. The other seven Zn-Pb samples have an effective network of galena running through them. The higher the density the better the network and the better the conductivity (0.001 to 112 S/m). The considerably extrapolated conductivity value at 7.5 g/cm³ density (100% galena) is about 20 000 S/m, an inferred value which is quite good for polycrystalline galena (see Shuey, 1975).

The galena in these samples does not have a neat cubic, euhedral habit. It is subhedral, embayed, cleaved and ragged. The behaviour of conductivity increasing with density suggests simply that it is caused by increments in the galena content of the ore mix. It does not vary in a linear manner with density on a semi log scale. However it does vary linearly with percent volume galena on a log-log scale (not shown here). Very coarse grained aggregates of soft galena with well sutured grain boundaries are capable of attaining quite high conductivities as can be seen here for Broken Hill where the galena tends to be pervasive, and starts to envelop other minerals as the volume percent increases. This is not always so, euhedral galena with poor grain boundary contacts may not exhibit conductivities that match those cited here.

Elura Ore

Another example is provided by some data measured on 17 fresh pyritic and pyrrhotitic cored sulphide ores from the Elura polymetallic deposit set in Palaeozoic metasediments. The geophysics and geology of Elura have been documented by Emerson (1980). The density referenced data here are conductivity and susceptibility and are shown in Figures 5 and 6 respectively. As for Broken Hill the porosities of these ores are very low (<<1%) and accordingly they can be regarded as zero porosity materials: DBD = SGG, P = 0. The ore cores tested carry up to about 5% by volume galena and up to about 30% by volume sphalerite. Pyrite ranges up to 85% and pyrrhotite up to 70% by volume. The pyrrhotite is thought to be dominantly monoclinic, i.e. quite magnetic. In contrast to the Broken Hill sulphides the Elura sulphides are fine grained (0.03mm).

Conductivity against density in Figure 5 shows three groupings: pyrrhotite rich, pyrrhotite-pyrite, and pyrite rich. This is a classification based on conductivity and density information supplemented by mineralogy. The pyrrhotite (Fe_7S_8) cluster trends towards the 100% pyrrhotite point representing 100 000 S/m nominal crystalline conductivity and density 4.60 g/cm³. The pyrite (FeS_2) cluster does not trend to the 100% pyrite point, representing 1000 S/m nominal crystalline conductivity and density 5.0, but suggests a projected conductivity value of around 200 S/m for 100% pyrite. The pyrite-pyrrhotite cluster shows intermediate conductivities decreasing with density and seems to trend towards the 200 S/m extrapolated value for 100% pyrite.

Figure 5 is quite instructive. It shows the usual excellent conductivity of pyrrhotite, which, with its anhedral pervasive habit, forms an effective electrical network and tends to attain its high crystal conductivity when concentrated in interlocking grain mosaics. It also

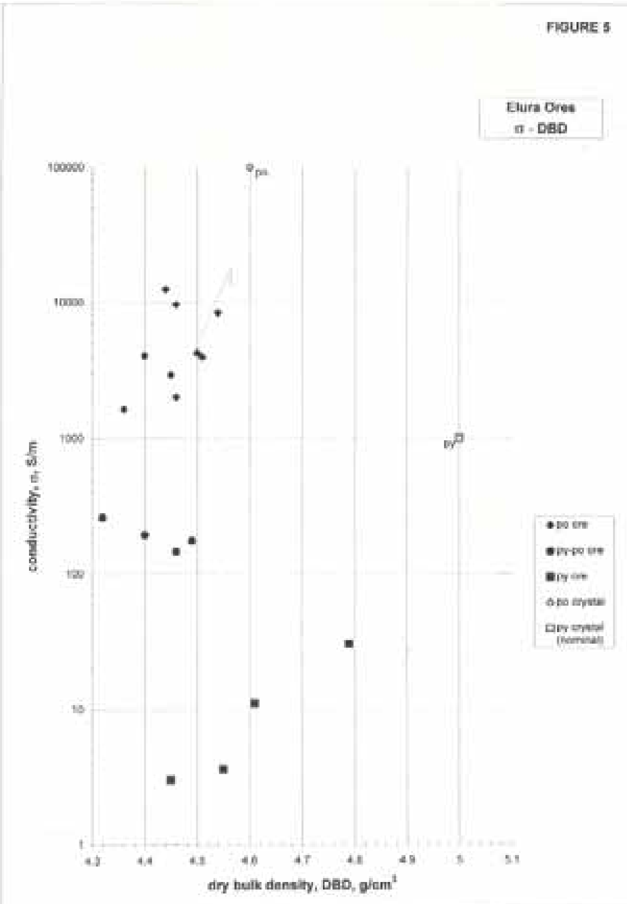

Figure 5.

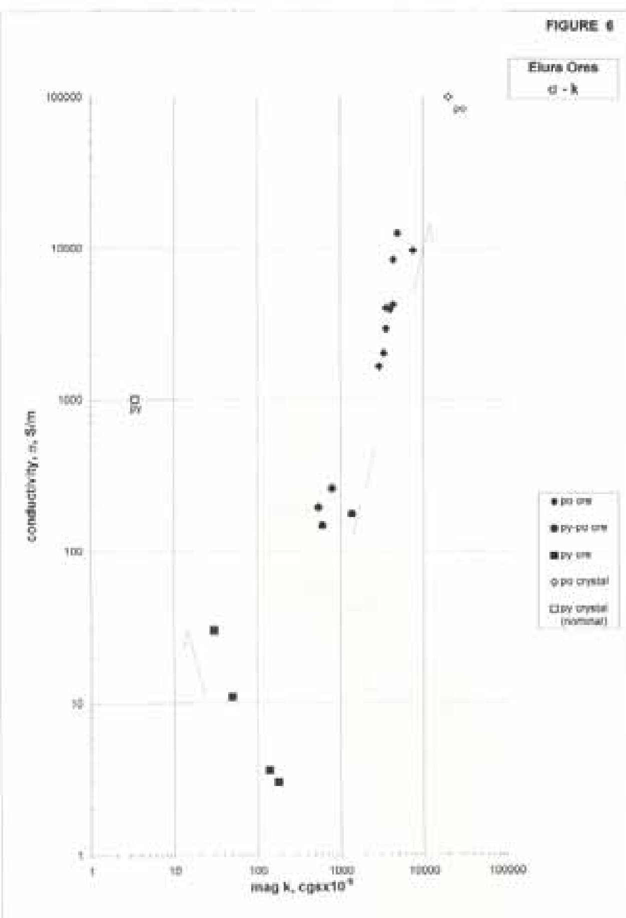

Figure 6.

shows the poor conductivity of polycrystalline pyrite. Pyrite is a brittle mineral and, in aggregate, even in large amounts it tends not to attain its nominal crystalline conductivity owing to its euhedral or subhedral cubic habit generating a considerable number of grain contact impedances. In our experience this is often the case (but not always, and for reasons that will not be discussed here).

Figure 5 suggests that massive sulphide bulk is not a simple control on conductivity as there are three trends. So what is the main control on conductivity? The answer is provided in Figure 6 where conductivity is plotted against magnetic susceptibility and the nominal positions for ferrimagnetic monoclinic pyrrhotite and paramagnetic pyrite are shown. The pyrrhotite and pyrite-pyrrhotite data now broadly but clearly trend to the pyrrhotite point which obviously is the main control on conductivity. Other factors such as pyrite content and ore texture are subordinate for these two groups. The four pyrites appear to trend to the pyrite point as they did on Figure 5.

The inner pyrrhotitic core of the Elura orebody would appear to be a quite high conductivity zone. The intrinsic conductivities of the Elura sulphides as reported here range from 3 to 30 S/m for pyritic, 146 to 260 for pyrite-pyrrhotitic ore, and 1654 to 12554 S/m for pyrrhotitic massive ores. The Elura conductivity information for massive pyrite and pyrrhotite ore supplements that provided in the Elura Volume Compendium (Emerson, 1980) where the conductivity data (average 3 S/m pyrite zone, 10 S/m pyrrhotite zone) were obtained from water bath IP-type wet galvanic measurements and thus included core-end termination impedance effects.

Conclusions

Density is a straightforward concept, but densities can be misleading if apparent values are all that a geoscientist has available. Density and porosity go together: mineral aggregates have voids and voids require an enclosing mineral framework. Density and porosity are linked in a rock mass property and it is the mass property that geoscientists require in geophysical and geotechnical studies, especially in weathered zones. (Permeability is another mass property that has not been considered here). The referencing of physical properties to density can help in the physical categorisation of rocks and in identifying controls on physical property behaviour. The use of crossplots facilitates such studies of particular rock formations in specific regions.

Procedures

Mass property measurements followed Emerson (1990). Ultrasonic (500kHz) P-wave velocities were measured in a uniaxial press with 5kN applied. The conductivities cited herein for the Broken Hill and Elura ores were measured in the dry state by two and four electrode low frequency galvanic techniques (Emerson, 1969). Inductive conductivities measured electromagnetically in an induction coil (Yang & Emerson, 1997) generally were similar to the galvanic values down to the 1 S/m threshold for EM laboratory conductivity measurements.

Acknowledgements

The Koongarra mass property data were collected in the ANSTO managed ARAP project. The conductivity data were measured on samples from the Systems Exploration collection and some were used in an AMIRA Report, No. P369A. AMIRA Projects P369 and P369A on Electromagnetic Conductivities of Sulphide Rocks and Ores supported Y P Yang while he worked on his PhD in the Department of Geology and Geophysics, University of Sydney. Don Emerson is an Honorary Research Associate of that Department.

