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The Australian Earthquake Engineering Society is a Technical Society of IEAust and is affiliated with IAEE

1/2007

AEES Newsletter

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President's Column

Welcome and greetings to all our members to the first edition of the newsletter for 2007.

The annual conference in Canberra was a great success with around 70 participants and a host of very good oral and poster presentations. Prof Gail Atkinson from Carleton University in Canada was one of the keynote speakers together with Tony Pearce, the Director General, Emergency Management Australia. Gail shared with us a USGS developed web based tool called 'Shake Map' and 'Did you feel it', where citizens can provide on-line the equivalent of modified Mercalli response data following an earthquake. Tony noted the greatest danger to effective planning for natural disasters was complacency and despite media distortion, natural hazards pose a much greater risk to people than terrorism. Overall 44 papers were presented, with around 26 papers on seismology, 11 papers on soil effects and earthquake engineering, 5 papers on blast and tsunamis and 2 papers on disaster management. Many thanks to Kevin McCue, Sonja, Mark Leonard and the team from Geoscience Australia for the superb conference organization, conference proceedings (Sonja in particular) and for developing the technical program. The conference for 2007 is in the early stages of planning and will be held in Wollongong, 23-25 November, a date for the diary. Geoff Pryke, a consulting engineer with good association with the Illawarra Structural Branch of Engineers Australia is heavily involved with the organizing in Wollongong with assistance from the Melbourne Executive for the technical program development. The annual conference is our flagship event and provides a great opportunity for sharing and discussing the latest developments in seismology, earthquake engineering and related fields such as blast engineering, USAR, insurance and emergency response management. We are exploring the option of a joint conference with ANCOLD in 2008 and in 2009 the AEES conference will be in Newcastle for the twentieth anniversary of the 1989 earthquake.

Following on from the AGM in Canberra the executive are progressing with 3 special initiatives involving; a) development of a concept proposal for a strong motion seismograph network, b) post earthquake reconnaissance study team and c) raising earthquake awareness in Australia.

In the last newsletter, I reported that the updated Earthquake Loading Standard AS1170.4 and AS3700 Appendix AA (earthquake clauses for masonry structures) have been approved by the various Standards Australia committees but was not approved by the ABCB technical committee for listing in the 2007 Building Code of Australia. The ABCB have since instigated a further study around the likely cost impact on the building industry from the adoption of the revised Earthquake Loading Standard, which is interesting given that the Standard is a loading standard with return periods set by the ABCB. We are hopeful that this edition will be published shortly by Standards Australia and 'called up' in the BCA as part of the Building Regulations for 2008.

Finally, the Melbourne Executive Committee on behalf of the member wish to thank Kevin McCue for

his tremendous efforts in being the secretariat during 2006 and newsletter editor for the past fifteen years, along with many other roles for AEES. We welcome Sharon Anderson as the new secretariat, continuing the great work of past secretariats Kevin (1990-1992 & 2006) and Barb Butler (1993-2005).

John Wilson
AEES President

President's Report 24 November 2006

Welcome to the 2006 AGM and Conference in Canberra. The AEES objectives as stated in the constitution are repeated below for consideration, along with a summary of the AEES activities undertaken during 2006. Overall, we undertake the first objective well, but the second and third objectives remain a challenge for improvement over the coming years and will form part of a discussion at the AGM.

AEES Constitution and Objectives:

The objective of the Society is to reduce earthquake risk by:

- advancing the science and practice of earthquake engineering and engineering seismology,
- improving understanding of the impact of earthquakes on the physical, social, economic, political and cultural environment,
- advocating comprehensive and realistic measures for reducing the harmful effects of earthquakes.

Professional Development:

- AS1170.4: AEES members have continued to assist Standards Australia in drafting the revised Australian Earthquake Loading Code, AS 1170, Part 4. The draft Standard has been to public ballot, approved and is ready for publication. All masonry specific clauses have been moved to AS3700 Appendix AA and have similarly been approved via a public ballot. The Building Code of Australia (BCA) technical committee voted in late October 2006 not to 'call up' these revisions in the BCA. Subsequently, an impact assessment was completed on behalf of the ABCB which recommended that the BCA accept the revisions and 'call-up' the revised Standards. We eagerly await the outcome that will be decided at the ABCB Codes Board meeting. Standards Australia will organise seminars to promote and educate the profession as part of the implementation of the new Standard, once published…..
- Research Scholarships: The Society aims to continue to offer funding for research scholarships to support research work in the area of earthquake engineering and/or seismology to honours/post-graduate students enrolled at Australian universities. One scholarship was awarded in early 2006 but no new scholarships were advertised this year. This will be rectified for 2007.
- AEES Conference: The Society's annual Technical Conference in Canberra November 24-26, 2006. An important feature of this conference is to allow more time for poster presentations and consequently the number of oral papers has been reduced and the theme broadened to include tsunamis, USAR and blast to complement the more traditional earthquake engineering fields. The conference attracted about 70 participants and the Society published proceedings containing some 40 technical papers. Many thanks to the Canberra team led by Mark Leonard and with great support from our Secretariat, Kevin McCue.
- USAR Engineer: Implementation of a national Urban Search and Rescue (USAR) training program for Engineers, sponsored and endorsed by our Society and Engineers Australia (EA) and endorsed by Emergency Management Australia who is the national coordinator of USAR services and activities. A Level One USAR Engineer course sponsored by the MFB was delivered on June 5 2006 in Melbourne to around 35 engineers, who all successfully completed the training. A follow up Level Two course with around 10 participants is being organised for the first half of 2007. AEES will maintain the database of registered USAR engineers who have successfully completed the Level 1 and Level 2 training.
- Seismic Monitoring: Kevin McCue co-ordinated a group of AEES members during 2005 to develop a proposal for a strong motion network succeeding JUMP to improve seismic monitoring in the country. The long term objective is to be able to reduce the social and financial costs of earthquakes in Australia. This idea was seeded at the 2004 conference and resulted in a draft proposal which was discussed at the 2005 conference with little resolution. Little further progress has subsequently been made during 2006.

