AEES NEWSLETTER

#3, August 2011

Contents

President's Report

The Southwest Pacific Earthquake Resilience Workshop was successfully conducted in Wellington from 22 to 24 August. The workshop was initiated by the then AEES President Kevin McCue and the then NZSEE President Graeme Beattie in 2009. With support from AusAid and NZ Aid, the workshop brought together delegates from Southwest Pacific countries to review the recent postearthquake and tsunami experiences, develop a broad agreement for regional cooperation on improving earthquake resilience, and analyze the requirements for a modern earthquake code for the region. Kevin McCue and Gary Gibson from AEES attended the workshop and gave presentations. This activity tallies with the Engineers Australia's 2011 theme of Humanitarian Engineering. It was included in the AEES annual report to Engineers Australia. Other AEES activities included in the report are our annual conference and AGM in Perth in November last year, the reconnaissance trips to Christchurch, some public talks given by our members about the recent Christchurch earthquakes, and our preparations for making a bid at the 15WCEE in Lisbon Portugal in September 2012, to host the 16WCEE in Australia,.

During our last AGM in Perth, we discussed the possibility of bidding and hosting the 16WCEE in Australia in 2016. Successful bidding and hosting WCEE will not only promote AEES and bring more public awareness of earthquakes and earthquake hazards in Australia, but also hopefully make some profit for the society. However, as we are a small society, some members expressed concerns at the possible workloads for hosting such a big conference, and suggested that we should get support from regional societies, especially NZSEE before we commit ourselves. I visited Singapore last December and talked to Prof. T. C Pan, President of the Singapore Earthquake Engineering Society. Prof Pan agreed that Singapore Society would assist us in this endeavor.

A small group of our members attended the PCEE in April in Auckland. Paul Somerville and Helen Goldsworthy spoke to NZSEE President Peter Wood in advance of the NZSEE AGM about our intention of hosting the 16WCEE in Australia. Helen was invited to speak in the NZSEE AGM before their members were asked if they would like to support our bid. The overwhelming majority of the NZSEE members were in support. Now we have the support from NZSEE and Singapore EES, we will go ahead and prepare for the bid. I have contacted Prof. Polat Gulkan, IAEE president to express our interests. I was advised that we would need to submit an EOI in June 2012 before the bidding in September. A few of us have already started contacting IAEE representatives whom we know personally to seek their support. I encourage all members to do the same. I will visit Melbourne in early December on my way to a workshop at Deakin University. I will take the opportunity to visit ARINEX, the professional conference organizer, regarding the preparation of the bidding materials and the budget, which is my primary concern at this stage.

The second call for abstracts of 15WCEE was just released. The deadline for abstract submission is 15 October 2011. Further information regarding the conference can be found at www.15wcee.org. I encourage as many members as possible to attend the conference to support our bid to host the 16WCEE in Australia in 2016.

I visited the old town of Beichun in Sichuan, China on 18 July 2011. Beichun was the town that suffered the most severe damage during the 2008 Wechuan earthquake. The entire town was abandoned after the earthquake and the ruins are now kept by the local government as an earthquake museum. A new Beichun town has been built for survivors on a

geologically more stable site about 20 km away. After two years, the devastating damage is still shocking. Beside the common types of damage such as excessive drift due to soft first storey, shear damage due to short columns, pounding damage between adjacent buildings and bridge spans due to insufficient seismic gaps etc. that are commonly observed in all major earthquakes, the most astonishing cause of damage was the excessive landslides. The old town was built along the river bank in a valley. Half of the town was virtually buried by mud and rocks from landslides on both sides of the valley. The original river bed was significantly raised. One cablestayed bridge crossing the river was buried under the new river bed and the only remaining structure above the water is the top portion of its tower. Many mediumrise buildings had their first two or three storeys completely buried by mud and rocks. The Beichun High School was completely buried underneath large rocks, with some of them larger than the size of a bus. The only things remained above the ground are a flag post and the top portion of a basketball board. I have visited a number of earthquake damage sites, but have never witnessed such large scale landslides which have completely changed the terrain of the area and caused such excessive damage to structures.

Hong Hao
President, AEES

SW Pacific Earthquake Resilience Workshop

The Southwest Pacific Earthquake Resilience Workshop was held in Wellington on 2224 August 2011. Congratulations to the organisers Brendan Donnel and Clark Hyland from NZSEE and a big thanks to NZaid and AusAID who provided partial funding for the delegates to attend from PNG, Solomon Islands, Vanuatu, Fiji, Samoa, Cook Is, and Tonga. AEES members Gary Gibson and Kevin McCue were among the presenters. The outcome will be presented as a proposal to SOPAC in coming weeks (see president's column above).
http://pcee.nzsee.org.nz/Workshop.htm

World Conference on Earthquake Engineering 2016 Australia bid

AEES will bid to host the WCEE in 2016 at the 2012 WCEE in Lisbon Portugal. The AEES Committee would appreciate offers of support and help from members.

AEES2011 in the Barossa Valley, SA

The 2011 AEES annual conference will be held at the Novotel Barossa Valley Resort in South Australia from 1820 November 2011. The conference will include keynote speakers, oral and poster presentations. Accepted papers will be peer reviewed and published in the conference proceedings and on the AEES website at a later date).

