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Scientific Writing = Thinking in Words

by David Lindsay
Publisher: CSIRO Publishing,
2010, 122 pp.
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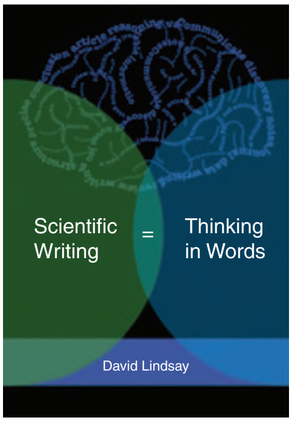

This book is an affordable paperback that all scientists who write about their work should read. It is 122 pages in length, although with small print. The author presents techniques to help scientists present their material more effectively in written form. Dr Lindsay is an 'animal biology' teacher and researcher of many years experience. I do not know this author personally, but some of my colleagues in the environmental geosciences sphere do, and speak highly of him. They have some anecdotal stories of him, not to be related here.

While Dr Lindsay expresses his ideas for new writers who are seeking excellence in scientific writing in terms of his direct experience, it is also of great value to scientific writers at all stages of their careers. He draws extensively from his personal sphere of scientific learning. It may initially be disconcerting to deal with titles like 'The influence of season of calving on the performance of Holstein cows'. However, the geophysical reader should readily be able to adapt from 'bio-words' into 'geo-words', as the concepts presented apply in a cross-disciplinary sense.

The book covers many important aspects of scientific writing, such as the structure of a scientific article, an oral presentation, the scientific review, writing for non-scientific people, and writing a thesis. Dr Lindsay's overarching hypothesis is described by his 'three immutable characteristics of good scientific writing that distinguishes it from other literature': it must always be

- Precise,
- Clear,
- Brief.

I particularly liked the material on thesis writing. If only I knew this when I started my own thesis, way back then. Eventually, some very generous English-literate supervisors sorted me out. The section on readability is very useful. I particularly liked the author's proposed seven verbal stumbling blocks. Actually, eight when he discusses sentences that are too long. He even talks about grammar (i.e. nouns, verbs, adjectives and subordinate clauses), a thing that is scarcely heard of nowadays.

The book is divided into three chapters: thinking about your writing, writing about your thinking, and thinking and writing beyond the scientific article. The first chapter, thinking about your writing, introduces the reader to the subject of scientific writing. Dr Lindsay engages the reader by trying to rationalise the need to think about the process of writing the scientific article, and then 'slipping his subject matter into the reader's comfort zone' with sub-titles like 'Getting into the mood for writing' and 'Getting started', both of which many writers, including myself, often struggle with.

Chapter 2 deals with writing about your thinking. In this chapter, the book deals with the anatomy of a scientific article. It treats in detail (1) the Title, and how to attract other researchers to read your paper, (2) the Introduction and the elements it should contain, (3) the Materials and Methods (often given by more specific titles in the geophysical literature), (4) the Results with a special emphasis on separating results from discussion, (5) the Discussion, and (6) the Summary and Abstract. I found the discussion about presenting results in a meaningful and 'user-friendly' way, especially in tables and figures, one of the more insightful aspects of this chapter.

Thinking and writing beyond the scientific article comprises the rather challenging content of the final chapter. In this chapter, Dr Lindsay deals with text to support an oral presentation, design and preparation of posters, the review article, and the preparation and content of a thesis. All oral and poster presenters should spend some time with this chapter; I shall.

I thoroughly recommend this work to all geophysicists regardless of their field of employment. We are always needing to write or talk about our work, and this book will make the process a lot easier for us. The book is available through CSIRO Publishing, www.publish.csiro.au/sales or email publishing.sales@csiro.au.