Outreach:

- AEES web site: has undergone significant development by our sponsors ES&S through Adam Pascale. An excellent new feature is the availability of past AEES conference papers in pdf format and improved earthquake engineering web links for members and the general public. Suggestions for improvements always welcome, including copies of photos from members for publication.
- The AEES newsletter: issued three times in 2006 under the editorship of Kevin McCue who took over from Nelson Lam early in 2006. The newsletter provides an important means of disseminating information amongst the membership. A new editor is required for 2007 and AEES is seeking volunteers or sponsors for this activity (Ed – Sharon Anderson has been found!).

- AEES Reconnaissance: AEES are in discussions with RedR Australia (Michael Dureau) to collaborate in post disaster reconnaissance missions with particular reference to neighbouring NZ, PNG and Indonesia. AEES has discussed this role for many years, and needs to collaborate to progress.
- Earthquake Mitigation: AEES currently has a low profile in the area of promoting earthquake mitigation and risk reduction. Earthquake engineering is currently not an issue for government nor for EMA. Insurance industries have significant interest. All parties will have an interest following the next damaging earthquake in an urban area. AEES needs to improve public profile in this area. The MOU with EERI may assist our society with this important external promotional activity.

Membership and Administration:

- Membership: is in the order of 200 members with the database and renewal notices now managed by Engineers Australia.
- Secretariat: Kevin McCue has done a great job as the stand in secretariat during 2006 following Barb Butler's retirement in 2005. AEES Executive currently in process of finding a replacement secretariat for 2007.
- Finally, a large thank you to our AEES executive of Amy Heath, Nelson Lam, Dee Ninis and Gary Gibson and our State representatives for their ongoing support of AEES.

John Wilson
AEES President

Australian Earthquake Engineering Society (AEES) Executive

President	John Wilson
Secretary	Amy Heath
Treasurer	Dee Ninis
Secretariat	Sharon Anderson

State Representatives:

Qld	Russell Cuthbertson
NSW	Michael Neville
ACT	Mark Edwards
Vic	Gary Gibson
Tas	Angus Swindon
SA	David Love
WA	Hong Hao

Web Master	Adam Pascale
Newsletter Editor	Kevin McCue/Sharon Anderson (from this issue)

Both the membership database and subscriptions are managed by Engineers Australia and ALL members, whether they be members of Engineers Australia or not, will be issued with subscription notices by that organisation. Please direct any enquiries regarding subscriptions to Lois Wurzer at EA lwurzer@engineersaustralia.org.au

The mailing address for other matters has changed! To contact Sharon Anderson at the Secretariat see the address top left front page.

Earthquakes in Australia 2006

Below is a list and plot of Australian earthquakes of magnitude 3 or more in 2006, only 52 tabulated by Geoscience Australia. Added to the list is one determined by the USGS, off the south coast of WA. The background of the plot is the hazard map in AS1170.4 – 1993 showing a good correlation.

No damage was reported and, though many earthquakes were felt, not a single isoseismal map seems to have been compiled during the year.

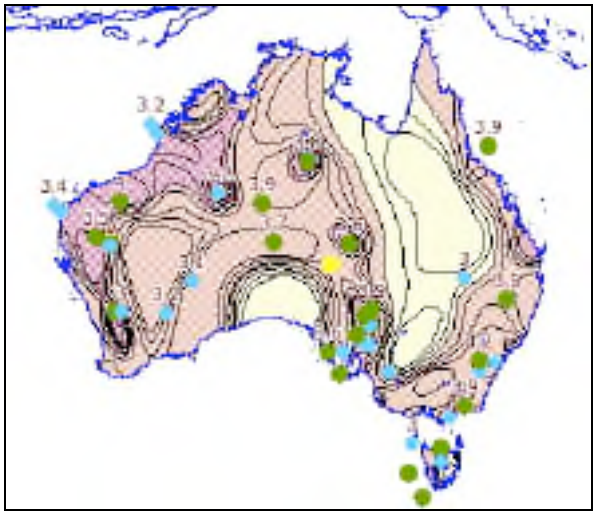
Focal depth is listed too, though this is the most unreliable of the focal parameters computed, rarely better defined than ±5 km. Default depths are set at 0 or 10 km, depending on the analyst. All earthquakes were in the Earth's thin outer crust.

The largest onshore earthquake ML5.1 was in South Australia in May. The USGS reported another M5 event south of WA in December which I have included in this listing as it is an Australian intraplate event. Only six earthquakes were in the magnitude range 4 to 5 which is fewer than two thirds the number expected from long term averages. No damage was reported in any of the events.

