



# SAA Newsletter



#4/2023

**From the Editor** We encourage members to submit articles with an earthquake connection of interest to members but accepting they may be edited or not published, at the discretion of the editor, currently Kevin McCue. Contributions to: [mccue.kevin@gmail.com](mailto:mccue.kevin@gmail.com)

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## Major earthquakes worldwide, July - September 2023

The third quarter of the year saw one major shallow earthquake and one major deep earthquake, magnitude 7 or more, an average number.

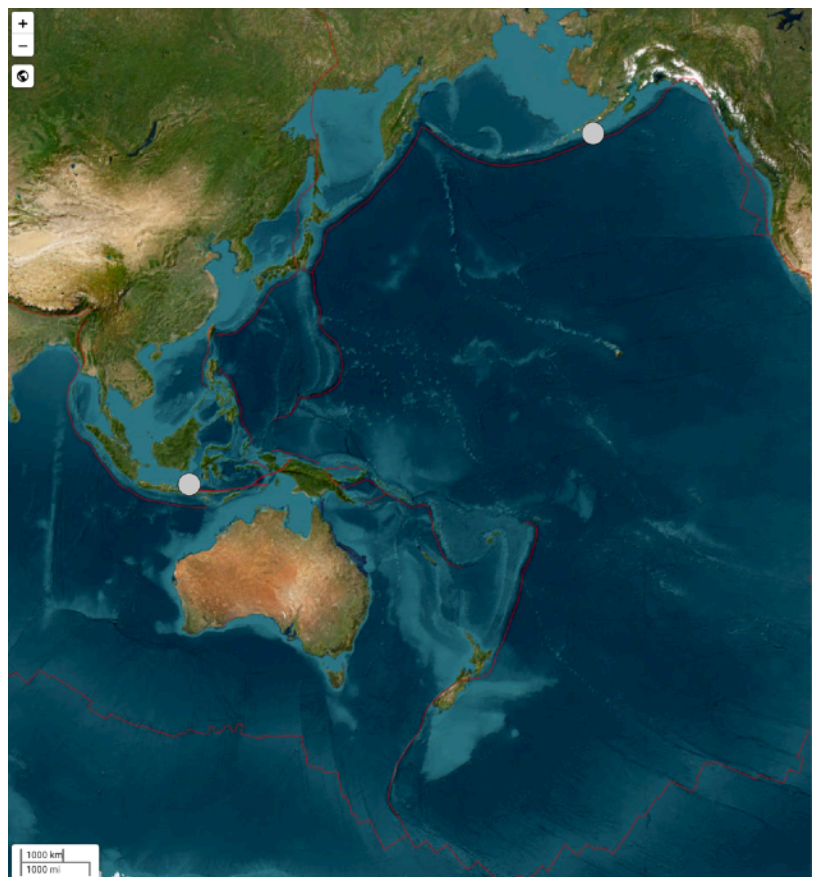
The 500km deep earthquake in Indonesia on 29 August, M7.1, rattled Darwin buildings enough for the ‘vigorous shaking’ to wake people on the 3rd floor of a hotel downtown.

In Bali, Indonesia tourists reported feeling their beds and hotels swaying at the time.

Residents at the Ramada Encore in Seminyak were evacuated into the streets while any damage was assessed and they waited for further information on potential aftershocks.

