Australian Institute of Geoscientists

# AIG NEWS

Quarterly Newsletter • No 102 • November 2010

## Minerals Exploration Decision Making

**Associate Professor Colin A Wastell**

The full findings of the study are reported in Wastell, C. A., Etheridge, M., McMahon, M., Lucas, G., & Hartley, L. (2010). The impact of cognitive predispositions on exploration decisions in the minerals industry. *Applied Cognitive Psychology.* 24,1-17.

**THE CURRENT MINERALS BOOM in Australia could give the impression of an industry that is characterised by the most up to date use of scientific and analytic methods for discovering and exploiting the mineral deposits that exist in Australia. At one level this is correct. The industry is very productive at the moment and is providing a great boost to the Australian economy.**

However there has been rising concern as to the effectiveness of minerals exploration decision making processes for the past few years. This concern has been growing based on the rates of return for funds invested in exploration and the rate of discovery of new fields capable of being commercially developed. One of the areas of concern has been focused on the processes that explorers use to decide that a site contains a deposit of sufficient value to proceed with mining. The scientific data such as geochemical assays or magnetic anomaly tests used to make these decisions are not the concern of this research. For the purposes of this paper it is assumed that the scientific data are accurate and veridical. The research reported here focused on the cognitive processes used by minerals exploration experts and how they use the data that are gathered. The participants were 94 minerals exploration experts (all male) with between 11 and 30+ years of field experience. They were employed by a number of mining companies as either contractors or permanent employees. The survey was administered online and so was completed by minerals exploration experts from a number of countries.

The findings of the research will be reviewed according to their robustness. The first set of findings is based on very solid evidence either from a methodological or statistical viewpoint. These are the most robust findings of the research. The second set also have strong support but need further investigation and clarification. These findings are solid but not as well supported as the first set. The third and final set of findings are somewhat speculative but are informed by the first two sets of findings and so suggest possibilities for further investigation.

### 1. Robust Findings

1.1. This sample of minerals exploration experts provided a wide range of estimates of the likelihood of finding a commercially exploitable deposit. Estimates ranged from 0% to 65%. This finding is very important. Participants were provided with standardised data sets and yet the estimates were of such variation as to bring into question the robustness of the processes used to interpret scientific data.

1.2. The same participants showed a wide range of recommended exploration techniques when asked to nominate a technique for further exploration given the methods already presented. This would be consistent with the recognition that the field has quite a degree of variation as to methodology and utilisation of methods. Again one is left with the impression that the field is somewhat idiographic in terms of scientific methodology.

1.3. On the Psychological side the trait of rational ability (Pacini & Epstein, 1999) had a consistent negative relationship with the estimation of probability. This is interpreted as higher scores on rational ability are associated with lower estimates of probability. It is important to realise that rational ability is not the same as high IQ. This finding is present across minerals types and

*Cont. on Page 2*

### INSIDE THIS AIG NEWS:



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# Minerals Exploration Decision Making

Cont. from Page 1

variations in such aspects as the number of investigative drill holes undertaken. In one sense this finding is not too astounding. The greater the reliance on rational ability the more conservative the estimate. However, this reliance seems to be more about a pre-judgement rather than an analysis of the data that was presented in the survey.

## 2. Solid Findings

2.1. A counter-intuitive finding was that there was no statistically significant relationship between probability estimates of finding a commercially exploitable deposit and commitment of further expenditure. It is important to be cautious of null findings but this would seem to fly in the face of a rational approach to minerals exploration decision making. The implications of this finding are considerable. Put in plain language the estimate of a commercially obtainable deposit was not a significant factor in the decision to spend more money on exploration. One is left with the question of why spend money without any predictive relationship of finding a mineable deposit? This is a very important result. What is it that motivates explorers to continue to spend investors money when their own estimate of finding something worthwhile is unrelated to the decision?

2.2. When a range of 'standard' information was provided there was no effect on the decision to drill depending on which piece of information was missing. This is consistent with point 2 above in that there seems little consensus as to what constitutes a standard set of information requirements. Forty plus percent said drill irrespective of what was missing. That is these participants did not bother to order any type of investigation – they simply said drill.

2.3. The number of failed test holes did not affect the estimation of finding a commercially exploitable deposit or the decision to expend an additional $200,000. This is a clear example of persistence in the face of mounting negative evidence. As the evidence of negative drilling results accumulative one would expect that the estimate of a mineable deposit should go down. This was not the case in this sample of minerals exploration experts.

2.4. The psychological trait 'Need for Closure" (Kruglanski & Webster, 1996) did predict lower probability estimates. These lower estimates would be consistent with attempting to bring matters to a finish. Why this is the case is open for investigation. This finding is intriguing. Here we have a psychological characteristic predicting a central estimate used to justify decisions to explore further, or to abandon the tenement. Notice that not the data or number of drill holes, but an internal psychological trait that was predictive of the process of project evaluation.

2.5. The size and range of probability estimates were not related to mineral type or information available. The implications of this are that the estimates used to make decisions are features of the explorer and not the information or situation in which the decision is being made. Again the estimates were more a product of the explorer and not the data.

Cont. on Page 4

# From Your President

**AT THE TIME of my last President's report we were heading towards a Federal election. One issue relevant to AIG members at that time, and indeed the Australian economy, was the stalled Resources Super Profits Tax. At last it appears that progress is being made to resolve the impasse. The Federal Government recently agreed on several major concessions after intensive consultation with the mining industry.**

Amongst the changes, which include renaming the tax as the Minerals Resources Rent Tax (MRRT), are the following:

- the MRRT tax rate will be reduced from 40% to 30%
- the MRRT tax will apply only to iron ore and coal, with all other minerals exempted
- the trigger for the MRRT tax will be the government bond rate plus 7% (in effect about 12%)
- miners with annual resource profits of less than $50 million will not incur a MRRT liability
- MRRT assessable profits will be calculated on the value of the commodity "at mine gate" less all costs to that point
- investments after 1st July 2012 can be written off immediately, rather than depreciated over a number of years
- MRRT losses can be transferred to other Australian iron ore and coal projects
- unutilised MRRT losses can be carried forward at the government long-term bond rate plus 7%
- unused credits for royalties paid will be uplifted at the government long-term bond rate plus 7%
- the tax will not be retrospective.

Additionally, the Petroleum Resource Rent Tax (PRRT), which currently only applies to offshore Australian petroleum projects, will be extended to include both onshore and offshore oil, gas and coal bed methane projects. The PRRT will apply at a rate of 40 per cent.

Some immediate implications of the new tax regime are that:

- the tax will now only affect a few hundred companies instead of the thousands that would have been liable under the previous scheme
- mining projects will be able to access deductions immediately
- projects will not pay any MRRT until they have made enough profit to pay off their up-front investments.

Downsides are that the exploration rebate has been abandoned and that the tax, which was originally supposed to fund a 2% cut in the company tax rate, will now only support a 1% cut.

No doubt there is still much work to be done before the tax takes effect on 1st July 2012 and we will keep you posted with any new developments. The best news, however, is that a significant amount of uncertainty has been removed for mining companies, their employees and their investors both in Australia and overseas.

Geology Superintendent, Chief Geologist, Junior Geologist, Mine Hydrogeologist, Geology Manager, Coal Geologist, Principal Geologist, Environmental Geologist, Senior Mine Geologist, Exploration Geologist, Senior Mining Environmental Advisor, Mine Geologist, Hydrogeologist, Resource Geologist, Geologists – all levels, Project Geologist – immediate start.

The above represent a small fraction of the geoscience jobs advertised by one arbitrarily selected online employment agency. Based on this, one can't help feeling that there is a certain level of ebullience in the geoscience industry; which is a far cry from where it was twelve months ago. In fact it's hard to believe that a mere 12 months ago unemployment amongst Australian mineral resources geoscientists was up around 40%.

There is, however, a flip-side to this good news story.

Demand for geoscientists in the mineral resources sector is largely driven by the prices of commodities and it is for this reason that mining-related employment experiences large swings as commodity prices fluctuate in response to a host of variables. Nothing much has been done to mitigate or minimise future swings which, as our recent experience showed us, would impact the mineral exploration sector first and hardest.

In contrast to the mining industry, the number of geoscientists working in the non-mining sector (e.g. environmental, groundwater) has been growing steadily for over two decades. In this case, employment is predominantly driven by increased government spending, increased legislation/regulation and changing corporate and personal attitudes around environmental and sustainability issues.

In the current economic environment demand for geoscientists in the mineral resources sector will probably continue to be driven by the rising prices of commodities. Similarly, in the environmental area it is likely that the above-mentioned trends will continue (or rather, there is little reason to believe they will decline).

The increasing number of geoscience employment opportunities currently being advertised, and their associated creeping remuneration packages, would suggest that these finite resources are becoming increasingly difficult to find. But there is an additional complication. Many senior professionals are now reaching retirement age and over the next five or so years a disproportionate number of Baby Boomer geoscientists could be expected to leave the workforce to start their well-earned retirements. Replacing their wisdom and experience will be a significant challenge; and even if our tertiary institutions begin churning out geoscientists today (and there is little evidence of a significant increase in geoscience enrolments), there is likely to be a hiatus before these future geoscience graduates accumulate any significant experience.

The possibility – indeed probability – of a dearth of experienced geoscientists over the next 5-10 years has direct implications not only for employers, but for the natural resources industry as a whole. A degree in geoscience is only the starting point in a

*Cont. on Page 5*

# Minerals Exploration Decision Making

*Cont. from Page 2*

## 3. Speculative findings

3.1. It would appear that drilling is seen as somewhat of a magic bullet. When in doubt, drill. This is consistent with the overall insensitivity to data availability and drill hole failures. This finding would seem at first glance sensible as drilling is the most concrete way of ascertaining what is in the ground. However this approach would seem to go against the use of other techniques that may be more effective across large areas and at depths that are difficult to reach with conventional drilling.

3.2. Period of employment in the field was associated with lower estimates of probability. It is interesting to speculate that longer on the job the larger the number of unsuccessful exploration programs and therefore an experiential base of lower estimates is produced. Again this is consistent with data insensitivity.

Overall the results of this research point to a number of very important issues for the minerals exploration industry. The sample of explorers was very experienced, working with major companies who have been very successful within the industry. How can such a group of experts virtually ignore data and show traits that seem to be more about psychological characteristics than 'hard science'? Further research is needed to clarify the mechanisms and processes at a more fine grained level of analysis. The contribution of psychological science to minerals exploration is potentially very substantial as it offers the possibility of understanding these processes as they influence minerals exploration decision making and so enable this industry to make better decisions for greater profit and efficiency.

(The participants were 94 mineral explorers from nine mining exploration companies who voluntarily participated in a web-based survey. The average age of the sample was between 36 and 45 years old, with the vast majority being male. Seventy-seven per cent of the sample had 11 plus years of industry work experience, while 70 per cent of participants last undertook tertiary study less than 15 years ago. Participants were asked (a) to estimate the probability of either finding a mineable deposit or the presence of the ore of a particular metal (e.g. copper); (b) to recommend a purchase price in $million and (c) to propose further exploration techniques to improve the data available for their decision. The number of participants in each of 30 cells was not sufficient to allow for full analysis of variance to be carried out but there was sufficient power to carry out a regression analysis.) ▲▲

## References

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Pacini, R. & Epstein, S. (1999). Some basic issues regarding dual-process theories from the perspective of Cognitive-experiential Self-theory. In S. Chaiken & Y. Trope (Eds.), *Dual process theories in social psychology* (pp. 462-482). New York: Guilford Publishers.

# From Your President

*Cont. from Page 3*

hopefully long and stimulating career. Ultimately, however, the value of an employee is based less on their qualifications than on their experience – the knowledge and practical wisdom they have accumulated from what they have observed, encountered, undertaken or undergone over a period of time. In the context of an impending hiatus in experienced geoscientists there is therefore a professional obligation on everyone employing and working with graduate geoscientists – individuals, private and public companies, and government agencies – to ensure that formalised graduate development, on-the-job training and mentoring programs, are lifted to and remain high priorities.