Magnitude is still a problem, the event off the west coast of Tasmania in December is listed as ML 5 by ES&S but ML 4.4 by GA so I have assigned it ML ML4.7.

Day	Time UTC	Lat S	Lon E	Z km	ML	COMMENTS
Jan						
08	220241.2	31.54	139.22	0	3.0	W Curnamona SA
19	161500.0	40.75	146.39	10	3.6	Devonport Tas
25	115332.4	34.13	135.63	6	3.0	Yeelanna SA
25	115414.2	34.17	135.62	1	3.1	Yeelanna SA
25	115820.4	34.16	135.56	4	3.6	Yeelanna SA
29	094016.5	21.68	113.45	22	3.4	W Exmouth WA
Feb						
04	163157.6	37.56	148.18	2	3.9	NW Orbost Vic Felt
09	41625.13	32.87	138.13	10	3.5	N Port Pirie SA Felt
Mar						
02	061747.4	34.80	149.18	3	3.4	S Oolong NSW
07	010608.2	30.15	117.14	2	3.6	N Kalannie WA
11	103549.5	35.80	136.70	15	3.5	W Kingscote SA
27	215732.2	29.32	150.76	10	3.5	NW Inverell NSW
29	125739.8	30.28	117.68	0	3.0	NW Beacon WA
Apr						
01	010918.4	25.99	130.98	10	3.7	S Yulara SA
02	083944.6	22.13	118.66	14	4.0	NE Tom Price

						WA
04	100642.8	33.43	138.75	10	3.3	Hallett SA Felt
21	081150.3	34.81	149.14	5	3.1	S Dalton NSW
26	142405.6	17.43	122.16	6	3.3	N Broome WA
May						
02	024716.0	26.04	137.22	0	3.6	W Poeppel Corner SA
13	010446.7	27.66	135.72	7	**5.1**	E Oodnadatta SA
14	043459.3	33.56	139.24	10	3.0	SE Hallett SA
24	213430.5	23.01	130.03	0	3.9	SE L Mackay NT
Jun						
03	162701.9	16.59	121.71	24	3.2	N Broome WA
06	153409.9	25.03	117.44	5	4.5	Mt Clere WA
12	224340.0	25.06	117.56	1	3.9	Mt Clere WA
15	080159.2	32.09	139.18	3	3.8	E Hawker SA
15	092425.7	32.10	139.18	10	3.2	E Hawker SA
15	180130.4	27.98	146.99	0	3.0	E Cunnamulla Qld
17	083625.0	32.07	139.18	10	3.2	E Hawker SA
18	131751.3	38.48	146.86	13	3.2	W Darriman Vic
18	154934.6	34.07	150.42	12	3.0	W Camden NSW
Jul						
04	160824.3	30.78	121.53	6	3.2	SE Kalgoorlie WA
07	234813.6	31.38	138.68	19	4.0	Willow Springs SA
17	064507.8	34.18	136.93	10	3.4	NE Port Lincoln SA
27	103850.9	30.93	139.27	10	3.9	SE Leigh Ck SA
28	054923.0	18.10	147.72	10	3.9	Offshore Ingham Qld
Aug						
12	022003.3	32.82	138.07	9	3.5	W Melrose SA
13	133004.3	34.81	149.14	3	3.3	Oolong NSW
29	003734.6	19.71	133.96	16	3.0	W Tennant Ck NT
Sep						
02	154739.2	24.43	116.41	5	3.5	NW Landor WA
13	054742.1	22.06	126.55	1	3.2	Gt Sandy Desert WA
13	143959.8	41.66	146.56	4	3.0	SW Deloraine Tas
29	124947.1	44.36	145.01	8	4.4	SW Hobart Tas
Oct						
01	072412.3	35.55	140.99	20	3.4	N Bordertown Vic/SA border
05	212454.8	40.57	143.70	3	3.0	S King Island Tas
06	120604.9	22.27	113.90	26	3.0	W Learmonth WA
11	014552.1	19.78	134.02	15	3.2	SW Tennant Ck NT
21	095149.6	34.04	149.16	15	4.2	SE Cowra NSW
Nov						
28	215147.5	28.56	123.95	9	3.1	Gt Victoria Desert WA
Dec						
07	105818.1	25.19	117.41	14	3.3	SW Mt Clere WA
14	172305.7	42.79	143.56	27	4.7	W Tasmania.
24	232257.2	19.88	133.72	10	3.8	SW Tennant Ck NT
26	072901	38.36	111.87	10	**5.0**	Southern Ocean



Epicentres of Australian earthquakes in 2006, ML ≥ 3.0

Other News

(mostly from Col Lynam)

Recent World earthquakes

Yet again, people have died or been severely injured following two large earthquakes in Indonesia. At least 70 people were killed, hundreds injured and there were severe damage and landslides in the Bukittinggi-Solok-Payakumbuh area. The shaking was felt along the west coast of Peninsular Malaysia and some buildings were reportedly evacuated in Singapore.
Region SOUTHERN SUMATRA, INDONESIA (USGS location)
Date-Time: March 6, 2007 at 03:49:39 and again at 05:49:28 (UTC)
Location: 0.512°S, 100.524°E, 50 km NNE of Padang, Sumatra
Magnitude 6.4 and 6.1, Depth 20 km.