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Seismic Window

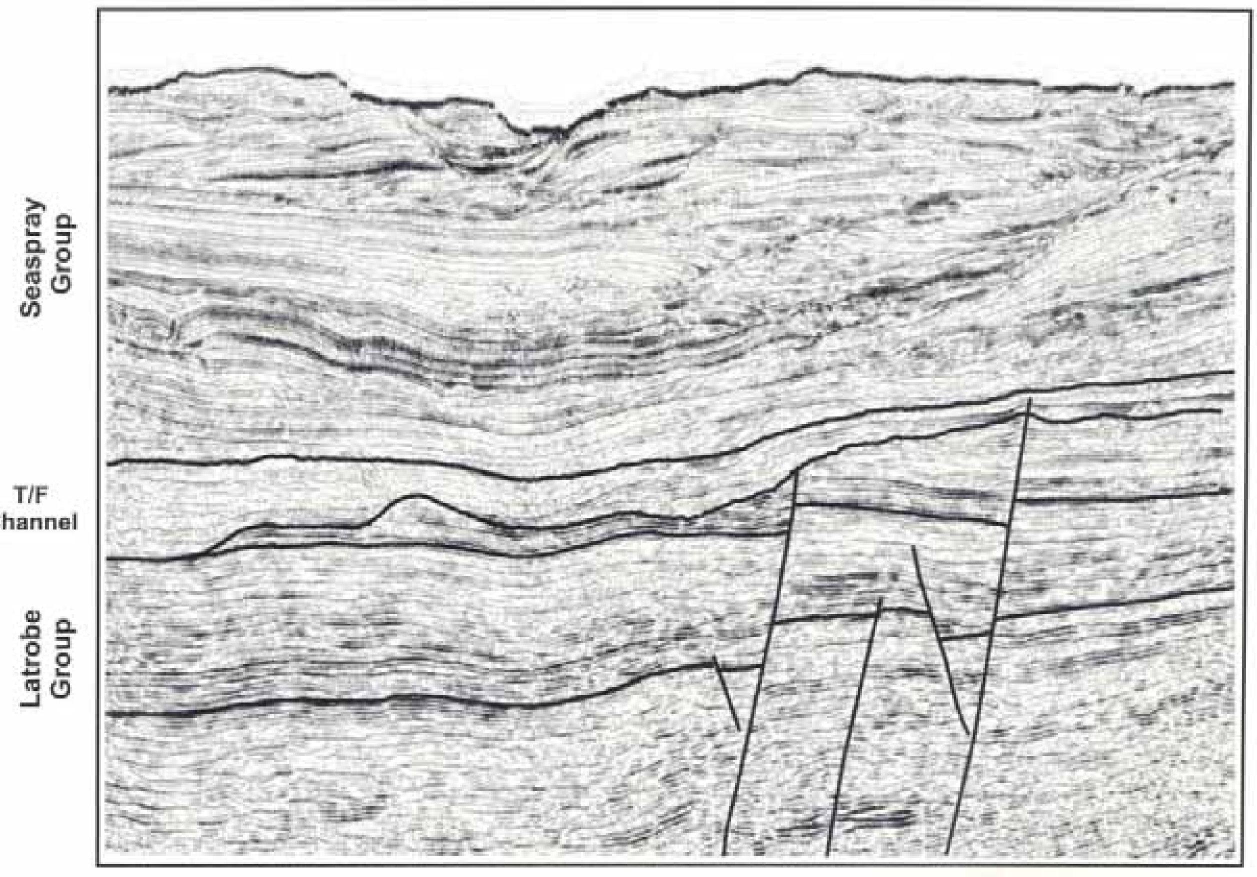
with

Henk van Paridon
GeoSolve

Rob Kirk is taking a break from Seismic Window. If you have a seismic section that is of interest to others please submit them to the Editor. (I am famous for one line interpretations!) Camera ready copy is preferred.

Gippsland Basin

Eocene aged channels,the Tuna Flounder Channel System, have eroded the Latrobe Group sediments near to the Volador 1 well south east of the Flounder field. Erosional remnants sealed by impervious channel sediments are exploration targets. Also evident on this line is false structuring at the level of the Intra-Latrobe reflectors as a result of water bottom topography that varies by over 200m on this line.



Exploration in the Robe Trough, Otway Basin

Noll Moriarty and Randall Taylor
Oil Company of Australia Limited

Petroleum exploration of the Robe Trough (RT) region (Fig. 1) has been conducted sporadically and with no commercial success since the first well, Robe-1 was drilled in 1915. Until recently, the onshore area has been regarded as having little prospectivity with exploration concentrated on the edge of the Trough. However, as a consequence of recent efforts, the onshore RT (PEL 60) region is viewed with significantly higher prospectivity, particularly the central region, and underwent a key test with the drilling of the Nunga Mia-1 well in late 1996.

Previously, onshore exploration had concentrated on shallow targets near the rim of the Trough. The Robe-1 well (Fig. 2) was sited on a fossil beach dune, mistaken for a surface expression of an anticline and was not a valid test. It did not reach the Crayfish Group, having a TD of 1,374m in the Eumeralla Fm (Fig. 3). During the early 1960s, Alliance Oil recorded single fold seismic data; in the late 1960s Esso Exploration recorded low-fold (1-6) seismic lines over the RT. The interpretation of these lines, when combined with regional aeromagnetic and gravity surveys, led to the drilling of two wells (Lake Eliza-1; Lucindale-1). The wells, having total depth less than 1,500 metres, were located on massive basement highs (Fig. 2). Both wells recovered very minor amounts of gas from the main reservoir target, the Pretty Hill Formation (PHF). A second well was drilled on the Lake Eliza structure in 1973. (In the offshore region during the 1960s only one well - Crayfish-1A was drilled. Four wells were drilled in the 1970s.)

Exploration of the onshore RT remained largely dormant until the mid 1980s when Hartogen Energy Ltd acquired seismic data, again on the flanks of the RT. This seismic data was of considerably better quality than earlier vintages, principally because of the higher fold (20-30). An example of the data quality is shown on the right of Figure 4. During 1987-91, four exploration wells - Camelback-1, Killarney-1, Lake Hawdon-1, (operated by Hartogen) and Greenways-1 (operated by Mosaic) - were drilled. All were on the rim of the RT and were unsuccessful. The central portion of the onshore RT was then believed to have only 3-4 km of sedimentary section and consequently be immature to generate hydrocarbons. It was relinquished in 1992.

The area, later to be granted as PEL 60, was gazetted in 1993. Oil Company of Australia Limited (OCA) examined all the data, in particular the 1960s seismic and gravity data. Review of the gravity data indicated the

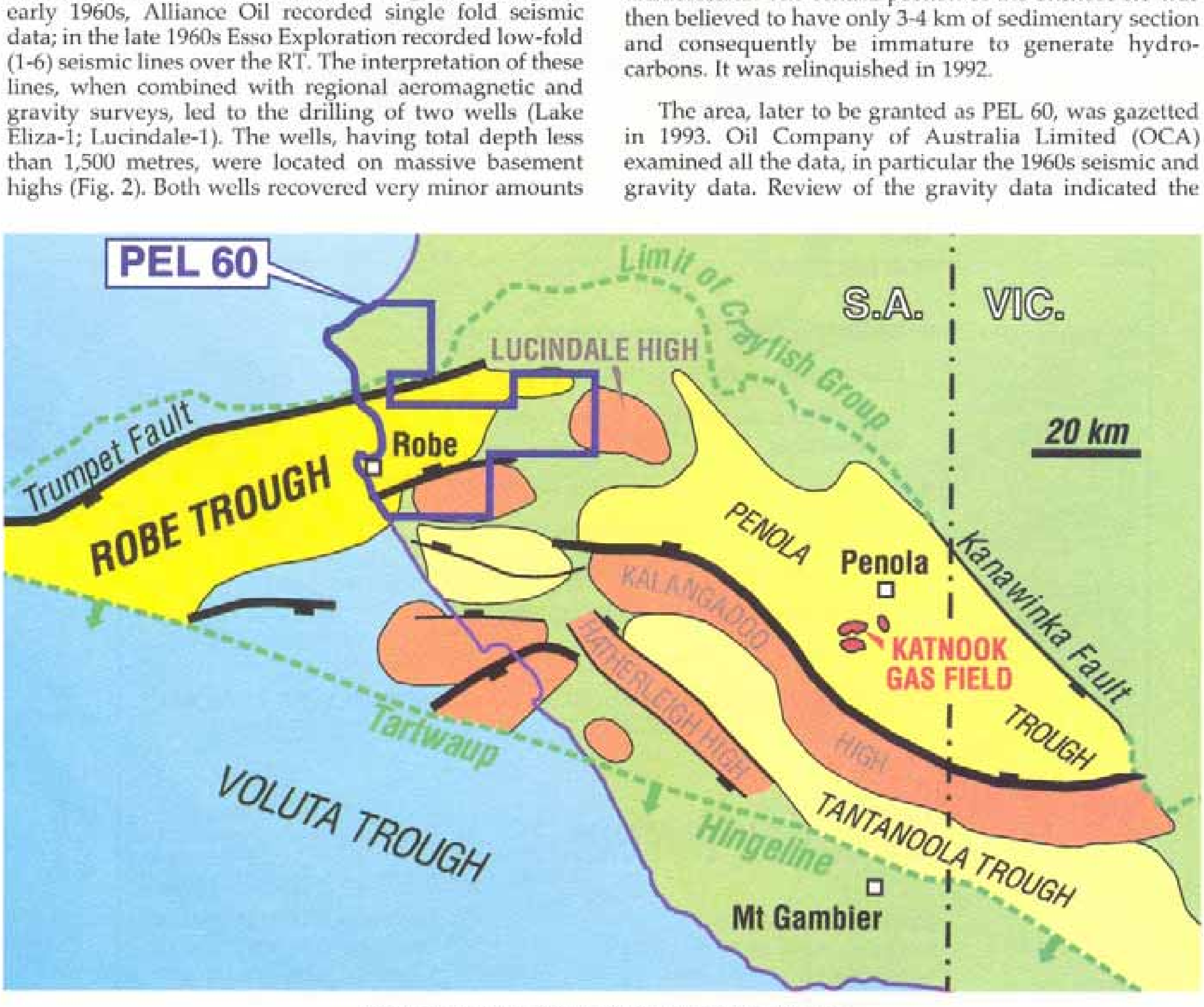


Figure 1. Western Otway Basin structural elements.