Complementing the above formal programs to facilitate the training of new geoscientists would be a process by which individuals would be able to explicitly demonstrate to their clients and employers their accumulated experience and commitment to ongoing professional development. The AIG's professional registration (RPGeo) program does exactly this. It reflects a logical progression in professional status from Student Member through Graduate Member to Active Member and ultimately, after the accumulation of experience, Registered Professional Geoscientist.

Additionally, although at this time there is no legislation in Australia which requires geoscientists to be professionally registered, many countries, for example Canada, the U.S.A., and parts of Europe, do require registration. Although AIG maintains reciprocal rights with many Recognised Overseas Professional Organisation (ROPOs) ongoing developments, in Canada in particular, may soon require Australian geoscientists to be professionally registered. To avoid unnecessary frustration it would probably be prudent for eligible AIG Members, working or planning to work in countries that require professional registration of their own geoscientists, to apply for RPGeo status as soon as practicable. Applications forms can be downloaded from the AIG's website.

Finally it gives me great pleasure to congratulate Kaylene Camuti for being awarded the AIG Service Award. The Award is offered for outstanding and distinguished service by an AIG member in making major contributions to the Institute and the Geoscience Profession over many years. Kaylene is a long-standing Councillor of the AIG. She has not only Chaired AIG's Education Committee for more than a decade but she has represented AIG as its Education Representative on a number of other professional organisations, including the Australian Geoscience Council, and has over the years been the primary linkage between the AIG and a host education programs run through a range of State and Federal educational organisations. In her role as Chairperson of AIG's Education Committee Kaylene was instrumental in developing the AIG's highly successful bursary program which is aimed at providing assistance and encouragement to university students pursuing geoscience degrees, and in the process significantly raising the profile of both geoscience and the AIG. She was the driving force behind establishing the AIG's Bursary Trust Fund, and is still active in administering the bursary scheme. An award ceremony will be held later this year. Well done Kaylene!

As we head into the end of the year period I would ordinarily expect a gradual slowdown in work. Not this year. It would appear that we're all hell-bent on making up for time lost during the recession. My own organisation is busy. Everyone I talk to in the geoscience industry is busy. It's a good sign. And although it's a little early I would like to take this opportunity to wish you all a very happy, peaceful, well-earned, and of course prosperous, festive season.

**Martin Robinson**



# Office Drilling Rig

Secret Mining Company Limited has today demonstrated its unique commitment to exploration drilling by commencing drilling outside the front door of its head office.

Company sources close to the management said: "We found a chunk of goldy looking metal on the front lawn and while we suspect the lawnmower man ran over a 1 dollar coin, you never know and we decided to drill test the area just in case."

"It also gives the Perth office staff a real sense that they are part of the action as well – I guess they don't get out enough."

# Medieval Climate Angst (Or how our ancestors coped with climate change – extract from a seminar "An Evening with Michael Crichton, November 15, 2005)

**Sallie L. Baliunas**
Astrophysicist, Harvard Smithsonian Center for Astrophysics

**THIS IS A BRIEF LESSON in history about fear and ignorance of extreme weather 500 years ago. Now, as impossible as it is to comprehend events in the 20th century without understanding totalitarianism, it is likewise impossible to understand Europe's 16th century without recognizing the role of superstition. Magic, witchcraft, sorcery and superstition pervaded every scale of culture from the smallest corner to the cosmic.**

Now, an equable climate had pertained in Europe about a thousand years ago, and by the 14th century, that had deteriorated into a long period called the Little Ice Age. The Little Ice Age saw harsh winters, severe storms, and also extreme variability. That means you could see mild winters and then very severe winters, summer heat waves, droughts, sea storms and floods. The Little Ice Age persisted about 500 years, abating only in the 19th century in some places.

Now the most severe period of that 500-year period of the Little Ice Age occurred in Europe between 1550 and 1700. That was also probably the harshest period of weather in the last thousand years, if not longer. Now the severe conditions and climate brought about crop failure, starvation, disease, death and social unrest. But it was already occurring in a period of great upheaval, as the Reformation, the counter-Reformation and warfare battered Europe.

Now how unusual was this very intense period of the Little Ice Age? On the afternoon of August 3, 1562, a thunderstorm struck central Europe across a front several hundred kilometers long. After raging for several hours, the storm unleashed a terrific hail that continued until midnight. It destroyed crops. It destroyed vineyards, birds and unprotected horses and cows.

Diarists then noted something that we hear today. They said for a hundred years, such a storm had not been seen. The storm was deemed so unusual in this period of superstition that it had to be unnatural. It had to be supernatural. Thus, superstition and witchcraft bred a precautionary response. Eradicate those responsible for the storm and this period of new storminess.

Now, it was well known that people could cook weather with the help of Satan, so thus did extreme conditions of the severest part of the Little Ice Age contribute to Europe's most horrific period of mass executions and witch trials. This was completely legal, and it was undertaken, administered, by highly educated upper social strata groups. These were institutionally legalized executions for sorcery.

There are many reasons for these trials, but some of them are related to weather cooking, that is, working with Satan to produce these severe storms. The estimates now are about 50,000 executions across Europe, and no country was spared of this.

There were skeptics who stood up, but they were often accused of or threatened to be accused of sorcery to squash any debate. So legal philosopher Jean Bodin in 1580 noted that witchcraft was the most terrible problem facing humankind. Again, a very modern note.

Bodin championed the international attack against skeptics like Johann Beyer. Now, Johann Beyer was a physician, and Beyer argued that the accused sorcerers seemed to be suffering from what he thought were medical conditions we would modernly term mood disorders. He also thought it was theologically impossible for Satan to work through such people to do his work. Beyer then declared that confessions that had to be extracted by torture because there was very little direct proof of witchcraft—well, these confessions were extracted by torture, and he found this torture immoral.

So the response? Jean Bodin decided to accuse him of witchcraft, so any feeble notes of humane skepticism had to be wrenched out of society. Jean Bodin wrote in response to Beyer's humane skepticism, "Any country which tolerates these skeptics will be struck by plagues, famines and wars." Now since it was known that witches caused weather and this unusual weather raged, so did the tortures and executions.

How severe did it get? Well, on May 24, 1626, a hailstorm struck central Germany and dropped one metre of hail. Two days later, an arctic front descended onto central Europe and bit hard. Rivers froze,

grape vines exploded, the rye and barley crops were destroyed. Tree leaves were blackened and fell to the ground and denuded the trees, and people thought it was Y2K.

Now, the lord mayor of Zeil in Franconia, Johann Langens wrote, "Everything was destroyed by the frost, which had never happened in people's memory." Which was true. Probably a frost that severe hadn't occurred in 500 years, but since it was so unusual, it had to be unnatural, given that century's reigning paradigms. "Whereupon," continues Johann Langens, "whereupon an intensive pleading and begging started among the rabble. Why did the authorities tolerate these sorcerers and witches? The sorcerers and witches must be punished."

So punish them, the authorities did. In this area of central Germany in 1626 alone, Bamberg executed 600, Wurtzburg 900, in electorate Mantz, 900 more were executed, and Westphalia, 2,000. That's just the result of the 1626 frost, and those are directly related to weather cooking.

Science is the only successful means we know of to explain nature, and growth of wealth is the only successful means we have to afford prediction, preparation for and survival—in order to survive extreme weather, which has always happened and always will. But science needs special societal protection, and without that protection, science will just be dialed out and in its place will be substituted the myths that humans love to create, myths like weather cooking. ▲▲

Source (http://www.independent.org/events/transcript.asp?eventID=111#4)



**ANOTHER YEAR HAS PASSED and it seems we have gone back into boom time as Martin Robinson notes in his President's report in this issue of AIG News. In the editor's view from his eyrie in West Perth, membership numbers continue to increase while older members pass away, albeit at a slower rate with the latest being Maureen Muggeridge' passing doing what she always loved, sampling trap sites for diamonds – Vale Maureen.**

Your editor is one of the baby boomer generation and earlier on this year experienced an "incident" involving his ticker – worked it to an inch of its life his so his doctor tells him, but was fortunately rescued at the appropriate time to allow recovery that is proceeding quite nicely. It's called getting old apparently and means that extended periods in the field have now to be consigned to fond, and not so fond, memories. That means more time in the office writing POW's, incident, annual and other reports plus dealing with the ever ballooning deluge of bureaucratic red, brown and black tape the exploration industry is confronted by. And apparently an incident report on his ticker that happened when he wasn't in the field. Is this the natural career path for a geologist?

The letters page features two interesting view points and climate problems continue apace – this time AIG News found some pertinent comments from a Brazilian geologist as well as an older address by Astrophysicist Sallie Baliunas on the medieval approach to climate problems – and nothing new under the sun it seems.

Rare Earth Elements – the next booming commodity. I was in the Northern Territory doing some field work recently and was a little puzzled by a voice mail from the Kalgoorlie office of the ABC asking whether I could do a breakfast interview on Rare Earth Elements. My problem, apart from knowing little to nothing about this commodity, was that being interviewed en-route from Renner Springs to Darwin to catch the 2pm Qantas flight seemed a trifle awkward to manage, apart from the time difference. Additionally I was a little puzzled why they chose me, and my gut reaction that I was 'dobbed' by my scabrous mates was right on the mark, so I dobbed it back. As REE's are absolutely essential for our modern civilisation, I found an interesting opinion piece, again written by a geologist, on the internet which AIG News reproduces in this issue. However it is a little disconcerting to learn that the creation of nature reserves and parks isn't so much to preserve nature but to deny humanity its mineral resources. So I wonder if going back to nature also means doing without the Iphones, Ipods and all the other hi-tech gadgets so essential for modern communications, including the electric cars that seem to consume larger quantities of REE in their manufacture than petroleum powered ones?

This issue also looks at the psychological aspect of exploration decision making as the lead article for this issue, being the final "mineral economics" strand for 2010.

And in case members haven't noticed, there is a shortage of complaints being received by the Complaints Committee, hence the second absence of the column during 2010.

Finally members are reminded about the WA Branch Christmas River Cruise on the 3rd of December, which I might be able to make depending on how much exploration success I have – though reading the lead article causes one to engage in some navel gazing.

**Louis Hissink**

Supporting Geoscientists

# EXPLORATION TECHNOLOGIES 2011

New and cutting-edge mineral search science

FIRST NOTICE

A 2 day conference at the **Burswood (Hotel and Casino) Conference Centre**, Perth, Western Australia.

Conference to maximise registrant and trade interaction with two sponsored sundowners and a conference dinner all at the same venue.

## Monday 28/Tuesday 29 March 2011

This event will appeal to all involved with mineral exploration globally. The conference features three distinct styles of presentation:

(1) Invited world experts who will present overviews on new developments, future technologies and the practical application of advances to finding the next mine;

(2) Technical presentations;

(3) The Exploration Technologies Shop Front (ETSF) where service providers and technology companies present the technical aspects of their products.