Man-induced earthquakes

The Australian, January 03, 2007
QUEENSLAND-based hot dry rock company *Geodynamics* says it has looked into the risk of causing earthquakes, after a Swiss company was recently forced to halt a test that triggered an earth tremor.

Geodynamics currently experiments with geothermal energy production by circulating water through an engineered, artificial reservoir and extracting heat from hot buried granite rocks.

Similar projects are currently under way in France, Switzerland, Germany, California and Japan. Australia has a recognised potential in production of the energy as it has access to one of the world's hottest known granite corridors.

In Australia, temperatures reach around 235°C at a depth of 3.5km.

Early last month, Swiss engineers halted a geothermal

heat experiment after it set off a small earthquake in the nearby city of Basel (site of Germany's largest known earthquake magnitude 6.5 in 1356 – Ed.). The tremor on December 9 measured 3.4 on the Richter scale and caused widespread fear, prompting about 1000 calls to emergency services.

The mishap occurred after water was injected at high pressure into a 5km-deep borehole, but reportedly posed no danger.

Geodynamic chief executive Adrian Williams said the renewable energy company had looked into the risks of similar tremors taking place at its major project at South Australia's Cooper Basin.

"Geodynamics has previously considered such processes and analysis indicates that such events in the Cooper Basin are of small and of negligible consequence," Mr Williams said.

The company's shares have almost halved to around 90c in the past 12 months, as work at one of its major wells, Habanero 2, was suspended due to a blockage. The shares slipped a further 40c in October when Geodynamics was unsuccessful in applying for a cut of the federal Government's $500 million Low Emission Technology Demonstration Fund.

The mining group debuted on the Australian Securities Exchange at 50c in 2002, after raising $11.5 million and winning a $5 million federal Government research and development grant. The company - which is 24.7 per cent owned by Origin Energy and Woodside Petroleum - recently announced that it would drill a new well to replace Habanero 2.

Ed: Thousands of small earthquakes to magnitude 3.5 did occur in the Cooper Basin during pumping. AEES Newsletter 2/2006 reported on another man-induced earthquake at Beaconsfield, Tasmania. Mining and fluid injection are two processes that can cause earthquakes. Readers of Engineers Australia may have seen the article about CO2 sequestration on page 26 of the March 2007 Bulletin. Plans are for up to 100,000 tonnes of CO2 to be pumped to a depth of approximately 2.3 km near Warrnambool Victoria. "One of the most important elements of the project is to demonstrate to the community, government regulators and industry that geosequestration works and that carbon dioxide can be stored safely and monitored in rocks deep in the subsurface," Dr Cook said (http://www.co2crc.com.au/).

Many readers of this Newsletter may remember that in 2003 two earthquakes near Warrnambool caused significant damage to the town, earthquakes with magnitude up to ML 5.3. Since then the area has been seismically quiet. ……Watch this space!

Claim coalmining set off Newcastle earthquake: researchers

Wendy Frew Environment Reporter SMH January 9, 2007.

Two hundred years of underground coalmining triggered the Newcastle earthquake that killed 13 people in 1989 and caused damage that ran to billions of dollars, researchers in the US have found (Ed - claimed would have been better).

Christian Klose, from Columbia's Lamont-Doherty Earth Observatory, said a major fault beneath Newcastle's coalfields was reactivated after coal was extracted and water was pumped out to keep the longwall mines dry.

In his paper, presented to the American Geophysical Union in San Francisco last month, Dr Klose said geomechanical pollution - the removal of millions of tonnes of coal and four times as much water - had significantly changed the stress field in the earth's upper crust below the Newcastle coalfield since 1801.

He estimated the $US3.5 billion damage done by the earthquake exceeded the total value of the coal extracted in the area.

He said his research also had implications for geosequestration (burying carbon dioxide underground) because earthquakes could release the gas (see Editors comment, previous column).

"That injection of carbon dioxide underground alters stress in the crust," Dr Klose told the American Geophysical Union, National Geographic reported. He told the audience the risk of earthquakes should be taken into account in planning where such facilities were located. "Don't put the injection fields close to large cities," he said.

A number of countries are researching geosequestration as a way of coping with the huge amounts of greenhouse gases released into the atmosphere when fossil fuels are burned to produce energy. The hope is to develop technology that will capture the greenhouse pollution and inject it underground.

A senior seismologist at the Federal Government's research unit, Geoscience Australia, Dr Phil Cummins, said Dr Klose's research was interesting but there was still a lot of uncertainty about the exact cause of the Newcastle earthquake. "The work seems credible but I think the conclusions are somewhat overstated," he said.

There are nine large full-cycle carbon capture and storage experiments under way around the world, according to an international coal lobby group, the World Coal Institute.

There are still questions about the viability of the technology.

Dr Klose said a change to mining practices could reduce the risk of earthquakes, but he did not know of any mining engineers researching the topic because they were not aware of the risk.

(Distributed via the AEES-list by Col Lynam)

Professor Ian Plimer and Hon Editor Kevin McCue were interviewed on the ABC 7:30 Report on Tuesday

9th January casting doubt on mining as the triggering mechanism on the basis of the 11.5 ± 0.5 km depth of the mainshock (ie under Sydney Basin sediments) and known M~5 earthquakes that occurred there back to 1837, prior to extensive underground mining (see GA Isoseismal Atlas Part 3, 1996).