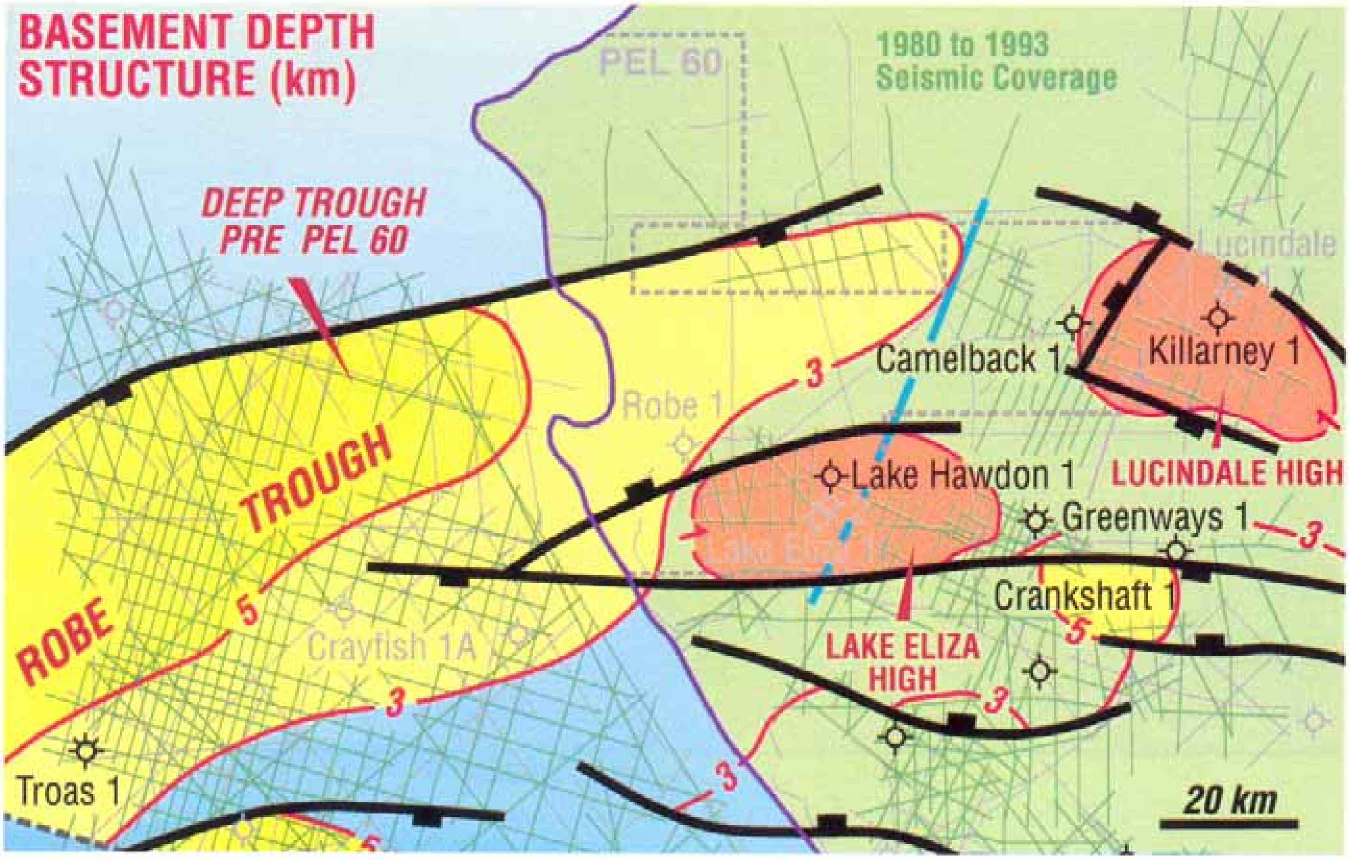


Figure 2. Robe Trough and referenced well and seismic locations in this paper.

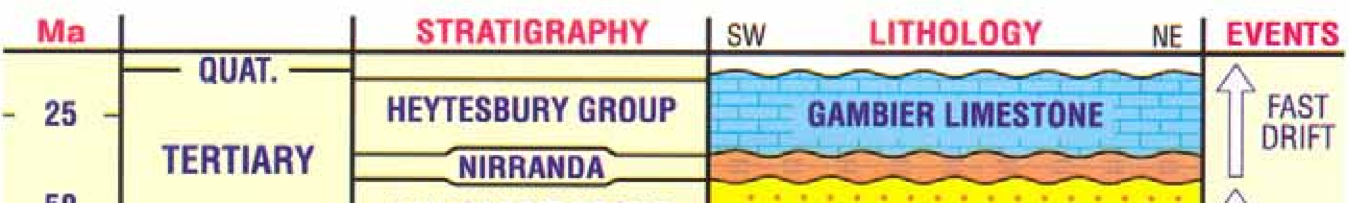


Figure 3. Western Otway Basin stratigraphy referenced in this paper.

sedimentary section in the central onshore RT may be considerably deeper than previously interpreted - indeed, as deep as the Penola Trough which by then had established gas production. Furthermore, the 1960s seismic data showed the central RT may have significant structuring. Thus OCA believed there was potential for

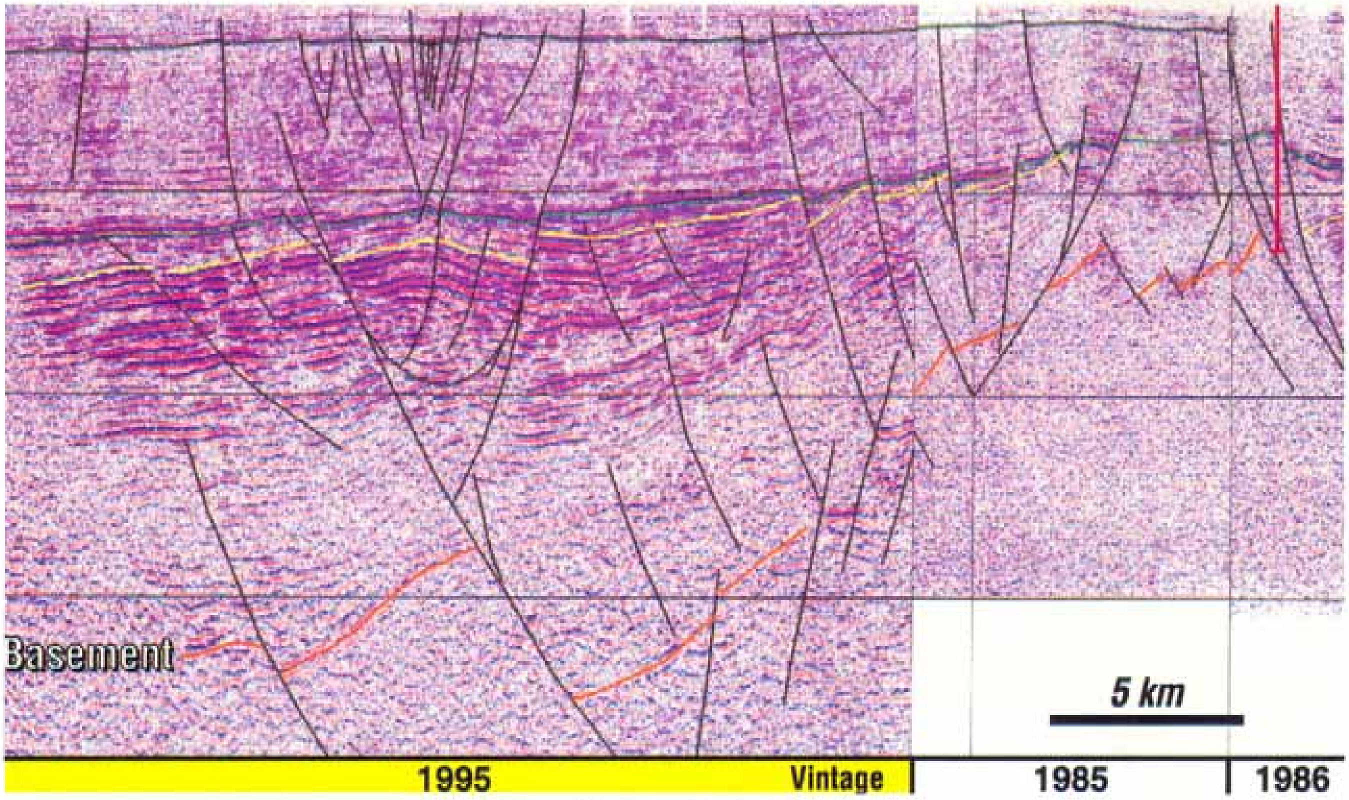


Figure 4. 2D seismic quality in the Robe Trough.

Figure 5. Vibrating along a drain.

the basal sediments to be mature for hydrocarbon generation and traps may exist.

OCA successfully bid in August 1994 on the area covered by PEL 60 and quickly formed a JV with Cultus Petroleum (Australia) N.L. and Ampolex Limited. (Todd Petroleum later joined the JV). The JV faced a commitment of seismic in Year 1, with seismic and one well in Year 2 of the Licence. Given that there was no multi-fold seismic data in the central RT region, the JV faced a big challenge to identify and adequately define a target for drilling in a short time.