AEES2009 winner of best student paper published

We are pleased to inform you that the following manuscript has been published in Natural Hazards and Earth System Sciences:

Title: The CATDAT Damaging Earthquakes Database
Author(s): J. E. Daniell et al.
MS No.: nhess2011148
MS Type: Research Article

It is available for download at:
http://www.nathazardsearthsystsci.net/11/2235/2011/

Kind regards,
Natascha Töpfer
Copernicus Publications
Editorial Support
on behalf of the NHESS Editorial Board

IUGG venue rocked by earthquake

During the recent very successful IUGG conference in Melbourne, delegates were treated to a special sensation. Midmorning on 5th July, the conference venue was rocked gently but noticeably by seismic waves from a small earthquake centred near Korumburra, about 100km distant. Some of the visiting seismologists expressed delight, it being their first experience of an earthquake, thankfully nondamaging.

AEES Contact Details

PO Box 4014, McKinnon P.O. VIC 3204
Email: sgh2604@bigpond.com Tel: 0414 492 210
Website: www.aees.org.au

The 2011 AEES Committee

President:	Prof Hong Hao
Secretary:	Paul Somerville
Treasurer:	Mark Edwards
Committee members:	
	Gerhard Horoschun
	Helen Goldsworthy
IAEE Representative:	Gary Gibson
Secretariat/Newsletter:	Sharon Anderson/Kevin McCue
Webmaster:	Adam Pascale

State Representatives

Victoria	Gary Gibson
Queensland	Russell Cuthbertson
New South Wales	Colin Gurley
Tasmania	Angus Swindon
ACT	Mark Edwards
South Australia	David Love
Western Australia	Hong Hao
Northern Territory	tba

IAEE matters

To all AEES Members,

The International Association for Earthquake Engineering (IAEE) is primarily known for its World Conference on Earthquake Engineering, held every 4 years.

The next conference, the 15th WCEE, will be held in Lisbon, Portugal from 24 to 28 September 2012. Abstracts close on 15 October 2011, the early bird registration deadline is 15 April 2012, and the deadline for submission of accepted papers is also 15 April 2012. Details can be found on the conference web site, www.15wcee.org.

The AEES is currently considering whether to bid for the 16th WCEE to be held in Australia in 2016. Voting for the venue will take place at the 15th WCEE in Lisbon.

All papers presented at each WCEE are published in the conference proceedings, originally in up to 12 volumes requiring 30 to 40 cm of shelf space for each conference, and now on a DVD supplied to each conference delegate. A considerable proportion of world research in earthquake engineering is published in these WCEE proceedings, and people who are working on specialised or obscure topics can often be identified from them.

The IAEE has recently arranged for all publications from all fourteen WCEE to date to be available on its website www.iaee.or.jp (see article below). Other IAEE publications are also advertised on this website.

Gary Gibson

Proceedings of All Previous World Conferences on Earthquake Engineering Now Online

The International Association for Earthquake Engineering (IAEE) is pleased to announce that the Proceedings for all 14 World Conferences on Earthquake Engineering are now available online at www.iaee.or.jp.

The international earthquake engineering community has always felt the need for quick and free access to papers that have been published in the Proceedings of the World Conferences, from the First World Conference in Berkeley, California, in 1956 to the Fourteenth in Beijing in 2008. The IAEE's rich collection will now make it possible for researchers and practitioners to read online or download and archive papers, some of which have long become standard items of reference but are otherwise difficult to find. The Proceedings collection is fully searchable by titles, authors, keywords, city or country names or the sequence number of the proceedings.

The development of this service has been made possible by the National Information Centre of Earthquake Engineering (NICEE) of India, under contract with the IAEE. The IAEE is grateful to all local organizing committees of past conferences that have granted permission to collect this body of information under one roof.