Organising committee: Julian Vearncombe (SJS Resource Management), Rick Rogerson (GSWA, AIG committee), Jocelyn Thomson (AIG)

## CALL FOR PAPERS, SPONSORSHIP AND INTEREST IN OUR NOVEL "EXPLORATION TECHNOLOGY SHOP FRONT"

- Geology, imagery, data collection and handling, and finding the next generation of deposits
- Geochemistry including regolith sampling and mineral mapping
- Exploration under cover and the future of deep exploration
- Geophysics, airborne, surface and down-hole
- Drilling technologies and down-hole surveys

## Interested?

For further information on sponsorship, trade booths and the ETSF, or presenting a paper contact **Julian Vearncombe** on **0437 477 220** or **julian@sjsresource.com.au**

# Climate Change: The Keywords (Part 1 of 3)

**Written by Geraldo Luís Lino**

Special to Climate Change Dispatch | 06 November 2010
Astrophysicist, Harvard Smithsonian Center for Astrophysics

*(Geraldo Luís Lino is a Brazilian geologist and author of the book "The Global Warming Fraud: How a Natural Phenomenon was Converted into a False World Emergency" (published in 2009 in Portuguese, with over 5,000 copies sold so far, and soon to be published in Spanish)*

**IN THE NOT TOO DISTANT FUTURE, it will likely be difficult to understand how so many educated people believed in and accepted uncritically for so long a scientifically unproven theory like the so-called Anthropogenic Global Warming (AGW).**

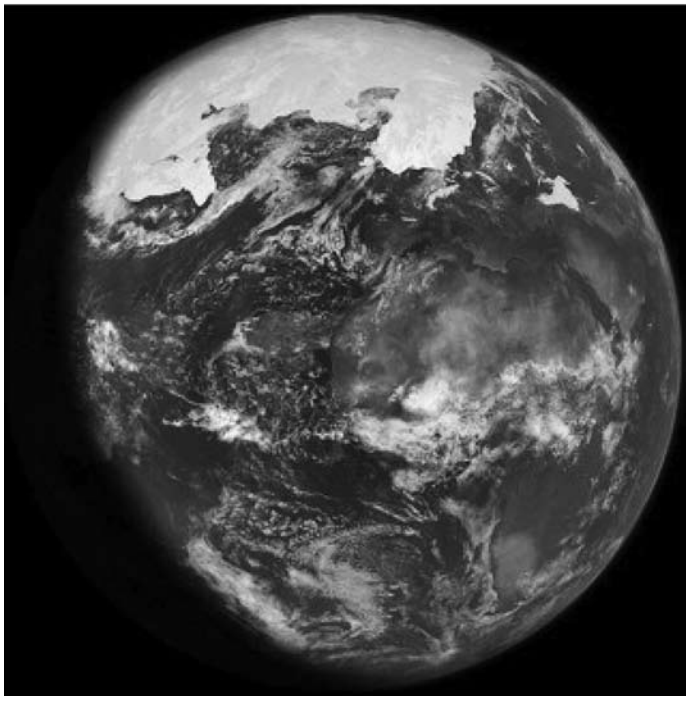
Taken almost as a dogma, the AGW has been forcefully imposed by means of a barrage of scare stories and indoctrination that begins in the elementary school textbooks and is volleyed relentlessly upon us by the media and many scientific institutions (including some pseudo-scientific ones), while gullible or opportunistic politicians devise all possible means of inserting climate-motivated items into their power-seeking schemes.

The threat allegedly posed by that supposed world emergency would justify the need of at least halving the human carbon emissions until mid-century, meaning a draconian reduction of the use of fossil fuels worldwide. Despite the drastic potential impact of such measures upon the living standards of all nations, the failure to do so and of establishing a "low-carbon economy," we are told, would usher the environmental apocalypse in. Well, fortunately for Mankind it won't.

However, that avalanche has gone too far. So, it's high time to turn the alarmist page and discard the buzzwords with which the subject has been marketed once and for all: (undeserved) hype, (unmotivated) scare, (unnecessary) restrictions and (unacceptable) sacrifices. In their stead new keywords are needed to put the climatic phenomena into their proper perspective again: proportion, knowledge and resilience.

Let's begin with trying to give the climate theme the right proportion concerning its nature and relationship with Mankind.

The environmentalist propaganda machine has ascribed an intrinsically negative and threatening connotation to the expression climate change, as if the climatic oscillations of the last century and a half were something unprecedented and implying that it should be combated at any cost – even if this would hamper the development perspectives of most of the developing countries (and as if Mankind had the necessary knowledge and means to do so). Notwithstanding, changing is the natural condition of the Earth's climate – in the historical and geological time scales there has never been and there will never be such a thing as a "static" climate (so, climate change is sort of a pleonasm). As a rule of thumb, during 90% of the Phanerozoic eon (the latest 570 million years) the Earth has experienced temperatures higher than the current ones, and 90% of the Quaternary period (the latest 2.6 million years) have elapsed under glacial conditions and temperatures much lower than the current ones.



*Ice age Earth at glacial maximum.*

The Quaternary has also witnessed the most frequent and rapid climatic oscillations in the Earth's geological history, alternating between cool glacial and warm interglacial periods in 41,000- and 100,000-year cycles. In the last 800,000 years the longer cycles have prevailed and the Earth experienced eight Ice Ages approximately 90,000-year long separated by eight interglacial periods averaging 10,000-11,000 years (although there are controversies about their length).

During the Ice Ages the average temperatures were 8-10ºC lower than the current ones, the sea levels were 120-130 m lower and much of the Northern Hemisphere was covered by an ice pack up to 4 km thick, down to the 40ºN parallel (the latitude of nowadays New York). During the interglacials the average temperatures reached 4-6ºC and the sea levels 3-6 m above the current ones. Our own interglacial the Holocene, which started 11,500-11,700 years ago, had average temperatures up to 4ºC and sea levels up to 3 m above the current ones between 5,000-6,000 years ago (Middle Holocene).

The transition periods between the warming and cooling phases and vice versa, when the average temperatures rose or fell the 6-8ºC that make the difference between an interglacial and an Ice Age, have lasted from a few centuries to a few decades. [1]

The genus Homo appeared on Earth soon after the onset of the Quaternary. Our species the Homo sapiens sapiens emerged during the penultimate Ice Age, somewhere between 150,000-200,000 years ago. And our problem-solver, city-builder, technological, scientific, industrial and artistic Civilization has been existing entirely in the Holocene and its warmer temperatures that allowed the advent of agriculture.

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# Climate Change: The Keywords (Part 1 of 3)

*Cont. from Page 9*

## Some useful tips emerge from such facts:

- The wild oscillations of the Quaternary are the general climatic condition faced by Humankind ever. We have been coping with them quite successfully and nothing suggests that we cannot continue to do so (as long as common sense and non-partisan science prevail).
- They outline a background "noise" that by far overshadows the tiny rise of the temperature and sea levels (and their gradients) that have occurred since the late 19th century – respectively 0.8ºC and 0.2 m, according to the IPCC. [2] This simply means that there is no scientific way to attribute causes other than natural to these, because the background "noise" has yielded much wider and faster oscillations of the temperatures and sea levels occurring before the Industrial Revolution.
- The Quaternary climate dynamics seems to be "self-adjusted" to the boundary conditions outlined by the Ice Ages and interglacials. So, the suggested risk of a "runaway warming" or some kind of climate disruption from the human carbon emissions is far-fetched, specially regarding the much ballyhooed "magic number" of 2ºC warming that supposedly could not be exceeded (a political contrivance admitted by its own author, the German physicist Hans Joachim Schellnhuber in an interview to the Spiegel Online website). [3] During the interglacials there were higher temperatures without any kind of "runaway" disturbance.

## Real global emergencies

As to the real global emergencies requiring urgent action on new levels of international attention, cooperation, coordination and funding, there is no shortage of them. For those seriously interested in this business, here are some that do not exist in supercomputer-run mathematical models but that could benefit very much from the fractions of the colossal amounts of money – and human resources – that have been wasted on the non-existent AGW:

- The world's most serious environmental troubles, particularly in the developing countries, are those related to the lack of water and sanitation infrastructure, like water pollution and the water-borne diseases that kill a child every 15 seconds in the developing countries, according to the World Health Organization. [4] A 2007 poll conducted by the British Medical Journal among physicians all over the world elected fresh water and sanitation infrastructure as the greatest medical advance of the last 150 years – a "privilege" still unavailable for over 40% of the world's population. [5] In Brazil, less than half of the population have access to sewage systems and two thirds of the child internments in the public health system are due to water-borne diseases. [6] (I've never seen Al Gore, Hollywood stars or the major environmental NGOs campaigning for sanitation.)
- Hunger and its consequences kill a child every six seconds, according to the FAO. [7] Almost one billion people all over the

world suffer from chronic hunger, a scenario that will surely worsen due to the current speculation-driven price rise affecting some basic staples. [8] Besides the immoral waste of productive lives, the annual economic cost of such a tragedy in productivity, revenue, investment and consumption losses is estimated in the order of hundreds of billion dollars. [9]

- The lack of access by much of the world's population to modern energy sources. Dung and firewood, the most primitive fuels known to Mankind, are still the basic resources for the daily needs of most of the Sub-Saharan Africans (besides being major sources of deforestation and respiratory diseases). Although with lower figures, the same happens in much of Asia, Latin America and the Caribbean. And, as over 80% of the world's primary energy needs are provided by coal, oil and natural gas, it's not difficult to ascertain the potential consequences of the intended restriction of their uses, as proposed by many scientists, environmentalists, politicians, carbon traders and all the people terrified by the AGW scare stories. Besides that, thermoelectric plants generate about two thirds of the world's electricity, the rest being almost totally provided by hydroelectric and nuclear plants (also increasingly targeted by the environmentalists). [10]

The list of real troubles is much longer, but these few examples suffice to demonstrate the distortions of the agenda of global discussions, both among the policymakers and the public opinion in general (which, in the case of the climate issues, also reflect a widespread deficiency of scientific education among the educated strata of the societies).

In any case, make no mistake. Barring an unforeseen technological breakthrough, there won't be large scale replacements for the fossil fuels until late this century at least. Massive national and international investments in efficient and integrated multi-modal and urban transportation systems may and should help to reduce the use of automobiles and trucks, particularly in the overcrowded big cities. For power generation, there are the options of harnessing the hydroelectric potential still available, the expansion of nuclear energy and the interlinking of continental and even inter-continental power grids in order to enhance both the energy efficiency and security for all countries involved (forget the current "alternative sources" for large scale uses, they are not technologically and economically feasible for energizing urban and industrial societies). However – and hence –, coal, oil and natural gas will continue to be sources of development and progress for a long time yet – and it is unacceptable that its growing use be hindered by an imaginary threat. ▲▲

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# Shackling National Security – and Renewable Energy

**by Paul Driessen**

*(Paul Driessen is senior policy advisor for the Committee For A Constructive Tomorrow (www.Cfact.org) and Congress of Racial Equality (www.CongressOfRacialEquality.org), and author of Eco-Imperialism: Green power – Black death. He has degrees in geology, ecology and environmental law).*

**NOW environmentalists say we need the minerals that they've been locking up for decades**

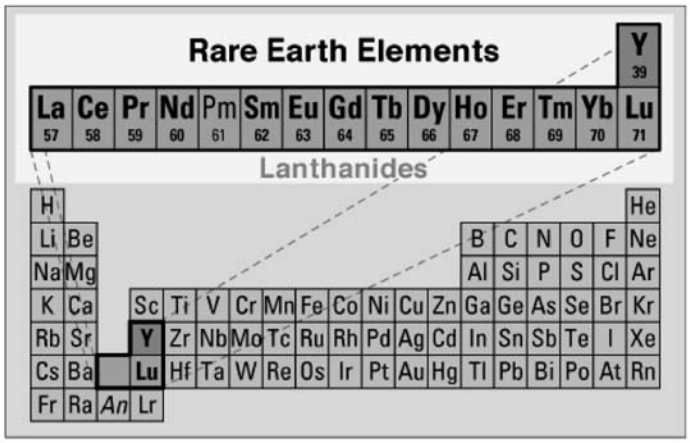
"China's control of a key minerals market has US military thinkers and policy makers worried about access to materials that are essential for 21st-century technology like smartphones – and smart bombs," the Wall Street Journal reports. Plus stealth fighter jets, digital cameras, computer hard drives – and wind turbine magnets, solar panels, hybrid and electric car batteries, compact fluorescent light bulbs, catalytic converters, and more.

China's dominance in mining and processing 17 "rare earth" metals "has raised alarms in Washington," says the Journal. These unique metallic elements have powerful magnetic properties that make them sine qua non for high-tech, miniaturized and renewable energy equipment.

China currently produces fully 97% of the world's rare-earth oxides, the raw materials that can be refined into metals and blended into specialty alloys for defense, commercial and power-generation components. However, the Middle Kingdom has slashed its rare-earth oxide and metal exports.

Beijing claims to be motivated by environmental concerns – reflecting the fact that rare earths are present in very low concentrations, mountains of rock must be mined, crushed and processed to get usable metals, and every step in the process requires oil, gasoline or coal-based electricity. A more likely reason is that the Chinese want to manufacture the finished goods, thereby creating countless "green" factory jobs, paid for with US and EU taxpayer subsidies, channeled through GE, Siemens, Vestas and other "socially responsible" companies that then install the systems across Europe and the USA.

So here we are, long beholden to foreign powers for petroleum – and newly dependent on foreign powers for "green" energy. National security issues (direct defense needs and indirect dependency issues)




once again rise to the fore, and the Defense Department, Government Accountability Office, House Science and Technology Committee and others are busily issuing reports, holding hearings and expressing consternation. Congressman Bart Gordon (D-TN) worries that the United States is being "held hostage."