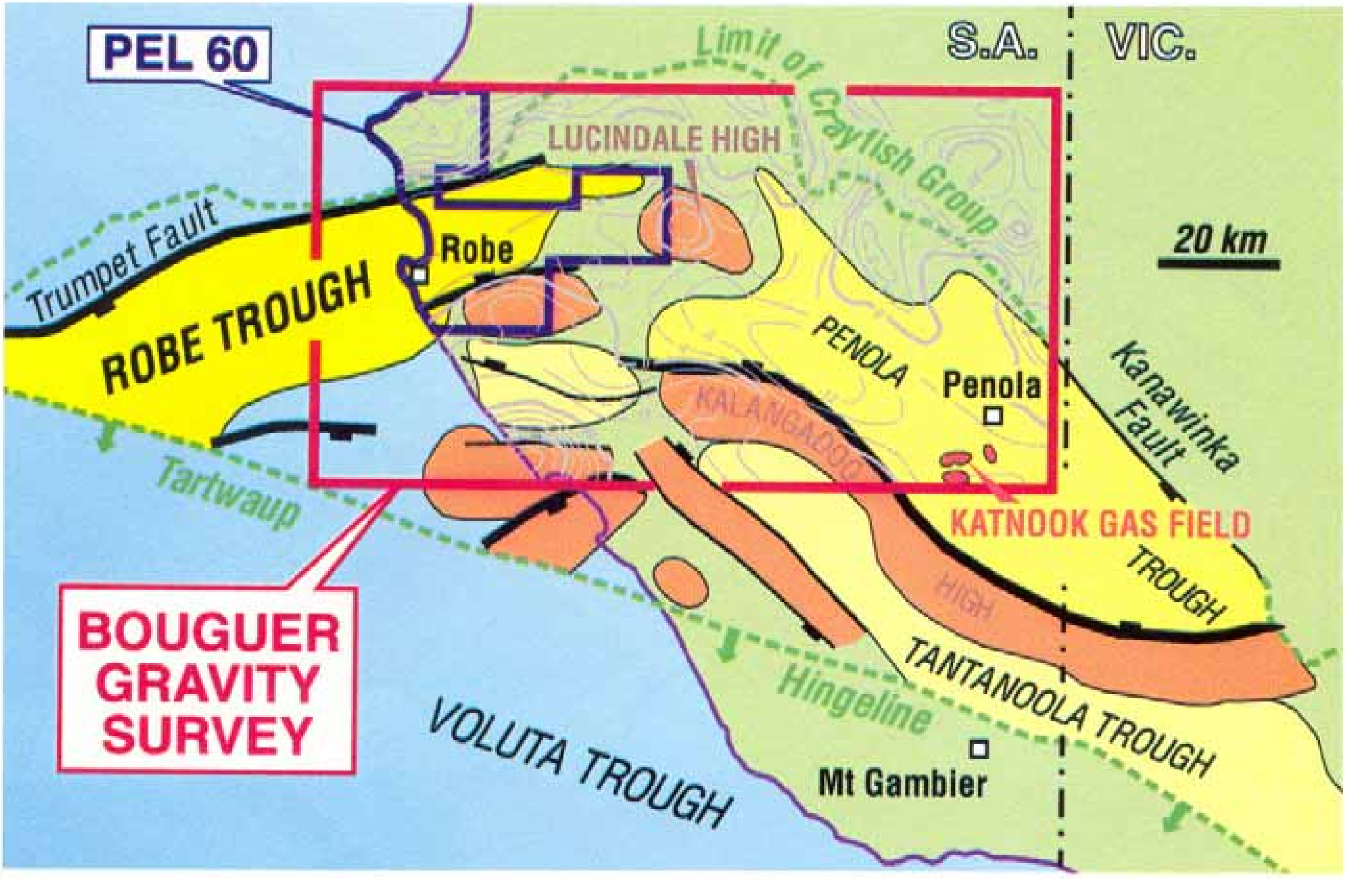


Figure 6. Location of Gravity Survey.

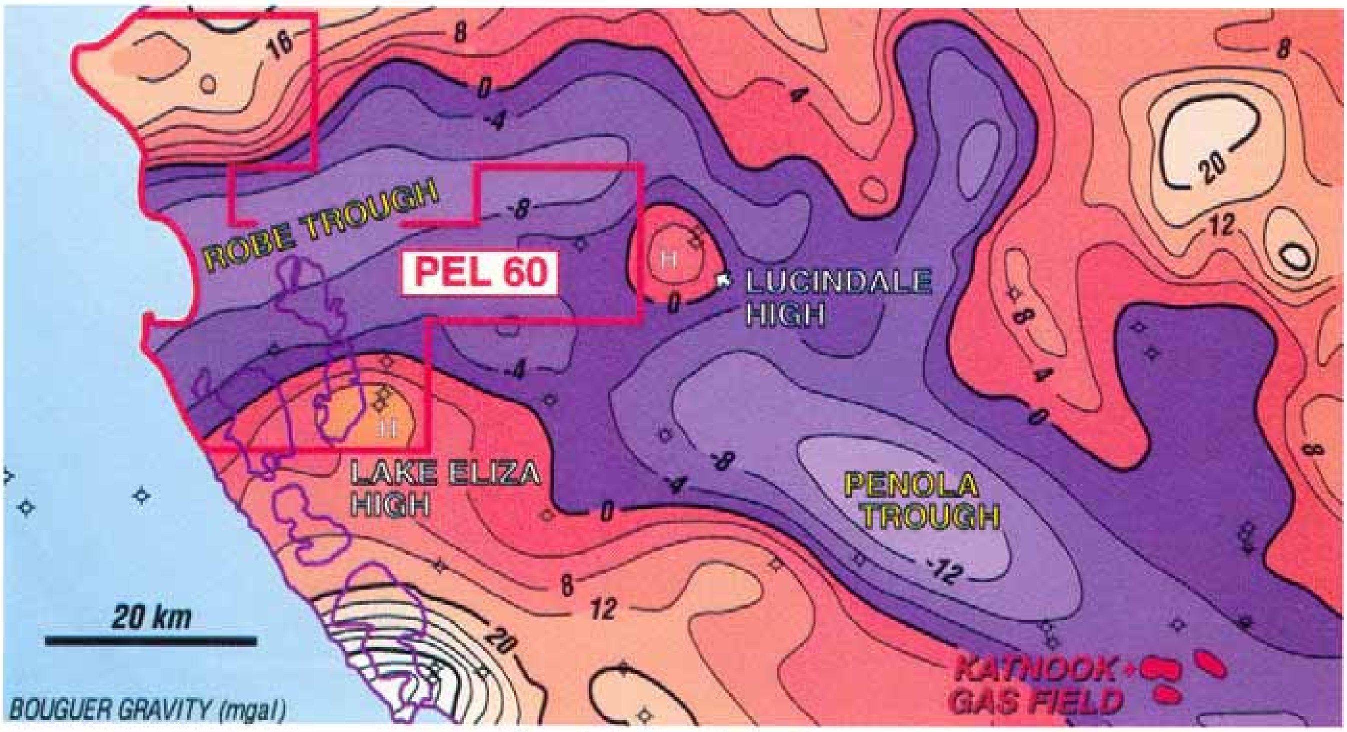


Figure 7. Bouguer Gravity Map.

In March 1995, a 194 km seismic survey with 4-5 km line spacing was recorded over the presumed deepest part of the onshore RT. The seismic data was dramatically better quality than any other previous acquired (Fig. 4). The improvement can largely be attributed to the high fold (200) and long offsets (4 km). Interpretation of this data indicated a 6-7 km thick sedimentary section contained in a full graben of about 20 km width and 30 km length between the Trumpet Fault and Lake Eliza High (Fig. 2). The Crayfish Group has been uplifted through the central axis of the graben. Consequently, this part of the Trough is characterised by complex faulting and crestal collapse. The Pretty Hill Formation has a band of high amplitude reflectors (at 1.3

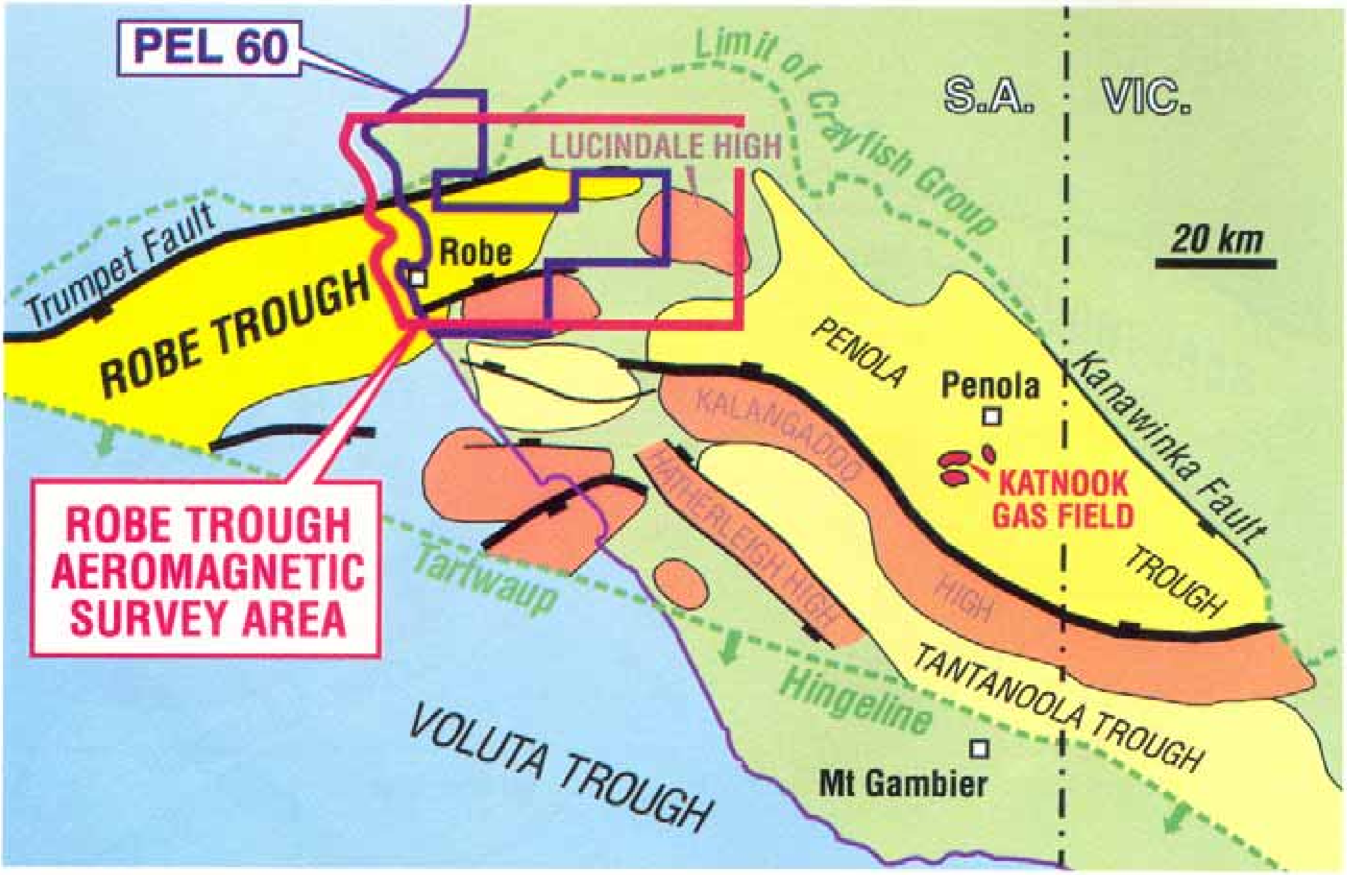


Figure 8. Location of Aeromagnetic Survey.