Obituary Dr Bill Robinson

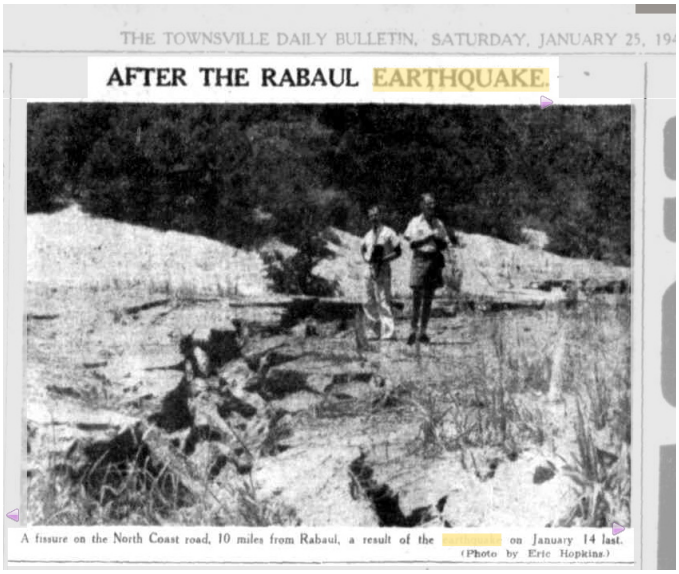
Dr Bill Robinson – a personal tribute It is sad to record the death on Tuesday 16 August, in Christchurch, of Dr Bill Robinson, inventor, scientist and engineer. A family funeral was held on Friday 19 August, and a memorial service is planned in Wellington. This will be fitting for a quietly reserved man who has had a huge influence on seismic safety in New Zealand and throughout the world. The invention by Dr Robinson of the leadrubber bearing in 1976 led to its first use in Wellington in 1978 in the William Clayton building. A handful of buildings used this technology, the simplest and most reliable of isolation devices, from that time until 1994. The Northridge earthquake that year affected several hospitals in the Los Angeles suburb, but only one continued to function throughout – protected by Dr Robinson's invention. Since that time the popularity of the device has grown exponentially and continues to grow. It now protects thousands of buildings around the world, in almost every earthquakeprone country. Notable Wellington buildings protected by the base isolators include Parliament Buildings, General Assembly Library, Te Papa Tongarewa, Rankine Brown Library, Old BNZ Building, Museum of the City and Sea, Wellington Regional Hospital and the recently completed Supreme Court. Overseas buildings include Sacramento State Building, San Francisco City Hall, Bhuj Hospital, Gujarat, Lok Nayak Hospital, Delhi, and private apartment buildings in Taiwan. The Christchurch Women's Hospital, protected with leadrubber bearings, survived undamaged in the recent earthquakes – a fitting tribute to the effectiveness of the leadrubber bearing. It is likely that the reconstruction of Christchurch will see many building owners choosing base isolation technology for peace of mind and protection of property. Dr Robinson was honoured with a Queen's Service Order in 2007 in recognition of his contribution to the reduction of the earthquake vulnerability of communities. However, the full impact of this deceptively simple device, and other devices that Bill invented, has yet to be seen. Many more buildings will be protected and, as time passes, increasing numbers of building owners and communities throughout the world will testify to the lives saved and damage avoided because of the ingenuity of New Zealander, Dr William Henry Robinson. His intellect and wit will be sorely missed, but his legacy will be long lasting.

David C Hopkins

18 August 2011

Historic faulting near Rabaul, PNG

Last Newsletter we published an enecdote from Professor Bullen regarding the earthquake hazard at Rabaul. In the meantime the editor has found, using the Australian National Library's search facility 'Trove', the following photo showing faulting on the Gazelle Peninsula during an earthquake in January 1941. This is the first known example of surface faulting in Papua New Guinea.


THE TOWNSVILLE DAILY BULLETIN, SATURDAY, JANUARY 25, 19

AFTER THE RABAUL EARTHQUAKE.

A fissure on the North Coast road, 10 miles from Rabaul, a result of the earthquake on January 14 last. (Photo by Eric Hopkins.)

Motley men of Payneham

One Monday evening, a motley group of men met together at Payneham (Ed. Adelaide suburb). They had two things in common: age, and an interest in seismology. Over takeaway chinese and a Penny's Hill shiraz, we started introductions with stories from our past. Paul Hutchinson regaled us with tales of planes and volcanoes in PNG, while John Mignone expounded on an early visit to Mt St Helens. We nearly didn't get to the main business of the evening. Blair Lade, using Amaseis software showed how he had refurbished a Willmore, and adjusted it to exactly 1 Hz, and fine tuned the damping. He used a square wave put through the signal coil. Vic Dent demonstrated PSN hardware, and the ACG webpage, which hosts a number of sites that he has set up around the country. Vic and John Harris were about to travel to Peterborough and Jamestown the following day, to investigate installing recorders in two country schools. (This was successfully achieved.) While the main business was in progress, my wife and daughter cleaned up in the kitchen. It was somewhere around 11 when people felt the necessity to escape.

David Love

Australian Seismometers in Schools Program

Dr. Natalie Balfour
Postdoctoral Fellow
Research School of Earth Sciences
ANU College of Physical and Mathematical Sciences

The Australian Seismometers in Schools (SIS) program is a fouryear project (20112014) run by the Education component of AuScope Australian Geophysical Observing System (AGOS) which is funded by the Federal Government's Education Infrastructure Fund (EIF). Over the next four years SIS will build a network of 40 seismometers installed in high schools across the nation to provide realtime monitoring of the Australian continent and raise awareness of geoscience through observing our dynamic earth in motion. The Australian Seismometers in Schools project aims to:

- Raise community awareness of regional earthquakes;
- Raise awareness of seismology and, more generally geoscience, as a field of study;
- Promote science as a possible career choice;
- Provide a tool to assist teachers in educating high school students in Physics and Earth Science.

In addition to the above educational goals the data collected will also be useful to the scientific community in the study of regional earthquakes. Because of the high quality of the seismic instruments to be used (Guralp 3component broadband seismometers) it will also complement monitoring networks run by government and state agencies. Longterm storage of data for research purposes will be aligned with community standards at internationally accessible data management centres, such as IRIS.

Students will be required to look after their very own seismometer and in doing so be a part of a national science experiment.

In designing the Australian SIS network organizers have studied similar programs throughout the world. Discussions with participants of the French equivalent of the program (Sismos à l'École) revealed two key elements required for success:

- Having a local enthusiast or scientist to liaise with the school.
- Having resources available for teachers, such as activities they can do in the classroom. These activities are even more beneficial if they are curriculum based.

The project will involve an online education portal, allowing near real time access by students to earthquake recordings in their own and other schools. The website will also provide resources for teachers to use in the classroom. We intend for these activities to help integrate the seismometers in the science curriculum.