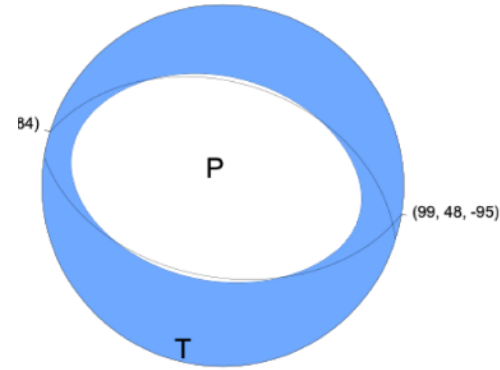
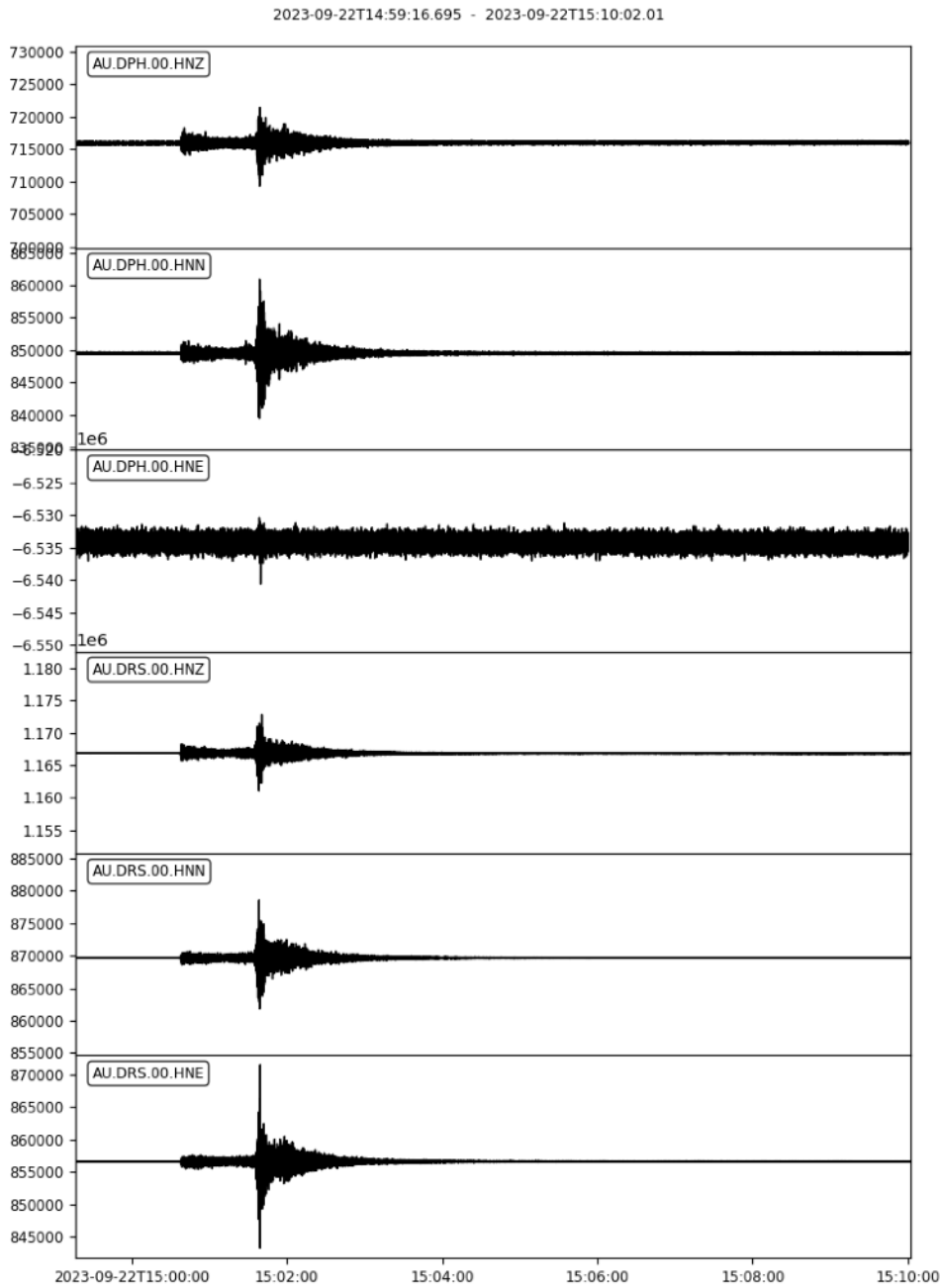
**Figure 1** Location of the World’s two major earthquakes,  $M \geq 7.0$ , July to September 2023, from the USGS.

The mechanism (Figure 2) from the USGS shown below is that of a normal fault with movement on an east-west



plane along the subduction zone.

Thanks to GA's Urban Monitoring Program, the ground shaking was recorded at two sites in Darwin, one on rock (DRS), the other on typical soil foundation (DPH) shown in Figure 3 below.



**Figure 2** (above) Focal mechanism from the USGS, maximum principal stress P direction is vertical, the minimum principal stress T direction is horizontal, details from the USGS.

**Figure 3** (left) Accelerograms from GA's two Darwin strong motion instruments located on the ground at free-field sites. The coda duration is about 2 minutes. The top trace of each recording is the vertical ground motion. The P and subsequent larger S waves are clear, the lack of surface waves is apparent.

The M7.2 Alaskan earthquake on 16 July was shallow but did not generate a tsunami, nor cause damage. The USGS focal mechanism is a typical thrust mechanism on a fault on the subduction zone. Hundreds of aftershocks were recorded.

**Table 1** Details of the two major earthquakes Worldwide in the 3rd quarter of 2023 (USGS).

Date	Time UTC	Lat	Long	Depth	Place
2023-08-29	05:55:30	6.789°S	116.521°E	510	Flores Sea East of Java
2023-07-16	16:48:21	54.393°N	160.762°W	25	Alaska



## Notes from the October 2023 IASPEI Newsletter

The July conference in Berlin had more than 5000 registered participants from 105 different countries. The scientific program consisted in total of 208 symposia with 5000 abstracts submitted. IASPEI organized 21 IASPEI Symposia and 9 Joint Symposia and contributed to 21 Joint Symposia organized by the other IUGG Associations. All abstracts of these 51 Symposia will be made available on the IASPEI Assembly webpage.

The IASPEI Medal 2023 was awarded during the Opening Plenary at the General Assembly in Berlin to

Harsh K. Gupta.

The 15th General Assembly of the Asian Seismological Commission (ASC) will be held in Antalya, Türkiye, November 2024.

The 39th General Assembly (GA) of the European Seismological Commission will be held at Corfu Holiday Palace, Corfu, Greece between 22 and 27 September 2024.

The 4th General Assembly of the African Seismological Commission (AfSC) will be held in South Africa in October 2024.

The following members of the IASPEI Bureau and the IASPEI Executive Committee were elected for the period 2023 – 2027.