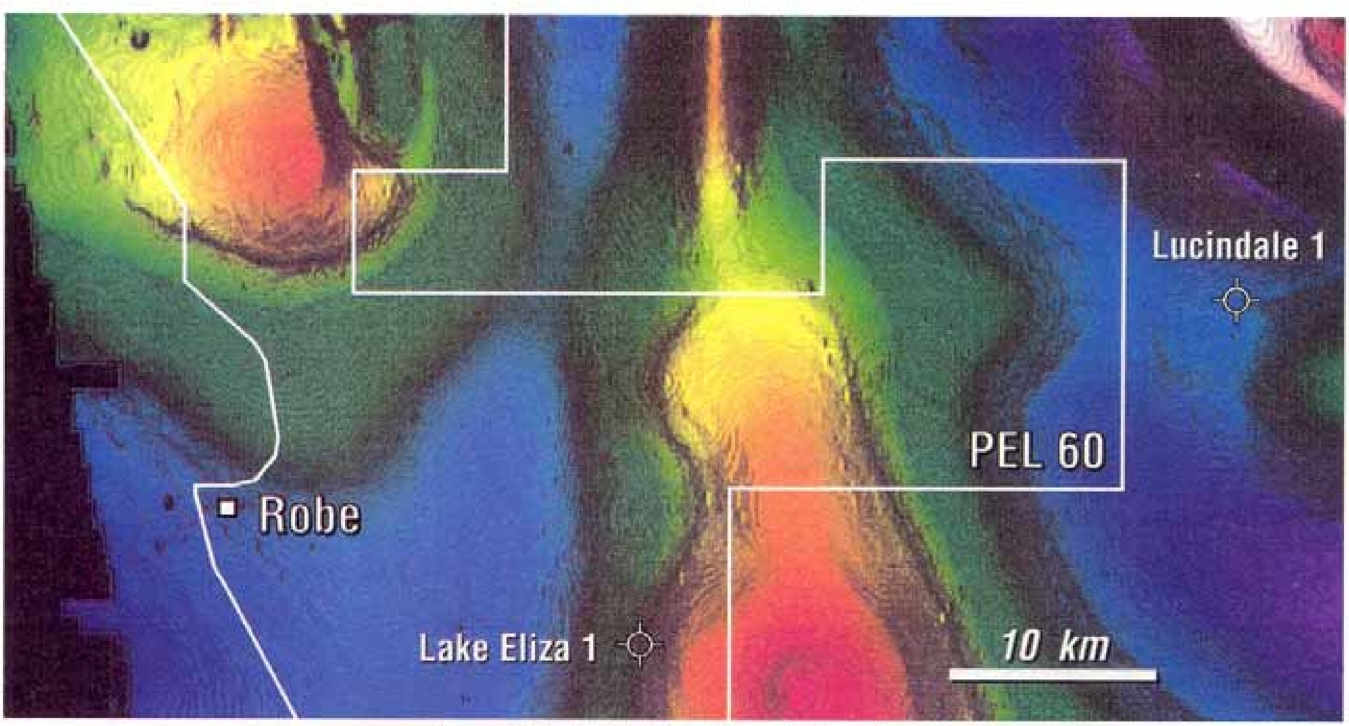


Figure 9. Enhanced Total Magnetic Intensity.

- 2.0 seconds, Fig. 4) presumed to represent interbedded thick sandstones and shales. These reflectors can be correlated to excellent reservoir quality sandstones in Crayfish-1A. In the 1980s, basement had been interpreted below these high amplitude events on the seismic lines tailing off in the RT. However, the 1995 seismic data shows a reflector about 3.2 - 3.8 seconds below a bland zone. (A similar bland zone above basement is seen in the Penola Trough, where basement was not imaged on seismic data until the 1990s.)

Mapping of the seismic data identified a number of weak leads. However, the size of the leads critically depended on the fault correlation. It was fortunate in

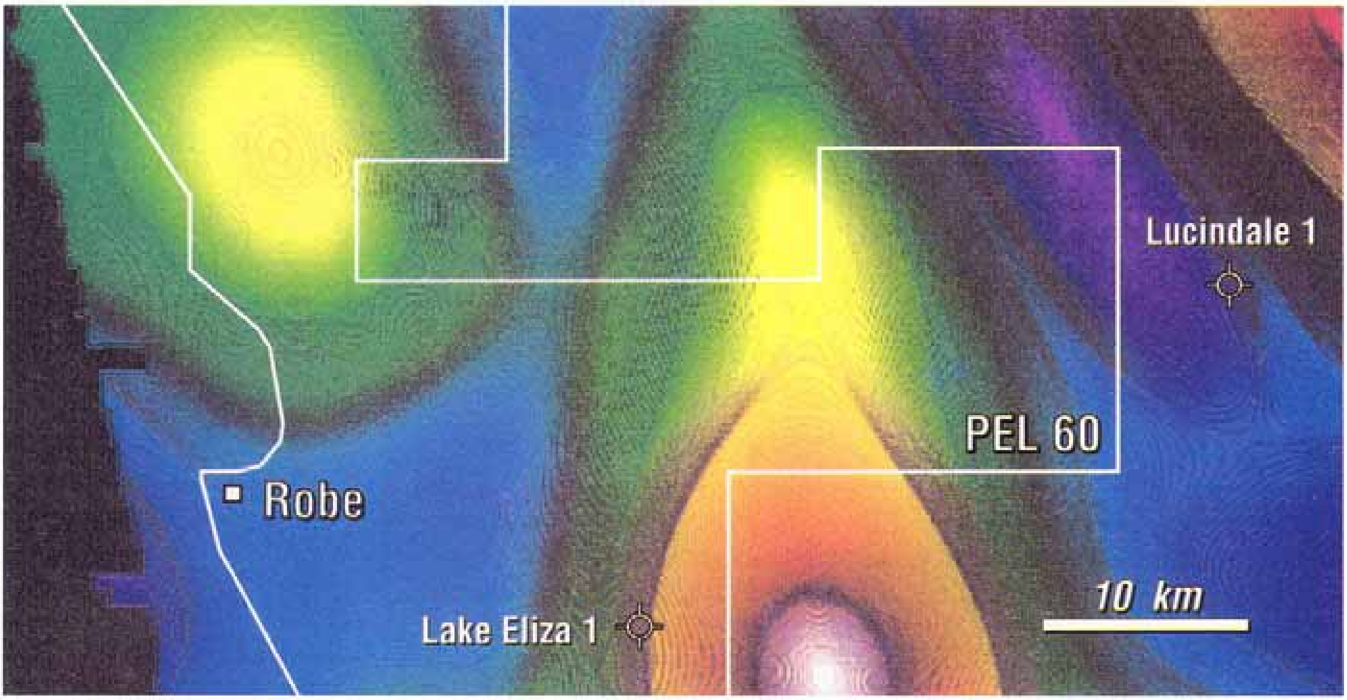


Figure 10. Psuedo Depth Slice 4000m.

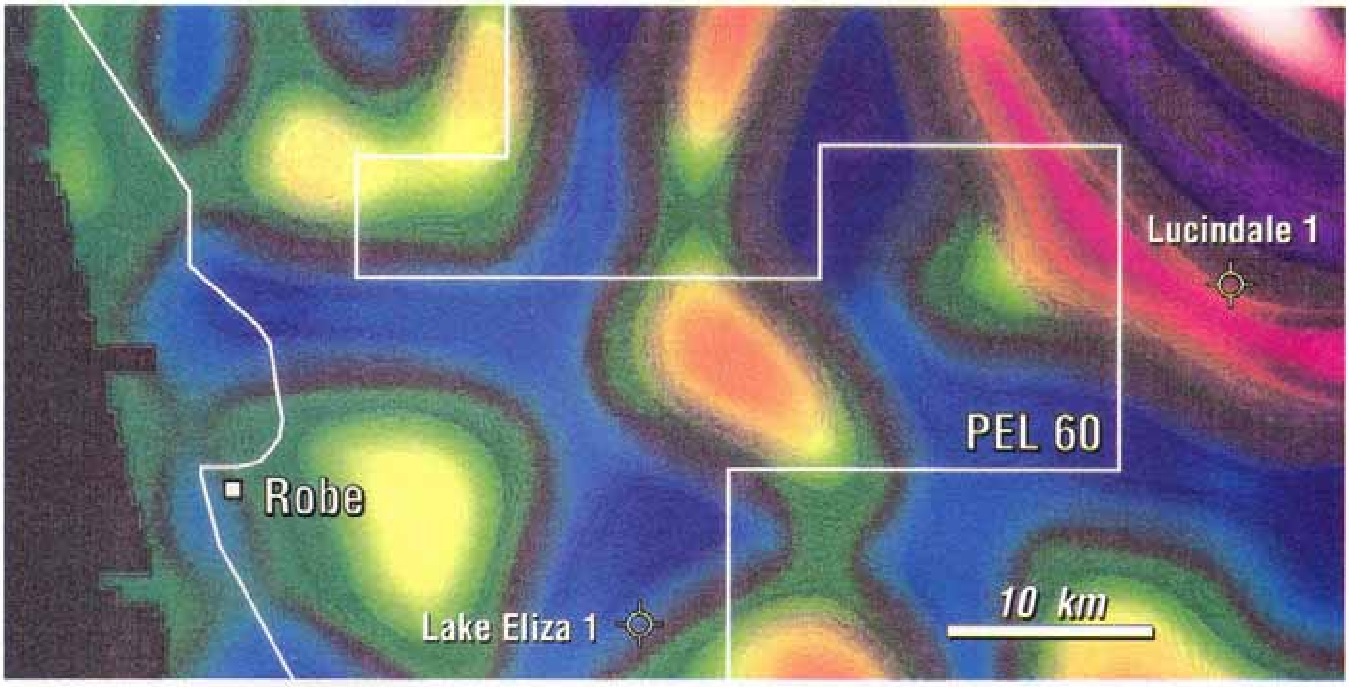


Figure 11. Psuedo Depth Slice 2000m.