Due to the expanse of Australia and remoteness of many communities we wish to get local experts and enthusiasts involved to provide support and share their knowledge with schools. A growing number of institutions and individual enthusiasts are forming to support the program within their local state or territory. Over the duration of the project this partner network will significantly enhance the project through provision of technical or management expertise as well as promotion within the education sector.

Photo: Students and teacher investigating waveforms recorded by their school's seismometer as part of the UK program. (Source: http://www.bgs.ac.uk)

The program would like to include as many schools as possible but unfortunately due to local conditions some schools may not be suitable for high fidelity seismometers. In this case, we intend to provide QuakeCatchers (USB accelerometers). These small, portable instruments are less sensitive than a seismometer but more flexible. They have been used successfully in classrooms to teach about seismic waves and earthquakes.

If you would like to be involved in the program or know of an interested school, please contact sis@anu.edu.au.

Poem on the 1653 New England (US) Earthquake

The solid earth, before an angry God,
Shakes at the terrors of His awful nod.
The balance of the mighty world is lost –
Its vast foundations, in confusion toss'd,
Through all the hollows of its deepest caves
Rock like a vessel foundering in the waves.
Volumes of sulphurous air, with booming sound,
Burst through the gorges of the parted ground.
The earth doth heave, with groanings of distress,
Beneath the weight of human sinfulness.
Shall not our eyes drop penitential rain,
When all creation travaileth in pain?
Great God! who shall not fear Thee in the hour
When heaven and earth are trembling at Thy power!
Father, to nature's tumult whisper peace,
And bid the wickedness of man to cease!

Latin poem composed by Reverend Peter Bulkeley, Concord, Massachusetts, on the occasion of the 29 October 1653 earthquake; recorded by Cotton Mather.

Tromometer an instrument for detecting or measuring very slight earth tremors

Professor Rossi, of Rome, thinks that by watching the progress of a microseismic storm, he can foretell the occurrence of an earthquake. The tromometer, or tremor measurer, as an indicator of movements going on in the interior of the earth, is expected by some seismologists to become what the barometer is as an indicator of the movements in the atmosphere (from Milne, 1885 – Ed. forerunner of the seismometer?).

Conferences

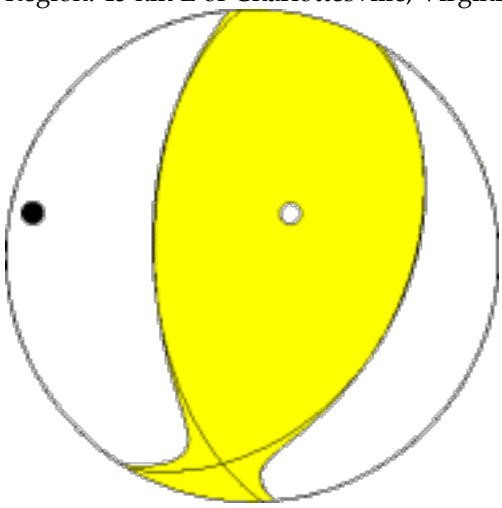
22 24 August, 2011 Wellington New Zealand **Southwest Pacific Earthquake Resilience Workshop**

http://pcee.nzsee.org.nz/Workshop.htm

1820 Nov 2011 AEES2011 Prof Mike Griffith will host this year's annual conference in the Barossa Valley, South Australia. This conference will no doubt match the prize winning wines that come from the valley.

US earthquake shakes Washington DC

Date: Tuesday, August 23, 2011 at 17:51:04 UTC
Magnitude: 5.8, Mo=5.7*10**17 Nm
Location: 37.94°N, 77.94°W, focal depth: 6 km
Uncertainty: horizontal ± 9.7 km; depth ±2.6 km
Region: 45 km E of Charlottesville, Virginia



Earthquakes in the Central Virginia Seismic Zone

Since at least 1774, people in central Virginia have felt small earthquakes and suffered damage from infrequent larger ones. The largest damaging earthquake (magnitude 4.8) in the seismic zone occurred in 1875. Smaller earthquakes that cause little or no damage are felt each year or two.

Earthquakes in the central and eastern U.S., although less frequent than in the western U.S., are typically felt over a much broader region. East of the Rockies, an earthquake can be felt over an area as much as ten times larger than a similar magnitude earthquake on the west coast. A magnitude 4.0 eastern U.S. earthquake typically can be felt at many places as far as 100 km from where it occurred, and it infrequently causes damage near its source. A magnitude 5.5 eastern U.S. earthquake usually can be felt as far as 500 km from where it occurred, and sometimes causes damage as far away as 40 km

Faults

Earthquakes everywhere occur on faults within bedrock, usually kilometres deep.

At well-studied plate boundaries like the San Andreas fault system in California, scientists may be able to determine the specific fault that is responsible for an earthquake. In contrast, east of the Rocky Mountains this is rarely the case. The Central Virginia seismic zone is far from the nearest plate boundaries, which are in the center of the Atlantic Ocean and in the Caribbean Sea. The seismic zone is laced with known faults but numerous smaller or deeply buried faults remain unmapped. Even the known faults are poorly located at earthquake depths. Accordingly, few, if any, earthquakes in the seismic zone can be linked to named faults. It is difficult to determine if a known fault is still active and could slip and cause an

earthquake. As in most other areas east of the Rockies, the best guide to earthquake hazards in the seismic zone is the earthquakes themselves.