As well he should. However, the fault lies not in our stars, but in ourselves – or more precisely in our militant environmentalists.

Back in 1978, I ruined a perfectly pleasant hike in a RARE-II roadless area, by asking an impertinent question. "How do you defend prohibiting any kind of energy or mineral exploration in wilderness study areas?" I asked Assistant Secretary of Agriculture Rupert Cutler and Forest Service Chief John McGuire, "The 1964 Wilderness Act expressly allows and encourages those activities, so that Congress and the American people can make informed decisions about how to manage these lands, based on extensive information about both surface and subsurface values. How do you defend ignoring that provision?"

"I don't think Congress should have enacted that provision," Dr. Cutler replied.

"That may be your opinion," I responded. "But Congress did enact it, and you are obligated by your oath of office to follow the law the way it was written, not the way you think it should have been written."

"I think we've said enough to this guy," Cutler said to Chief McGuire, and they walked away.

A couple months later, I asked the Denver Sierra Club wilderness coordinator a related question: "Why are you focusing so heavily on areas with the best energy and mineral potential? Isn't that going to impact prices, jobs and national security?"

"Americans use too much energy, and they're not going to change voluntarily," he said. "The only way to make them change is to take the resources away. And the best way to do that is put them in wilderness."

And every other restrictive land use category that arrogant, thoughtless activists, bureaucrats, judges and politicians can devise, he might have added. Which is how we got where we are today.

As of 1994, over 410 million acres were effectively off limits to mineral exploration and development, according to consulting

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## Shackling National Security – and Renewable Energy

Cont. from Page 13

geologist Courtland Lee, who prepared probably the last definitive analysis, published in The Professional Geologist. That's 62% of the nation's public lands – an area nearly equal to Arizona, Colorado, Montana, New Mexico, Utah and Wyoming combined – primarily in Alaska and our eleven westernmost Lower 48 states. Today, sixteen years later, the situation is much worse – with millions more acres locked up in wilderness, park, preserve, wildlife refuge, wilderness study and other restrictive land use categories, or simply made unavailable by bureaucratic fiat or foot-dragging.

Due to forces unleashed by plate tectonics, these rugged lands contain some of the most highly mineralized mountain and desert areas in North America. They almost certainly hold dozens, perhaps hundreds, of world-class rare-earth deposits. The vast mineral wealth extracted from those areas since the mid-1850s portends what might still be there, to be discovered by modern prospecting gadgets and methods. But unless laws and attitudes change, we will never know.

How ironic. First eco-activists lock up the raw materials. Then they force-feed us "renewable energy standards" that require the very materials they've locked up, which we've never much needed until now. Thus China (and perhaps other countries a few years hence) will happily fill the breach, creating green jobs beyond our borders, selling us the finished components, and using our tax dollars to subsidize the imported wind turbines, solar panels and CFL bulbs that are driving energy costs through the roof.

Science historian James Burke became famous for chronicling the "Connections" between successions of past discoveries and achievements and various modern technologies. Unfortunately, today's increasingly powerful and power-hungry activists, jurists, legislators and regulators cannot see the connection between their actions and the economic havoc they leave in their wake.

Of course, there is little incentive for them to do so. They know they will rarely be held accountable. Others may freeze jobless in the dark – but most of them will keep their jobs, perks, pensions, positions of power over our lives, economy and civil rights progress.

However, there are bright spots. The upcoming elections offer hope for a general House (and Senate) cleaning. A recent poll found that a third of all Americans don't want to pay even $12 a year in higher energy costs, even to create "green" jobs or forestall Climate Armageddon. Many people are simply fed up – with Washington, and with constant assertions of imminent eco-catastrophes.

A steady stream of shale-gas discoveries in Europe and the United States suggests that we still have plentiful supplies of cheap natural gas. Evidence is mounting that petroleum is abiogenic in origin – and natural forces deep inside the Earth are constantly creating new hydrocarbons from elemental carbon and hydrogen. Both developments undermine a principle argument for pricey, land-intensive, intermittent wind and solar power: that we are running out of "fossil fuels."

Just north of the Mojave Desert, near Mountain Pass, California, Molycorp is working to restart mining operations at the largest rare-earth deposit outside of China. They had been suspended in 2002, for economic, permitting and environmental reasons that have since been resolved. China's Baotou Rare Earth Company was a happy beneficiary of the circumstances and US regulatory excesses.

Now there is hope that common sense will prevail at Mountain Pass, new processing methods will reduce costs and environmental impacts, and exploration may one day be permitted in areas locked up by Cutler & Company. Too many technologies depend on lanthanides to keep US deposits under lock and key.

Radical greens may not give a spotted owl hoot about military needs. But they may care enough about preserving their dream of a hydrocarbon-free future, while a few politicians may want to ensure that tens of billions in taxpayer subsidies for wind and solar power and electric cars don't all head overseas. ▲▲

# Killing the Expanding Earth

**David Pearcey, Member**

## Introduction

Expanding earth theories used to explain plate tectonic or at least ocean floor spreading remain popular to this present day. Most theories (Carey 1975) use an expanding earth to account for global tectonic based on geometrical plate patterns. For the most part they do not investigate the possible processes which take place in the Earth, although some did (eg. Egyed 1969), to account for an expanding earth and then applied those processes to develop an expanding earth model which which was then used to predict the rate of change in the size of the Earth.

The main exponent of the expanding earth theory was Warren Carey Who considered that plates were moving apart because the new ocean floor was created as the surface of the Earth increased while it expanded. He also thought that plates were not being subducted at the same rate which new ocean floor was being created at spreading ridges. Carey was a very persuasive person and difficult to argue against.

A more scientific approach to the expanding earth would be to assume that it is expanding and then investigate the potential processes that may cause this expansion. From these investigations tectonic models of the Earth can be developed, listing the assumptions that are necessary to make a tectonic model consistent with plate tectonics. The model should predict the rate of expansion of the Earth to account for current plate motion. If the resultant expansion is absurdly high then expanding earth theories can be consigned to history.

## Physics of an expanding earth

At the heart of any explanation for an expanding earth is an explanation of how the Earth's density decreases with time.. There are two ways this might be achieved

1. By chemical processes where the mineralogy of a chemical reaction within the Earth produces a less dense set of minerals, or
2. by phase changes of a material where a high density phase changes to a one of a lower density.

It has been interpreted from seismic data that the density of the Earth increases with depth and this density increase is also associated with abrupt discontinuities at different depths within the Earth. These changes in density are concentric to the Earths centre and are occur at specific pressures within the Earth.

The main density discontinuities occur at the

1. The inner and outer core boundaries,
2. The core mantle boundary and
3. at the upper and lower mantle boundary with several minor discontinuities in the upper mantle.

If any material crosses these discontinuities then it will either increase or decrease in density depending on the appropriate direction the material is moving and thus, will cause the Earth to expand or contract as the case may be.

## Expansion at pressure controlled phase boundaries

A pressure phase change, associated with a change in density, is associated with a high pressure phase of a substance becoming unstable at a lower temperature and pressure within the Earth and changing to a less dense phase. The boundary between the inner and outer core is thought to be such a boundary where the solid core is thought to have much the same chemical composition of the outer liquid core but is more stable at the higher temperatures and pressures deeper with in the Earth. If the solid inner core melts to form the less dense liquid outer core, the core as whole will still expand even though the inner core is contracting.

## Expansion at chemical controlled facies boundaries

These are boundaries where chemical composition changes within the Earth. An example is the mantle core boundary where the mantle is composed of an Mg-Fe silicate and the core a liquid iron alloy. These chemical composition boundaries are thought to have occurred early in the Earth's history where a homogeneous earth separated out in layers of different mineralogy and density. If the process is still going on within the Earththen residual silicate material will still be precipitating and floating to the top of the core (Weijermars 1986), and mantle material will be sweating residual liquid iron into the core. This process would cause the liquid core to increase in size and the mantle to shrink (strictly speaking this is not an expanding earth model).

## Expansion mechanism

There are two prominent models of the expanding earth; either the core is expanding due to the inner solid core melting, or where, if it is assumed the Earth is still evolving, the core-mantle boundary is still forming with segregation of material across the boundary. In both models it is the liquid core that is expanding, although in the evolving earth model there is additional material accreted to the base of the mantle. In both cases the liquid will exert a hydraulic pressure to the base of the mantle lifting the mantle up to a higher level. This hydraulic force acts uniformly across the base of the mantle. Thus as the mantle rises it will have to readjust itself to a larger volume. This process can be imagined if the mantle is modelled into a series of thin

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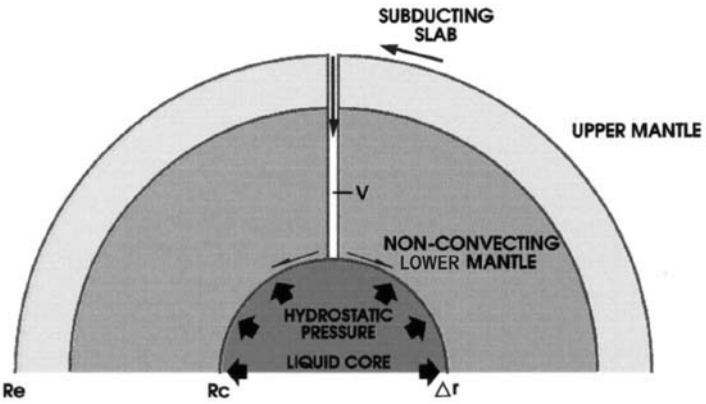


*Figure 1. Section through the Earth showing how the mantle may rupture with an expanding core.*

# Killing the Expanding Earth

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shells. If each shell is pushed out to a larger radius then each shell will grow in surface area in the manner of a balloon stretching as it is blown up.

How the mantle responds to the hydraulic pressure acting at its base depends on the nature and rigidity of the mantle. This readjustment will be achieved by a process that is one of least resistance and energy consumed.

There are two likely scenarios that the mantle may take depending on the mantles rigidity.

1. It will deform by plastic deformation as the mantle readjust itself to occupy a larger volume and spread itself around the expanding core. This is a mechanism of high energy because it requires every fragment of the mantle to deform in three dimensions to compensate for the extra volume it is required to occupy.
2. Alternatively, it may act as a solid and rupture with the resultant cracks being occupied by either collapse material of the rupture walls or by a more liquid facies of the mantle nearer the Earth's surface (the seismic low velocity zone near the Earth's surface indicates a liquid phase in the mantle) to flow into the rupture zones as they open up. This is a low energy response to the expansion but depends on the presents of a liquid phase in the upper mantle; however it does not involve wholesale deformation of the mantle.

## Plate tectonics and an expanding core

As the purpose of this investigation is to examine how an expanding earth is responsible for plate tectonics, the model most compatible with plate tectonics is selected. This is the model of mantle rupture with less viscous material near the surface of the Earth, i.e. plates and mantle material above the low velocity zone (partly melted layer in the mantle), sliding and sinking into the rupture zone, (Lister 1975).

The plastic deformation model is rejected on the grounds that it is less energy efficient than the rupture model. However, the rupture model requires the mantle to be rigid enough to allow the flow of surface plates on the Earth's surface to slide on semi liquid material into the rupture zones rather than plastic deformation of the rupture walls. This model has many characteristics that make the core expansion and mantle rupture model compatible with the salient features of plate tectonics.

## Salient features of plate tectonics

There are several features associated with plate tectonics, such as those associated with plate motion geometry, that any viable working tectonic model of the Earth should be compatible with. In brief these features are:

- A fixed frame of reference in which a hotspot, at least Pacific hotspots such as the Hawaiian and Easter Island hotspots (Morgan 1971), appears to be stationary as the tectonic plates slide over them.
- Spreading ridges that form between diverging oceanic plates that do not appear to be stationary with respect to each other or to a fixed underlying frame of reference. (Spreading ridges in some places are a dominant feature in plate tectonics, such as the Atlantic spreading ridge, but in some places are ephemeral such as in the region of the Nazca plate where spreading ridges are subducted).