PNG Seismologists in Australia

Lawrence Ambon from the Port Moresby Geophysical Observatory has arrived at Monash University to start a post-graduate degree under the supervision of Prof Jim Cull and SRC's Gary Gibson.

Lawrence will be working on earthquake hazard assessment in PNG that will include analysis of existing strong motion data. One outcome of this research should be a better basis for making earthquake risk estimates in PNG.

Ima Itikarai from Rabaul Volcano Observatory is well into his MSc at the ANU using tomography to elucidate the plumbing under the Rabaul caldera complex. He gave a paper at the AEES2006 Conference, at GA, Canberra.

Automatic Data Request Manager - AutoDRM

To access the USNSN AutoDRM, send mail to autodrm@usgs.gov with the message: PLEASE HELP.

Information about how to obtain a user's guide through the AutoDRM will be returned. The user's guide describes the commands available and how to use them. It also describes several software packages available through the AutoDRM for interpreting the GSE format and converting it to other popular formats.

Int Assoc for Earthquake Engineering

The Executive Committee of IAEE is:

President	T Katayama (Japan)
Past President	L Esteve (Mexico)
Executive vice-President	P Gulcan (Turkey)

Directors M Belazought (Algeria), D Hopkins (NZ), E Faccioli (Italy), SK Jain (India), P Fajfar (Slovenia), TC Pain (Singapore), LE Garcia (Colombia), L Wylie (USA).

The 14th WCEE will be held in China in August 2008 following the Olympic Games. www.IAEE.or.jp

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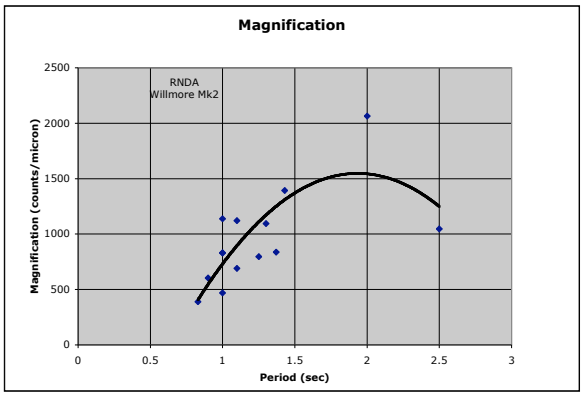
From the States

ACT:

Amateur seismologists Ever wondered what the response of your seismometer is? Wanted to measure your own magnitude? Engineers are used to reverse engineering so I had a go at reverse seismologising my Willmore Mk2 seismometer and Echo digital recorder at Aranda, a Canberra suburb.

August bodies such as the USGS publish a list of earthquake parameters including origin time, magnitude, location and depth. You record the maximum zero to peak amplitude of the P, PP and S waves (Gutenberg, 1945) in counts and the frequency (period of the wave group), and compute the epicentral distance from the travel time or location difference (GA website). Then you just have to compute the expected ground motion from the magnitude/distance/depth and compare it with the number of counts.

Figure Magnification vs period (seconds) – site RNDA



Since the MK2 is a short period seismometer I had to use MB and converted Mw or Ms or mb to MB (not straightforward I agree but see McGregor and Ripper, 1976) and then compute the expected ground motion in microns μ (10^{-6} m) at my recording site. The magnification shown on the ordinate in the figure above, using just 14 earthquakes in the magnitude range 5.4 to 7.2, depth range 10 to 400 km and distance range 20 to 82°, is the ratio of the computed to observed ground motion counts/μ. Yes I need more data but the scatter is about 30% which is less than 0.2 magnitude units. Surprisingly, the natural period of the seismometer is shown to be about 1.8s, not ideal for local earthquakes. I checked the seismometer and found the period adjustment knob was set at 16, equivalent to a natural period of about 1.4 s. I reset the knob to a shorter period and am repeating the calibration.

Reference: McGregor and Ripper BMR Record 1976/56.

Victoria:

The state has been quite active since late 2006 culminating on 8 March 2007 in a magnitude 3.7 earthquake in eastern Victoria near Warburton. The earthquake was widely felt in the region extending to the south-eastern suburbs of Melbourne. If you felt it you can either phone ES&S or fill in a felt report on their web site: www.esands.com.au and follow the links to earthquake news.

Hopefully we will be able to publish an isoseismal map in the next newsletter.

Australian engineers involved overseas:

SMEC engineers have been involved in a design project to build a 9 km long road tunnel under the Himalayan mountains in India. Amongst the challenges facing the project are the lack of detailed geotechnical information, the high stress of both

tectonic and overburden origin, *and the high seismicity*. See Civil Engineers Australia, March 2007, page 38.

The seismic design of what will soon be the World's highest building, in Dubai, is based on a study, including a seismic hazard analysis, by Dr Max Irvine from Sydney firm *Structural Mechanics & Dynamics*. The 1st two modes of lateral sidesway have natural periods of 11.3 and 10.2 seconds, about the period of the dominant surface waves in oceanic crust. The Zone factor in Dubai is 0.15 and soil factor Sc (UBC 97) [see Engineers Australia February 2007 p 40].