Earthquake recorded by 'citizen scientist' in Charlottesville

Carolyn McPherson, a retired English professor, has a matchbox-sized seismometer (accelerometer) on the floor of her basement laundry room in Charlottesville, next to a stack of rocks and fossils. It had not triggered in the two years it had been installed but at 1:51 p.m. Tuesday, the seismometer recorded the magnitude 5.8 Washington earthquake and sent the data via Carolyn's computer to Stanford University. Of more than 1,000 home seismometers tied into Stanford's national network, hers was the closest to the epicenter, still some 50 km away.

They're all part of the QuakeCatcher Network, a "citizen science" project that's distributing the tiny seismometers. The goal: a dense mesh of inexpensive detectors to augment the much sparser network of researchgrade seismometers deployed by the government, which can cost $100,000 each.

"If we have more sensors, we can, in theory, detect earthquakes and characterize them before they hit surrounding areas," said Jesse Lawrence, a Stanford seismologist who helps lead the QuakeCatcher Network.

Lawrence hopes the project will eventually help first responders in a huge, damaging quake by directing them toward places prone to moresevere shaking. As the sensor network records smaller quakes, it can slowly sketch a picture of morevulnerable areas.

Seismologists have just begun to get a handle on this phenomenon, called microzoning, said Elizabeth Cochran, a geophysicist at the U.S. Geological Survey in Pasadena, California. Variations in the geology underlying a region can s
hake one building severely while another nearby experiences far less movement.

"You could potentially use the information to know which areas of the ground will shake," said Cochran, who dreamed up the network in 2006.

The team adopted the home seismometers, which cost about $50 apiece and plug in via a USB port to desktop computers. Some 1,000 to 2,000 are now deployed, with another 6,000 poised to go, purchased with a $1.8 million grant from the National Science Foundation. Half will go to classrooms, where kids will no doubt delight in watching squiggles appear on computer screens as they bang tables and slam doors.

Most of the other 3,000 will be shipped to volunteers in quakeprone zones in California and Missouri, where the New Madrid fault ripped off huge quakes in 1811 and 1812.

More information about the QuakeCatcher Network is at http://qcn.stanford.edu/

Photo: Damage to Washington cathedral

NEW ZEALAND SOCIETY FOR EARTHQUAKE ENGINEERING TECHNICAL CONFERENCE & AGM

Implementing lessons learnt

APRIL 13 – 15, 2012 | CHRISTCHURCH

The New Zealand Government cancelled the state of national emergency on 6 April 2011 despite a forecast of possible future large earthquakes (see below). Two earthquakes centred southeast of the city struck during the afternoon of Monday June 13: a magnitude 5.6 event at 1:00 pm and a large magnitude 6.3 earthquake at 2:20 pm. There was yet more damage in Christchurch, a further three buildings collapsed, and there were more rockfalls in the Port Hills. There were no fatalities but at least 46 people were injured, many were without power, and there was widespread liquefaction yet again.

Police evacuated shopping malls and office buildings around the city. Essential organisations in the area were evacuated as a safety precaution, including the police headquarters and offices of the Canterbury Earthquake Recovery Authority where a neighbouring building was tilting dangerously. The 130yearold Christchurch Cathedral was reported to be structurally compromised due to the collapse of its western wall, while strong shaking shattered its stained glass rose window. Similar damage was inflicted on the Christchurch Arts Centre, although it had been in a precarious state following the previous two large earthquakes. The Grand Chancellor Hotel is reported to have tilted further despite elaborate underpinning and the heritage listed Lyttelton Timeball Station collapsed before demolition work could be completed. Shaking was felt from Dunedin in the south to Wellington in the north.

The focal mechanism of the 13 June magnitude 6.3 earthquake shows strikeslip faulting, quite different from the adjacent 22 February magnitude 6.3 earthquake which had a reverse or thrust faulting mechanism.

GNS Science forecast in May that Canterbury has a nearly one-in-four chance of a third major earthquake of up to magnitude-7.0 during the next year. One focus for researchers over the past month has been the aftershock-rich "gap" between the eastern end of the Greendale Fault and the western end of the Port Hills Fault.

Scientists want to know what is going on between the two, with some concerned that any faults in the gap may rupture and link the two bigger faults.