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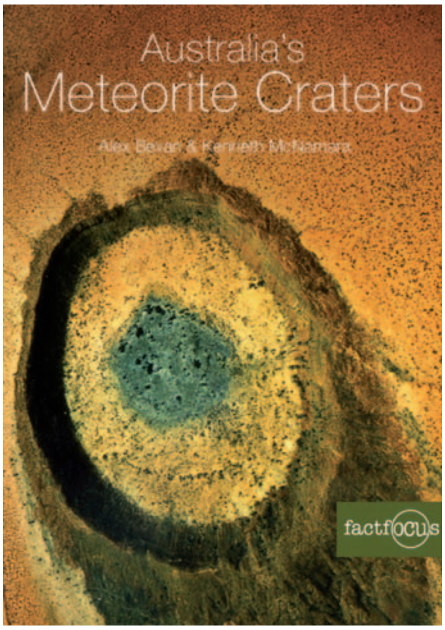
Australia's Meteorite Craters

by Alex Bevan and Ken McNamara
Publisher: Western Australian Museum, 2009, 96 pp.
RRP: $18.95 (paperback),
ISBN: 9781920843960



Now that Google Earth and satellite photography are available to reveal new impact craters with surface expression, exploration geophysics is not only helping to confirm that they are not volcanic by their characteristic magnetic high and coincident gravity low but is also, with increasing frequency, revealing the buried craters with no surface expression. In Western Australia recently, Woodleigh impact structure measuring 120 km across, the fourth largest in the world to date, was discovered by geophysics alone, as was Yallalie, north of Perth (*Preview*, Issue 94, 2001). At least four other buried structures in other states owe their discovery to geophysics.

Australia's Meteorite Craters is the only compilation of Australia's meteorites in book form that I am aware of, and being an enthusiast for the subject I just had to get it. It is however, a small paperback measuring 13 × 18 cm and of its 96 pages, only 54 pages have text, sometimes only on half the page or less. It is therefore easily read in one hour or less. Correspondingly, the book is not overpriced and well worth buying. Of course, it is not meant to be a highly technical publication (lacking references or footnotes) but is clearly designed more to intrigue the general public, authored as it is by a Curator of the Western Australian Museum (Bevan) and a former Curator (McNamara). The remaining 42 pages are taken up mainly by photos and while this would normally be applauded, it is as if some are used simply to fill the remaining pages. A two page spread is of the planetary alignment as the sun sets over Wolfe Creek crater rim. One page is of time lapse star trails over Wolfe Creek (!). There are also 12 photos of Wolfe Creek crater itself including as the front and back cover photos, one of which is duplicated inside over 2 pages.

The reason for this emphasis on Wolfe Creek is, as stated in the Introduction, that it is used as a classic example of the topics to be discussed. Granted, while it is only 880 m in diameter, it is able to be visited easily and a locality map for it is on page 15. There is a good three page Foreword by Robert Hough of the CSIRO, Perth; a 2 page Preface; and nine Chapters. Topics covered include the formation of craters, the distinguishing features of impact structures, the Earth as a target and the frequency of occurrence of impacts. The C/T boundary story is well done.

While there are no references in the text, there are 7 pages of 'Sources and Selected Further Reading', listing 72 general texts and specific references to individual craters. Of the 32 references to specific Australia craters, once again, 7 are of Wolfe Creek. One has to search all the references if looking for something more on a topic in the text. A Glossary includes many terms that are not very unusual ('mineral' and 'bed' for example).

Nine pages have one third of the page devoted to 'Fact Focus', headlining some specific fact such as the velocity of an incoming meteorite as more than 11.2 km/s (very precise!) which would travel Perth to Sydney in 6 min. One figure (actually originating from NASA) plots the estimated frequency of occurrence of impacts (from annually to 500 million years) versus diameter of asteroid which is also equated to impact energy in megatons of TNT equivalent. For example, the asteroid assumed to have caused the Wolfe Creek crater would have been 100 m in diameter and asteroids of this size have a predicted frequency of once every 25 000 years. This is not to say that an impact couldn't happen in historical times. At least one impact of this size has occurred in the last 1000 years, namely Tunguska in Siberia.

Given the background of the authors, not much might be expected in the book on the use of geophysics. However, geophysics is mentioned in four places in the text including reproducing the magnetic image of Yallalie (after Phil Hawke) and in a good table of 37 impact structures, five have geophysics listed as the only evidence for them, since they are buried. This table gives the state of location, diameter, age and evidence but not the coordinates in latitude and longitude which are available for them all elsewhere. Two website references are supplied but oddly, one is for the Vredefort Dome in South Africa which is not specifically mentioned anywhere in the book. The other site's URL is not correct but its initial part directs to the Earth Impact Database of the University of New Brunswick where a list of (only) 26 of Australia's impact structures is available (with latitudes and longitudes).