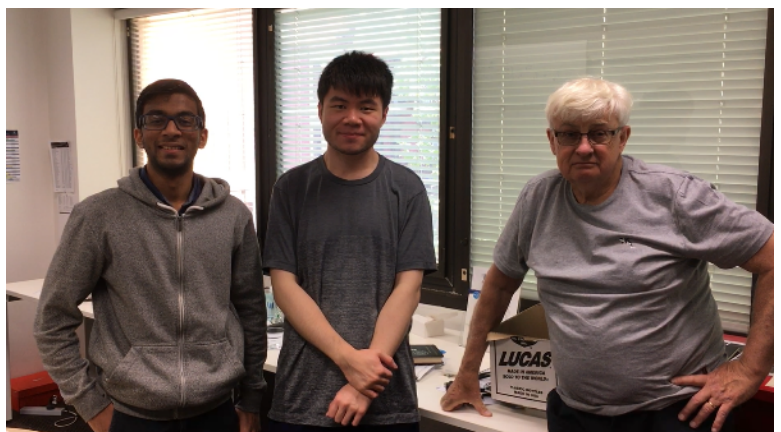
- President: Michelle GROBBELAAR (South Africa)
- 1st Vice-President: Li LI (China)
- 2nd Vice-President: Dmitry STORCHAK (UK)
- Secretary General / Treasurer: Johannes SCHWEITZER (Norway)
- Other IASPEI Executive Committee Members: Sergio BARRIENTOS (Chile), Fiona Ann DARBYSHIRE (Canada), Kenji SATAKE (Japan) (Past President), Christine THOMAS (Germany), and Hrvoje TKALČIĆ (Australia).

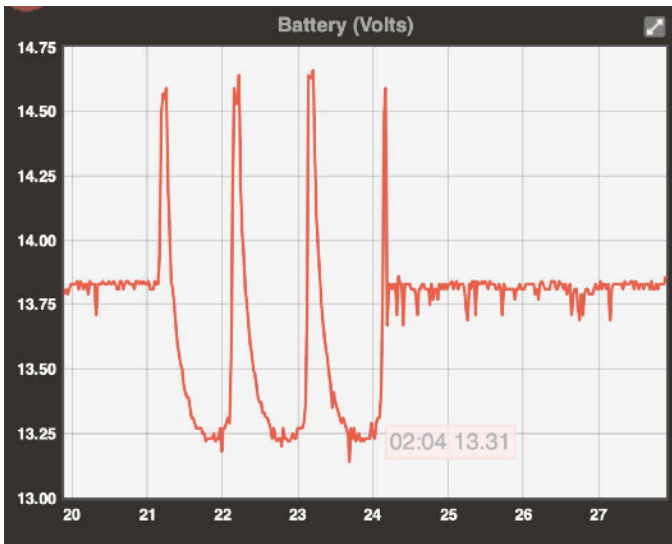
SAA congratulates ANU seismologist Dr Hrvoje Tkalčić on his election to this prestigious body.

## Monitoring the Nexus10 building (cont. p10)

David Love and Blair Lade

Blair with students John (left) and Vincent (centre), and the EchoPro recorder on the floor of the Nexus Building Adelaide University.



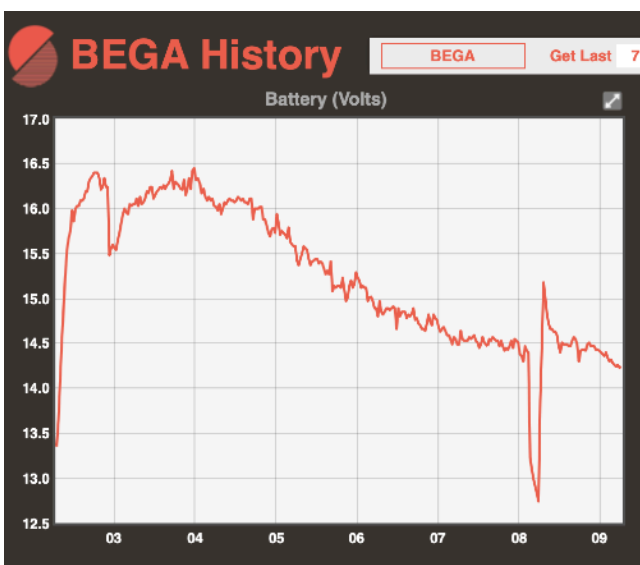


**Figure 4** Battery voltage RND A using solar

### Powering a seismograph

The above figure shows the voltage over several days at the RND A EchoPro seismograph station using a LiPo battery, 100w solar panel and commercial regulator. Not wishing to blow up the Echo a second time the solar panel/battery/regulator were replaced on the 24th with a standard 240V trickle charger and 7.5A gel cell. Compare that with the situation at BEGA. The battery and charger were replaced with a sealed lead acid battery and standard battery charger after apparent failure of the charger or battery. But later tests at home indicated that the 7.5A gel cell and charger were ok.

But the history of the new battery/charger system



**Figure 5** Battery voltage BEGA using battery charger

is hard to understand. What has happened here? First it charged up to nearly 16.5V, then the voltage slowly decayed until a sudden drop on the 8th, a rapid recovery and then back to the voltage decay curve at 14.2V. Any clues?

### Was it a bird, was it a plane, was it – a meteor?

#### Loud boom and ‘earthquake’ felt

On 7 August 2023, dozens of people across Melbourne claimed they felt the ground shake moments after what appeared to be a meteor was seen burning across the sky.

**Figure 6** Photograph of the ‘meteor’ over Melbourne.

The Australian Space Agency has confirmed that what caused the flashes of light seen across Victorian and Tasmanian skies is believed to be remnants of a Russian Soyuz-2 rocket re-entering the Earth’s atmosphere.