1995 that MESA was acquiring high resolution aeromagnetic data as part of a South Australian Exploration Initiative, over the onshore RT and to the north. To assess the potential of aeromagnetic data to assist with fault correlation and define regions with favourable structural potential, the JV acquired additional infill data, then processed the data to produce a number of displays including pseudo-depth slices (Figs. 9-11). The interpretation of these, integrated with the regional seismic coverage, further assisted in the definition of the leads.

The best of the leads were defined by a 134 km seismic survey in February 1996, reducing the seismic line spacing to about 1-2 km. Interpretation of this data has identified the Nunga Mia prospect, 5 km east of the town of Robe (Fig. 2). The assessment of the geological risk controlling hydrocarbon accumulation predicts low risk for reservoir and structure, moderate risk for source and high risk for seal. Wells both in the onshore and offshore RT have encounted good reservoir section in the Pretty Hill Formation. Source potential of the PHF can be Type II kerogen, with Type I possibly present in the deepest undrilled section (Casterton Fm) of the RT. Seal is expected to be provided by the Eumeralla and Laira Formations. In particular, the nature of the Laira Fm (sandstone or shale) in the central RT is unknown as it

Figure 12. Good vibrations.

has not been comprehensively tested by any wells in the RT, onshore or offshore. Otway Basin plays all rely on fault seal - this is proving a challenge to predict.

Current exploration status of the onshore RT can be compared with that of the Penola Trough of ten years ago, prior to the Katnook gas field discovery. The Penola Trough at that time did not have any drilling in the deepest part of the Trough. Nunga Mia-1 was scheduled to be drilled in November - December 1996. The prospect had the potential to have attractive reserves of oil and/or gas. The well was programmed with a 2400 m TD, evaluating the upper 500 m of the PHF.

Through lateral thinking, rigorous analysis of all data and application of a judicious mix of various exploration techniques, the JV has significantly upgraded the petroleum potential of the onshore RT and defined a potentially commercial target in the short time of two years. We now eagerly await application of the drill bit to provide the only true test of our predictions.

Postscript

Nunga Mia-1 was drilled as a deviated hole in November-December 1996, reaching a 2650m TD. After logging, a DST over an intra-Crayfish Formation sandstone recovered 0.71 bbl 33.8o API oil. The well was then sidetracked to the Nunga Mia North structure. The sidetrack was plugged and abandoned after no hydrocarbon shows.

While the drilling results are disappointing, the oil recovery - being the first for the Robe Trough - provides encouragement that the region may yet harbour significant volumes of hydrocarbons. The search continues...

Status Report: South Australian Seismic Datasets

Elinor Alexandar, MESA

A program commenced in 1989 to consolidate South Australian open file basic and interpreted seismic data into coherent data sets. This programme is nearing completion for major onshore prospective basins in SA including the Otway, eastern Officer, Eromanga, Pedirka, Simpson and Cooper Basins, and for large areas offshore in the Otway and Bight, Duntroon and Polda Basins. All data is available in a variety of hardcopy coloured maps and sunshaded images, as well as in digital forms for grids and contours. For information on the SA seismic mapping project, contact Dave Cockshell (ph (08) 8274 7671, fax (08) 8373 3269, email dcockshell@msgate.mesa.sa.gov.au).

Duntroon, Bight and Polda Basins

Key seismic horizons in the Bight, Duntroon and Polda Basins offshore SA were mapped as part of a joint study between the BMR (now AGSO) and MESA in 1986-90. This was the first regional seismic mapping project attempted by MESA and covers most of the onshore waters of South Australia and south eastern Western Australia. A folio of this study is available from AGSO.

Eromanga, Simpson and Pedirka Basins

Compilation of the C-horizon (mappable over the entire basin in SA, Qld, NSW and the NT) commenced in 1990. This was the first regional seismic mapping project undertaken by MESA. Production of this regional dataset in the Eromanga Basin contributed towards development of the Cooper-Eromanga NGMA Project agreement between AGSO, MESA, QDME, NSWDME, BRS and the NTDME. One of the key outcomes of this initiative is compilation of regional seismic datsets of key horizons (C horizon, top Triassic, top Permian and top Warburton Basin) across the entire region, ignoring State boundaries.

Other major horizons in the western Eromanga Basin region, where it overlies the Simpson and Pedirka Basins have now been mapped.

Cooper Basin

MESA has been compiling regional geophysical maps of the Cooper and Eromanga Basins since 1990. The aims are to provide an overview of the structure and tectonic history of this onshore petroleum province and to consolidate some of the enormous quantities of seismic data generated during exploration and development of the Cooper Basin. Recent mapping has concentrated on the Cooper Basin as preparation for the acreage release in 1999. The following depth maps have been prepared from seismic and well data (and matched to well depths): base Tertiary, top Cadna-owie, base Birkhead, base of Eromanga Basin, top Permian, Daralingie unconformity, top and base Patchawarra and top Warburton Basin.

Isopachs of various units have also been prepared and a digital seismic surface elevation dataset has also been compiled.

Otway Basin

The onshore Otway Basin was mapped in 1992-93 was mapped as part of a joint study between Mines & Energy South Australia (MESA), the Australian Geological Survey Organisation (AGSO) and the Geological Survey of Victoria (GSV). These studies produced digital datasets of four key horizons across the entire basin (depth to basement, top Crayfish Group, top Eumeralla Formation and top Sherbrook Group). Subsequently, 1n 1994, the offshore portion of the basin was mapped by MESA and GSV and merged with the onshore dataset.

Officer Basin

Compilation of seismic maps in the Officer Basin occurred in 1992, as part of a major reappraisal of this frontier basin by MESA and AGSO under the National Geoscience Mapping Accord. Seven key horizons were mapped in time in this frontier region (three major unconformities - crystalline basement, base Cambrian, base Permian; and four other marker horizons).

Reflections on Saudi Arabia

A.P. Spenceley
Spencely & Associates

Driving out of Dhahran you could be excused for momentarily thinking that you are somewhere in northern South Australia. The almost total lack of vegetation cover and the dull tan rather than the reds typical of Australia soon bring you back to reality. The other main difference is one of scale. Consider for example, the ability of Saudi Arabia to develop a maximum sustained production capacity of 10M bopd (Saudi Aramco Public Relations, 1995) and that during 1996 the average crude oil production in Australia was 566K bopd whilst Iraq, even in its impoverished state, produced an equivalent amount of crude oil to Australia, on a pro rata basis (Anona, 1997).

Saudi Aramco, headquartered in Dhahran, is the largest oil company in the world employing over 56 500 people (Saudi Aramco Public Relations, 1995). Most 2-D data on the Arabian peninsula are recorded at 240 fold which means data handling and storage provides yet another challenge. 3-D acquisition is becoming more important in Saudi Arabia with over 8500 sq. km of data being acquired since 1992 (Hastings-James & Al-Yahya, 1996); over 21% of the existing oil concession in Oman is covered by 3-D surveys (Wams & Rozemond, 1997). These data also illustrate another problem of scale.

The industry perception that interpretation of 24 fold or even as low as 6 fold data volumes can equal or surpass that found by processing and interpreting numerous 2-D lines of up to 120 fold is severely challenged in Saudi Arabia. Results indicate that whilst there is sufficient improvement in data quality to justify acquiring 3-D data with a minimum of 120 fold improvements may continue to occur up to at least 288 fold (Hastings-James & Al-Yahya, 1996).

The reasons for these requirements are directly associated with the geology of the oil province. This is located to the east of the Palaeozoic Arabian Shield, comprising a series of sub-horizontally eastward dipping beds. These are made up of a series of cyclical sequences of anhydrite, dolomitic limestone and clastic beds (Meyer et al, 1996). The majority of oil reservoirs are upper Jurassic/lower Cretaceous in age with gas reservoirs generally being at least Permian in age. Over 70 oil and gas fields have been discovered in the last 60 years including giant and super giant fields, for example the Ghawar oil field (Halbouty, 1980). This has an area of approximately 2240 sq. km and a maximum vertical oil column of 396 m (Arabian American Oil Company Staff, 1959). Estimated petroleum reserves for Saudi Arabia were, in 1996, 261.2 billion barrels of oil and 185.9 trillion cubic feet of gas representing approximately 35.9% and 3.7% respectively of the world's oil and gas reserves (Trevelyan, 1997).

SAUDI ARABIA

Trying to image wavefields correctly through the anhydrite/limestone/clastic layers presents a major challenge to the analyst. Static corrections are of primary concern. Not only can there be major lateral near-surface velocity changes associated with the presence/absence of sabkhas and calcrete layers but dunes can also be a problem as in the Rub' al-Khali or the Empty Quarter. This lies in the south of the country. Dunes over 100 - 200 m high are common. Fortunately, an anhydrite or a calcrete layer, developed in old lake beds, often underlies them (McClure, 1978). Since this is flat, it provides a reference level against which to test the derived static models. Surface generated and peg leg multiples also present a challenge.

The Rub' al-Khali does not deter the serious doodlebugger. This is the location of the Shaybah oil field which will be brought on stream in mid-1998. The field will play a significant role in the Company's 10M bopd sustained capacity. A large number of deviated and horizontal wells are expected to be drilled to exploit this reserve (Anonb, 1997).