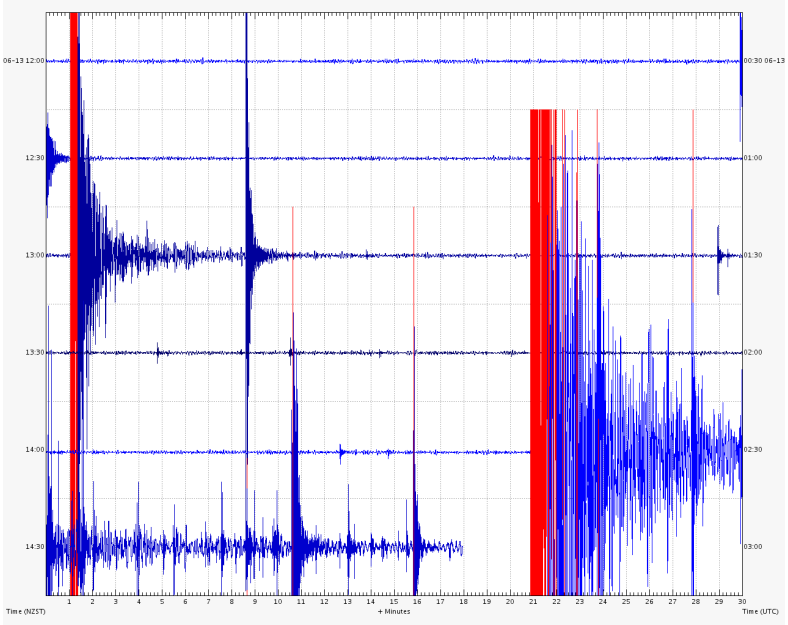


Figure Seismogram of the 3rd large earthquake and earlier foreshock (top left) east of Christchurch and 10km northeast of Lyttelton.

The aftermath of the 3 large earthquakes is that perhaps as many as 1000 buildings in the CBD and many more homes in the suburbs, will have to be demolished.

We hope this is the last large aftershock of the extensive sequence near Christchurch New Zealand but a more scientific assessment is given in the table below from GNS NZ and published on the Geonet website http://www.geonet.org.nz/canterbury-quakes/aftershocks/

Long-term forecasts

The table below summarises the expected probabilities of further earthquakes anywhere in the entire Canterbury region aftershock zone. The probabilities are based on the behaviour of aftershock sequences worldwide and the specific knowledge that scientists have of the Canterbury aftershock sequence since last September. The figures are generated from a computer model that is updated as the aftershock sequence

continues.

It shows that as time passes these probabilities become smaller, but any further significant earthquakes that do occur will cause these probabilities to change. The magnitude categories illustrate clearly how the probability falls away as magnitude increases. The probability for an aftershock to occur decreases as magnitude increases and a magnitude increase of one means a probability decrease of roughly 10 times. This means that a magnitude 7.9 earthquake is roughly 100 times less likely than a magnitude 6.0 earthquake and is therefore very unlikely. With every month that passes without a major aftershock, probabilities will continue falling. However, if another large aftershock occurs it can re-energise the system and spark a resurgence of earthquake activity for a month or so; this was seen with both the February and June magnitude 6.3 earthquakes.

The maximum magnitude of an earthquake is also bounded by what scientists know about the size of faults in Canterbury. Scientists are currently are not aware of any faults in Canterbury that are long enough to be able to produce a magnitude 7.9 earthquake. However, they cannot rule out this possibility with 100 percent certainty.

These figures are for the entire aftershock zone, not just for Christchurch city. The zone extends from Hororata in the west to large parts of Banks Peninsula, and from Kaiapoi in the north to Lincoln in the south.

Canterbury region long-term earthquake probabilities						
One month: August 15 2011 - September 14 2011				One year: August 15 2011 - August 14 2012		
Magnitude range	Expected range	Expected average	Probability	Expected range	Expected average	Probability
5.0 - 5.4	0 - 2	0.3	26%	0 - 5	1.7	82%
5.5 - 5.9	0 - 1	0.06	6%	0 - 2	0.5	39%
6.0 - 6.4	0 - 1	0.03	3%	0 - 1	0.1	10%
6.5 - 6.9	0 - 1	0.007	<1%	0 - 1	0.05	5%
7.0 - 7.9	0 - 1	0.003	<1%	0 - 1	0.02	2%

This table was last updated on August 19 2011

IAG PROVIDES UPDATE ON CHRISTCHURCH EARTHQUAKES
30/06/2011

IAG today advised that, based on its early assessment of the damage caused by the earthquakes and aftershocks which affected New Zealand's Christchurch region on 13 June 2011, it expected a maximum associated net claim cost of $65 million.

This cost will be included in the Group's financial results for the year ended 30 June 2011 (FY11), and is after allowance for a $50 million recovery under the Group's aggregate reinsurance cover.

Despite the financial impact of the latest Christchurch earthquake, IAG's Managing Director and CEO, Mr Mike Wilkins confirmed that the Group still expects to report an FY11 insurance margin in the range of 8%–10%. This is in line with the guidance provided on 23 February 2011, and reflects:

- an increased estimated net natural peril claim cost of around $600 million, including the latest earthquakes in Christchurch; offset by
- a higher contribution from prior period reserve releases, which are now expected to exceed the $228 million reported in FY10. This follows favourable experience in long tail classes (as indicated at IAG's market briefing on 14 June 2011), although related actuarial valuations will not be finalised until after the financial year end.

Guidance for underlying gross written premium growth for the full year remains unchanged at 3% 5%.

Mr Wilkins said: "Our priority is to assist our customers and our people, many of whom were still in the process of rebuilding from past earthquakes. We are working closely with government and industry to ensure we can help people get on with their lives as quickly as possible."

As at 30 June 2011 the Group's maximum event retention (MER) for a next event is approximately $165 million.

The Group will announce its full year result on 25 August 2011.

Australian earthquakes, 01 April – 31 August 2011

Table Earthquakes in the Australian region, magnitude 3 or greater, located by Geoscience Australia, PIRSA, ES&S, and ASC. The implied accuracy in epicentral coordinates is no better than 3km (.03º) horizontally and 5 km vertically. The largest earthquake, ML 5.3, occurred near Bowen, Qld on 16 April, no damage reported.