Kevin McCue

AEES Annual Conferences

	Year	*Place*	*Theme*
1	1992	Sydney NSW	Earthquake Resistant Design and Insurance in Australia
2	1993	Melbourne Vic	Earthquake Engineering and Disaster Reduction
3	1994	Canberra ACT	Survival of Lifelines in Earthquakes
4*	1995	Melbourne Vic	PCEE'95
5	1996	Adelaide SA	The Australian Earthquake Loading Standard
6	1997	Brisbane Qld	Earthquakes in Australian Cities - can we ignore the risks?
7	1998	Perth WA	Meckering 30 years on – how would we cope today?
8	1999	Sydney NSW	The 10th Anniversary of the Newcastle Earthquake - Lessons learnt
9	2000	Hobart Tas	Dams, Fault Scarps and Earthquakes
10	2001	Canberra ACT	Loading Codes in the Real World
11	2002	Adelaide SA	Total Risk Management in the Privatised Era
12	2003	Melbourne Vic	Earthquake Risk Management
13	2004	Mt Gambier SA	Australian Earthquake Engineering in the new millenium – where to from here?
14	2005	Albury NSW	Earthquake Engineering in Australia
15	2006	Canberra ACT	Earthquake Engineering in Australia

- ***held jointly with NZSEE***

Copies of some of the Proceedings are still available, contact Dr Nelson Lam n.lam@civenv.unimelb.edu.au or Kevin McCue kmccue@grapevine.com.au

Col Lynam's Column *(extracted from the daily blog of a seismetrician)*

Useless Arithmetic: Why Environmental Scientists Can't Predict The Future

by Orrin H. Pilkey and Linda Pilkey-Jarvis
February, 2007, Cloth 248 pages 46 illus.
ISBN: 978-0-231-13212-1
Columbia University Press
$29.50

Useless Arithmetic evaluates the assumptions behind models, the nature of the field data, and the dialogue between modelers and their *customers*.

Coastal geologist Orrin Pilkey and environmental scientist Linda Pilkey-Jarvis show that the quantitative mathematical models policy makers and government administrators use to form environmental policies are seriously flawed. Based on unrealistic and sometimes false assumptions, these models often yield answers that support unwise policies.

Writing for the general, nonmathematician reader and using examples from throughout the environmental sciences, Pilkey and Pilkey-Jarvis show how unquestioned faith in mathematical models can blind us to the hard data and sound judgment of experienced scientific fieldwork.

The book offers fascinating case studies depicting how the seductiveness of quantitative models has led to unmanageable nuclear waste disposal practices, poisoned mining sites, unjustifiable faith in predicted sea level rise rates, bad predictions of future shoreline erosion rates, overoptimistic cost estimates of artificial beaches, and a host of other thorny problems. The authors demonstrate how many modelers have been reckless, employing fudge factors to assure "correct" answers.

PREFACE (extracts)

Before we can develop a new mine now, a vast amount of paperwork is required, including an environmental impact statement. Such statements are predictions of the ways in which the proposed project could affect the quality of air and water in the neighbourhood, and the quality of life for plants and animals and humans alike.

The widespread availability of computers, the requirement for environmental impact statements and cost-benefit ratios, and the dawn of mathematical models all arrived on the scene simultaneously in the final quarter of the twentieth century. Scientists in the 1960s and 1970s assured bureaucrats that the computer would make it possible to predict the outcomes of natural processes accurately. We don't know how to do it right now, they said, but fund us and we'll figure it out. There are still some scientists who claim successes—undaunted by several decades of the failure of certain mathematical models to provide the accurate answers that society needs.

At the beginning of the twenty-first century, predictive models of processes on the surface of the earth have come into widespread use. The recognition of complexity and chaos seems not to have diminished the still-rising star of modeling. Every year hundreds of cost-benefit ratios roll off the presses for federal engineering projects involving beaches, rivers, lakes, and groundwater flow. Engineers who have found great success in the use of models to predict the behavior of steel and concrete have applied modeling to the natural environment just as if nature were made up of construction materials with well-defined properties.

The environmental impact of various engineering activities 50 years into the future is calculated even more frequently than cost-benefit ratios are. The mother of all environmental impact predictions is the

required assurance of 10,000 years of safety from the Yucca Mountain repository of the nation's radioactive waste. Billions of dollars have been spent at Yucca Mountain on the unrealistic goal of predicting what the climate and groundwater flow will be thousands of years from now. The American judiciary apparently is even more clueless than the scientists of the Department of Energy who are charged with proving the safety of Yucca Mountain—recently a federal court decreed that the prediction must cover 300,000 to 1 million years! The New York Times quotes an incredulous bartender in Las Vegas as saying, "The earth might not even be here a million years from now." The disappearance of the earth is perhaps not likely, but certainly over the next several hundred thousand years there will be two or three ice ages, the sea level will fall and rise by hundreds of feet, and Yucca Mountain will experience major changes in climate, perhaps an earthquake or two, maybe even a volcanic eruption. Undying faith in mathematics stilled the voice of scientific caution and skepticism that should have warned Congress and the judiciary that the predictive requirements they established for a repository at Yucca Mountain were impossible to achieve.

The reliance on mathematical models has done tangible damage to our society in many ways.

Clearly, the mathematical modeling community believed so strongly in models that it insisted on using them even when there was no scientific basis for their application.

