AEES NEWSLETTER

August 2010

Contents

President's Report

Our AEES representative on the joint NZSEE-AEES post-earthquake reconnaissance mission to Chile, Gary Gibson, returned safely and his reports are on the AEES website. Gary, who is our current delegate to IAEE, also attended a follow-up meeting in New Zealand a month later and will be giving a paper about his experiences at AEES2010 in Perth, another good reason why you should attend.

Such post-earthquake reconnaissance missions are a goodwill gesture with a strong dose of learning about earthquakes and their effects, analysing the earthquake, and inspecting damaged buildings to improve future building codes and to contribute to life safety all over the world, not just in NZ and Australia. They are invaluable training for the next damaging earthquake in the southwest Pacific.

It came as a shock to the world seismological community that six Italian seismologists are being prosecuted for not providing an adequate warning of the L'Aquila earthquake that struck central Italy last year. They had visited the region following a number of small earthquakes and failed to recognise and provide advice that these were foreshocks, proffering the advice on 31 March at a meeting that 'there is no reason to suggest that the sequence of low-magnitude tremors are a precursor to a main event'.

The mainshock, magnitude Mw6.3, occurred the following week on 6th April 2009. More than 300 people were killed in buildings that collapsed, modern buildings that should have been designed and built to the Italian Loading Code Eurocode8.

Since the building collapses and damage would have occurred regardless of a warning, one might consider that the developers, engineers and architects are lucky that they haven't been called to sit in judgment beside the seismologists.

An engineer in charge of construction of the Newcastle Workers Club was served with an injunction following the partial collapse of the club following the Newcastle earthquake in 1989 (this case was never prosecuted as the complainants settled out of court).

There is no way to distinguish a foreshock from any other similar sized earthquake or aftershock, at least not until the mainshock has happened.

Could such litigation happen here? I myself felt one of the foreshocks in the ten days prior to the 1968 Meckering WA earthquake of magnitude 6.8 though I had returned to Canberra in the week before the mainshock struck, not recognising that it was a foreshock.

Many AEES members contributed to the loading code AS1170.4-2007 which includes an earthquake hazard map and is called up in the current Australian Building Code. What if a large earthquake happens in an area designated low hazard? say Brisbane or Hobart. Can members expect to be summoned to appear in court?

At a recent Engineers Australia meeting on professional indemnity in Canberra I put this question to one of the presenting lawyers. His opinion was that provided we had explained that earthquakes could occur anywhere in Australia then we were probably safe. How many engineers and architects who use the building code bother to read the commentary? Standards Australia didn't bother to publish a commentary on the 2007 Standard and it was left to AEES to do so. That was a strength of the first Australian Earthquake Code AS2121-1979 which included explanatory comments in the Standard.

Seismologists worldwide have made presentations to the Italian Government on behalf of our colleagues and we await a positive outcome.

Kevin McCue
President

Alice Springs Heritage Seismic Vault

Any members travelling through the Centre might like to visit a heritage site of special interest. A secret 4-station seismic array established at Alice Springs by the US Government late in 1954 to monitor nuclear tests was the predecessor of the current borehole array. One of the original vaults has been declared a heritage site and the previously secret site details and function have finally been published (Spencer Hill Seismic Vault and Array, Heritage Assessment Report 2009, NT Government).

The entrance to the vault at the base of Spencer Hill near Alice Springs showing the counterbalanced steel doors atop a steel-lined vertical shaft.

Understanding the innards of the Alpine Fault NZ

(Article provided by seismologist Michael Andre Phillips, Director of EPSO – see later article)

An international team of geoscientists under project co-leader Dr John Townend, of Victoria University will carry out multimillion-dollar research into New Zealand's major visible earthquake source – the Alpine Fault.

They plan to drill through the South Island's Alpine Fault to understand how large faults evolve and generate earthquakes.

The Deep Fault Drilling Project has applied for resources to drill two boreholes about 150 metres deep and 50m apart in Gaunt Creek, near Whataroa, next year. It will involve 100 or more scientists and require funding from New Zealand, Germany, Britain, the United States, Canada and Australia.