“Launch of the Soyuz-2 rocket occurred from Plesetsk Cosmodrome earlier in the evening. (Plesetsk Cosmodrome is a Russian spaceport located in Mirny, about 800 km north of Moscow and approximately 200 km south of Arkhangelsk, the cosmodrome dating back to 1957). According to Russian authorities the launch placed a new generation ‘GLONASS-K2’ global navigation



**Figure 6** The cause of the sonic boom.

atellite into orbit,” the agency said on social media.

**Figure 7** The Melbourne University Server shows the shock wave travelling across the Melbourne seismograph network.

The time is just after midnight local time or 14:00 UTC as shown in the figure.

“This launch was notified and remnants of the rocket were planned to safely re-enter the atmosphere into the ocean off the southeast coast of Tasmania.

“We will continue to monitor the outcomes of this re-entry with our government partners.”

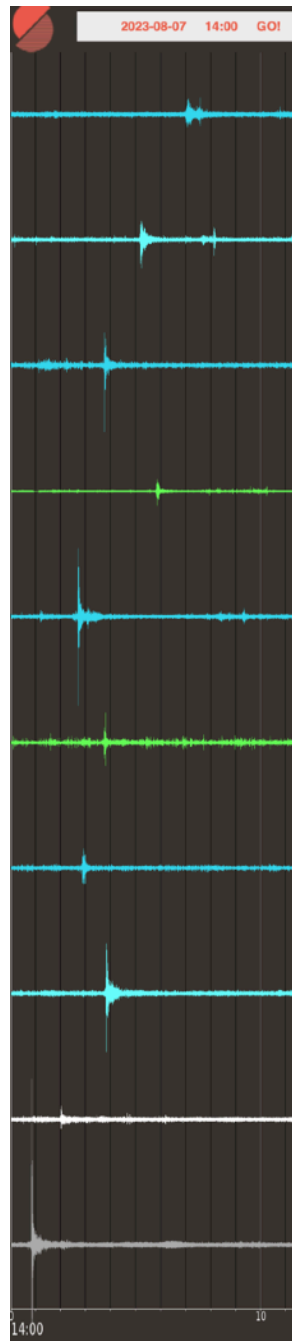
While most people posting to social media about the object were in Melbourne, residents in Geelong and Bendigo, and even some observers in Tasmania reported sightings.

“It was sort of like the start of a quake with window rattle but, no ground shake or extended time. Actually scared me,” one person said on Facebook.

### **Gnowangerup WA Earthquake, Felt in Perth 315km away**

An early morning earthquake on 6 August 2023 in WA’s South West rattled homes, and tall buildings as far away as Perth, and a Geoscience Australia seismologist warned that aftershocks were a possibility.

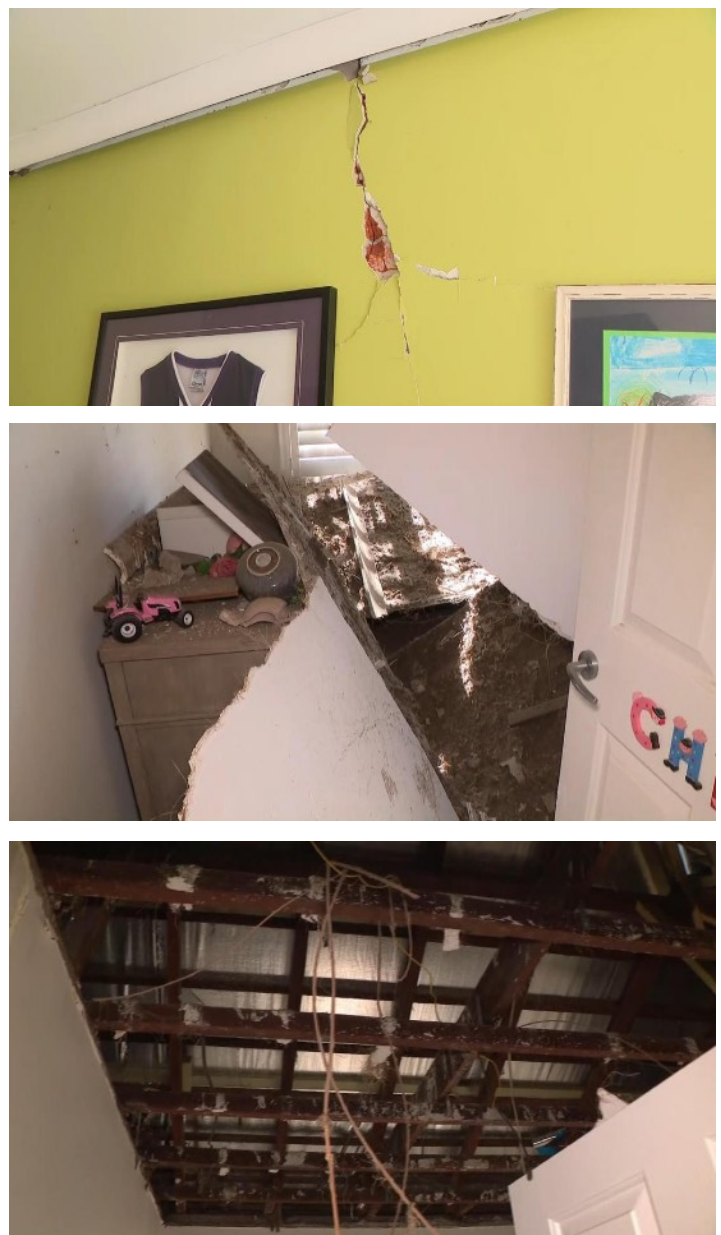
The shallow magnitude ML5.6 earthquake was recorded by GA at 5.34am on Sunday. Later GA assigned the magnitude to Mw5.0.