Date UTC	*Time*	*Latitude °S*	*Longitude °E*	*Magnitude ML*	*Depth (km)*	*Approximate location*
02/04/2011	6:07:03	25.055	117.345	3.7	0	Mount Clere, WA.
04/04/2011	12:03:04	17.452	127.984	2.7	0	W of Purnululu, WA.
10/04/2011	16:12:18	13.296	131.513	2.8	0	SE of Batchelor, NT.
12/04/2011	10:29:45	42.207	145.54	2.7	0	South of Queenstown, Tas
14/04/2011	1:18:22	18.197	123.73	3.6	20	South of Derby, WA.
16/04/2011	15:33:19	20.128	147.759	3.4	4	Near Bowen, QLD.
16/04/2011	13:06:44	20.191	147.692	3.2	0	Near Bowen, QLD.
16/04/2011	7:06:52	20.17	147.679	4.1	0	Near Bowen, QLD.
16/04/2011	5:31:18	20.085	147.764	**5.3**	7	Near Bowen, QLD.
17/04/2011	1:35:55	20.174	147.668	3.2	0	Near Bowen, QLD.
19/04/2011	7:38:05	20.067	147.81	3.2	6	Near Bowen, QLD.
23/04/2011	2:22:52	31.031	138.858	2.8	10	Blinman area, SA.
26/04/2011	14:27:52	30.508	117.155	3.4	0	Burakin, WA.
28/04/2011	19:57:56	32.712	140.379	2.5	10	Wadnaminga area SA
29/04/2011	22:26	40.7	145.0	3.5	10	Robbins Is, Qld
01/05/2011	21:40:20	19.876	133.928	3	5	Near Tennant Creek, NT
04/05/2011	12:29:17	32.273	137.931	3.3	0	NW of Quorn, SA.
05/05/2011	5:35:05	20.242	147.651	3.1	0	SW of Bowen, Qld.
07/05/2011	5:23:36	17.735	122.881	4	10	NE of Broome, WA.
08/05/2011	5:49:00	24.159	151.008	2.5	8	E of Dumgree, QLD.
09/05/2011	8:18:10	27.25	112.972	3.5	10	Off Kalbarri, WA.
12/05/2011	18:36:54	32.463	122.068	3.1	19	SE of Norseman, WA.
13/05/2011	23:25:55	25.014	151.579	3.3	1	Bundaberg, QLD.
16/05/2011	14:47:13	37.701	150.942	2.5	20	Offshore, SE of Eden, Vic
16/05/2011	3:30:36	31.386	139.133	2.7	10	NE of Hawker, SA.
18/05/2011	20:41:04	30.878	138.879	2.8	10	NE of Blinman, SA.
20/05/2011	20:03:29	23.46	119.332	4.5	9	SW of Newman, WA.
20/05/2011	22:27	40.7	142.3	3.3	5	Southern Ocean
22/05/2011	18:16:18	33.261	139.33	2.6	10	E of Terowie, SA.
22/05/2011	1:40:31	33.2	119.328	2.5	10	SE of Newdegate, WA.
23/05/2011	13:47:13	26.002	131.424	3.2	0	SE of Yulara, SA.
24/05/2011	16:42:24	32.25	138.861	2.5	0	Bendelby Ranges, SA.
24/05/2011	16:13:56	35.63	147.428	2.6	0	Holbrook area, NSW.
24/05/2011	12:45:51	33.172	139.318	3.6	5	E of Terowie, SA.
24/05/2011	10:27:16	33.167	139.271	3.7	0	E of Terowie, SA.
25/05/2011	22:05:20	32.341	138.823	2.7	0	NE of Orroroo, SA.
26/05/2011	12:28:45	26.801	147.232	3.4	10	SE of Charleville, QLD.
28/05/2011	10:34:55	33.28	139.349	3.2	10	SE of Terowie, SA.
01/06/2011	3:29:04	37.49	142.425	3.8	2	Grampians National Park, Vic
17/06/2011	10:39:27	32.443	149.742	2.5	10	NE of Mudgee, NSW.
21/06/2011	20:03:26	25.292	113.481	3.1	0	W of Carnarvon, WA.
22/06/2011	13:03:53	33.813	135.232	2.7	0	Sheringa, SA.
26/06/2011	20:32:14	27.111	152.611	3	0	West of Mount Mee, QLD.
27/06/2011	22:18:34	25.283	115.643	3.5	0	SE of Gascoyne Junction, WA.
05/07/2011	17:03:09	38.45	145.835	3.3	3	Korumburra, Vic
05/07/2011	16:02:10	32.219	149.398	2.7	0	NW of Gulgong, NSW.
05/07/2011	9:16:26	38.412	145.806	3.7	6	Korumburra, Vic
05/07/2011	2:37:16	38.404	145.888	3.3	0	Korumburra, Vic
05/07/2011	1:32:11	38.412	145.839	4.4	2	Korumburra, Vic
07/07/2011	17:49:50	38.359	145.823	3	7	Korumburra, Vic

