PREVIEW

AUSTRALIAN SOCIETY OF EXPLORATION GEOPHYSICISTS

December 1990, Issue # 29

Contents

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Introduction

This Christmas edition of PREVIEW is to give members advance notice of the forthcoming Society AGM and nominations for new committee members.

The AGM will be held at 9.00 am on 22 February 1991 at the Darling Harbour Convention Centre, Sydney, NSW. The ASEG Nominating Committee has selected the following members, with their consent, to be officers of the Society for 1991:

President:	Norm Uren
1st Vice President:	Mike Sayers
2nd Vice President:	Robyn Scott
Hon. Treasurer:	Craig Dempsey

Other nominations for these offices may be submitted. They should state the office aspired to, give the name and consent of the nominee and be supported by the signatures of at least 10 members. Nominations should be received before 11 January 1991 by the ASEG Secretariat.

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All Dues Notices have now been posted, with payment due on 1 January 1991. Unfortunately, an error in the programme has meant that members who paid their 1990 dues prior to April 1990 have been issued with a debit instead of credit. We apologise for any confusion, but if you have any queries please contact Paula Sinclair at the Secretariat.

May you all enjoy the Christmas festivities.

Seasons Greetings.

Anita Heath
Editor

Branch News

ACT

A joint Christmas dinner function with the GSA was held on 20 November 1990 at "The Restaurant", School of Tourism and Hospitality, Canberra TAFE. The venue proved very popular with a full booking weeks before the event. Problems occurred in arranging a speaker for the evening and so a series of quiz sheets were distributed throughout the evening to stretch the minds of those who attended.

The ASEG/BMR Spring Golf Classic was held on the afternoon of 2 November 1990 at the Belconnen Golf course. The weather conditions were ideal, and an enjoyable afternoon was had by everyone who played. The prestigious BMR Golf Champion cap for the 1990 Spring Classic was won by Brian Barlow.

The ACT Branch will go into recess over the Christmas/New Year period, and wishes all ASEG members a very merry Christmas and all the best for the New Year.

Kevin Wake-Dyster
Secretary

QLD

The Branch has had a busy end to the year. In November we ran a very successful "Seismic Sequence Interpretation School", ably conducted by Rob Kirk from BHP. Rob was also kind enough to give a talk at a Branch meeting while he was in Brisbane. We followed this up with a well attended one day seminar "Aeromagnetics in Hard Rock Geological Application", in conjunction with the Geological Survey of Queensland. The same night the Branch held our annual Student's Night. Talks were given by six students from the two universities. Congratulations to Ken Evans of QUT for his Best Paper award, and to David de Wit of the University of Queensland for his Best Presentation award.

To finish up the year our Christmas Dinner is being held at Galichet Restaurant on 15 December. The Branch Committee would like to extend their best wishes to all the members for the Christmas season and the New Year.

Danny Burns
Secretary

SA

The SA Branch held its annual Student's Night at the AMF on 28 November. Four students presented, two from Flinders University, one from Adelaide/NCPGG and one from SAIT.

The presenters and topics were:

- Raj Singh - SAIT *(Seismic response of high velocity calcite cemented sandstones and removal of these effects on depth mapping of the gidgealpa field.)*
- Frank Enzmann - Adelaide/NCPGG *(Prospectivity evaluation of an area of the North Gippsland platform).*
- Jim Leinback - Flinders *(An evaluation of Wiener Seismic Deconvolution).*
- *Simon Crosato - Flinders (Callovian-Eocene subsidence history of the Vulcan sub-basin: Timor Sea NSW Shelf, Australia).*

All presentations were of a good standard and appreciated by the audience. The awards, which the Committee had upped to $75, this year went to Raj Singh for best technical content and to Simon Crosato for best presentation.

Nick Fitzgerald
Secretary

WA

State AGM

The State Branch AGM will be held in the new year and nominations are called for all committee positions. Contact the Secretary Kim Frankcombe on 322 1799.

Student's Night

The following Abstracts were presented at the ASEG Student Night. Sofia Bartoszewicz received the Best Presentation Award and Robert Han the Best Technical Content Award.

Kim Frankcombe
Secretary

* * *

Bonaparte Basin WA - A seismic tie between the Tamar-1 and Flamingo-1 wells
Sofia M Bartoszewicz, B.Sc. (University of Melbourne) presently at the Department of Exploration Geophysics, Curtin University of WA

The main objective of this honours dissertation was the correlation of relevant seismic units across the Sahul Depression between the Tamar-1 and Flamingo-1 wells. In particular, a chronostratigraphic or "time-rock" tie was anticipated, and despite the low quantity and quality of data in the region, this was successfully achieved.

Fundamental steps taken to reach this stage included a general overview of the Bonaparte Basin; perusal of the well completion reports and well logs; generation of synthetic seismograms from the well logs and check shot surveys; and finally, integration of these towards the interpretation of a seismic grid across the Sahul Depression.

In addition to achieving the seismic tie between the two wells, a possible intra-Cretaceous unconformity was identified, commonly recognised as an Albian-Aptian radiolarite horizon. Furthermore, this study has shown the usefulness of synthetic seismograms in correlating well and surface seismic data; as well as providing data for incorporation into a number of other studies being undertaken at Curtin University. Finally, it has added some more insight into this sparsely explored, and even less understood basin.

Frequency-Wavenumber Migration
Robert Han, Curtin University of WA

Migration of seismic data is a process which involves mapping one time section onto a second depth section in which events are positioned to their correct subsurface positions. Frequency-wavenumber (F-K) migration is based on a solution of the one-way wave equation in a constant velocity medium.