Linda has worked for both federal and state governments. Quantitative modelers, she independently observed, have an almost religiously fanatic outlook on the veracity of their models and brook little criticism. It is a characteristic we believe can be applied broadly to many natural-process modelers. The modeling modus operandi is shrouded in mystery, with necessary though poorly communicated assumptions made at each step along the way. In Linda's view, those who rely on the models for making policy decisions rarely understand the limitations of the models, much less are prepared to communicate such information to the public.

The book is intended to be read by non-specialists who are interested in nature and in the politics of working with the earth. We have not included equations. *We are speaking to non-mathematicians like ourselves (Ed – my italics).*

http://www.columbia.edu/cu/cup/catalog/data/978023113/9780231132121.HTM

Another from Col:

Geotechnical Strong Motion Array Monitoring in the United States

Steidl, J H steidl@crustal.ucsb.edu
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A goal of earthquake engineering research is to generate analytical and empirical models for accurate prediction of ground shaking, pore water pressure generation, ground deformation and soil-foundation-structure interaction (SFSI) and to understand how these predictions will affect the built environment. A required element for the development of these models is well-instrumented test sites where actual ground response and deformation can be monitored during earthquake shaking to provide benchmark case histories for verification of the models. In the United States, there exist 15 "extensive" geotechnical strong motion arrays (GSMA) for monitoring the effects of surface geology on strong ground motion. Here we define extensive as sites with surface and 4 or more downhole accelerometers in a vertical array. In addition, there also exist another 15 "moderate" arrays, with surface and 2 or 3 downhole accelerometers in a vertical array, and another 17 sites with a single borehole and surface accelerometer. Research using these GSMA sites consists of analysis of earthquake recordings, ambient noise analysis, and active source testing. This paper is a review of the current research activities in the United States using the GSMA sites and a look at future planned activities under the NSF George E. Brown Jr., Network for Earthquake Engineering Simulation program.
http://www.agu.org/cgi-bin/sessions5?meeting=fm06&part=S14B&maxhits=400

Conferences and Seminars

Readers are encouraged to provide information to the editor on upcoming conferences and seminars.

• **2007 28 July - 3 August** XVII INQUA Congress 2007, Cairns Convention Centre, Cairns, Australia.

Rising greenhouse gases are driving climatic boundaries beyond the Quaternary envelope; rising tides of humanity are pushing the ecosphere towards an impoverished and uncharted state. The world approaches a crossroad.

In uncharted seas, sailing directions are taken from historical knowledge. Never has the need to understand Quaternary history been greater: history of climate, the biosphere and humankind. Quaternarists are skilled in integrating with other disciplines. The challenges are clear; our goal is that INQUA 2007 enhances our global ability to meet them.

INQUA is the International Union for Quaternary Research. The Quaternary Period spans the last 2.6 million years of Earth history. The Quaternary is an interval with dramatic and frequent changes in global climate; warm interglacials alternated with cold ice ages.

Every four years the international Quaternary community gathers together for the INQUA Congress. This is the largest gathering of its kind of Quaternary researchers. Session themes are broad, and diverse topics are covered such as palaeoclimate, archaeology, glaciology, the carbon cycle and environmental reconstruction.

• **2007 12 - 14 September International Symposium on Rock Slope Stability in Open Pit Mining and**

Civil Engineering Perth, WA. Submit your abstract to the ACG before 26 February 2007. First Announcement and Call for Papers: http://www.acg.uwa.edu.au/__data/page/2168/Flyer.pdf

• **2007 7 - 9 November 4th International Seminar on Deep and High Stress Mining Perth, WA,** Submit your abstract to the ACG before 18 May 2007. First Announcement: http://www.acg.uwa.edu.au/__data/page/2168/DeepHighFlyer2.pdf

2008 20-25 July Australian Earth Sciences Convention 2008 The Geological Society has announced that Australian Earth Sciences Convention 2008 will be held in Perth, Western Australia – during International Year of Planet Earth – to highlight Australian geosciences in a global context. Held in conjunction with the Australian Institute of Geoscientists, expert international speakers at the 2008 convention will feature in a program created to address contemporary world Earth science issues. Australian Earth Science Convention 2008 Sunday 20 July - Friday 25 July 2008.

New Books and Journal Publications

Newsletter articles (could authors please send the references to any of their relevant research publications – you are usually the first to know).

Short course

Managing Seismic Risk in Mines
6 November 2007, Novotel Perth, Langley, WA

The ACG will present a one-day pre-seminar (4th International Seminar on Deep and High Stress Mining) Mine Seismicity short course that will provide attendees who currently have limited knowledge of seismic monitoring with the essential information to understand the capabilities and limitations of this rapidly evolving technology.

Australian case histories will be used extensively as examples. A full demonstration of the Mine Seismicity Risk Assessment Program – MS-RAP and trial copies of the software will be made available to attendees. For more information about MS-RAP visit www.ms-rap.com.

The Society website/email list

Dear AEES Members,

The AEES website (www.aees.org.au) has been overhauled and new content added. Any contribution from you on the following topics is most welcome:

- details of interesting recent publications
- significant research projects in earthquake engineering (in Australia?)
- links to other relevant websites.

Please email me your contributions/suggestions.