Thus, as suggested, the scale of the industry is quite different from Australia. Life and work in Saudi Arabia presents many challenges and experiences. However, you always have to put them into perspective and not go overboard in one's enthusiasm in meeting them head on, after all, you do not want to lose it!

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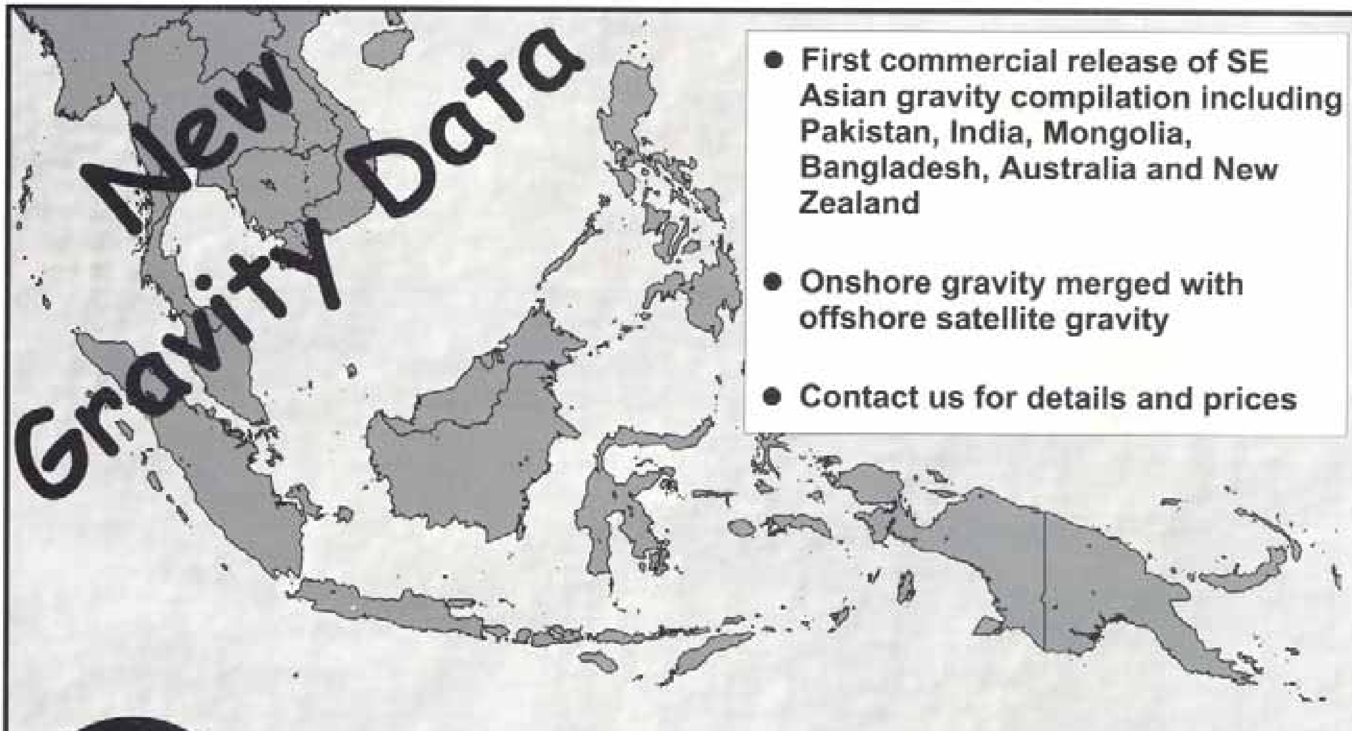
Tony Spencely is currently working for ARAMCO as a Seismic Processing Geophysicist. He enjoys catching up with his ASEG colleagues when he is on leave with in Brisbane.



Directions of Magnetisation and Vector Anomalies Derived from Total Field Surveys

P.W. Schmidt and D.A. Clark
CSIRO, Exploration & Mining Division

Although high resolution magnetic data sets are now a routine requirement of exploration programs, it has proved elusive to extract the vast amount of information that such data sets contain. Moreover, the interpretation of total magnetic intensity (TMI) maps, the location of magnetic units and the siting of drill holes is often complicated by the non-uniqueness caused by the presence of remanent magnetisation or high anisotropy of magnetic susceptibility. This contribution briefly illustrates results of vector data processing techniques we have developed that exploit the potential field properties of magnetic fields.

It has been long known that one of the consequences of potential fields obeying the Laplacian equation is that any magnetic field component can be derived from the measurement of another component, given sufficiently dense sampling. Since the total magnetic intensity (TMI) closely approximates a potential field, it is possible to derive all the magnetic components from the TMI (e.g. Blakely,[1] p.342-343). In addition, by integrating over the moments of the components it is possible to derive the magnetisation direction and the magnetic moment of a compact source.[2] Reduction to the pole may then be performed with the a *priori* knowledge of the appropriate magnetic inclination.

In general, to overcome non-uniqueness problems in magnetic interpretation, the direction of magnetisation of the rock units is required. The method we advocate here can determine the magnetisation direction of an isolated depth limited source, irrespective of the Koenigsberger ratio (the ratio of remanent magnetisation to induced magnetisation) or the anisotropy of magnetic susceptibility, both of which can significantly deflect the magnetisation away from the direction of the inducing field.

Results of the method are illustrated using two examples. The Mt Leyshon area near Charters Towers, Qld, is characterised by negative magnetic anomalies associated with intense reverse polarity remanent magnetisation.[3] A greyscale image of the area of interest is shown in Figure 1 along with vector diagrams, representing projections of the anomalous magnetic field on to the horizontal plane and the two orthogonal vertical planes. The plan diagram clearly points to the centre of the anomalous source, while the sections show why the anomaly is negative, with a downward directed vertical component dominating at the centre of the anomaly. The calculated magnetisation direction has a declination of 257° and an inclination of 74°, which is within 16° of the measured declination of 186° and inclination of 81°. This magnetisation is dominated by remanence dating from the time of alteration during the Permo-Carboniferous when Australia was close to the South Pole. Because the magnetic field was reversed at this time remanent magnetisation is directed downward.

The other example is from east of the Flinder Ranges, SA, and has been the subject of a number of previous studies.[4,5] The anomalies appear to be largely due to remanent magnetisation (Figure 2), which has been confirmed through rock magnetic studies. The calculated magnetisation direction has a declination of 209° and an inclination of -32°, which is 22° from the measured direction (declination = 229°, inclination = -20°. The plan vector diagram shows the horizontal anomalous field sweeping back to the NE after emanating from the SW edge of the anomalous bodies. This is to be expected of bodies that are magnetised in a shallow SW direction. The remanence of these bodies dates from the time of their intrusion during Cambro-Ordovician times, immediately after the Delamerian Orogeny.

This brief exposé provides a glimpse of a new range of products that can become available by reprocessing extant TMI data sets. Moreover, simple extensions of these methods will enable volumes of magnetic source rocks to be estimated and magnetic lines-of-force to be mapped below the surface. While this vector approach will not overcome non-uniqueness in general, it can provide a powerful visual aid for interpretation.

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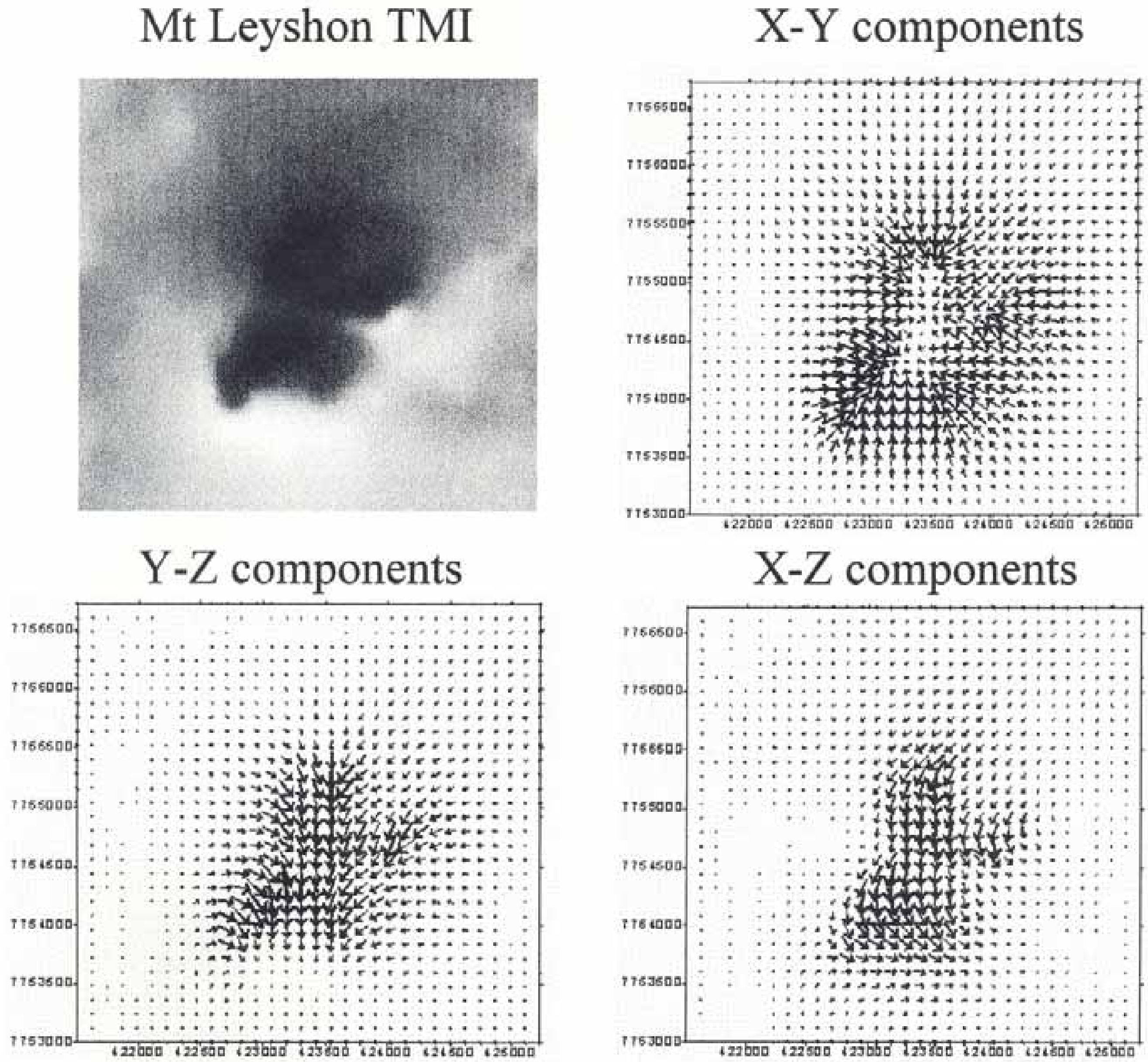

Figure 1. Greyscale image of the Mt Leyshon magnetic anomaly and projections of the anomalous field vectors onto the principal orthogonal planes (X-Y top right, Y-Z bottom left and X-Z bottom right). Eastings and northings are shown along the margins.