This project involved writing and testing a two-dimensional (2-D) F-K migration algorithm on the Vax based Disco processing system in Curtin's Department of Exploration Geophysics.

The program utilised the two-dimensional (2-D) Fourier transform as its fundamental technique, which basically grouped all events with the same dips, regardless of their positions in the time section, as a single radial line in F-K space. In this way, all the scattered varying dipping events in the time section will be Fourier transformed neatly as a fan of radial lines for the migration process to be performed rapidly, resulting in very fast computing run times. The algorithm written, used the Hilbert transform to further reduce the processing time.

An important step in the algorithm is the complex interpolation in the frequency domain. The two-point complex sinc interpolation was chosen for speed consideration.

For the purpose of testing the F-K migration program, code to model simple reflections was also written, using a basic sinc function waveform centred on the reflection times.

The first test on a simple impulse enabled the impulse response to be verified as a perfect semi-circular smile in the depth section. Migration of dipping events was verified with the migrator's equation. As expected, smiles were similarly observed only at both ends of the migrated boundary reflector, since those smiles generated in between, interfered destructively with each other.

The migration process was observed to image steep dips up to 70 degrees satisfactorily. In the process, migration noise artifacts were also generated which got more prominent, with increasing dips.

A Study of Velocity Analysis, NMO Correction and Deconvolution Using Synthetic Data Generated by Sierra

Robert Gordon Eliott-Lockhart, B.App.Sc. (Geophysics), Curtin University of WA

An important part of the seismic method is the processing of acquired data to produce an image of the subsurface for interpretation. In order to understand the resultant image, an understanding of the processes involved in obtaining the image must be achieved. The processes of Velocity Analysis; NMO Correction, and Deconvolution are integral to the manipulation of the acquired data from raw field data to an image of the subsurface that is more easily interpreted. To be able to identify the effects of these three processes on a wavelet, other extraneous effects must be removed. This is achieved using numerical modelling techniques. As with any modelling package, assumptions are made to assist either the running time of the program or the size of the program and associated files. Not all the assumptions and their consequences are immediately obvious. So an understanding of how the modelling package used works is essential to interpret the results correctly.

This study was carried out in the Geophysical Processing Laboratory (GPL) at Curtin University of Technology. The aim was to examine how the above mentioned processes affected the shape of a wavelet and if they produced a time shift in the recorded events. The data sets were all generated from six (6) models created on the Sierra modelling facility at the GPL, the modules used being Mimic, QuikCDP and Slipr. The data was then transferred onto the VAX 11/750 where the three above mentioned processes were applied before stacking, using the Disco (V8.0) processing software. In order to study the effects of these processes the complexity of the models was increased by subjectively determined increments. The models used were:

- a simple homogeneous, single layer model,
- a horizontal multilayered (5) model,
- a dipping (2^{o}) homogeneous, single layer model
- a dipping (2^{o}) multilayered (5) model,
- simple structural model consisting of a single layer with a fault plan, and
- a single layered heterogeneous velocity model.

In the process of conducting this study, several features of the Sierra package that affect the accuracy of the models were examined. These were in relation to the way in which Sierra produces the model initially, how it then decides on the rays to generate, and how it treats the physical properties of the layers whilst generating the ray sets. A few of the final stacked sections illustrated the effects of some assumptions used by Sierra. For example, in model 5 several traces were dropped from the synthetics during the ray generation process, presumably due to the non-capture of rays at some receiver points. The processing of the data (with reference to the above-mentioned process) did induce some time shifts and wavelet shape alterations. The time shifts were not significantly large. The change in the shape of the wavelet was significant, phase differences between wavelets within CDP gathers and in the wavelets after stacking (across the sections) were large. This was generally the result of large offsets and high impedances. The effects on the performance of deconvolution due to the breakdown in the minimum phase assumption were as expected, ie the quality of the spiking deconvolution deteriorated as the wavelet became more mixed phase.

The length of offset was also examined in relation to the accuracy of velocity analyses and its effect on phase and consequently deconvolution.

Geophysical Museum Pieces

At the November meeting of the ASEG Federal Executive I raised the possibility of establishing a collection(s) of early geophysical equipment.

Notable geophysical identities present said they were still using theirs. However, there still remains a large number of instruments which are gathering dust in the cupboards and stores of various exploration companies, government organisations and universities.

My initial suggestion was that there should be some sort of national collection housed somewhere like the NSW Geological Museum or Powerhouse Museum in Sydney. Other members of the Committee thought that we should encourage local branches to set up their own collections and ensure that they go to some suitable venue in each state.

(Continued on page 17)

1991 ASEG-GSA Conference and Exhibition

This will probably be the last column written before the Sydney Conference; I will therefore attempt to provide an overview of how the Conference planning is coming together.

One of the major benefits of the joint nature of the conference is evident in the technical programme that has been assembled. As at 1 December some 165 'regular' papers, 12 ' advance' papers and 12 invited keynote addresses have been scheduled; a few more papers may still be added. It is anticipated that 90 of these papers will be published in the Conference Volume(s) of Exploration Geophysics.

Two publications will be produced in conjunction with the Conference - an Abstracts volume containing abstracts of all presented papers and an Exploration Geophysics volume(s) containing selected or predominantly geophysical, refereed short papers. The Abstracts Volume will be a part of the GSA Abstracts series and will be provided to all Conference registrants. The Exploration Geophysics volume will also be available at the Conference for provision to ASEG members or for purchase by non members.

The Exhibition continues to expand. As of early December, some 75 exhibitors have confirmed their bookings for in excess of 120 booths, poster panels, or premier rooms. The Exhibition is certain to be one of the highlights of the Conference. A current listing of the confirmed exhibitors is provided in the 'Reminder Notice' for the Conference and Exhibition.