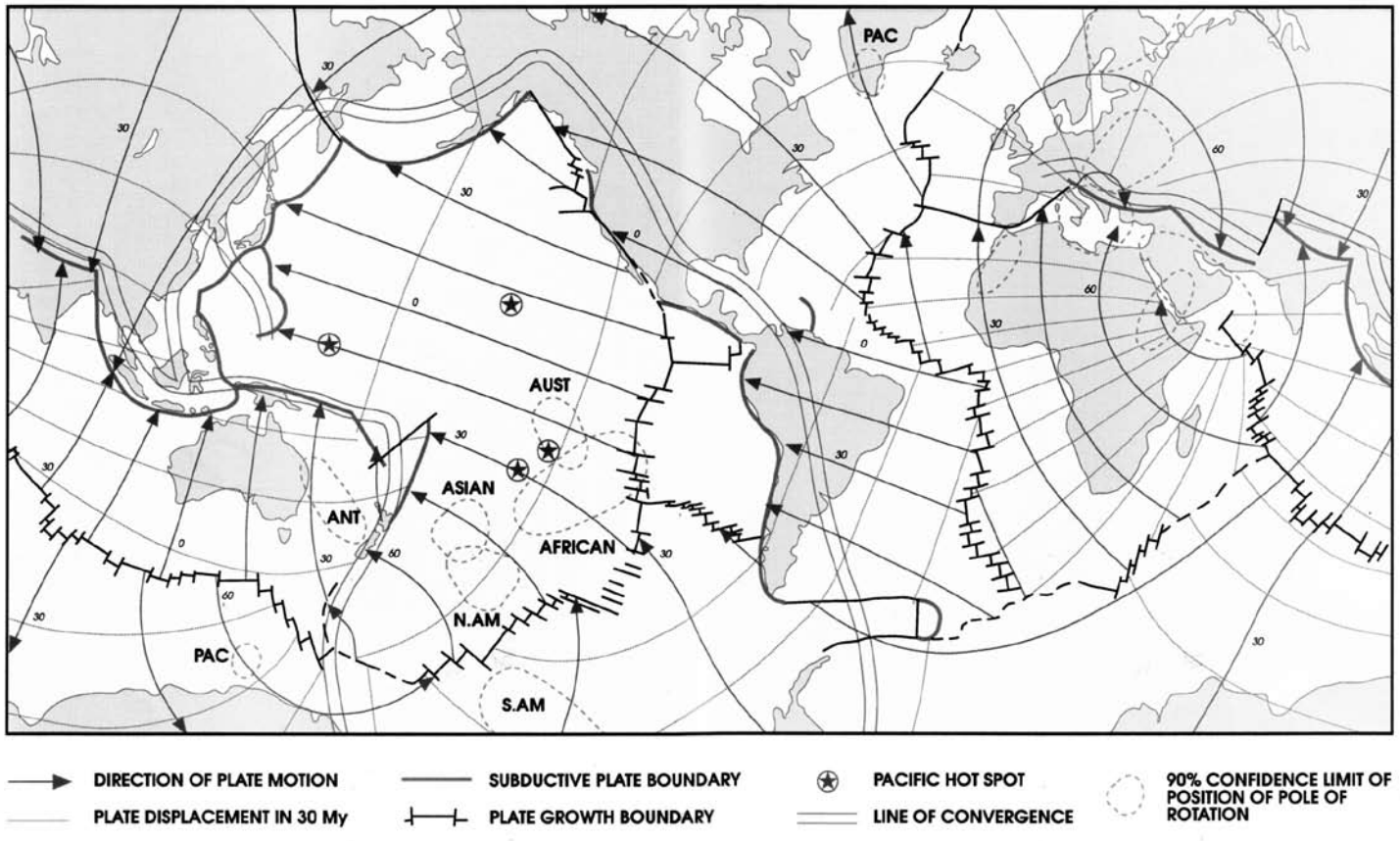


*Figure 2. Map of the salient features of plate motion showing the Line of Convergence*

- Trench systems around the Pacific that appear to be stationary with respect to the pacific hotspots and with respect to themselves.
- Global trench systems are not arbitrarily located about the Earth but linearly connected to each other, from the Sandwich Island trench around the Pacific to the Tonga-Kermadec trench, by a line of convergence (a contour line on the Benioff zones (Isacks 1969) at 650 km depth) which traces a single line on the lower-upper mantle boundary to which all plates subduct as well (Pearcey 2009).
- Ocean floor plates move faster to subduction zones than those with continents. The low velocity zone is better developed under younger ocean floor plates.
- Plates are generally large and not flexible implying a stable underlying mantle.

## The expanding core tectonic model

The model involves either one of two processes; the inner core melting to enlarge the liquid outer core which exerts a hydraulic force at the base of the mantle (core phase change model) or alternatively the mantle is still sweating out liquid iron into the core causing the core to expand (evolving earth model). Both of these models are expanding core expanding earth models.

As the liquid core expands the mantle ruptures and the material of the low velocity zone, and the tectonic plates above, slide into the rupture zones filling them as they open up. On the Earth's surface the rupture zone is expressed by the line of convergence (Pearcey 2009), the line to which the plates also subduct . The fracture system is exposed on the Earth's surface in the Pacific region from the South Sandwich Islands, north around the Pacific Ocean and extending south to the Tonga Kermadec trench in the south Pacific. A branch of the fracture zone extends from Indonesia across Asia to the Mediterranean. The plates slide over the rigid mantle, with its associated stationary hotspot, pulled by gravity over the semi liquid phase of the mantle of the low velocity zone moving into the rupture system. The spreading ridges form where plates break under tension as the plates move away from each other. The rate to which a plate moves depends on the rate of opening at a rupture system that the plate is moving into and the thickness and fluidity of the low velocity zone that the plate is sliding on. The oceanic plates have a better developed low velocity zone and thus move faster. The material under spreading ridges wells up between the separating plates and is sourced from the material in the vicinity of the low velocity zone as the Earth's surface is continuously peeled off and subducted. There would be a preference for spreading ridges to sweep across the top of the solid upper mantle supplying material to the plates as a stationary spreading ridge would use up the available material of the solid mantle under it leaving a dip on the Earth's geoid.

## Qualitative assessment

This mantle rupture tectonic model of an expanding earth compatible with plate tectonics, is associated with some assumptions These assumptions are that the core is expanding by either, the core phase change model, or the evolving earth model. Also there are assumptions

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## Killing the Expanding Earth

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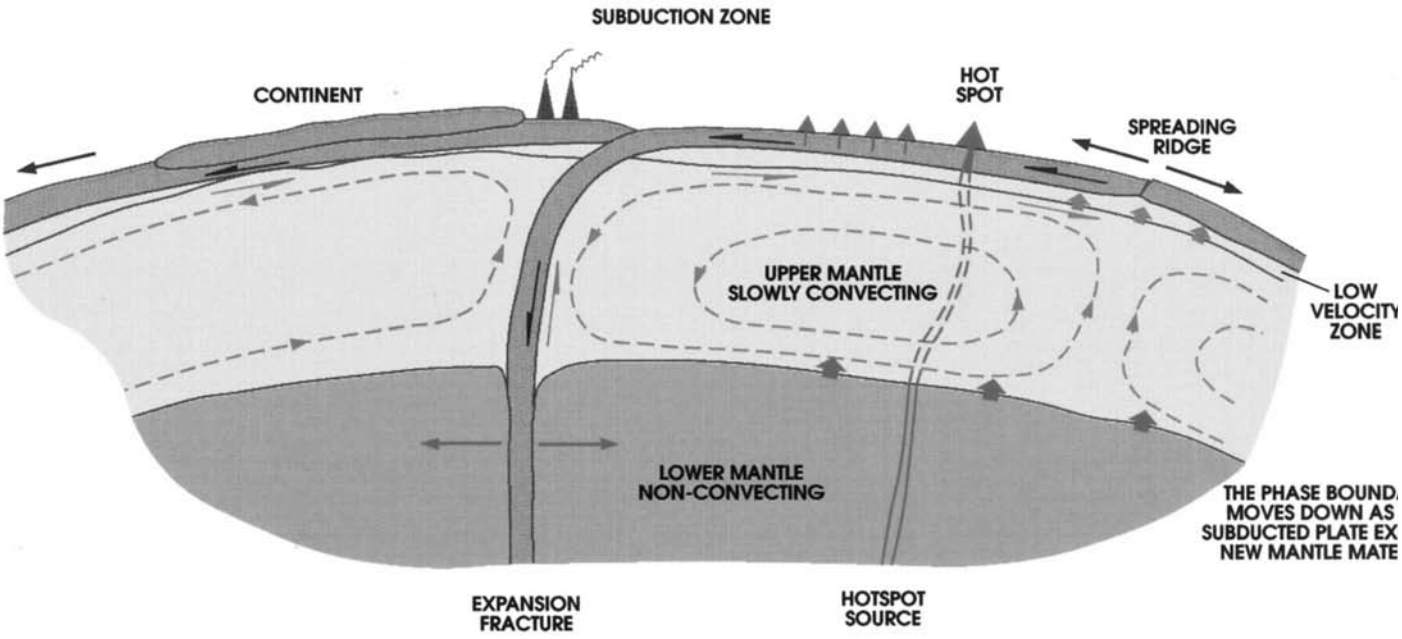


*Figure 3. Section through the Earth showing the subduction of a plate into the mantle's rupture zone*

about the nature of the mantle, that is, it will behave as a ridged body and rupture rather undergo plastic deformation under the stress regime of an expanding core and that plates can slide on the material of the low velocity zone.

The outcome of the expanding core model with a rupturing mantle does appear to conform to the requirements of plate tectonics and as such the model can be used to measure the rate of expansion of the core for the current rate of plate motion.

## Conclusion

The expanding earth model developed here is based on good scientific procedure where it is assumed that the Earth is expanding and then determining what processes are going on inside the Earth to achieve it. Inevitably there are assumptions that have been made to develop a dynamic model of an expanding earth, or more specifically an expanding core, to make it compatible with plate tectonics. The aim of the investigation was to examine the plausibility of the concept of an expanding earth based on sound physical principals rather than explaining plate tectonic geometry through the concept of an expanding earth without concern to the underlying physics.

There were two possible models of an expanding earth both of which involved an expanding core. There is the model where the core expands because the denser inner core is melting and the other where it is assumed that the interior of the Earth is still evolving where liquid iron in the mantle is still being sweated out into the core.

Because the core is liquid, an expanding core will exert a uniform hydraulic upward pressure on the base of the solid mantle. The mantle will respond through two plausible processes, the core will deform plastically, or it will rupture as a solid with the rupture being filled in from more fluid mantle material higher up near the surface of the Earth, being fed by gravity. The rupture model was investigated because processes associated with this model seemed to fit in with processes of plate tectonics. By matching this model to the processes of plate tectonics this model has predictive powers that can be used to relate the expansion rate of the core with the rate of motion of the plates in plate tectonics.

This model relied on the assumptions that the mantle is ridged enough to remain relatively undeformed and to rupture within the stress regime of an expanding liquid core and that plates on the Earth's surface above the seismic low velocity zone (200km thick) slide and sink into the mantle as the mantle ruptures open up.

The predicted expansion rate of the core to achieve the current rate of plate subduction is 0.1 mm of radius a year. For the melting inner core model, an inner core shrinkage of 1mm of radius a year with an increase in the Earth's circumference of 6mm a year.

Although the main aim of the investigation was not achieved, to disprove the concept of an expanding earth as an explanation for plate tectonics, but it does show that expanding earth theories that deny the concept of plate subduction are clearly untenable as physical theories. ▲▲

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**Dear Editor**

Your readers might be interested in a couple of papers that may well have a bearing on palaeontology. These are "Sex-specific, male line transgenerational responses in humans", by Pembrey et al. (2006), European Journal of Human Genetics, and "Transgenerational effects of betel-quid chewing on the development of the metabolic syndrome in the Keeling Community-based Integrated Screening Programme", by Chen et al. (2006), American Journal of Clinical Nutrition.