GNS spokesman John Callan said "The Alpine Fault is late in its earthquake cycle, so it is seen as a great opportunity to investigate one of the top faults in New Zealand by putting a range of probes down into the zone where earthquakes occur.

The Alpine Fault extends more than 650 kilometres from Marlborough, along the western edge of the Southern Alps to Milford Sound. Research suggests it ruptures every 200 to 400 years, producing damaging magnitude eight or more earthquakes.

The two boreholes will enable scientists to examine unweathered rocks, install earthquake recorders and weather gauges, and measure temperature and water pressure.

"The Alpine Fault offers great opportunities to investigate pressure, temperature and chemical conditions in the heart of the `earthquake machine'," Townend said.

"The Alpine Fault's geometry, rapid rate of slip, and well-studied surface exposures make it a site of real global importance for fundamental research into the evolution of large faults and the conditions under which earthquakes occur.

"Funding applications ... have been submitted in Germany, the UK, US, Canada, and **Australia**, as well as New Zealand, and we await the outcomes of these and future applications."

Researchers at GNS Science, Otago University and Victoria University are co-ordinating the work in collaboration with colleagues at Canterbury University and Auckland University, and organisations in Germany, Britain and the United States.

Back in the 1960's Frank Evison, the inaugural professor of Geophysics at Victoria University Wellington, arranged to have a masonry wall built straddling the Alpine Fault to see if it was creeping. The wall is still intact which is not necessarily good news.

More earthquake research in NZ

By PAUL GORMAN - The Press
South Island
New earthquake sensors will be deployed across Canterbury and Marlborough during a multimillion-dollar national project.
From next year, GeoNet, a collaboration between the Earthquake Commission (EQC) and GNS Science, will roll out a monitoring station network across the upper South Island as part of a $45 million, five-year programme.
A dense network is needed to improve public safety and understanding of earthquakes, to help pinpoint and measure tremors, and provide more details on fault ruptures.
The Hope Fault near Hanmer Springs – likely to be the source of a damaging earthquake in Christchurch – will be among those in the spotlight.
In September 1888, a magnitude 7.3 earthquake on the Hope Fault shook Christchurch for 50 seconds and brought down the Christ Church Cathedral spire.
GNS Science's GeoNet project director, Dr Ken Gledhill, said the improved South Island network would provide a better match for North Island coverage.
A Canterbury strong-motion network had been in place since 2004.
The earthquake and deformation-recording equipment would include seismographs, strong-motion recorders and GPS (global positioning system) equipment.
By 2016, 30 new seismic stations and 16 GPS sites would be sited in the Marlborough fault zone, he said.
In the next two years, 10 new instruments would be installed in Canterbury, mainly in Christchurch. Eventually, 40 instruments would be spread across the region, with 20 around the city.
(Ed: Seems our colleagues across the ditch are way ahead of Australia in undertaking the necessary basic research for understanding their earthquake environment).

Tsunami observed in Brisbane

(Queensland) NPA News Vol 81 No 3 p25

by Heatherbell Mellor, 28 Feb 2010

This bird outing turned out to be quite a surprise and a very special morning because we witnessed the arrival of the tsunami which had come across the Pacific after the earthquake in Chile. There was also a high tide, but it wasn't supposed to come in until 9.16am. We were at the Wynnum roost at 7.30am and already there were only long-legged birds left standing: stilts, egrets and pelicans. There were no waders.

By 8.30am all the birds had gone because of the amount of water rushing in through the mangrove forest into the lagoon area.

(Ed. We have taken the report at face value – no checks have been made).