Registrations by early December had reached 480. Projections based on timing of registrations from previous conferences would indicate this number will significantly increase by Conference start (dare we hope for double?).

The early registration is indicating that some of the ancillary events will likely be 'sold out'. The events that should be considered (reconsidered if you are already registered) are:

- short courses and workshops (A chance to get smarter)
- conference breakfast with Harry Butler (Don't miss this one)
- Harbour Cruise (You've got to do this in Sydney)
- Conference Dinner (Don't forget the Skai PC to be presented and our surprise for you!)
- Golf on Friday (A great way to end the week).

A special thank you to our sponsors is warranted; their participation has been most gratifying. Please take the time at the Conference to see who they are and keep them in mind in future considerations.

We look forward to seeing you in Sydney, and hope we will be providing what you, the ASEG membership, want from your conference.

P.S. We've had to leave the weather to chance. None of the geophysicists who responded to our requests for help came up with the same prognosis.

Wes Jamieson
Conference Co-Chairman

Golf Day

The Conference Golf Day will be held on Friday, 22 February 1991 at Bonnie Doon Golf Club, one of Sydney's top flight private courses.

Tournament fees of $55 per person cover 18 holes of golf, 3 course lunch and prizes. Equipment can be arranged for players requiring it.

Please indicate your interest in this event on the Conference registration form. Tournament registration will take place at the Conference venue.

Barry Smith
Conference Organising Committee

Multichannel Factors for Potassium and Thorium

Roger L Clifton, W A School of Mines, Kalgoorlie.

Gamma ray surveys are commonly collected as 256-channel spectra. Usually this is condensed to three windows and processed as such. Yet information is lost and noise penetrates to the resulting maps. In multichannel processing theory, wanted factors such as the concentrations of the three radioactive elements (K,U,Th) are to be extracted from a 256-dimensional space, leaving unwanted signal and noise behind. The implied procedures have been demanding on computer power and still need experimental research. In this article, adapted from a recent paper (Clifton 1990b) the two most significant multichannel factors are extracted from airborne gamma ray spectral data (ARGS) without direct reference to calibration sources.

Readings of N-channel data form data vectors in a space of N dimensions in which a sensed physical quantity is represented as a direction, here called a ***factor***, whose magnitude may be displayed pixel-by-pixel as an image. The factors for physical causes such as K, U, Th are usually linearly dependent, so orthogonal spectra such as principal components are used in manipulating the data. Other factors such as the correction for airborne radon can in principle be described in the space and isolated from the factors sought. Such factors have been considered to require experimental calibration.

However, calibration facilities are usually unavailable. If we are to reduce the need for calibration, it would be desirable to extract the factors of greatest significance through their dominant variation in the data itself

An hypothesis that has served the evidence of the thesis research (Clifton, 1990a) ascribes the main distinct variations in multichannel data to: the effect of aircraft clearance on the ground signal; Poisson noise; concentrations of potassium relative to thorium, and the combined signal of airborne radon and uranium. The first of these, variation with aircraft clearance, need only be considered distinct for grounded radioactivity, that is, potassium plus thorium.

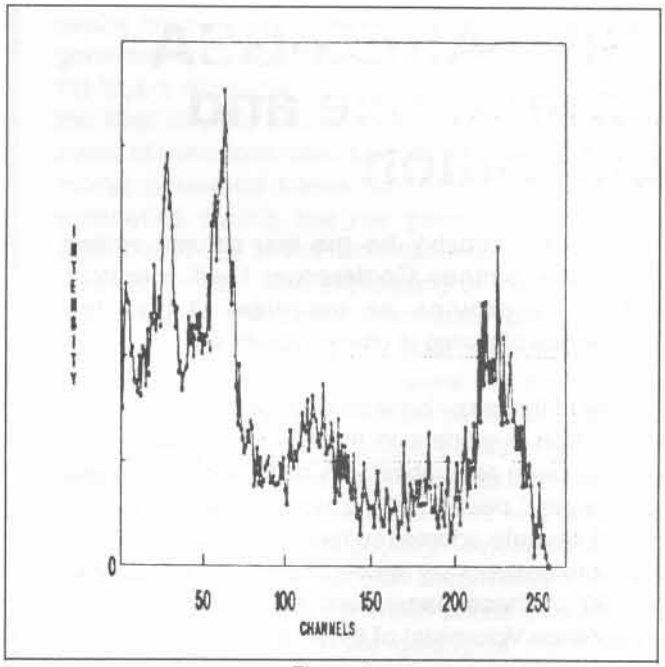

Figure 1

Raw spectrum of thorium ore, taken to test the current state of drift of the instrument. The channel numbers correspond to the energy range from 0.3 to 3.0 MeV. The low energies are more represented than in flight data due to the absence of attenuation.

The isolation of airborne radon from uranium requires experimental research. However the Poisson noise can be largely stripped out as a statistical procedure.