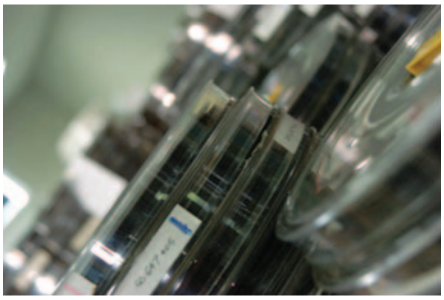
A half-page map of Australia shows the location of the 37 structures now recognised together with twelve others that are still lacking conclusive proof. This is quite up-to-date. The map also shows how very few occurrences there are in the eastern one-third of Australia which is due in part to greater deformation and burial by sediments there. There is only one for NSW, the Lorne Basin, yet to be confirmed, and Victoria has none. Some of my own suspects that could fill these spaces are Jervis Bay in NSW which juts anomalously beyond the general line of the coastline and has a magnetic high fitting neatly in its circular shape. As for Victoria, is it more than coincidence that Westernport, a circular bay with an island that could be a central uplift, has the Cranbourne meteorites on its western shore? More geophysics is needed for verification!

Reviewed by Roger Henderson
Email: rogah@tpg.com.au

The more things change – the more they stay the same…

Guy Holmes
Guy.Holmes@spectrumdata.com.au

Welcome to a new regular column in Preview. *Guy Holmes, Founder & Director of Ovation SpectrumData, has offered to contribute this regular column to discuss issues related to all things 'data'. Guy has over 10 years experience within the data management, information technology, data recovery and data preservation arena with specialisation in the data centre and oil and gas areas. His expertise can be applied to any industry that incorporates data storage technology as an essential element within its organisation. My warmest thanks go to Guy for joining the* Preview *team. – Ed.*



'Hey Peter – do we have that seismic data from our old prospect in Queensland?' I hear yelled across the office. Invariably – the answer is, 'Yes – I think so… but I am not sure where it is'.

Data seems to flow in and out of our offices, lives, and minds much like the hot water tap in our showers at home flows down the drain. We turn it on, wait for the right stuff to come along before we use it, and then we usually mix it with other stuff to get the desired result. And of course once we are done with it, most of it goes down the drain, and although we see it go down, and are mesmerised by the concentric circles as it whirlpools, no one seems to realise what is really happening.

Data in the workplace comes in so many forms and on so many media types these days that it is pretty difficult to keep track. In fact – so difficult most people don't even try. Larger companies have teams that tackle the issue, smaller ones ignore it or have a champion that recognises the importance of it and tries to plug the shower drain – usually only to be mesmerised by the whirlpool.

One would have thought that widely published statements like 'geophysicists spend 60% of their time looking for data, and only 20% of their time using it' would make someone stand up and take action. While I understand why they don't, I do wonder what geophysicists do with the other 20% of their time not stated above?

For the most part it is the data loss we don't know about that is most worrying (the data you didn't even know existed in the first place – as who would miss that?). Petroleum companies have large seismic data archives, in many cases overflowing with data recorded on what is now inaccessible media types. Without forethought, proper management and restoration, these data are now feeling the whirlpool tugging at their edges trying to drag them down the drain.

There are many factors that lead to data being poised for certain death, or in fact already lost, and these include:

- Hardware technology changes (that new tape drive you just bought);
- Software technology changes (that new application you purchased);
- Poor handling, transportation and storage (that box under your desk); and,
- Deterioration (a common but little known factor in data loss).

To explain more…

How could getting a new tape drive be a death knell?

Firstly, most people don't buy a new tape drive so they can carry out an archive project – they get one so they can store more on less tape, faster. This in turn leads to data created on your old storage media not being compatible with your new drive. And with that – voila – data falling off the radar and into the void.

Software = data loss?

Yes – it is true. Can't load that Novastor backup tape with your aeromagnetic grids on it? Why… Probably because you no longer use Novastor, and neither does anyone else. One major obstacle like incompatible media or data format is usually enough for most users to hit the wall and look elsewhere for joy – those tapes might as well be blank!