30 PROPUESTAS RELATIVAS AL TERREMOTO
27 DE FEBRERO 2010
COMISIÓN PROVISORIA TERREMOTO 2010
INSTITUTO DE LA CONSTRUCCIÓN
29 DE MARZO DE 2010

30 Proposals Resulting from the Earthquake of 27th February, 2010
Provisional Report on the 2010 Earthquake
Chilean Institute of Construction
29th March, 2010

Draft English Summary Interpretation for NZSEE
Clark Hyland & Patricio Quintana-Gallo
12th May 2010

Tsunami damage Dichato, Chile (photo Gary Gibson)

Introduction

Ten societies and departments involved with various aspects of design and construction in Chile including the Department of Public Works met and discussed their observations of damage during the earthquake with the aim to minimise and mitigate damage and problems arising from the recent earthquake on 27th February 2010.
Thirty recommendations broken into five areas of action are listed. Many of these are already being implemented. The aim is to get a consensus on the relative importance of each proposal.

INN (National Standard Institute) Technical Standards

1. Review and update official technical standards for soil mechanics and geotechnics
2. Review and update the Nch433Of.96 seismic standard (and others) using mainly the lessons learned from the 2010 earthquake.
    a. Loadings
    b. Reduction of damage to non-structural components.
    c. Amplification of loadings effects due to local geology.
    d. Update zonation.
3. Create technical specifications, recommendations and eventually standards for connections of non-structural elements to the main structure, in particular restraint of equipment and suspended ceilings, among others.
4. As a complement to 3, develop a new standard for attachment of non-structural elements and equipment in buildings.
5. Update code for elevators.

Regulations and Law

6. Developer must submit geotechnical report to OGUC (Building Control Authority) with building permit application.
7. Regulate the limitations and/or conditions for the construction of residential areas in risk zones for tsunami or others, in the regulation planning of the cities.
8. Improve regulation of independent inspection of construction, detailing procedures required and responsibilities.
9. Incorporate the certificate number of the structural reviewer in the building permit application. This is a person with an appropriate professional qualification.
10. Include signature of structural design reviewer on record set drawings for the local Building Control Authority which issues the permit.
11. Incorporate in the Building Control Authority the definition of 'failures and deficiencies' in the Quality for Construction law.
12. Regulate in the Building Code (OGUC) the fulfilment of the technical standards for materials and constructive systems considered as strategic.
13. Regulate in the building code the obligation of certifying some construction materials, considered as strategic, as well as the model or procedure chosen for the certification.
14. Make free, easy and open access to national standards that are obligatory for construction, like the OGUC (referred here as Building Code)
15. Regulate the obligation to have alternative sources of electricity, potable water and telecommunications. In addition make this mandatory for buildings required to operate during the disaster period, such as hospitals, police stations, high schools, etc.
16. Regulate common and exceptional laws to make faster procedures for reconstruction after disaster. The same applies to elaborate and modify the building regulations in affected areas.

Structural Design and Architecture

17. Promote, encourage and update teaching of structural design particularly for engineers and architects, incorporating "Seismic Architecture", in virtue of the earthquake evaluations e.g. prevention of soft storey mechanisms.
18. Promote, review and update design requirements for bridges and overpasses and other structures which are key life-lines.
19. Plan in detail the reconstruction related to edification and urbanism.

Study and Dissemination

20. Request the Ministry of Education (MINDUC) and the city councils more dissemination and training for the community through high schools, universities, city councils, neighbours organizations, etc., about how to behave under a natural disasters such as earthquakes, tsunamis, flooding, etc.
21. Promote the exchange of documentation, experience and research with foreign organizations of recognized expertise in earthquakes, tsunamis and other natural disasters.
22. Organize seminars or dissemination workshops were subjects like code provisions, life safety, quality of construction, acceptable and unacceptable damage, professional engineers registration, among others.
23. Disseminate through publications and other means of massive media the probable expected consequences of a 'seismic lake' in the north of the country (no seismic events in that area for a considerable time), as well as promote the review of basic life-lines, high schools, hospitals, communication systems, and tsunami evacuation programmes in these regions.
24. Take up again the design and eventual implementation of insurance related to earthquakes and construction deficiencies, with focus on guarantee the interests and the patrimony of people affected by damages.