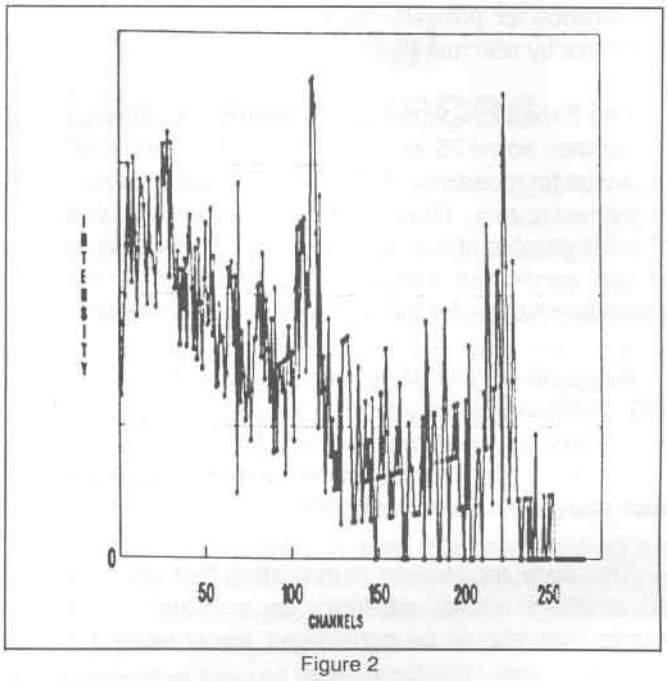

Figure 2

Sample reading from multichannel airborne gamma ray survey. The individual counts may be discerned. The spiky Poisson noise obscures the signal.

It is convenient to convert the spectra to the intensity form by multiplying by the energy. As an example, Figure 1 shows a field calibration for thorium in the intensity form. This bias suppresses the Poisson fluctuation of the high-count, low-energy end of the spectrum. Applied to the raw data (see Figure 2), the intensity bias enhances the variation due to thorium and also enhances the ground uranium relative to airborne radon.

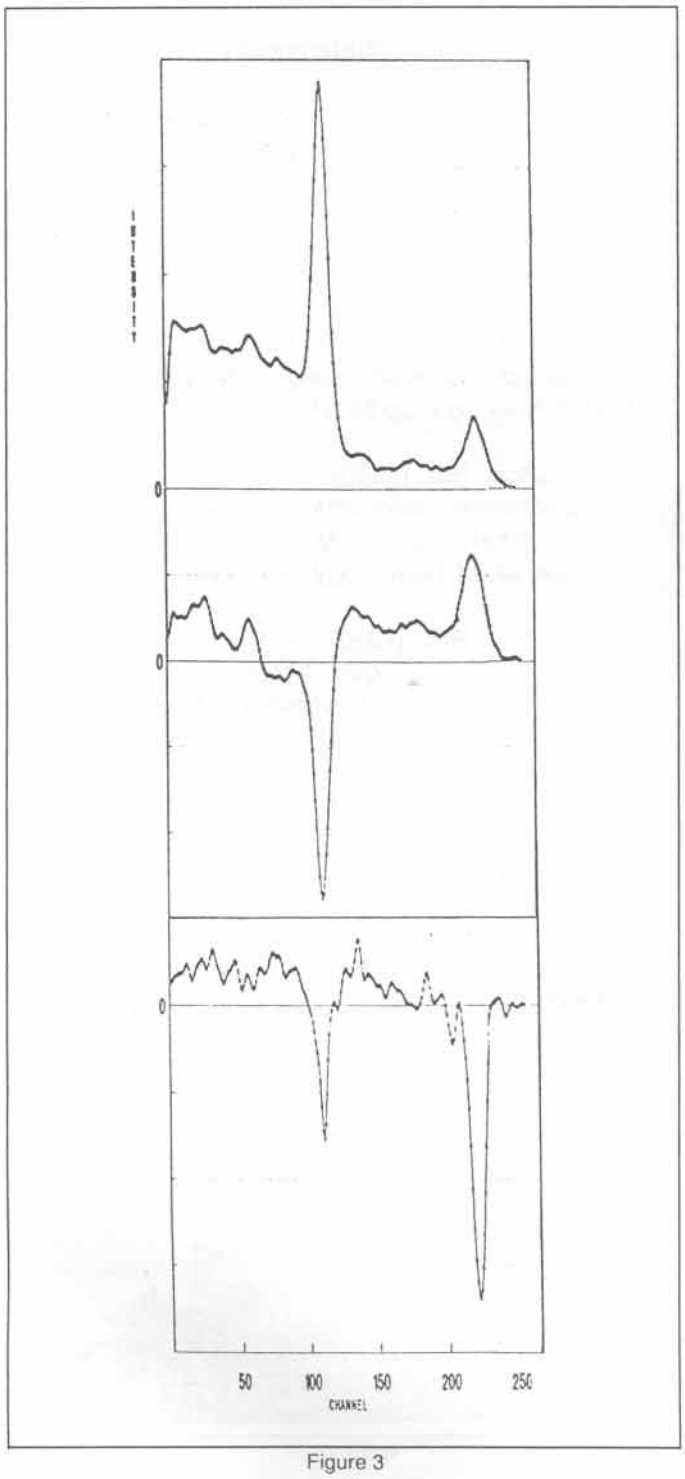

Figure 3

The first three principal components from the constructed subspace.

Smoothing is a standard method of reducing noise in data, often performed by taking a digital Fourier transform, zeroing or reducing some of the coefficients and retransforming back again. A consideration of strong smoothing in Fourier space shows it to be equivalent to taking a subspace spanned by the lowest frequencies. Taking a subspace for smoothing also greatly reduces both the volume of the data and the complexity of subsequent computation. It is convenient to be able to achieve all three benefits in one step.

The Poisson noise is distributed across all the channels and frequencies. It follows that most of the noise can be eliminated by discarding most of the 256 frequencies. It is not necessary to smooth each reading. Instead, the covariance of a large sample of the data was taken and smoothed. It can be shown that the smoothed covariance is the covariance of the smoothed data, that is, the covariance in the enhanced subspace.

Principal components (PCs) were taken in the subspace; the first three are shown in Figure 3. As 256-vectors, these spectra represent the three directions of greatest variance in the data space. If the Poisson noise has been adequately suppressed these three PCs should span the variation of: ground clearance, potassium versus thorium; uranium plus airborne radon.