Poor storage? That box under your desk…

No need to explain this to most Geo's. Even an evangelist like me about preservation has a box with 'stuff' in it. Stuff so important that it could never be tossed… but not important enough for me to do anything about it. That might cost money – and the 'stuff' in there is of course also 'mine'. I don't want anyone else touching it…

Deterioration of media?

Yep – tiny little parasites, slowly chewing their way through the mylar substrate of your tapes. If you listen very carefully you can hear them chewing. Well not quite that nasty – but none the less serious and rampant in the industry – especially on pre-1996 data sets recorded on magnetic media (my back just suddenly got very itchy). I used to say pre-1988 data sets, but hey… the more things change the more they stay the same. Nowadays I just add eight to everything – and the best part is that I am usually right (or only off by eight or so).

So what to do? Never buy new technology? Keep a can of pesticide near your desk? Work without a desk so that your box has nowhere to hide?

None of the above… Start to future proof yourself from the issues is my advice. Take the time and energy now to get on top of the issues and form a plan to keep on top of them. No pain – no gain.

Future proof your data – tips to keep the bytes alive

1. Purchase a good media brand to prevent degradation.
2. Keep a register of what type of data you have on tape.
3. Keep a register of what type of tape you have data on (know the technology and hardware).
4. Include in your register the software and the formats used to backup the data including different versions.
5. Understand the lifespan of the media technology – know where the industry is headed and what the trends are.
6. Perform regular technology and media audits – keep testing! Ensure that this is a regular (preferably quarterly) part of your data management program.
7. Assign responsibility and make someone accountable.
8. Network – talk to peers, consultants and others within the industry.
9. Look at your tape storage facilities (personally – not just the brochure – everyone has had one of those holidays where the room does not quite match the picture in the advert).

Lastly, plan and budget for future data migration and preservation. Or if not, take the easy road and just plan for data loss.

Continued from p. 9

equipment built by Graham Boyd and his group in Adelaide. Ultimately however the positives of life in a big company were outweighed by the negatives and I went back to consulting and joined what was then the relatively small group at Southern Geoscience Consultants (SGC). Over the next 13 years I helped shape SGC into one of the largest mineral geophysics consultancies in the world which just goes to show that I didn't learn the lesson the first time, as SGC has become a big company with all its positives and negatives. Armed with a solemn promise not to grow big again, I left SGC in 2010 to establish ExploreGeo. I have bought an office about 10 min from home and moved in to it in May. ExploreGeo currently has two consultants, myself and Riaan Mouton who is also the ASEG WA president so there is plenty of ASEG discussion around the kitchen.

I'm pleased to see some new and younger faces taking up committee positions in the society and hope that this trend will continue. Having served on several of these committees and occasionally felt that the Federal Executive were not always effectively tapping a resource they had I'd like to hope that over the next 3 years I could energise some of the sleeping committees and use them to help the Federal Executive make better decisions on behalf of the members.

If you've got an idea which might help the society or a gripe about it, drop me a line at kim@exploregeo.com.au. If you're in Perth feel free to drop by the office – Riaan might even sign you up for the WA branch committee!

Kim Frankcombe

Cloud computing

My superficial impression of cloud computing (CC) was that it would simply be a mechanism for software companies to better manage software licensing and maintenance, a solution to reduce infrastructure and IT costs, or a vehicle to access files and data 'on the road' without having local file storage; all you need is an internet connection. But, there had to be more to it, so I decided to investigate. Alas, my worst fears about encountering endless jargon were quickly realized (see for example, http://en.wikipedia.org/wiki/Cloud_computing). Maybe the following few paragraphs will make your efforts easier, or maybe they will not.