Third Parties Proposals

25. Update the maps for risk of natural disasters like flooding, earthquake, tsunami, etc.
26. Compare the zones of flooding due to tsunami established by the Army with the ones observed after the one that occurred in 2010, and eventually modify them.
27. Promote the creation and/or the improvement of an Early Alert System, with an autonomous seismological network.
28. Regulate a compulsory training for the inhabitants of tsunami prone areas.
29. Promote the creation or reconstruction of strategic bridges in the immediately.
30. Propose the implementation of an autonomous Satellite Telephone network.

South Australia experienced the two largest earthquakes in Australia in this period, the largest its magnitude 4.8, far enough from Cleve that there was no damage or injuries.

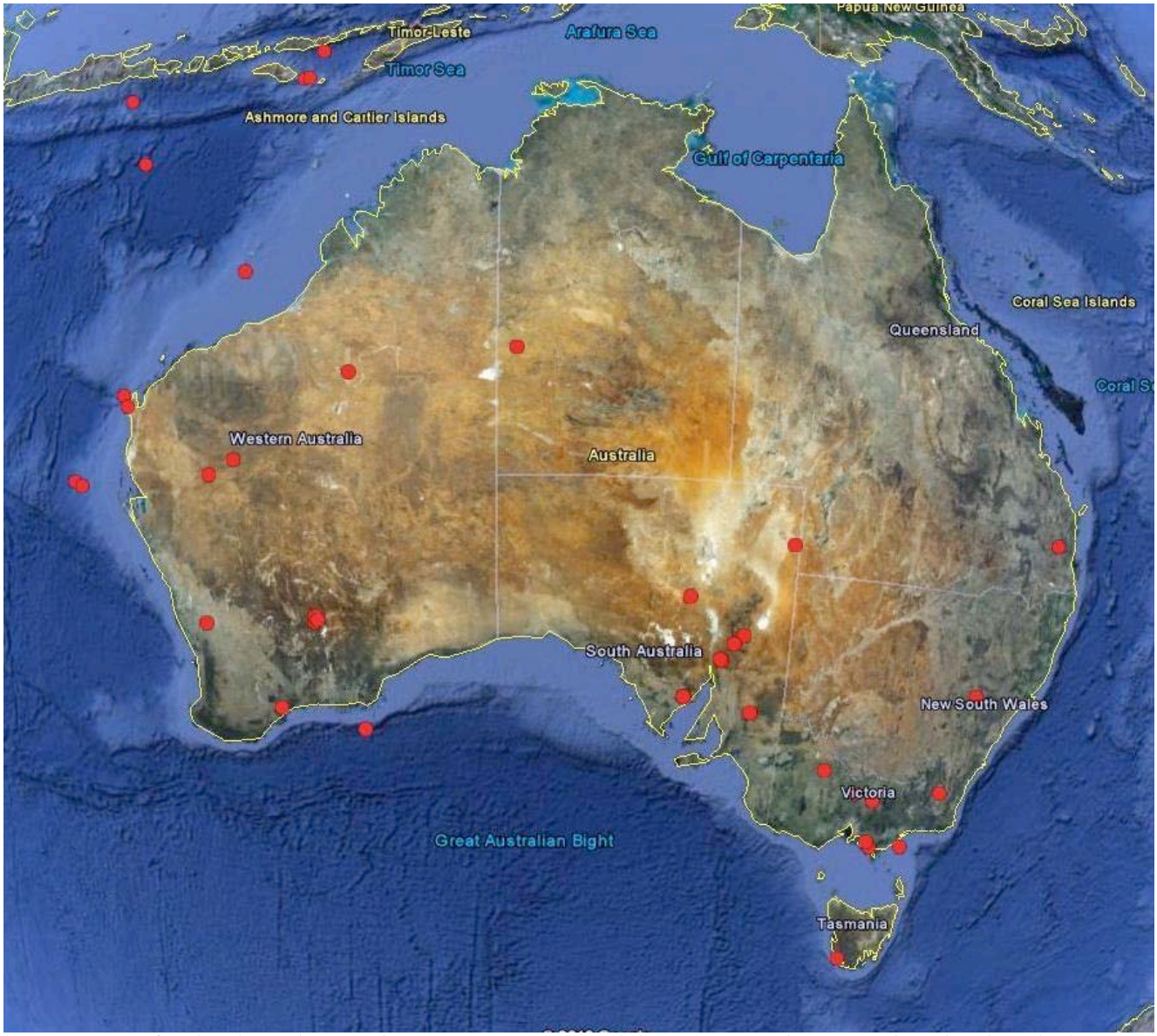
Table Earthquakes in the Australian region, 10 May 2010 – 10 August 2010, magnitude 2.5 or greater, located by:

- PIRSA http://www.pir.sa.gov.au/minerals/earthquakes/recent_earthquakes_in_sa,
- Geoscience Australia www.ga.gov.au
- ES&S www.esands.com; and
- ASC (the Australian Seismological Centre)

The implied accuracy in epicentral coordinates is fanciful, the best are located no better than 3km (.03º) horizontally and 5 km vertically.

Date (UTC)	Time (UTC)	Lat ºS	Long ºE	Depth (km)	Mag	Location
22-Aug-2010	04:10:29	24.777	110.795	10	3.4	W Carnarvon WA
18-Aug-2010	20:54:01	25.345	117.219	0	3.0	SW Mt Clere WA
15-Aug-2010	08:56:09	26.701	152.283	5	2.5	Kingaroy Qld
11-Aug-2010	21:12:06	43.172	145.769	0	3.5	SW Strathgordon Tas
06-Aug-2010	06:50:38	38.608	146.006	12	2.8	Buffalo Vic
31-Jul-2010*	16:56:27	30.048	136.744	0	2.9	Olympic Dam SA
31-Jul-2010	02:45:38	32.224	138.206	12	2.7	NE Quorn SA
30-Jul-2010	21:29:22	32.175	138.141	10	4.2	NE Quorn SA
29-Jul-2010	13:59:33	30.640	116.460	0	2.8	W Ballidu WA
28-Jul-2010	03:46:05	31.291	139.038	0	2.7	SE Blinman SA
26-Jul-2010*	18:38:29	30.911	121.343	0	2.9	Kalgoorlie, WA
24-Jul-2010	19:17:52	12.752	114.453	0	5.0	NW Australia
23-Jul-2010	22:20:42	36.315	148.879	0	2.9	Berridale NSW
17-Jul-2010	16:24:04	34.823	123.154	13	2.6	SE Esperance, WA
16-Jul-2010	16:35:58	18.000	119.068	0	3.7	W Broome, WA
15-Jul-2010	18:26:26	31.609	138.659	10	3.5	Wilpena, SA
15-Jul-2010	17:43:52	35.884	143.225	10	2.9	N Wychepro Vic
15-Jul-2010	13:59:34	33.905	119.454	10	2.5	E Jerramungup WA
09-Jul-2010	17:16:01	38.424	145.826	0	2.7	Korumburra Vic
05-Jul-2010	14:34:30	24.916	118.336	0	2.6	N Meekatharra WA
04-Jul-2010	03:48:11	22.370	113.677	13	3.1	SW Learmonth WA
21-Jun-2010	04:04:10	21.524	129.752	5	3.6	Lake Mackay NT
09-Jun-2010	15:41:41	22.166	123.256	0	3.3	E Lake Dora WA
08-Jun-2010	20:07:17	21.935	113.534	34	3.9	W Exmouth WA
07-Jun-2010*	12:30:28	28.007	140.791	0	3.1	Innamincka SA
05-Jun-2010	21:47:00	33.559	136.714	15	4.8	NE Cleve SA
04-Jun-2010*	10:56:26	30.726	121.385	0	2.6	NW Kalgoorlie WA
31-May-2010	19:20:17	32.614	149.643	0	2.6	Mudgee NSW
27-May-2010	11:08:53	34.005	139.600	10	2.7	NW Morgan SA
26-May-2010	10:09:20	36.634	144.796	10	3.0	Colbinabbin Vic
24-May-2010	00:56:51	36.863	145.718	2	2.7	Strathbogie Vic
19-May-2010	20:08:03	24.985	111.125	50	3.6	W Carnarvon WA
12-May-2010	11:09:08	33.646	118.278	4	2.6	Pingrup WA