A cross-check of their correlation with ground clearance shows a strong negative correlation for the first two PCs and a weak positive value for the third, confirming that the first two span much of the signal from the ground concentrations, and that the third is dominated by airborne radioactivity. This shows that the Poisson noise has been suppressed to a relatively low level.

If the hypothesis above is correct, simple linear combinations of these first two PCs should yield the spectra expressing potassium and thorium in this data. Indeed this is quite readily achieved. Figures 4 and 5 show the factors for potassium and thorium, still in the intensity form. For confirmation compare Figure 5 with Figure 1.

In principle, one could take the dot product of either of these factors with each 256-reading biased to intensity, to give a field of the magnitudes of the potassium or thorium factor. One would still correct for height, strip out the other's contributions and regrid before projecting them as separate images of the elements. In practice it would be less noisy to process the principal components relative to the factors, and then present a two colour map of the (reprocessed) PCs, leaving the eye to infer the

separate distributions of the two radioactive elements. If someone can separate the airborne radon factor from a uranium dominated component, the map can be three coloured.

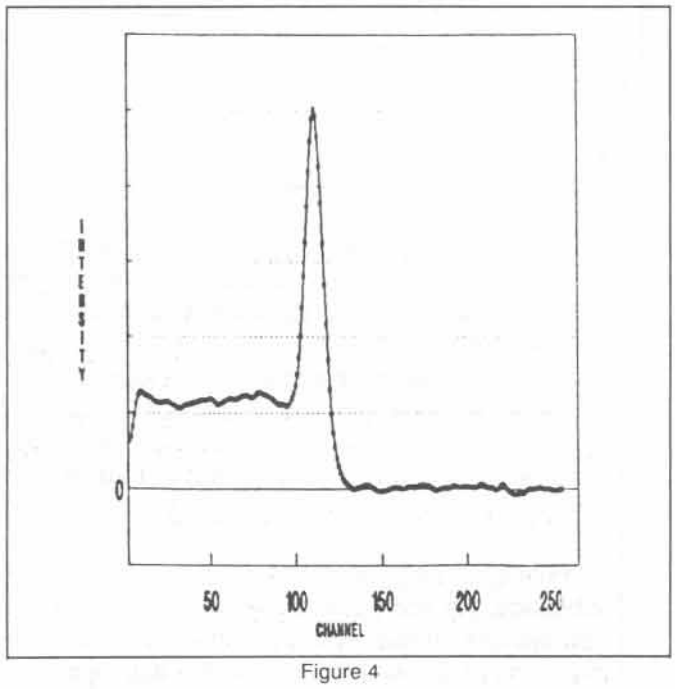

Figure 4

The factor of potassium in the data set, obtained from a simple linear combination of the first and second principal components in Figure 3.

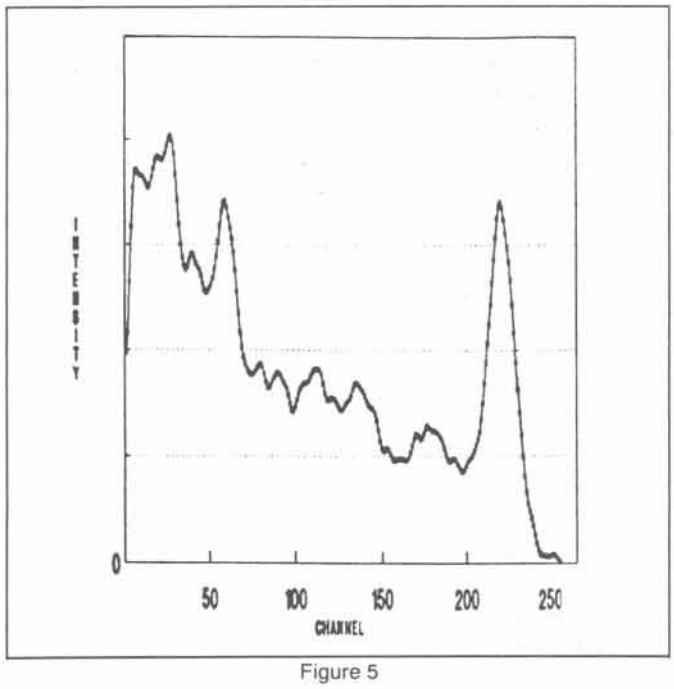

Figure 5

The factor of thorium in the data set, obtained from a simple linear combination of the first and second principal compnents in Figure 3. Compare to Figure 1, the unattenuated raw spectrum of the thorium series.

Such a three colour map of K,U,Th derived from the multichannel factors is expected to be a significant improvement on the current maps. Although the height corrections should yield readily to experiment, obtaining the isolation factor for airborne radon will require a serious effort, with appropriate experimental facilities. Industry would be well served by supporting a research project to describe the height corrections and measure the isolation factor for airborne radon.

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Indonesian Association of Geophysicists 15th Annual Convention

Yogyakarta

October 8-10, 1990

I had the good fortune to attend this well organised meeting. There were at least 300 geophysicists in attendance, all from Indonesia except for about 10. The Association would appear to be blossoming and holds annual conventions, the next one being in Bandung in October 1991.

The conference was meant to be opened by the Indonesian Minister for Mines but, in his absence, the Minister for Social Affairs declared it officially open with a very ceremonious banging of a large gong. They do seem to like formalities and made much of the elections which they hold at the meeting for the next Executive of the Association. The winners of these elections were announced at the end of the meeting.

From my experience, Indonesia would seem to have the most well developed group of geophysicists in the South East Asian region, second only to Japan.