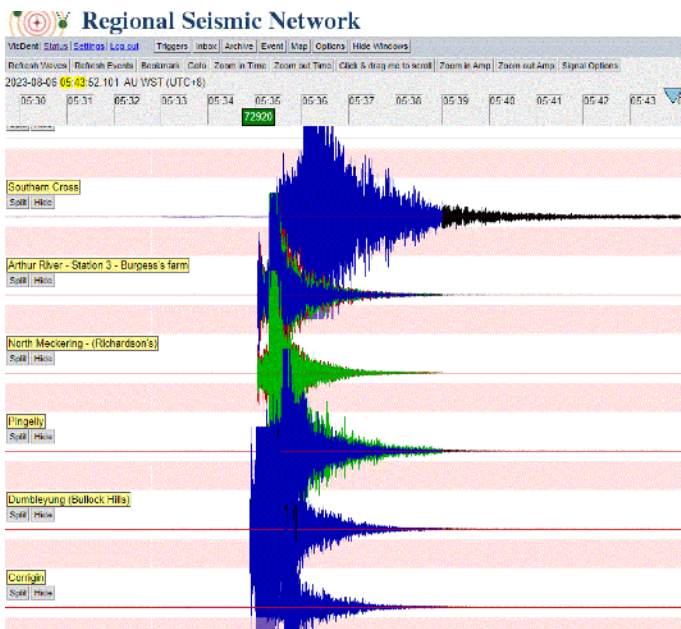
At the epicentre near the small town of Gnowangerup, between Katanning and Albany, Jo and Scott Hemley were jolted awake as they felt the earthquake.

Ms Hemley said plaster from the walls fell on to their faces. “It sounded like an explosion and everything shaking and we could hear everything crashing,” she said.

“We were jumping up running outside screaming get out of the house get out of the house. “From outside you’d never know anything was wrong — it’s completely intact. “But inside the house every single room is damaged.”



**Figure 8** Damage near Gnowangerup WA.



**Figure 9** Seismograms recorded by SAA member Vic Dent in the Southwest show the strong shaking at Dumbleyung (the closest seismograph about 80km away) through Meckering to Southern Cross.

## History – for SAA engineers

*Australian Town and Country Journal (Sydney, NSW : 1870 - 1919), Saturday 29 December 1888, page 26.*

### Some Mad Inventors

..... Another invention connected with house-building is the anti-earthquake spring. A house built on such a spring cannot, it is asserted, be upset or even seriously damaged by even the most violent earthquake; but it would, perhaps, sway inconveniently during a high wind.

(Ed. Note the date - that's 1888).

## Insurer wins dispute over earthquake damage claim

30 August 2023

<https://www.insurancenews.com.au/daily/insurer-wins-dispute-over-earthquake-damage-claim>

A Victorian homeowner who sought cover for cracking and movement damage to her property following an earthquake will not have her claim paid after a dispute ruling backed her insurer. The insured reported the damage following a 5.9 magnitude earthquake that hit the state in September 2021. She says the damage had a significant impact on the property's value and demanded QBE pay her \$260,000 for the loss, as

well as for costs associated with professional fees and denied access to temporary accommodation. QBE declined the claim following the findings of its engineer, referred to as MC, which reported the damage to be consistent with pre-existent issues relating to the soil moisture of the building's foundation that had been "exacerbated by inappropriate repairs and upgrades". MC noted that during the quake the property would have experienced weak to light shaking as per the Modified Mercalli Intensity (MMI) scale, which it says would have been "insufficient to cause the observed damage".

The engineer also highlighted that a property may experience "earthquake-induced damage", in which, following an event, pre-existing issues and faults are more likely to be exposed.

The insurer obtained a second report from an engineer called SE after the complainant disagreed with its claim denial decision. SE's report supported the initial findings, noting that the damage came from a "combination of factors" including undersized concrete footings, elevated moisture levels, and incorrect insulation of parts of the brickwork.

QBE also provided the opinion of a third engineer, referred to as RB, after the complaint had been filed with the Australian Financial Complaints Authority (AFCA).

RB reported that the loss had been "consistent with infiltration of water to the subfloor over a long period," and that the pattern and location of cracking had not been typical for earthquake damage.

The complainant's engineer, referred to as AD, provided its own report as well as two rebuttal reports to the insurer's experts, identifying the extensive movement in the property's internal and external framing as consistent with seismic activity.

The policyholder also relied on a statutory declaration from her builder, who identified the damage as "caused by extreme vibration or ground movement".

But AFCA says it was not convinced by the claimant's argument, noting that AD's responses to the insurer's experts failed to explain how the earthquake could have had such a devastating

impact given the distance from the quake's epicentre. "As the complainant's property was 126km from the epicentre, the shaking on the MMI scale would have been MMI III (weak) to MMI IV (light)," AFCA said. "AD has not addressed the MMI scale. Nor has it adequately explained how an earthquake could reasonably have caused the inconsistent pattern of damage at the property."

AFCA acknowledged that various factors, including the quake, may have played a role in the emergence of the cracking and movement but favoured the assessment of QBE and its experts in identifying the most likely cause of the loss.