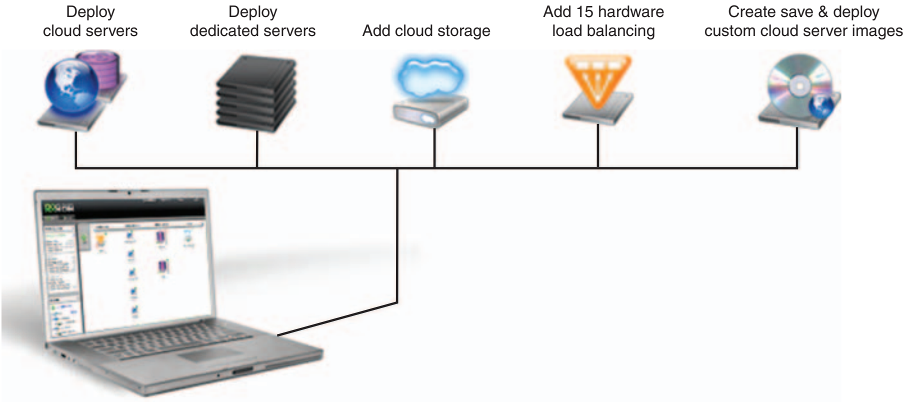


Fig. 2. *Example of cloud infrastructure management (from http://www.gogrid.com/).*

A lot of publicity regarding cloud services is driven by the providers, vendors and consultants. In a nutshell, any mention of CC to your friendly IT representative will probably evoke a pessimistic response regarding data security and the bottleneck challenges transferring large files of geophysical data to and from any CC server. If we can temporarily suspend such doubts and focus on opportunities instead, there may be CC opportunities for the geophysical community, including high performance computing (HPC) applications and shared development; notably inclusive to those without access to high-end computational resources. The caveat will remain, however, that a stable and reasonably high bandwidth (a subjective phrase) internet connection is available.

On the mainstream front, notable drivers are Microsoft (Windows Azure, http://www.microsoft.com/en-us/cloud/developer/default.aspx?fbid=omv3OTfykKB, a platform for collaborative development) and Amazon (Amazon Web Services, http://aws.amazon.com/). The Amazon online resources provide a useful overview, progressing from a cloud-based web service for content delivery (http://aws.amazon.com/cloudfront/), storage (http://aws.amazon.com/s3/), resizable compute capacity (http://aws.amazon.com/ec2/), and integration with HPC (http://aws.amazon.com/about-aws/whats-new/2011/04/07/announcing-amazon-ec2-spot-integration-with-hpc-instances/ and http://aws.amazon.com/about-aws/build-a-cluster-in-under-10/?utm_source=hpccloud&utm_medium=banner&utm_campaign=BA_hpccloud_hpctrial&trk=BA_hpccloud_hpctrial5). In the latter theme, the cluster resource manager vendors are looking into integrating their products with cloud services (http://www.platform.com/private-cloud-computing/clouds#cloudbursting) and large research programs also have started investigating cloud as an alternative to large scale data processing (http://www.taverna.org.uk/introduction/taverna-in-use/genome-and-gene-expression/next-generation-sequencing/).

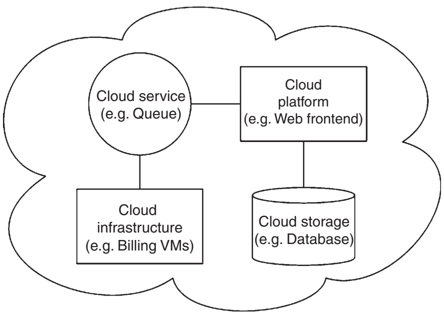


Fig. 1. *Example of cloud computing architecture (from http://en.wikipedia.org/wiki/Cloud_computing).*

I just focus on possible HPC applications for geophysics here. A few obvious areas of possible interest are as follows:

- Using HPC cloud for development and testing (new algorithms) where there is limited access to cluster infrastructure internally,
- Using HPC cloud in locations where investing in in-house infrastructure is not viable,
- Supplementing production with added capacity when needed, data transfer issues aside, and
- Data storage.

One can also ponder whether scientists in less privileged countries can overcome local infrastructure limitations by accessing cloud services too.

As an industry, we will each need to consider several aspects of applying cloud services, including the difference in cost between cloud and in-house, what level of service can be provided by the cloud business (including security and performance/capacity), and impacts upon existing company application architecture. It is clear that various services are already becoming available to manage infrastructure (e.g. http://www.gogrid.com/) and provide HPC 'on demand' (e.g. http://www.penguincomputing.com/POD). None of the links given here represent any kind of endorsement (!), but the white paper at http://www.penguincomputing.com/files/whitepapers/PODWhitePaper.pdf is probably a reasonable introduction to HPC via cloud services.