Also from Australia was School Master, Reg Nelson, David Tucker, Greg Reudavey of Aerodata and Rod Elleway of SAGRIC.

Reg Nelson

I and my co-author, Zoltan Beldi, gave a paper entitled "A New High Resolution Helicopter-Borne Magnetometer for Mountainous Terrain" and Reg Nelson and Dave Tucker jointly presented a key note paper written with co-authors John Pitt and Tom O'Driscoll, entitled "Structural Fabric and Tectonics Associated with the Polda Lineament, South Australia: A Geophysical and Morphotectonic Assessment". In all, 44 papers were presented in three parallel sessions in 2 days. A 400 page volume of proceedings was produced, as well as an abstracts booklet. I can provide these to anyone who is interested.

Dave Tucker

The photo of Dave Tucker only serves to illustrate that Dave can't be prevented from talking, even when his dual screens are blank!

Roger Henderson

Thermal Properties of Sedimentary Rocks

Increasing sophistication of models of hydrocarbon generation has created a need for better definition of thermal properties of sedimentary rocks. Thermal properties of sediments are often ignored, or poorly approximated, when modelling thermal processes influencing sedimentary basins. It has become common in tectonic modelling to use a constant value of thermal conductivity and diffusivity for the whole crust, including sedimentary fill. Despite the proliferation of these simplistic models, basin modelling in petroleum exploration has adopted a slightly more advanced approach, which provides a correction for sediment thermal conductivity with changing porosity. However, both these approaches can be in serious error in many situations.

Sediment thermal conductivities for all Australian basins are required to be known in considerable detail to meet the needs of basin modellers. Apart from studies by Gallagher (1987) and Middleton (1990), little detailed information is available on Australian sedimentary basins. An extensive database of thermal properties of our sediments is now required.

Thermal properties entail two main physical quantities: thermal conductivity and thermal diffusivity. The thermal conductivity is an indication of how effectively a substance transmits heat in a steady state situation. Thermal diffusivity is an indication of how effectively a substance transmits heat in a transient situation.

A "transient thermal" technique has been developed by West Australian Geophysics and Environmental Research (WAGER) to determine the thermal properties of rocks. The technique measures thermal diffusivity and density, and then calculates thermal conductivity from the formula $\mathbf{K = k \rho c}$, where K is thermal conductivity, k is thermal diffusivity, ρ is density and c is specific heat. As specific heat is not measured in this technique, thermal conductivity suffers an inaccuracy of approximately 10 percent, due to assumption of this value. However, as density is commonly 2.5 g cm^{-3} and specific heat is approximately equal to 0.2 cgs units, thermal conductivity is approximately one half the thermal diffusivity.

The WAGER transient thermal technique uses a radiating hot-coil heat source, generating constant heat flux, placed above the top surface of a block of rock of approximate dimensions 3.5cm x 3.5cm x 1.0cm (Figure 1). The base is insulated, thus preventing the escape of heat. Carslaw and Jaeger (1959) have described a similar approach for measuring thermal diffusivity for a semi-infinite medium. The experimental method measures the increase of temperature at the base of the block with time; the increase of temperature rapidly becomes linear. The intercept of the linear segment with the horizontal time axis is equal to $a^2/6k$, where 'a' is the thickness of the sample block (Figure 2). Thus, we can immediately determine the thermal diffusivity (k) from the intercept on the horizontal time axis.

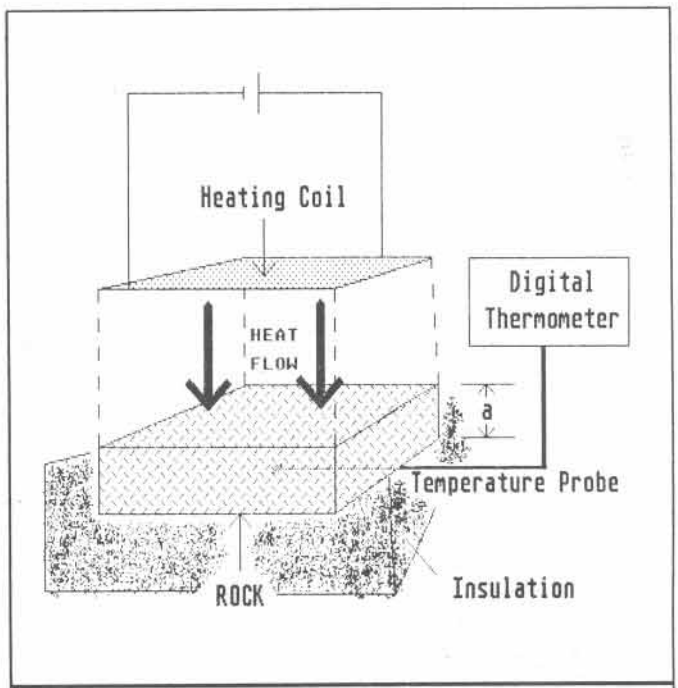

Figure 1

The methodology was substantiated using standards of known thermal conductivity, generously provided by the Australian National University (ANU).

Further, collaboration (one of many such tests) of the method was obtained by measurement of a dolerite intruded into the Fraser River Anticline, Canning Basin, Western Australia, and drilled by Fraser River No. 1. The experimental results are shown in Figure 2, which gives a thermal diffusivity of 0.0063 $cm^2 sec^{-1}$.

Measured density was 3.07 g cm^{-3}, and specific heat was assumed to be 0.21 cal $g^{-1}deg^{-1}$ (Kappelmeyer and Haenel, 1974): therefore thermal conductivity is estimated to be 0.0040 cal $cm^{-1}sec^{-1}deg^{-1}$. This agrees well with the value of 0.0038 cal $cm^{-1}sec^{-1}deg^{-1}$ (within approximately 5 percent) quoted by Kappelmeyer and Haenel (1974) for dolerite. These data also demonstrate the fascinating observation, and one of importance to hydrocarbon generation concepts, that dolerite has similar thermal properties to shale rather than normal crystalline rocks.