"It is more likely than not the damage claimed is not due to the earthquake but is from excluded causes," AFCA said.

"Even if the damage was not observable before the earthquake, that is not enough of itself to prove the earthquake was the proximate cause."

"As MC, SE and RB indicate, it may have exacerbated pre-existing issues, but it was not the primary cause of damage. "The insurer is entitled to deny liability for the damage and the temporary accommodation costs sought."

The ruling also did not require the insurer to pay the costs associated with the claimant's professional fees.

### **Seismicity of South Australia, and Australia and Region, July - Sept 2023**

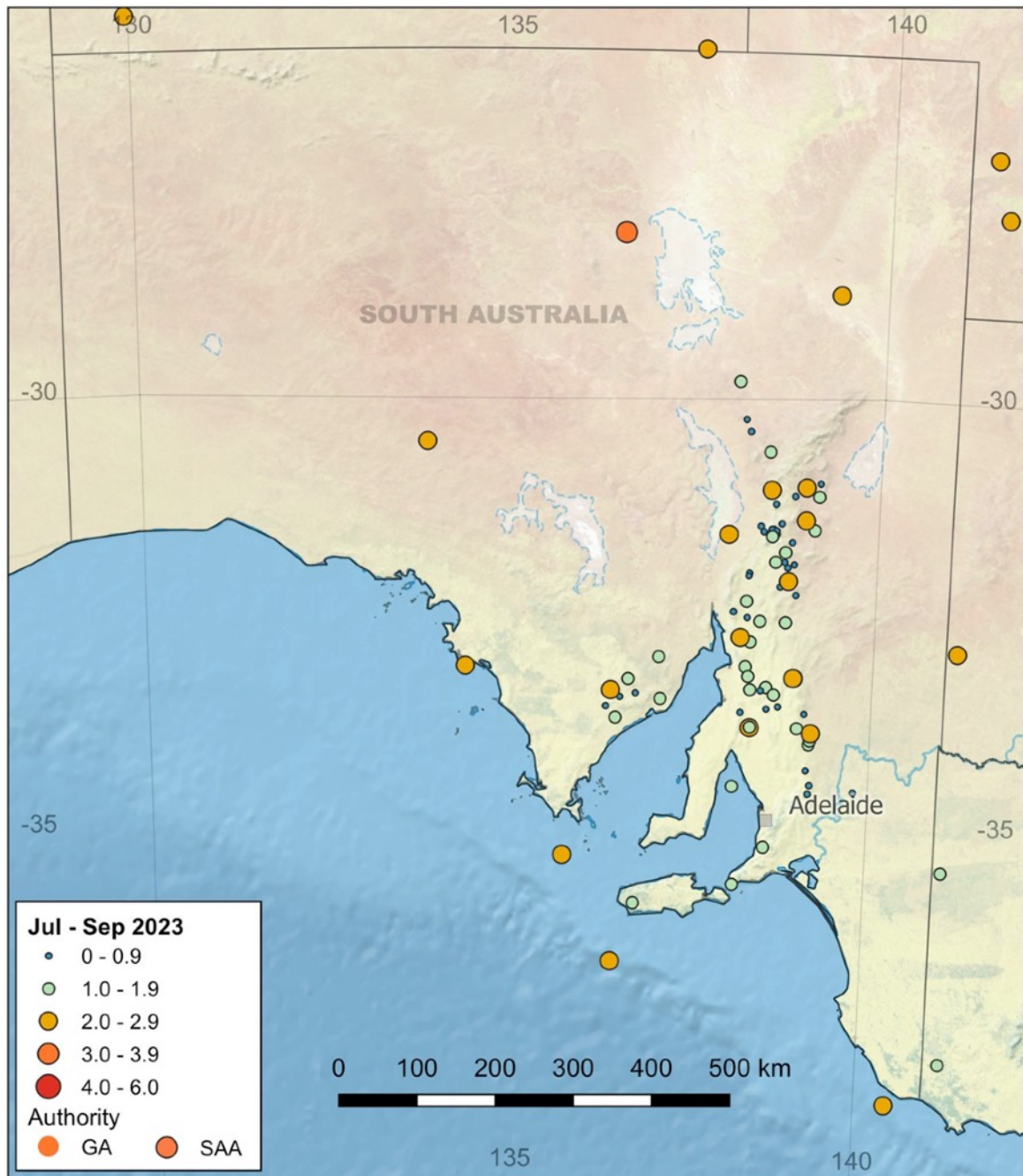
Once again thanks to Clive Collins for creating three interesting epicentre maps for the Newsletter for the third quarter of 2023.



**Photos** Damage from the M5 Otway Ranges earthquake of 22 October 2023. Near epicentre (top) and in Melbourne more than 100km away. Will the owners insurance company fob them off too?

**South Australia** The first of Clive's maps shows those earthquakes that were locatable in South Australia by SAA and GA. None of them were close enough or large enough to be felt in Adelaide. Most of the earthquakes occurred in the usual places, the Flinders and Mt Lofty Ranges, Eyre Peninsula but just a single event in the South-east. One of the interesting isolated events plotted on the map is that near Poeppel corner, the intersection of the SA, NT and Qld borders. Between 1937 and 1941 a series of large earthquakes struck this isolated region, the larger events relocated by Bruce Bolt in 1959. Apart from another large earthquake in 1972, the area has been mostly quiet.