These two papers are doubtless now among others that demonstrate that Lamarck's Giraffes were indeed barking up the right tree and that Lysenko's wheat was merely awaiting the warm manure of gene-splicing to germinate through the frosty climate of Darwinian random selection. No, it does not seem that we need random meteorites to wipe out dinosaurs so that Homo sapiens can eventually mutate into being by accident. Rather, these two papers indicate that environmental delights, such as voluntarily chewing the right leaves, can not only promote, through gene-switching in the parent, trans-generational diabetes and other nasties, but could also conceivably promote and no doubt continue to promote gene-switching in the succession of parents to the benefit of the parents' future unevolved species, such as the proto-Giraffe, striving to get its nose out of the gutter of Buai (betel) spit produced by the equally rapidly environmentally-promoted gene-switched ancestor of the human species.

Food for thought (and for one's genes); what will over-consumption of Mc Donald's Hamburgers do for gene switching? According to Pembrey et al. (2006) burger-overeaters may well produce a tendency to diabetes that could perhaps increase through later generations, perhaps leading to the evolutionary extinction of certain populations of Homo sapiens.

Finally, when you read the first earth-moving, paradigm-shifting, palaeontological paper about gene-switching and evolution in "Nature", remember, I said it first and that the AIG was the first geological publication off the block with the idea. Please ensure that the citation index scores me (and the AIG) the right number of academic brownie points.

Regards, **Bob Findlay**
Montagu Minerals Mapping Pty Ltd, Tasmania 7018.



**Dear Editor**

The recently-released Australian Academy of Science (AAS) policy document, "*The Science of Climate Change – Questions and Answers"*, is flawed. It contravenes its self-proclaimed aim of wanting to contribute to '*...the public understanding of the state of the science...*' by blatantly withholding credible scientific evidence contrary to its own position, and in stating that it wants *' ...to attempt to tread a path through the often contradictory public commentary on the science...*' also undermines the Scientific Method. I can only assume that the 'public' does not include the 30,000 scientists in the US who signed the Petition Project. (www.petitionproject.org).

To make its case that carbon dioxide ($CO_2$) will be the death of us all, the AAS arduously correlates $CO_2$ and time, and also temperature and time, but nowhere does it correlate $CO_2$ and temperature which is, after all, the crux of the argument. I suspect this ploy is designed to evade the evidence revealed by Vostok ice cores that show that rising levels of $CO_2$ lag behind rising temperature, in other words, that rising $CO_2$ levels are an effect and not a cause of rising temperature. (Google 'vostok').

Another blatant omission is any mention of the logarithmic relationship between $CO_2$ concentration and enhanced temperature effect as determined by the modtran (**mod**erate resolution atmospheric **tran**smission) model (www.modtran.org). This logarithmic relationship shows that even a doubling of current levels of $CO_2$ would cause only a minor increase in average temperature, (Archibald, 2008 & 2010); nearly all the warming that $CO_2$ is capable of doing is achieved at concentrations less than 60 ppm. Yet the Academy presents scenarios of a planet with average global temperature rising by 7C deg by year 2100.

The Academy cannot ignore credible scientific evidence; to do so is in violation of its charter. It can argue and rebut the science in the public domain but it cannot ignore it. In doing so it is conveying to policy makers that no counter position exists. No wonder that so many Parliamentarians with little or no science education are so alarmed and driven to such extreme solutions as wanting to turn our economy and standard of living on its head.

The language in this document is duplicitous and the arguments are circuitous, no doubt by design; it also cherry-picks its topics. Does the Academy really think it is adding to the font of human knowledge when it proclaims *'The Earth's climate has changed'?* (p 2). This is an old fashioned snow job, beautifully presented in colour, and aimed at the masses that have come through an education system in which core science subjects continue to lose traction.

In the end the scientific fact always prevails, even if it takes decades or, heaven forbid, centuries. In that context, for how many more years does global temperature have not to rise or fall, as has been the case for the previous 12 years, for the Academy to concede that it may be wrong. I am sure that the day will come when the scientists who put their name to this publication will rue that day.

**Aert Driessen FAIG.**

# IPCC Science: Are You Willing to Take the Risk?

**Marc Hendrickx, November 2010**

*Marc Hendrickx works as a part time consulting geologist and is completing a PhD at Newcastle University.*

**ABC UNLEASHED'S FAVOURITE PSYCHOLOGIST Stephan Lewandowsky once again takes aim at those suggesting it might be prudent to wait for the facts to come in, before turning society on its head. All to combat a climate crisis that has been manufactured up by activists with a poor appreciation of what constitutes a hazard; generally inner city folk.**

This time round in a piece titled *"Climate change: are you willing to take the risk?"* Lewandowsky suggests the level of certainty in climate science is similar to other well founded scientific principles like gravity. He contends that if climate science has the same veracity as evolution for example, who wouldn't be prepared to sell their children and prepare for climate Armageddon? However, if we apply the same level of uncertainty inherent in climate science concepts to other disciplines it seems there is little to justify Lewandowsky's level of confidence.

**If IPCC Climate scientists were Physicists:** The IPCC has found that the total net anthropogenic forcing is 1.6 $W.m^{-2}$ with an error range of 0.6 to 2.4 $W.m^{-2}$. If the IPCC's same errors for Radiative Forcing Components were applied to the universal gravitational constant, IPCC climate scientists would tell us that the UGC is 6.67 × 10-11 $N•m2/kg^2$ with a range of 2.5-10 $N•m2/kg^2$. They would then assure us there is 90% certainty that acceleration due to gravity on Earth at sea level is in the range 3.7 to 14.7 $m.s^{-2}$. IPCC climate scientists would tell us apples may be as light as a feather or as heavy as a brick. They would tell us apples fall down, but they'd be unable to tell us how fast, and occasionally they may actually fall upwards. As a result of their endeavours, Newtonian physics and Relativity would be tossed on its head. Quantum physics, built on the uncertainty principal, would have no place in a world where the science is settled. Speaking about gravity IPCC climate scientists would say things like: *"The fact is that we can't account for the lack of gravity at the moment and it is a travesty that we can't."* They would earnestly explain that there was no statistically significant gravity from 1995, and suggest that anyone disagreeing with their assessment must be a gravity denier.

**If IPCC Climate Scientists were engineers:** If IPCC climate scientists were engineers they wouldn't use rulers to measure distance, they'd use the wind. IPCC climate models predict a hot-spot over the tropics but thermometers attached to weather balloons show no sign of it, the hotspot is missing. So with no warming in the thermometers IPCC climate modelers looked elsewhere and claimed to have found it in wind shear. Throw away your calculators, they would tell the engineers the answer is blowing in the wind. So how would IPCC climate scientists go at engineering? Early attempts at engineering by IPCC climate scientists are documented in the image to accompany this piece above; the effect of wind shear not accounted for in this case: Would you trust an IPCC climate scientist to build your building?

**If IPCC Climate scientists were laser eye surgeons.** In a report titled "Draft Water Sharing Plan Greater Metropolitan Region unregulated river water sources.", the NSW Office of Water has forecast rainfall and runoff across NSW using 15 global climate models for the IPCC SRES A1B climate scenario; finding:

> *For the Greater Metropolitan Region the worst case forecast is a 5-10 per cent reduction in mean annual rainfall by 2030, while the best case is a 5-10 per cent increase in mean annual rainfall. 7 of 15 models predict that mean annual rainfall would decrease by between 2 and 10 per cent, while 8 of 15 models predict that rainfall would increase by between 2 and 10 per cent by 2030.*

Half of these models are wrong! What other science happily promotes incorrect models and expects politicians to make decisions based on spurious outputs? And Lewandowsky suggests that IPCC climate science has the same precision as laser surgery!

Applying the same laser like precision of the climate models to eye surgery in 7 out of 15 cases IPCC climate scientists as laser surgeons would blind the left eye, while in 8 out of 15 cases they would blind the right.

**If IPCC climate scientists were historians.** The palaeo-temperature study that gave the world the Hockey Stick Graph has now been debunked so many times that even the Australian Academy of Sciences concedes the existence of the Medieval Warm Period and Little Ice Age. Based on the mess they made of the last 1000 years of climate, if IPCC climate scientists were historians they'd find no

*Cont. Overleaf*

## IPCC science: are you willing to take the risk?

*Cont. from Page 21*

evidence for the French and Russian Revolutions. Copernicus, Galileo and Einstein would be cast into the dustbin denounced as deniers of prevailing authority. They would ignore Napoleon's defeat in Russia because the weather could never have been so cold in the 19th century. There'd be no Renaissance, the authorities would not allow it. Aristotelian philosophy would rule supreme over the scientific method. If IPCC climate scientists were historians, history would only record those events officially sanctioned by governments, queen and kings. Only those facts that supported the prevailing view would be recorded for posterity; inconvenient truths have no place in the official accounts. Thankfully IPCC climate scientists are hopeless at history.

**If IPCC Climate scientists were climate scientists:** With current warming trends at about 0.1 degrees C per decade, well short of the warming required to lend credence to IPCC climate models that forecast rates of 0.3 to 0.7 degrees C per decade it seems climate scientists are not even capable of doing their own job let alone anyone else's.

**And if IPCC climate scientists were fruit pickers:** they would obviously pick the cherry. They appear so used to cherry picking data to fit the models there simply is no other fruit, except perhaps the Durian, which is a nice metaphor for the current state of the IPCC.

**IPCC science: are you willing to take the risk?** ▲▲

# Vale: Maureen Muggeridge (1948 – 2010)

**MANY TRIBUTES will be paid to Maureen but for me she will always be remembered as a truly inspirational field geologist whom I first met in March 1979 when I joined CRA Exploration Pty Ltd as a contract geologist and placed in one of the teams of the Pilbara diamond sampling program under her supervision.**

A team consisted of 6 geologists (3 staff geologists and 3 contract geologists), approximately 6 field assistants, 2 helicopter pilots, 2 engineers and a cook. We lived in tent accommodation from March to September 1979 operating on a 5 weeks on 1 week off roster, moving camp every 4-6 weeks. CRA rotated several staff geologists during the program some of whom included Neil Poole, Kevin Wills, Paul Roberts, John Ikstrums and Peter Buck.

The exploration program utilised two Bell Jet Ranger helicopters to ferry geologists and field assistants. Each helicopter team had two crews consisting of a geologist and field assistant collecting 2x 20 kg stream samples from trap sites spaced 5 km and or 10km along the stream drainage. A fifth geologist remained in camp plotting up samples on a 1:250,000 topographic sheet and indexing our field cards whilst a sixth geologist was away on a 7 day break. We were in the air from 7am - 5pm for 6 days with each crew collecting 10 trap site samples daily. By the time we were ready to move camp a freezer truck was used to transport the samples to Perth and loading the samples on to the truck employed all hands in a chain loading exercise which was as physically demanding as taking the samples in the first place. We sampled an extensive tract of the Pilbara from east of Jigalong Mission to Nanutarra Roadhouse.

At the end of the program Paul Roberts and myself were transferred to Calwynyardah to work on the Noonkanbah and Ellendale lamproite pipes under the direction of Dave Jackson and meeting with Tom Redicliff, Ray Muskett and Peter Onley.

Maureen trained all the geologists and field assistants in the "art" of stream trap site sampling according to methodologies developed by her. The training was on a one to one basis providing us with the knowledge and confidence to undertake the most rigorous and physically demanding sampling program we would ever do in our careers. Maureen's passion for sampling and meticulous attention to detail was clearly evident in the training. I have not seen her zest and exuberance for the work in anyone else before or since. Hence for me it was a standout quality which months later would prove to be quintessential in the discovery of the Argyle Diamond Mine. I last saw Maureen in 1992 when I made her aware of a possible lamproite dyke in the Mosquito Creek region 80kms east of Nullagine. Maureen then was with Moonstone and had matured into a successful corporate geologist but still retained that quality of zest, exuberance and attention to detail that made her stand out from the rest of us.

In 1984 the renowned late geologist Hector Ward said to me "the field is your laboratory". Maureen worked in her laboratory to the end. All geologists should remember the field is their laboratory. I will always fondly remember Maureen and the impact she made on my career and the careers and lives of many Australians.