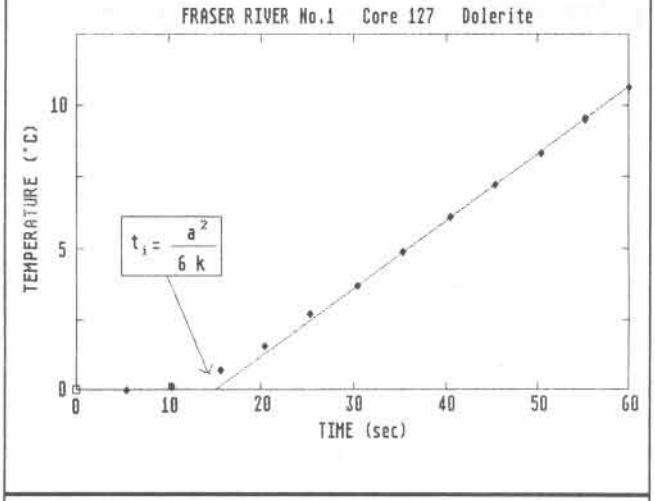

Figure 2

As more rapid and simpler methods for the determination of thermal properties, and hence more data, become available: an understanding of the thermal processes governing the generation and maturity of hydrocarbons in our sedimentary basins will become more complete. WAGER is engaging in the establishment of a database of thermal properties of Australian sedimentary basins, which should be complete by the end of 1991. This database will support Australian petroleum exploration by providing the platform to better approximate the generation scenarios of our hydrocarbons.

M F Middleton
WA Geophysics and Environmental Research

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Acknowledgements:

West Australian Geophysics and Environmental Research wishes to thank the Australian National University for making thermal conductivity standards available for this study, in particular F.E.M. (Ted) Lilley is acknowledged.

Frequency Domain Processing

A saving in computer time is possible for frequency domain processes by using the property of the Analytical Signal (Bracewell, 1965; Nabighian, 1972). It goes like this.

Take the Fourier transform of a sequence of geophysical measurements (e.g. a magnetic profile or a seismic trace), then double the positive frequency values, and put the negative frequency values to zero. Then, when the inverse Fourier transform is taken, you end up with complex numbers. The real part contains the original data set, while the imaginary part is the Hilbert transform of the real part.

The time saving occurs when some additional process is to be carried out in the frequency domain. Since half of the spectrum is put to zero with this method, the number of frequency domain computations required is halved. The result you need is still found in the real part of the inverse transform. The imaginary part may be discarded.

Practical note: Don't double the D.C. term or the Nyquist term, otherwise your answer (real part) will contain 'noise'.

Norm Uren and Will Verhoeff
Department of Exploration Geophysics
Curtin University of Technology

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Early Accounts of Australian Geology & Geophysics

Although there does not seem to have been a geologist as such amongst the first fleet (unless he was a convict) there was, however, our first surveyor, Augustus Alt, who, incidentally, was a member of the NSW Commission for Trial of Pirates. Unfortunately Alt did not publish an account of the early settlement. He died on 9 January 1815 at Parramatta and is buried in the St John's Churchyard there. Some of the officers of the first fleet, however, did record their geological experiences.

Perhaps the first person to realise the advantage of our mineral wealth, real or otherwise, was a convict by the name of Dailey. In August 1788 Dailey claimed that he had found gold and demanded his freedom for his secret. He subsequently confessed to having filed down a metal buckle and mixed with it some gold of a guinea. Further adventures of convict Dailey and the results of his speculation can be found in the books of Hunter (1793), White (1790) and Collins (1798).

The first person to make a geophysical observation in NSW is possibly David Collins for he records that "*In the afternoon of 22 June 1798 a flight fhock of an earthquake was observed, which lasted 2-3 feconds, and was accompanied with a diftant noife, like the report of a cannon, coming from the fouthward; the fhock was local, and fo flight that many people did not feel it.*"

By 1803 the spectacular Dailey at Sydney had had his back burnt and things were looking up, geologically speaking. In 1803 Adolarius Humphrey, a mineralogist, sailed with David Collins and the usual load of convicts to found a Colony on the southern coast of Australia.

Collins decided that a convict settlement at Port Phillip (now Melbourne) would just not do and sent Humphreys to Port Dalrymple at the mouth of the Tamar River with a view to settling there. Humphreys seems to have welcomed the break ashore and the chance to start chiselling rocks again, for here he carved with his hammer and chisel, the legend "A.H. 1804" deep into dolerite rock. Humphrey's legend can still be seen near the Supply River, so named because it supplied the only stuff worth drinking in that area.

Returning to Port Phillip he sailed again with David Collins to southern Tasmania to found Hobart Town where he again interested himself in the minerals of the island. Possibly his best find was the salt pans at Tunbridge.

Humphreys later lost interest in geology, perhaps tiring of the field work, and settled down as a magistrate and an agriculturist - a very astute combination of occupations.

Meanwhile, interest in geology had not declined and by 1826 possibly the first book of Australian geology had been published by William Filton. Filton entitled his book "An Account of Some Geological specimens from the Coasts of Australia" - by William Henry Filton, MP, FRS, VP, GS etc, From the appendix to the narrative of a survey of the inter-tropical and western coasts of Australia, etc by Captain Phillip Parker King, RN. Vol ii, pp 566 etc, printed by W Dowes, Northumberland Court MDCCCXVI.