Overall, cloud computing is a messy affair to wade into right now, but you can be sure it will rapidly become a larger part of our life. From the replacement of DVDs to online video streaming to cloud HPC services, change is guaranteed.

Andrew Long
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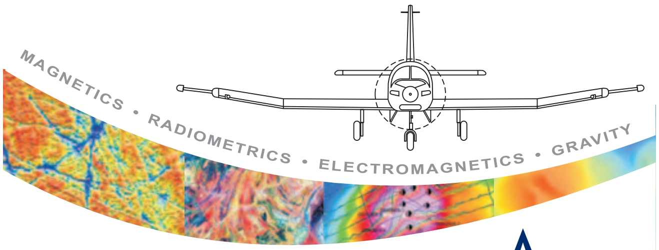
advanced airborne geophysics



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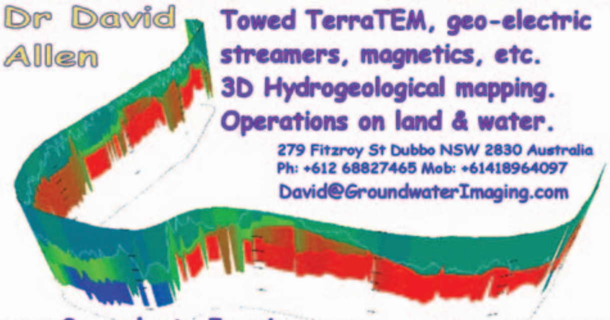

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31 Jul–5 Aug	SEG D&P 2011: Opportunities and Challenges in Unconventional Resources http://www.seg.org/events/upcoming-seg-meetings/dp2011-changping	Beijing	China
August			**2011**
22–24 Aug	Eighth International Mining Geology Conference http://www.ausimm.com.au/imgc2011/home.asp	Queenstown	New Zealand
28 Aug–2 Sep	Geosynthesis 2011: Integrating the Earth Sciences Conference & Exhibition http://www.sbs.co.za/geosynthesis2011	Cape Town	South Africa
September			**2011**
12–14 Sep	Near Surface 2011 http://www.eage.org	Leicester	UK
18–23 Sep	SEG International Exposition and 81st Annual Meeting http://www.seg.org	San Antonio	USA
October			**2011**
10–13 Oct	GEM Beijing 2011: International Workshop on Gravity, Electrical and Magnetic Methods and Their Applications http://geophysics.mines.edu/cgem/gem2011.html	Beijing	China
24–26 Oct	IGCP 5th International Symposium: Submarine Mass Movements and Their Consequences http://landslide.jp	Kyoto	Japan
30 Oct–2 Nov	Society of Petroleum Engineers ATCE 2011 http://www.spe.org/atce/2011	Denver	USA
November			**2011**
8–11 Nov	Sustainable Earth Sciences 2011: Technologies for Sustainable Use of the Deep Sub-surface http://www.eage.org	Valencia	Spain
15–17 Nov	2011 International Petroleum Technology Conference http://iptcnet.org/2011	Bangkok	Thailand
December			**2011**
5–9 Dec	AGU 2011 Fall Meeting http://www.agu.org/meetings	San Francisco	USA
11–14 Dec	First International Conference on Engineering Geophysics http://www.eage.org	Al Ain	United Arab Emirates
January			**2012**
22–24 Jan	4th International Professional Geology Conference: Earth Science – Global Practice http://www.4ipgc.ca	Vancouver	Canada
February			**2012**
26–29 Feb	22nd ASEG Conference and Exhibition 2012: Unearthing New Layers http://www/aseg2012.com.au	Brisbane	Australia
April			**2012**
2–5 Apr	Saint Petersburg International Conference & Exhibition 2012 http://www.eage.org	Saint Petersburg	Russia
June			**2012**
4–7 June	Copenhagen 2012: 74th EAGE Conference & Exhibition Incorporating SPE EUROPEC 2012 http://www.eage.org	Copenhagen	Denmark
August			**2012**
5–10 Aug	34th International Geological Congress http://www.34igc.org	Brisbane	Australia

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