07/07/2011	20:59	42.2	147.1	2.9	10	Oatlands Tas
*07/07/2011	0:01:59	30.832	121.473	2.8	0	Kalgoorlie, WA.
10/07/2011	3:32:37	37.023	146.901	3.1	0	S of Bright, Vic
11/07/2011	19:39:58	20.051	116.135	3.5	33	NW of Dampier, WA.
11/07/2011	13:28:33	32.065	141.624	2.6	0	SE of Broken Hill, NSW.
11/07/2011	12:19:29	30.202	139.729	2.9	4	E of Leigh Creek, SA.
13/07/2011	16:30:12	29.968	139.721	2.9	4	NE of Arkaroola Village, SA.
14/07/2011	10:27:45	21.093	120.351	2.7	11	E of Marble Bar, WA.
14/07/2011	5:51:36	20.865	120.356	4.5	12	NE of Marble Bar, WA.
14/07/2011	2:35:53	33.165	114.173	3.4	0	W of Bunbury, WA.
15/07/2011	6:06:26	30.319	139.714	2.7	0	E of Arkaroola, SA.
17/07/2011	1:22:28	31.837	117.8	2.5	2	S of Kellerberrin, WA.
23/07/2011	20:47:55	31.945	138.788	2.8	20	E of Hawker, SA.
24/07/2011	13:16:30	23.533	114.557	3.2	10	SE of Giralia, WA.
*27/07/2011	4:02:42	30.573	121.529	3.3	0	Kalgoorlie, WA.
29/07/2011	3:37:30	29.604	143.839	3	15	NW of Bourke, NSW.
30/07/2011	23:10:48	31.277	117.991	2.5	2	NW of Merredin, WA.
30/07/2011	21:18:45	31.295	118.05	2.6	5	NW of Merredin, WA.
30/07/2011	14:27:02	31.288	118.074	2.6	0	Merredin area, WA.
31/07/2011	13:50:22	30.122	115.855	2.5	16	SW of Marchagee, WA.
02/08/2011	1:20:15	24.2	150.919	2.5	10	NE of Biloela, Qld
05/08/2011	10:55:56	33.252	118.719	2.6	10	SW of Newdegate, WA.
05/08/2011	9:58:29	33.227	118.852	2.7	10	SW of Newdegate, WA.
05/08/2011	9:47:50	33.201	118.915	2.7	10	SW of Newdegate, WA.
06/08/2011	8:23:45	33.243	118.831	2.5	2	SW of Newdegate, WA.
11/08/2011	17:53:52	18.698	127.42	2.6	4	SW of Halls Creek, WA.
18/08/2011	9:42:41	21.177	116.25	3.1	0	Near Mardie, WA.
18/08/2011	4:46:38	36.965	139.95	3.1	10	NE of Robe, SA.
28/08/2011	08:29	32.83	138.30	2.7	5	Melrose SA
29/08/2011	19:54:08	25.919	137.471	3.3	10	Near Poeppel's Corner, NT.
30/08/2011	2:42:13	25.943	137.378	3.4	10	Near Poeppel's Corner, NT.

* Probable rockburst in mine

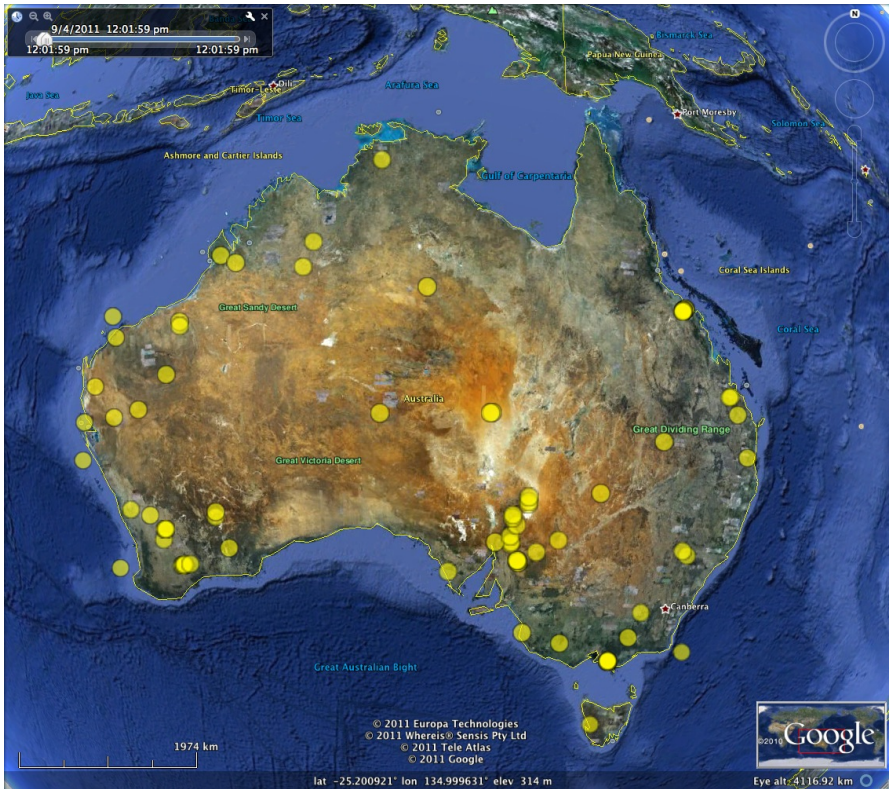


Figure Epicentre of earthquakes in the Australian region, M ≥ 2.5 and map from Geoscience Australia.