Note. Events marked with a '*' are probably not natural earthquakes but seismic events induced by mining or fluid injection. On seismograms it is difficult to distinguish between natural and man-made seismic events although blasts can in theory be discriminated because of the use of delays between shot holes and between rows of holes. Time-of-day combined with location and coda shape have also been used to label mine and quarry blasts but this may have lead to real earthquakes being incorrectly identified as mine blasts, and vice-versa, in the past.



Epicentre of earthquakes in the Australian region, M ≥ 2.5 as listed above. Map created using GoogleEarth and GA database (map courtesy of Dr. Clive Collins, GA).

Conferences

13 October 2010 Seismic Engineering – Design for Management of Geohazards. Australian Geomechanics Society and the NSW Association of Consulting Structural Engineers. Australian National Maritime Museum, Darling Harbour Sydney. AEES members will be charged the same registration as members of AGS.

01-03 December 2010 3rd Asia Conference on Earthquake Engineering, ACEE-2010, Bangkok, Thailand. acee3@gmail.com

12-14 December 2010, International Conference on Sustainable Built Environment. Faculty of Engineering, University of Peradeniya and Earl's Regency, Kandy, Sri Lanka. http://www.icsbe.com/

PCEE2011 Auckland NZ, 14-15 March 2011
The New Zealand Society for earthquake Engineering is hosting next year's Pacific Conference on Earthquake Engineering in Auckland in March. Please keep checking the AEES and NZSEE http://pcee.nzsee.org.nz/ websites for details but abstracts are due 24 August 2010. Attached to the PCEE is the following important workshop which we hope Australian and New Zealand consulting engineering companies working in the region will sponsor.

SW Pacific Earthquake Resilience Workshop 11-13 April 2011
This workshop, endorsed by the South Pacific Engineers Association (SPEA), will draw together lessons from recent earthquakes and tsunamis to develop a road map for improved regional resilience. This will include considerations of cooperative response strategies, seismological studies, earthquake engineering guidelines, standards, education, continuing professional development, and building control systems development.

AEES Contact Details

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IMPORTANT NOTE: AEES conference final papers are due by 1 September 2010

See next page for details

The Australian Earthquake Engineering Society
AEES 2010
26-28 November 2010
Hosted by the University of Western Australia
Perth, WA 6009

Keynote Speakers:

Professor David Blair
Director AIGRC
University of Western Australia

Dr Trevor Allen
Risk and Impact Analysis Group
Geoscience Australia

Dr Richard Lynch
Manager: Operations
ISS International Limited
Republic of South Africa

Professor Mike Griffith
Department of Civil Engineering
University of Adelaide

Professor Shyh-Jiann Hwang
National Taiwan University
Taiwan

For AEES members, the AEES AGM will also be held during the conference.

Topics:

- Earthquake engineering
- Engineering seismology
- Blast induced ground motion
- Tsunami
- Critical infrastructure protection
- Disaster response
- Emergency management and insurance
- Earthquake influence on mining infrastructure
- Micro seismic response and damage in mining
- Influence of earthquakes on mine slope stability

Programme:

	26 Nov (Friday)	27 Nov (Saturday)	28 Nov (Sunday)
Morning		Presentations	Presentations
Afternoon	Presentations	Site visit	
Evening	Reception	Dinner	

Deadlines: Full Papers due: 1 September 2010

Venue: UWA Campus

Site visit: Gingin Gravity Discovery Centre, 1098 Military Road, Gingin West 6503

Enquiry: Winthrop Professor Hong Hao, Tel: +61 8 6488 1825, Email: hao@civil.uwa.edu.au