**Denis J Rafty MAIG**

*CRA Exploration field camp near Newman showing the author sorting out samples.*

# VALMIN: Call for Papers

As part of its stakeholder consultation process, the VALMIN Committee is planning a conference for the Second quarter of 2011. As with the previous VALMIN Conferences, there will be a proceedings publication. The Committee would like to invite interested parties to submit valuation and reporting related papers for possible inclusion in the conference and proceedings publication. Selected papers will complement those already received to date by the organising committee. Initial enquiries and submissions can be directed to Darren Herdman at darren.herdman@heggies.com and Jon Bell at jbell@alexanderresearch.com.au.

# Events

### Advanced Coal Preparation

When: Monday, November 08 - Wednesday, November 10, 2010

08:00AM - 11:00AM (America - Vancouver)

Where: Edumine Webcast

### Field Assessment of Gossans and Leached Caps

AIG EVENT

- A one day Professional Development Workshop

When: Monday, November 08, 2010

08:45AM - 05:00PM (Australia - Brisbane)

Where: Theodore Club - 13th Floor, 333 Adelaide St Brisbane

### Townsville Minerals Christmas Party

When: Saturday, November 20, 2010

AIG EVENT

06:00PM - 11:45PM (Australia - Brisbane)

Where: Townsville Qld

### WA Branch Christmas River Cruise

When: Friday, December 3, 2010

AIG EVENT

12:00PM – 5:00 PM (Australia - Perth)

Where: Barrack Street Jetty, Perth

### Exploration Technologies 2011

When: Monday, March 28, 2011 - Tuesday, March 29, 2011

08:00AM - 05:00PM (Australia - Perth)

Where: Perth, WA

### CIM 2011

When: May 22-25, 2011

Who: Canadian Institute of Mining

Website: http://www.cim.org/montreal2011

Contact: Lise Bujold, Director, Conferences & Exhibitions, Phone 1-800-667-1246, email cim@cim.org" cim@cim.org

### Eighth International Mining Geology Conference

When: Monday, August 22 - Wednesday, August 24, 2011

09:00AM - 05:00PM (Pacific - Efate)

AIG EVENT

Where: Queenstown, New Zealand

### 34th International Geological Congress

When: Thursday, August 02, 2012 - Friday, August 10, 2012

08:00AM - 05:00PM (Australia - Brisbane)

AIG EVENT

Where: Brisbane Qld

For the latest in Geoscientist news, views, codes, events, employment and education visit the AIG website:
**www.aig.org.au**

# News from the Australian Geoscience Council

**THE ORGANISING COMMITTEE for the 34th International Geological Congress has published an electronic FIRST CIRCULAR for this major international conference. Mark Berry is the AIG's representative on the IGC Organising Committee.**

Please review the IGC draft Scientific Program at the link below: http://www.34igc.org/FileLibrary/34igc_first_circular_v4.pdf

This large and prestigious world geoscience congress will be held at the Brisbane Convention and Exhibition Centre, 5-10 August 2012. The scientific program will cover all aspects of the geosciences. It will demonstrate how geoscience knowledge and applications are contributing directly to meeting societal needs, for example through innovation in the resources and energy based industries, better informed land and water management, enhanced understanding and mitigation of climate change and geohazards, and building major cities and infrastructure.


The committee invites all geoscience groups to participate in the 34th IGC to benefit from the opportunities it offers for synergies and networking. The 34th IGC will incorporate the 2012 meetings of IUGS' Commissions, Task Groups and Joint Programs, as well as the 2nd Young Earth-Scientists (YES) Congress.

There will be about 40 pre and post Congress field trips offered, and a major exhibition. The GeoHost support program for delegates from low income nations will be linked to participation in training workshops. The 34th IGC will feature a major Theme dedicated to geoscience benefiting low income nations, and we are expecting to receive UNESCO patronage – these factors should assist other delegates from developing nations in their applications to international funding agencies for support to attend the Congress.

The Congress website www.34igc.org will be the main vehicle for dissemination of updated information. We look forward to seeing you in 2012. ▲▲

# Mines and Wines 2010 – A Vintage Year for the Tasmanides Geoscientists of the Future


**THIS YEAR'S MINES AND WINES was a ripper! It was jointly organised by AIG, SMEDG and Industry and Investment NSW and held in beautiful Mudgee on 23 and 24 September with a geology tour of the district the day before and a delicious wine tour the day after.**

Over 200 people attended with 27 great speakers covering topics ranging from the tectonic and metallogenic evolution of the Tasmanidesthrough architectural controls on mineralisation at Cadia, to deposit scale updates on numerous exploration projects including Attunga (NSW), Mt Unicorn (Vic.), Whitewash (Qld), Webbs (NSW) and McPhillamys (NSW). Abstracts for most of the talks will soon be available on the SMEDG website and as AIG Bulletin 52. This was a wonderful chance to catch up on all the latest news from exploration successes in eastern Australia as well as JV opportunities, or in the case of those students who attended, find a future employer.

In keeping with the theme, the Mudgee wines were great, the talks were excellent, but the real benefit ultimately flowed from the discussions stimulated by both. Keep an eye out for notice of the next Mines and Wines to be held near a vineyard near you!

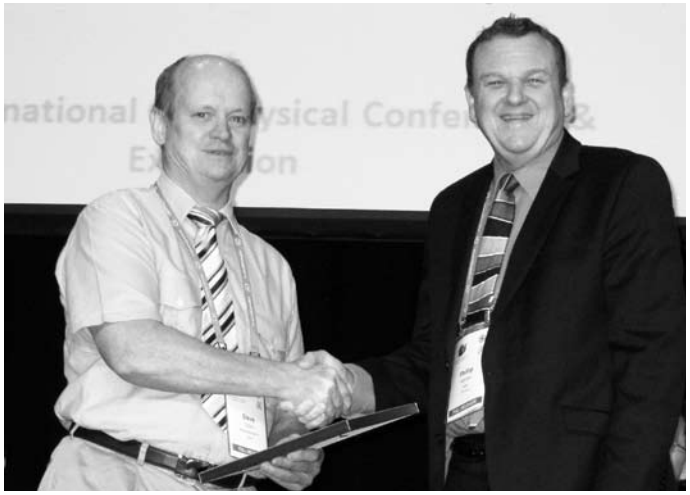
**Wendy Corbett**

For the latest in Geoscientist news, views, codes, events, employment and education visit the AIG website:
**www.aig.org.au**

# Steve Collins - Recipient of the Lindsay Ingall Memorial Award, August 2010

**THE LINDSAY INGALL MEMORIAL AWARD honours the memory of Lindsay Ingall for his capacity to cross geoscience boundaries and for his enduring commitment to assist geoscientists across Australia. It is awarded to an individual who has actively promoted geophysics to the wider community.**

The award this year is made to Steve Collins for his energetic and enthusiastic promotion of the science and benefits of applied geophysics within the broader geological community, in particular through his involvement for over 10 years with the Sydney Minerals Exploration Discussion Group, and as Convener of several highly practical and successful SMEDG symposia.



To the many non-geophysicists who have worked with Steve over the years, or benefitted from presentations given by Steve, he projects a very clear understanding of the capability of geophysical technologies to provide beneficial information for resource projects. His detailed knowledge of a wide range of geophysical methods is consistently communicated in straight-forward and clear language. He provides an honest and accurate assessment of the benefits of the geophysical approach to data gathering and is meticulous in ensuring that data is collected with the highest standards of quality control and verification.

Steve recognized early in his career that it was not triple integrals that impressed geologists and managers but easy to understand diagrams and images. Steve was far more interested in making the results available to geologists in a form they could understand and use. This made geophysics, no matter how complex, accessible not only to geologists but to non technical people and hence usable and relevant.

As well as his interaction with the geological fraternity, Steve produced extensive practical notes on safety in IP surveys, many of the points having been adopted by contractors. He was also involved in the development of a 'Standard Format for the Transmission of Gridded Data'. He has given many talks to geological symposia on various applications of geophysics, and has published many technical papers which are mostly in the style of practical case histories, often co-authored by geologists.

His capacity to communicate effectively to geologists, engineers, managers and accountants has resulted in an increase in the implementation of the discipline of geophysics throughout Australia. His reasoned and realistic portrayal of the role and effectiveness of geophysics in many environments and applications does great credit to him, the profession and the ASEG.

He has also been an enthusiastic supporter of the ASEG since becoming a member in 1973, and has attended every ASEG Conference. Steve is a most deserving recipient of the ASEG Lindsay Ingall Award.

The day was wrapped up by a very well attended talk by adventurer and mountaineer Greg Mortimer, (and originally a geologist) who spoke on the influence of his geological background on aspects of his career such as (with Tim Macartney-Snape) to the first Australian ascent of Mt Everest in 1984 and some of his amazing experiences. One could hear the gasps from the audience when some of the slides came up. ▲▲

# AIG WA 'Adopt a School' Initiative Supports Geoscientists of the Future

**IN 2006, the AIG – Western Australian Branch was approached by geologist and secondary school science teacher Suzy Urbaniak requesting some financial assistance for a field trip that was organised for the new Geology TEE course at Kent Street Senior High School in Perth.**

Four years and eleven field trips later the association is going strong and future geoscientists are entering their tertiary education to graduate and become part of the resources industry. The first class to graduate from Kent St in 2007 has seen three of its original nine students go on to study Applied Geology at Curtin University. Both Denzyl Moncrieff and Jacob Hopkins will do Honours in 2011 and after a gap year to work as a field assistant in 2008, Tara McCann will enter her 3rd Year in 2011. The classes of 2008 and 2009 have seen 20% of the students, including Yasinta Situmorang and Rebecca Snell (see photo) enter Applied Geology at Curtin. Of the eleven completing Grade 12 in 2010 five are intending to enrol in geology courses at Curtin University and the University of Western Australia.

Additionally, AIG WA also supports student awards for the top student in geology in Years 10, 11 and 12. These awards are unique at Kent Street and are held in high regard by the school community. In 2010, Brittany Fare (in photo) is the winner of the Year 12 award. Over the four years that the top award has been offered, young women appear well represented.

AIG WA's Adopt a School initiative is a positive one that will benefit industry as passionate and well informed students from Kent Street

*Jacob Hopkins (graduated 2007), Rebecca Snell (2009), Brittany Fare (2010), Yasinta Situmorang (2008), Suzy Urbaniak, Tara McCann (2007) and Denzyl Moncrieff (2007)*

High School enter the professional workforce. The best aspect of this initiative is that of the students who have graduated since 2007, only one was aware of geology as a potential career path prior to Year 10. Awareness created by running a geoscience program and from the ongoing financial and educational support of the AIG has exposed many more students to the concept of geoscience as a career alternative. Most of the students who went on to study geology at university indicate they became interested in geology because of the field trips (partly funded by AIG) they participated in, initially in Year 10.

Maybe other State AIG Branches should Adopt a School? ▲▲

# Education Report

**Kaylene Camuti, (Chair, AIG Education Committee)**

## 2010 AIG Bursary Awards – the 10th Anniversary Year

In the August issue of AIG News I noted that this year we received bursary applications from 45 students – a record number. This response from students was especially pleasing this year, as 2010 is the tenth anniversary of the AIG bursary program. It was great to mark the occasion with a record number of applications, reflecting the increasing number of students studying geoscience over the last few years. Since the program started in 2001 (and it seems like only yesterday) the AIG has received bursary applications from 240 students, and has awarded 100 bursaries with a total value of over $160,000.