If you are seeking a copy of this very rare book it is an octavo of iv preliminaries and 64 pages. It is in grey boards and should contain a chart of the inter-tropical and western coasts of Australia by P P King 1818 - 1822 and three other plates.

By this time the men who had survived the lean years had learnt to make a very good living in Australia and some began to see the country as more than a penal settlement. The question of the abolition of transportation divided the population for two decades. Although the convicts were a means of cheap labour, when emancipated they competed with the free migrants, many of whom were inexperienced. No ticket-of-leave men reached New South Wales after 1850 and the last transport of convicts was despatched to Tasmania in 1852.

At least as early as 1839 the emigrant handbooks had begun to note the advantage mineral deposits would have on the new colonies. In 1839 Samual Butler published a small 12mo book of eight preliminaries, 240 pages of text and 4 pages of advertisements. The book which is bound in green embossed cloth contains a map of Australia and a rather cramped title page. The title page reads "*The Handbook for Australian Emigrants, being a descriptive history of Australia and containing an account of the climate, soil and natural production of New South Wales, South Australia and Swan River Settlements. The facilities they offer for emigration; the terms upon which land is purchased in each; the advantages they present for increasing the capital of the emigrants and furnishing a profitable market for his labour by Samual Butler, Esq. Glasgow, W R*

McPhan Publisher Trongate; M H Cotes: London; W White and Co, Edinburgh - MDCCCXXXIX. Third Thousand."

In his book Butler stated that in all the streams of the Swan River Colony there was found in abundance a minute, ponderous black sand, strongly attractable by the magnet. With further vision Butler stated that *"It is not certain that coal has yet been seen, but it is doubtless abundant, as in New South Wales and Van Diemens Land; thus affording another point for our establishment of steam navigation over the world."*

By the 1850s Australia's mineral wealth was in the minds of many. Also comparatively unknown men such as the Rev. W B Clarke had done much valuable work. The countryside abounded with amateur geologists and a new type of rogue that was not in chain gangs was abroad. Accounts of the goldfields were eagerly sought after.

Perhaps some of these accounts could provide the basis for another story - if there is enough interest. This then is a very brief account of some of the early writings on Australian Geology. It is hoped that the following paper, quoted in full, from the Australian Almanack for 1832 will allow the reader to sample the flavour of these early writings.

Terry Lee
BMR, Canberra

References:

Australian Almanack for the year of our Lord 1832; being bisextile, or leap year; and the second of the reign of His Most Gracious Majesty King William the Fourth - Published under the sanction and patronage of His Excellency Major Richard Bourke etc etc etc, Sydney. Edited, printed and published by Ralph Mansfield, Gazette - office for the Executors of R Howe, 1832. 8vo pp xxiv, 270, Two plates.

(Collins, D). An Account of the English Colony of New South Wales with remarks on the dispositions, customs, manners, etc, of the native inhabitants of that country to which are added, some particulars of New Zealand; compiled by permission from the Mss. of Lieutenant-Governor King. By David Collins, Esq, Late Judge Advocate and Secretary of the Colony. Illustrated by engravings. (quote) London. Printed for T Caddell Junior and W Davies, in the Strand 1798. 4to pp xx, xxxiii, (ii) 618, (ii). Map and twenty three engraved plates or illustrations.

(Hunter, J). An Historical Journal of the transactions at Port Jackson and Norfolk Island, with the Discoveries which have been made in NSW and the Southern Ocean, since the publication of Phillip's voyage, compiled from the official papers; including the Journals of Governors Phillip and King, and Lieut. Ball; and the voyages from the first sailing of the Sirius in 1787 to the return of that ship's company to England in 1792-(Vignette-from a sketch by J Hunter) by John Hunter Esq, Post Captain in His Majesty's Navy. Illustrated with seventeen maps, charts and other embellishments, Dawes, and Governor King, London. Printed for John Stockdale, Piccadilly, January 1793, 4to pp (xxiii) 584, Seventeen plates and maps.

Membership

The change in ASEG's financial year, as approved at the 1989 AGM, means that membership fees for 1991 are due on 1 January 1991.

The following fees will be effective from 1/1/91:

	Local	Overseas	
		Airmail	*Seamail
Active	A$45	A$105	A$65
Associate	A$45	A$105	A$65
Student	A$15	A$75	A$35
Corporate	A$275	A$335	A$295

*Please note: Seamail can take up to 3 months delivery to some destinations.

New Members

We welcome new members to the Society:

Member		Category	State
ANDREW	Lisa	Student	NSW
BROWN	Peter	Associate	QLD
CARPENTER	Christopher	Student	WA
CLYDESDALE	Elizabeth	Associate	WA
FEATHERSTONE	Paul	Active	VIC
MANDER	Tina	Associate	WA
MASSEY	Stephen	Associate	WA
McKENZIE	Keith	Active	NSW
ROBERTSON	William	Associate	WA
SZABADOS	Juliet	Associate	NSW
WILKES	Paul	Active	WA
WYNN	Llewellyn	Active	QLD

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Organisation
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DARLINGHURST NSW 2010

Greg Turner
New address:
Division of Geomechanics
CSIRO
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New address:
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Bentley Hall
Blacknest, Alton
Hampshire GU 34 4PU
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R Smith
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HAWTHORN VIC 3122

Geophysical Museum Pieces

(*Continued from page 4*)

While I do not believe that we can possibly expect museums to establish permanent displays of all types of geophysical instruments I think we could make some suggestions on interesting small displays of individual techniques. Development of modern magnetometers is one example that I saw in the Science Museum in London.

I would like to hear the views of members on the feasibility, likely venues or any other comments you may have about this idea.

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