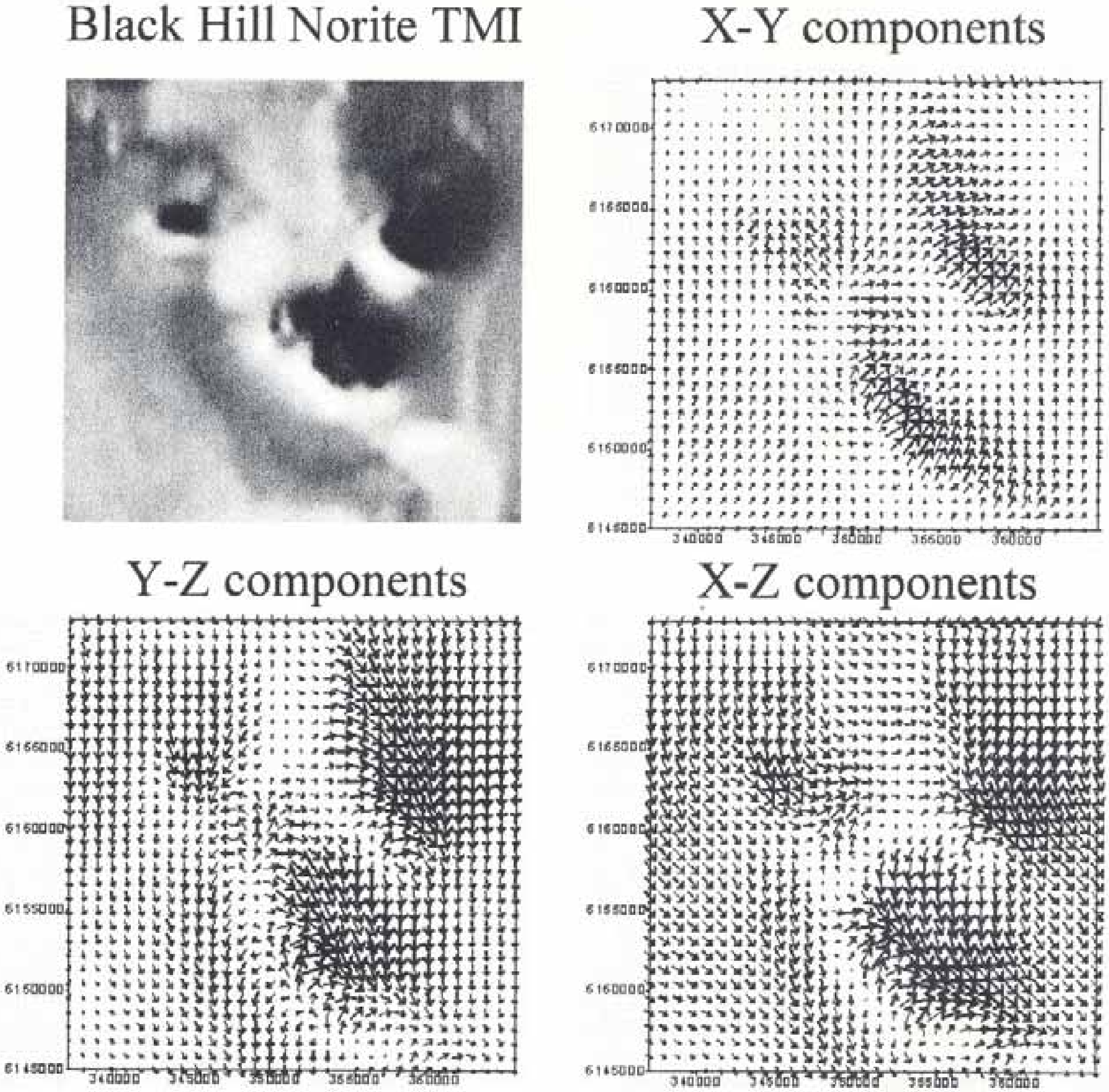

Figure 2. Greyscale image of the Black Hill Norite magnetic anomaly and projections of the anomalous field vectors onto the principal orthogonal planes (X-Y top right, Y-Z bottom left and X-Z bottom right). Eastings and northings are shown along the margins.

Letters to the Editor

This letter was previously published in the AIG News in response to Derecke Palmer's article also published in Preview. Ed.

I must to respond to Derecke Palmer's "black armband" version of the status of geophysics in Australia. (Newsletter No. 48 - "Are These The End Days for Australian Geophysics?"). It is so unbelievably pessimistic. I hope AIG members, especially those who have reservations about geophysics already, won't choose to agree with it. He will be proved wrong just as all the other doomsday prophets. Derecke says the whole "purpose of this article is about the inexorable demise of Australian geophysics. A definition of "inexorable" is "unable to be changed".

On closer analysis, the article itself is of course deliberately provocative (those that know Derecke will know that there is a certain amount of possum stirring) but is also very repetitious and therefore too long. For example, the three assertions that are made are repeated several times throughout the article. Furthermore, each of them is based largely on anecdotal evidence.

The most incorrect of Derecke's assertions is "that the level of technical innovation in Australian exploration geophysics has shown a small but significant decline which is likely to accelerate". I would like to know how Derecke is able to measure the level of technical innovation, and having done this, how he can know firstly that it has shown a 'small' decline and secondly, that it will "accelerate". I would have thought it was just the opposite. Everyone knows of the technical innovations that have been taking place in our profession recently and I'm sure that these will continue to occur, if only as spin-offs or piggy-backs on the general developments in computing capabilities and advances in communications, etc.

The developments in the visualisation of data including the ability to 'fly-through' and observe from all directions, is just one example. When I'm asked to give talks on the future of geophysics, I can only say that much of what we used to consider as science fiction is now a reality. For example, we can have our geoscientific results transmitted from a processing centre to the field site and displayed on a screen attached to a mobile phone. Other such "Dick Tracey" stuff is now available. One further indication of this is the most recent ASEG Conference held in Sydney last February, where many of these developments were on display.

The size of this exhibition was a further indication of the very healthy state of geophysics innovations in Australia.

Many of the general innovations I have alluded to above have had a real impact on geophysical techniques of late. For example, smarter technology and the introduction of GPS surveying has resulted in the ability to revive geophysical methods that had otherwise reached their limits of usefulness due to positional accuracy. One such case of this is airborne gravity which has now become a real possibility due to the ability to determine from the precise GPS information the corrections required for platform acceleration. The recent involvement of my company in the search for the Japanese midget submarine using a helicopter rather than a much slower moving boat is mostly possible due to the improvement in resolution and sampling rate of the instrumentation and also the fact that with GPS we can still be confident of our position to the accuracy necessary to locate such a relatively small object.

In asserting "that there has been a decline in both the number and the calibre of new earth science graduates from the universities", Derecke is not incorrect overall but there are some universities in Australia where numbers are increasing in recent years. For example, this is evident at the student prize-giving ceremony held each year at Sydney University's Department of Geology and Geophysics and more especially the mood of that gathering (officiated by the Chancellor) is one of great optimism. It is also particularly interesting to notice that this year the number of women graduates are in the majority.

I also take issue with his assertion "that the age profile of geophysics is skewed towards the older generation" (the phrase "the older generation" is replaced by, "senior end" and "older individual" where it is repeated, for some variety at least). What evidence does he have? He gives no statistics. All I know is I see more and more young geophysicists at conferences lately. As a portent of this trend continuing, again the recent ASEG Conference had the greatest number of student geophysicists registered so far, 62 in all or 8% of the total.

In summary then, as one of Derecke's aging profile, I am much more optimistic about the status and future of geophysics in Australia.

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Geophysics has it's day in the Media

The disastrous landslip at Thredbo has been an awful tragedy, but it was interesting that the expert who was flown in from Sydney was said to be a geophysicist. In fact it was Prof Robin Fell from the Department of Geotechnical Engineering of UNSW. Normally such a job would be the provenance of a geologist or geotechnical engineer.

This was taken up by the media to such an extent that other geophysicists were asked for their opinion of the situation. I was phoned by one of the radio stations and asked what I thought should be done to prevent the landslides at Thredbo. I was told they found me by looking up Geophysicists in the Yellow pages! On one TV programme the interviewer badgered the police spokesman at Thredbo by asking three times in succession if a geophysical survey had been done at the site prior to the landslide. I doubt if any of these people knew what a geophysicist was.

In less than three days the term geophysicist was no longer used in the media and no doubt disappeared from the public's consciousness again.

Roger Henderson

Geophysicists stayed in the media profile for just a little bit longer. In a weekend issue of the "Australian", SANTOS placed an advertisement for a senior geophysicist on page 3. This may well be the furthest forward a job ad has ever been placed for a geophysicist. It certainly attracted some comment from people of my acquaintance. Although they are still not sure what I do for a career they are now certain sure that it's important. Ironically the ad appeared immediately below a story about Thredbo and the media.

Ed.

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