Every year the AIG education committee is pleased to see the high quality of the applications we receive, and the range of research topics being carried out by geoscience students around the country. This year was no exception, and after much deliberation the committee awarded bursaries to 18 students. We would like to congratulate the following students on their awards:

- **Mark Burdett**, Monash University, who is working on a PhD project on *"The role of volatile-rich melts on distribution of PGE in magmatic systems"*. Mark was awarded a GEOCONFERENCES – AIG Postgraduate Bursary to assist with the cost of attending an intensive seminar on Experimental Petrology and Rock Deformation in Zurich later this year.
- **Ben McGee**, Adelaide University, who is completing a PhD on the *"Tectonic Evolution and Palaeoenvironment within Western Gondwana; evidence from the southern Congo craton, Namibia, and the Paraguay Belt, Brazil"*. Ben was awarded an AIG Postgraduate Bursary to help with the costs of presenting a paper at the AGU conference in Brazil this year.
- **Amy Cockerton,** Monash University, who was awarded a SMEDG – AIG Honours Bursary for her project *"The relationship(s) between Au and Bi: an analysis of Stormont, Tasmania"*. Amy will give a presentation on her project at a SMEDG meeting in Sydney later this year or early next year.
- **Katherine Farrow**, Honours student at Macquarie University, who was awarded an AIG Honours Bursary for her project *"The behaviour of isotopes in migmatites and granite production: a case study from Mt Stafford, Central Australia"*.
- **Campbell Harvey**, Adelaide University, who was awarded an AIG Honours Bursary for his project *"Architecture and evolution of the Central Eastern Ghats Province: Araku-Paderu-Visakhapatnam"*.
- **Anne Horvath**, Melbourne University, who was awarded an AIG Honours Bursary for her project *"Arsenic contaminated groundwater at a Victorian gold mine: possible remediation strategies"*.
- **Joanna Kowalczyk**, Monash University, who was awarded an AIG Honours Bursary for her project *"'Stratigraphic architecture of the Bass Basin - a detailed synthesis employing integrated basin architecture and applied palaeontology"*.

*Cont. Overleaf*

## Education Report

Cont. from Page 29

- **Rhys Lennings**, University of Queensland, who was awarded an AIG Honours Bursary for his project *"Geology, alteration and geochemistry of a hydrothermal system at Gossans West, Central Queensland"*.
- **Zoe Martin,** University of Queensland, who was awarded a TERRA SEARCH – AIG Honours Bursary for her project *"The formation of high grade iron ore deposits in the Carajas Mineral Province, Brazil: a study of the geochemistry and timing of enrichment processes"*.
- **Laura Morrissey**, Adelaide University, who was awarded a PIRSA – AIG Honours Bursary for her project *"The metamorphic evolution of the eastern Warumpi Province"*.
- **Michael Steele**, Curtain University, who was awarded a DIGIROCK – AIG Honours Bursary for his project *"Petrophysical modelling using self-organising maps"*.
- **Will Teale**, Curtain University, who was awarded an AIG Honours Bursary for his project *"The structure, geochronology and geochemistry of the Kadauur Dome, South India"*.
- **Sabin Zahirovic**, Sydney University, who was awarded an AIG Honours Bursary for his project *"Geodynamics of the India-Eurasia Collision"*.
- **Michael Archer**, QUT, who was awarded an AIG Third Year Bursary.
- **Sharon English**, Curtin University, who was awarded a Bonwick – AIG Third Year Bursary.
- **Michael Gill**, University of Tasmania, who was awarded a CRYPTODOME – AIG Third Year Bursary.
- **Amberley Murray**, ANU, who was awarded a CRYPTODOME – AIG Third Year Bursary.
- **Natalie Reid**, JCU, who was awarded an AIG Third Year Bursary.

The AIG would like to thank all the students who applied for the AIG geoscience student bursaries. We also thank all our bursary sponsors for their continuing support of geoscience students and the AIG bursary program. As the number of applications has been increasing over the years the ongoing support of our sponsors has ensured we can continue to expand the bursary awards. The 2010 bursary sponsors are listed on page 27 of this issue of AIG News.

Thank you, also, to members of the AIG education committee for the time and effort they have contributed to reviewing the bursary applications:

Marcus Harris (AIG WA); Graham Teale (AIG Councillor, SA); Chris Torrey (AIG NSW); and Doug Young (AIG Councillor, Qld)

While the primary objective of the bursary program is to support geoscience students, the program has also encouraged many students to become aware of, and involved in, their professional organisation. The program has fostered interaction between students and professional geologists, largely due to the bursary presentation functions held by the AIG state branches. AIG state branches will be organising bursary presentation functions for later this year or early next year. Keep in touch with your AIG state branch to hear details of these events, and take the opportunity to come along and meet the students.

If you're interested in sponsoring or donating to our bursary program (it's tax deductible), please contact the AIG secretariat in Perth, or send me an email (contact details on the back page of AIG News).

***Best wishes for the festive season.*** ▲▲

## Membership Update

***New Members and Upgrades at the September Council Meeting 2010***

| | | |
|---|---|---|
| **FELLOWS** | | |
| **GRGURIC** | **Benjamin** | **Alexander** |
| **PHILLIPS** | **Geoffrey** | **Neil** |
| **MEMBERS** | | |
| **ACKERMAN** | **Benjamin** | **Ronald** |
| **BUHOV** | **Valentin** | **Velikov** |
| **COLE** | **Lachlan** | **Forsyth** |
| **CONNELL** | **Christopher** | **Alan** |
| **DETHERIDGE** | **Jason** | **Anthony** |
| **DUGDALE** | **Allison** | **Lorraine** |
| **EADIE** | **Ellen** | **Meredith** |
| **EDWARDS** | **David** | **Cameron** |
| **EVANS** | **Lucas** | **Patrick** |
| **FRASER** | **Donald** | **Graham** |
| **HAFER** | **Mark** | **Raymond** |
| **HILLIER** | **Kimberley** | **Bruce** |
| **NADER** | **Alizeibek** | |
| **OGIERMAN** | **Joseph** | **Anthony** |
| **PETROVA** | **Iskra** | **Georgieva** |
| **SCHIFANO** | **Joseph** | **Anthony Angelo** |
| **SEABROOK** | **Charlotte** | |
| **SHIRTLIFF** | **Greg** | |
| **SLINGER** | **John** | |
| **TURNER** | **Bernard** | **Joseph** |
| **WITTWER** | **Paul** | **David** |
| **WUST** | **Rorie** | **Benjamin Jorg** |
| **GRADUATES** | | |
| **BAILEY** | **Simon** | **Peter** |
| **CAREY** | **Heather** | |
| **CHOPRA** | **Aditya** | |
| **KHATIBZADEH** | **Alireza** | |
| **LUNDQUIST** | **Eva** | |
| **MEXTED-FREEMAN** | **Clinton** | **Troy** |
| **MITCHELL** | **Kristin** | **Renee** |
| **PRICE** | **Matthew** | **Timothy** |

## Registered Professional Geoscientist Approvals & Applications

### CANDIDATES APPROVED BY AIG COUNCIL IN SEPTEMBER 2010

**Mr. Andrew Moser** of QLD in the single field of Hydrogeology

**Mr. Richard Bray** of WA in the single field of Mining

**Mr. Martin Brownlee** of VIC in the single field of Hydrogeology

**Mr. Julius Marinelli** of QLD in the single field of Mineral Exploration

**Mr. Steven Williamson** of VIC in Mineral Exploration and Hydrogeology

### NEW CANDIDATES PUBLISHED FOR PEER REVIEW BY THE MEMBERS OF THE AIG

**Dr. Rodney Boucher** of Bendigo, Victoria, is applying in the fields of Mineral Exploration and Regional Geology

**Mr. Martin Scott** of Orange, New South Wales, is applying in the fields of Mineral Exploration and Regional Geology

*We welcome all new members to the AIG.*

**STUDENTS**

| | | |
|---|---|---|
| ADAMS | Cameron | James |
| ASHLEY | Melanie | Sophia |
| AULD | Jillian | Clare |
| BAKKER | Benjamin | |
| BEECHER | Vicki | Alexandra |
| BENNETT | Jason | Malcolm |
| BERTRAM | Cari | |
| BREE | Veronica | Lisa |
| BROWN | Courteney | Lisa |
| BURRASTON | Lauren | Nicole |
| CAMILLE | Ristch | |
| CHAPMAN | Timothy | |
| DEACON | Melinda | Alice Rita |
| EASTON | Max | Eric |
| EIPPER | Jennie | |
| FARINA | Andrew | |
| FARROW | Katherine | Louise |
| FISHWICK | Sean | |
| FLITCROFT | Paul | Andrew |
| FORD | Jaclyn | Louise |
| GAIN | Sarah | Eleanore |
| Margaret | | |
| GILL | Michael | George |
| GODBER | Neil | James |
| GOLDMAN | Matthew | Kenneth |
| GOLDSMITH | Andrew | John |
| HAILEMARIAM | Dawit | |
| HARVEY | Campbell | Leonard |
| HORVATH | Anne | Susan Jean |
| HUNTER | Nicholas | James Richard |
| JONES | Toby | Dylan |
| KING | Nicole | Patricia |
| KLEIN | Thomas | |
| KOBLER | Madeline | Elso |
| KOWALCZYK | Joanna | |
| LAWRENCE | Roderick | James Andrew |
| LEE | Jen | Deng |
| LENNINGS | Rhys | Douglas |
| MACKAY | Ceinwen | Jane |
| MAY | Lachlan | |
| McGLOIN | Matthew | |
| MILAN | Luke | Albert |
| MORRISSEY | Laura | Jane |
| MURRAY | Amberley | Louise |
| PEARSE | Amanda | |
| PETERSON | Eleanor | Claire |
| REDDING | Caitlin | Jay |
| REID | Billy | |
| REID | Natalie | Joan |
| RUBBI | David | Joseph |
| SCHWARTZ | Susan | Jasmine |
| TANNER | Allyson | Louise |
| TAYLOR | Mathew | James |
| THOMAS | Michael | |
| SMITH | James | |
| WALKER | Brent | |

***New Members and Upgrades at the November Council Meeting 2010***

**ASSOCIATE**

| | | |
|---|---|---|
| TATTERSON | Tim | |

**FELLOWS**

| | | |
|---|---|---|
| MACNAB | Robert | Peter |

**MEMBERS**

| | | |
|---|---|---|
| ADAMS | Brett | Colin |
| BACHMANN | Damien | Richard |
| BECKETT | Thomas | Samuel |
| Chan | Sik Lap | |
| CHHUN | Eath | |
| COSTA | Lucas | Fidelis |
| EVANS | Darin | John |
| GAUNT | Barry | |
| HALL | Mark | |
| HOLCOMBE | Rodney | John |
| KOLFF VAN OOSTERWIJK | | Lennard |
| Alexander | | |
| KREMER | Kimble | Jan |
| LEU | Michael | Roby |
| LEW | Jonathon | Howard |
| LYNN | Stephen | Francis |
| LYONS | Patrick | Cornelius |
| MAJOR | Josef | |
| MARINOV | Daniel | |
| MOREAU | Xavier | Francois |
| PEEBLES | Peter | Alexander |
| RASHIDI | Bahman | |
| RIDGWAY | Matthew | |
| SEARLE | Shaun | |
| SULLIVAN | James | Joseph |
| TILLICK | David | Alan |
| TULLBERG | David | Giles |

**GRADUATES**

| | | |
|---|---|---|
| BIDDLECOMBE | Jennifer | Clare |
| FINN | Matthew | |
| HOLM | Robert | John |
| SHAH | Azhar | |
| SPILSBURY | Richard | |
| STEVEN | Daniel | Iain |
| STRYK | Antionette | |

**STUDENTS**

| | | |
|---|---|---|
| ALDRIDGE | Peter | John |
| BARIFCANI | Omar | |
| FOSTER | Jessica | Marie |
| HAHN | James | |
| KANER | Paul | Edward |
| KOUHSEN | Aspasia | |
| OSTROWSKI | Michael | Francis |
| STANDING | Callum | Steven |
| WOOLLEY | Madelaine | |
| YORK | Alicia | Rebecca |
| FREDERICKS | Scott | |

# AIG FEDERAL COUNCIL FOR 2010-11



# AIG NEWS

## CONTRIBUTION DEADLINES

AIG News is published quarterly as per the following table. Avoid disappointment by contacting the Editor at least several days beforehand to advise submission of items for the newsletter.

| ISSUE DATE | CONTRIBUTION DEADLINE |
|---|---|
| February | January 31st |
| May | April 30th |
| August | July 31st |
| November | October 31st |

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*Please use these contacts for all matters relating to advertising accounts, changes of address, AIG News distribution, or membership.*

## The EDITORIAL ADDRESS is:


**Editor: Louis Hissink**
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*Please submit all articles, letters and advertisements to the above email address.*

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**Text:** Word Files (Please DO NOT EMBED pictures in Word, supply as separate files.)

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The **AIG Website** in currently undergoing a major update. Comments on content suggestions or new features should be directed to Andrew Waltho: aawaltho@tpg.com.au

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Supporting Geoscientists