The AEES email list is operated by the ES&S Seismology Research Centre, Melbourne. If you would like to register please notify me at adam.pascale@esands.com

Regards
Adam Pascale

Obituary

Jakim T. Petrovski (1934 – 2006)

Jakim T. Petrovski, civil engineer and fulltime professor, was born in Kriva Palanka, Macedonia. He graduated from the Civil Engineering Faculty, University of Zagreb, took his master degree in earthquake engineering from the *Ss Cyril and Methodius University* in Skopje and his doctoral degree from the Civil Engineering Faculty, University of Belgrade. He specialized in earthquake engineering in the UK, USA and USSR. His first employment in 1957 was in the position of design-structural engineer and head of a construction site in *Zelezarnica* (Ironmill) Skopje.

After the 1963 earthquake, he was advisor at the Main Office for Reconstruction of Skopje. In 1965, he was one of the founders of the Institute of Earthquake Engineering and Engineering Seismology (IZIIS) where he worked as a head of section, associate and fulltime professor of post-graduate studies. He was director of this institute in the period 1973 – 1985 when, with the assistance of the UN and UNESCO, the Institute grew into one of the leading scientific institutions in the field of earthquake protection in the world.

Prof. Jakim Petrovky published over 270 scientific papers in the country and abroad and about 80 reports for the UN agencies and governments of a number of countries. He prepared 8 volumes on Earthquake Catastrophe Management for the UN as well as four books issued by IZIIS. From 1976 to 1988, he was a member of the UNESCO Council on Seismic Risk Mitigation and UNDRO. He participated in 23 missions as a high ranked expert and principal technical advisor on 16 projects on seismic risk mitigation for UNESCO and UN-Habitat. From 1988 – 1990 he was Counsellor of the UN Secretary General for planning and organization of the International Decade for Natural Disaster Reduction and rector of the University *Ss. Cyril and Methodius*, Skopje. In 1990, he was elected member of the European Academy of Sciences (Academia Europaea). For his achievements, he received a number of the nation's highest honours and

international recognition. He was an honorary member of the International Association for Earthquake Engineering.

(Article provided by Dr Cvetan Sinadinovski, RSES, ANU).

We still need email addresses for the following AEES – surely someone knows of them. Please send to the secretariat:

Mr B H Aldcroft MIEAust CPEng
Mr J L Ballantyne FIEAust CPEng
Mr J Bay Hoon Sang MIEAust CPEng
Mr M J Brock MIEAust CPEng
Mr W M Buckland MIEAust CPEng
Mr C W Chang
Mr K E Christesen MIEAust CPEng
Mr W J Clarke MIEAust CPEng
Mr Daniel Po Kei Tam MIEAust
Mr P J Dimauro MIEAust CPEng
Mr D J Dineen MIEAust CPEng
Mr B Dorien-Brown GradIEAust
Mr R J Drew MIEAust CPEng

Mr J Giedl
Mr M Gregory
Mr S L Harriott MIEAust CPEng
Mr R S Heggie FIEAust CPEng
Mr B R Jones GradIEAust
Mr D Kew GradIEAust
Mr N Lal MIEAust CPEng
Mr R G Lewis MIEAust CPEng
Dr S Loganathan MIEAust CPEng
Mr J D Millar MIEAust CPEng
Mr P Parmanand GradOIEAust
Mr R J Potter MIEAust CPEng
Mr J J Quinn MIEAust CPEng
Mr R G Rollo MIEAust CPEng
Ms J Ruddle
Mr H Schultz MIEAust CPEng
Mr C Shakeri MIEAust CPEng
Mr G N Tankov MIEAust CPEng
Mr J P Thompson MIEAust CPEng
Mr G H Vasilareas MIEAust CPEng
Mr R Vegners MIEAust CPEng
Mr D G Whiting MIEAust CPEng
Mr D J Wilson MIEAust CPEng

Photos from the AEES2006 Dinner at Café D'Lish on Mt Stromlo near the ANU's Astronomical Observatory, Canberra. Clockwise from top right previous page: President John Wilson, AEES bard Mike 'Lawson' Turnbull, dinner guests from Canberra, Sydney, Adelaide (including former President Mike Griffith), Melbourne and Perth, and international delegates Gail Atkinson USA, Graeme McVerry NZ and Paul Somerville Aus/US.

Life Member of AEES

At the AEES conference in Perth WA in 1998, the founding President of AEES, Charles Bubb, was made a life member of the organisation. The certificate (copy below) signed by then President Graham Hutchinson and current President John Wilson applauds his dedication and significant contribution to earthquake engineering. Though not itemized in his nomination, Charles:

- wrote an earthquake code for PNG and most of AS2121-1979 (and chaired the Standards committee). He made a similar contribution to the wind code.
- was the 2nd Australian representative to IAEE (after Prof Shaw) and served for about 12 years, attending most of the exciting early World Conferences, in Chile, Rome, San Francisco, Madrid and Turkey.
- convinced the then Commonwealth Department of Works to adopt AS2121 for all its buildings and structures throughout Australia.
- seized the moment to establish AEES immediately after the 1989 Newcastle earthquake, writing the constitution and having AEES established as a professional society of IEAust.
- chaired the inaugural executive committee that organised the first national conference of AEES (in Sydney) and the second one in Canberra the following year.
- Charles contributed a column and much content to every edition of the AEES Newsletter for the first 10 years.

Perth was an apt choice for the presentation as Charles grew up there and studied Civil Engineering at UWA before heading east to build a remarkable career.