**Australia** Epicentres are scattered across the continent, clearly more in the west than the east,



particularly few in Queensland. The largest earthquake in the quarter struck near Gnowangerup in the southwest of WA on 5 August at 21:36UTC, ML5.7, Mw5.0. See page 5 and an article on the SAA website by David Love about this earthquake:

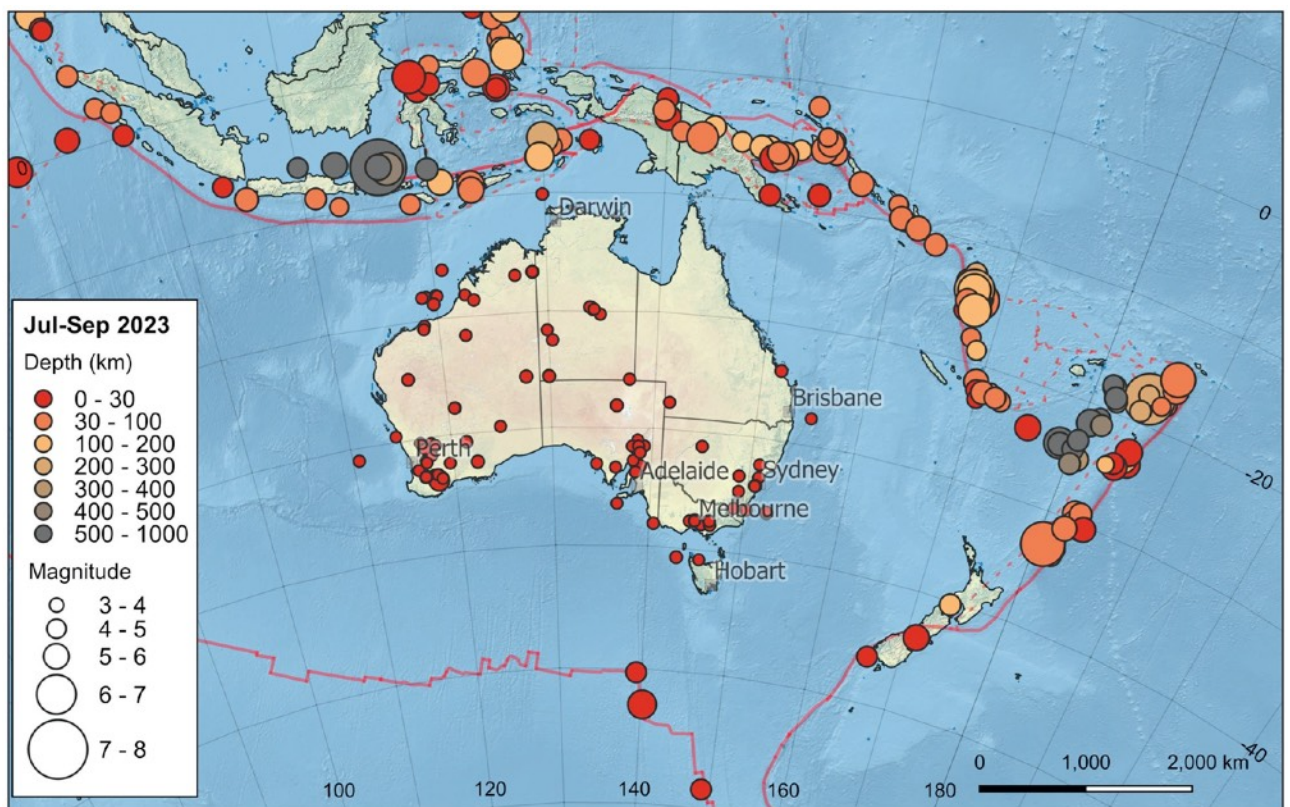
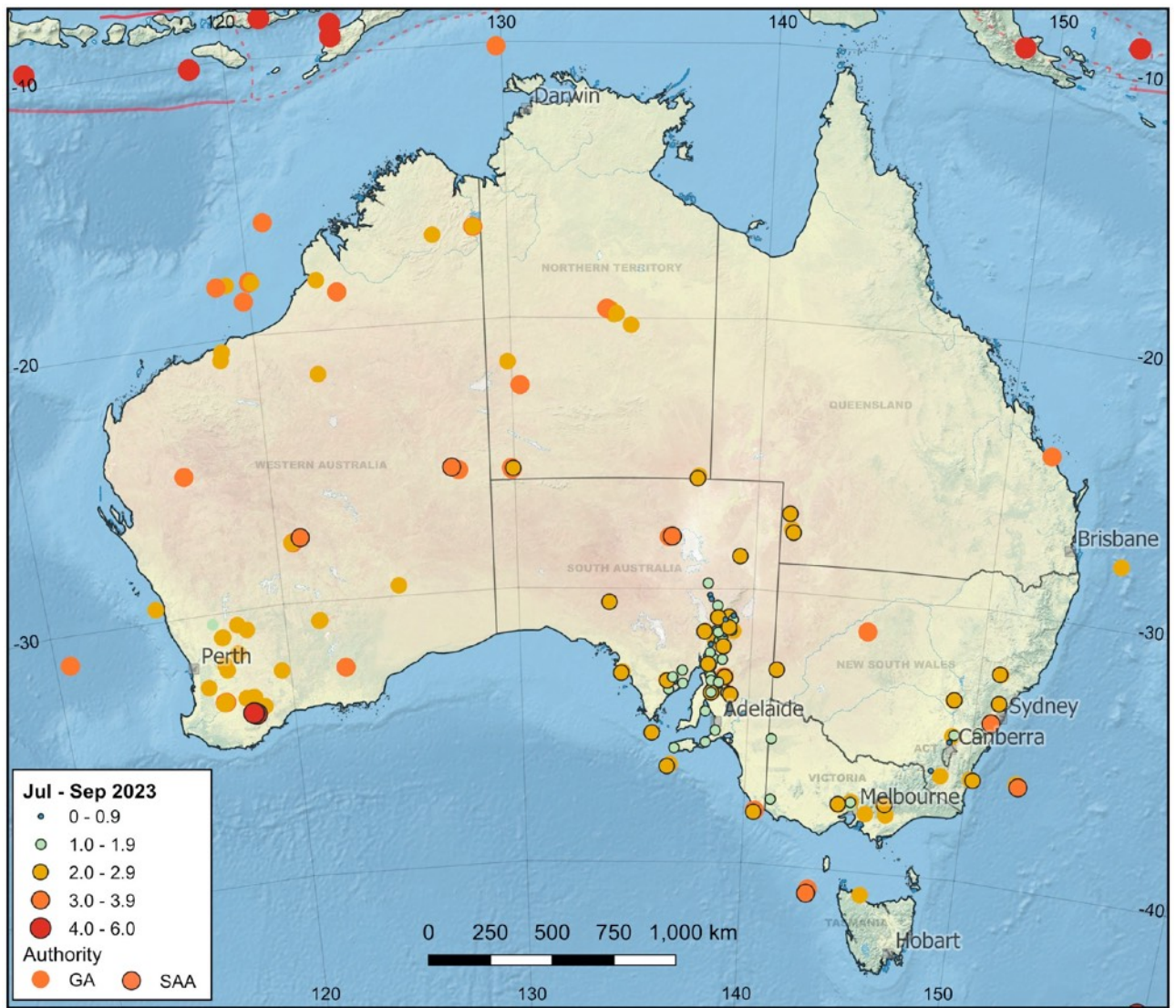
<https://earthquake.net.au/index.php/2023/08/10/gnowangerup-earthquake/>

**The Australian Plate boundary** The major earthquake in Indonesia on 29 August, felt in Darwin, has already been mentioned on page 1. Otherwise the epicentres shown in the third figure clearly outline the plate boundary north

and east of continental Australia. Does anyone still doubt the theory of Plate Tectonics?

The only part of Australia impacted directly by such earthquakes is Macquarie Island, south of Tasmania but Papua New Guinea is right in the collision zone with the Pacific Plate. Australia owes it to Papua New Guinea, and it is in Australia's best interest, to provide aid to maintain the seismograph networks and Geophysical Observatories in Port Moresby and Rabaul. Many Australian seismologists learned their trade in PNG and two Australian volcanologists died there, studying volcanoes for





our benefit.

## Monitoring the Nexus10 building

David Love and Blair Lade

Following the success of monitoring in the Schulz building (Newsletter #31 p3) we have managed a similar exercise in the University of Adelaide Nexus10 building on the corner of Pulteney Street and North Terrace. Although from an engineering point of view it was a similar exercise (spacing accelerometers throughout the building), nearly everything else about it was different. We hope that the resulting data will help in familiarising some engineers with the monitoring of buildings.

Instruments were placed in offices instead of passage-ways. This required more explanation and negotiation. It also required installation and removal during office hours. We were thankful to have two students (currently working on the Schulz building data) to help in the installation. Offices instead of passageways meant that security was not a problem as it was previously. We were able to run the instruments over two weekends and the week in between. The accelerometers were all placed on carpet instead of hard floors. This required some taping to make sure the stiff cables did not tip the accelerometers over. This time the windows all had metal blinds, meaning we needed to check the GPS signal strength. This turned out not to be a problem. Using offices meant we had 240V power to run the instruments as long as we liked. Unfortunately, a last minute change on the two instruments with lithium batteries saw these instruments fail after a couple of days.



EchoPro recorders.

Thanks are due to Melbourne University for the loan of accelerometers, to Jerry Vaculik and Terry Bennett for advising on the accelerometer layout, to David Bennett for safety tagging of all cables, to John and Vincent for installation help, and numerous people at the University of Adelaide for permissions and access.

**Figure 10** The Adelaide University's Nexus Building.

As with the previous exercise, all instruments were checked over a few days for any timing problems, and brief calibration checks were performed before and after.

The Nexus building is a fairly symmetric building, close to square in plan, with lifts and stairs in the centre. We placed accelerometers in the north-east and south-west corners of floors 3, 6, 10 and 13. We were not able to place anything at ground or basement level, for security issues and lack of GPS signal, however the Geoscience Australia site GHSS is less than 500m away.

CMG 5TC accelerometers were used, with

## AEES Conference 2023

The 2023 conference will be held in Brisbane, Queensland at "Capri by Fraser" (no virtual attendance) from midday on Thursday 23rd November 2023, wrapping up on Saturday the 25th in the late afternoon.

<https://aees.org.au/aees-conference-2023/>

For those interested in seismology, a meeting will be held at 10am on Thursday 23 November at the venue, with virtual access available to seismologists who are not attending AEES.