CREATING AN EARTHQUAKE CATALOGUE FOR 1911; LOCAL, NATIONAL AND WORLD.

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Abstract. New information is presented on earthquakes in the pre-modern-seismograph era – for 1911, based on Australian newspaper reports. Here we discuss a few earthquakes in (i) South Australia that add 7 events to the seemingly exhaustive catalogue of Dix (2013), and (ii) the whole of continental Australia where GA list just a single earthquake (in Tasmania) in 1911, and (iii) the World but only those reported from those same Australian newspaper sources. In Australia, newspapers are a better source for pre-1960 earthquakes than seismographs but the reverse is true in the world for large earthquakes, at least in 1911. It turned out to be an active year in all three areas searched.

Newspaper stories add pathos and details not to be found in bare catalogue or database listings.

INTRODUCTION.

Information on past Australian earthquakes is constantly being unearthed from various sources such as the National Library project Trove. This anecdotal information helps us get a feeling for the impact of those earthquakes on people and structures, usually not good. It helps us imagine what would happen today if these earthquakes were repeated in urban areas; inadequate building certification, poor foundations, many more buildings, larger and higher buildings with high occupancy, bigger schools and hospitals, more old buildings and infrastructure, complex communications systems etc. Such information extends the earthquake database backwards in time to better define source zones and the frequency of damaging or potentially damaging earthquakes. The data also help us improve risk assessments by identifying poor building performance.

We illustrate this by focussing on a year's earthquakes in South Australia and extend the torch beam on all of continental Australia and then the World – just from the Australian newspaper sources. The year chosen somewhat arbitrarily was 1911 after a visit by the author to Central Asia where he learned about a major shallow earthquake in 1911 that ruptured the ground surface along a section of the bus route. For another, the International Science Congress was held in Sydney in January 1911 including a meeting of Section A (Astronomy, Physics, and Mathematics).

The message is that we can and should learn from these past earthquakes rather than being constantly surprised when they happen.

The methodology hasn't changed from that described in numerous other reports by this author (2013, 2014, 2015) and others such as Everingham and others (1977) and Dix (2013), the object being to identify the date and time of an earthquake of interest and with enough newspaper reports, define the felt area to assess the epicentre (normally the centre of the felt area) and magnitude (the radius of the felt area used as a proxy for magnitude). Those are the minimum requirements of a database entry but human injuries, damage reports, secondary effects such as tsunami, landslides and liquefaction are also important to record.

SOUTH AUSTRALIA

After much lobbying from senior scientists in South Australia following 2 large damaging earthquakes in the state in 1897 and 1902, a seismograph was purchased and installed at Adelaide Observatory in 1909, just 2 years before our study year. A modern state seismograph network was installed over decades from the late 1950s but was closed by the state government in early 2017, handing over responsibility for advice and response to the Commonwealth Government more than 1000km away.

Reviewed earthquakes For the year 1911, the Geoscience Australia on-line database lists just a single Australian earthquake (Table 1), a magnitude 4.8 earthquake in Tasmania. One might think there had been none in South Australia whereas Dix (2013) lists 11 events in South Australia, 2 of them of magnitude 5 or more. Dix (2013) and McCue (2013) left a few crumbs for history buffs, as more data becomes available on Trove. We can add another 7 small, previously unknown earthquakes (Table 2), contribute more information on the largest earthquake there near Cleve in October, and improve the location and size of the Oodla Wirra earthquake on 19 February.

The Oodla Wirra earthquake With more newspapers scanned, the 19 February felt reports indicate that the felt area actually extended as far south as Adelaide suburbs and east to Morgan. The epicentre appears to have been west of Auburn, in a sparsely populated area near Hoyleton about 30km SSW of Oodla Wirra, the magnitude upgraded to 5 in reflection of its larger felt area.

The Cleve earthquakes The largest earthquake of 1911 in South Australia was, according to Dix's estimate page 169, that near Cleve on 26 October, its magnitude 5.5, the second of two earthquakes in 2 days that were widely felt across the central south of SA. We have found more newspaper reports that it was felt at Althorpe Island lighthouse off the tip of Yorke Peninsula, at Victor Harbour and other towns on Fleurieu Peninsula, and on Kangaroo Island. It was also reportedly felt at North Adelaide and Hahndorf, all of which slightly increase the felt area though we concur with a magnitude of 5.5.

An extract from *The North West Post* of Wednesday 1 November 1911 listed below, mentions that articles were thrown off shelves in Port Lincoln, Moonta and Maitland, and supports Dix's (2013) contention that both late-October earthquakes were epicentred near Cleve, a typical doublet.

Newly Discovered or Modified Earthquakes

1. February 13, MOUNT BRYAN. A slight earthquake was felt here yesterday at about 7.15 a.m.
2. March 12, CARRIETON. A sharp shock of an earthquake was felt here at 7 o'clock this evening, shaking the buildings and rattling the crockery.
3. May 13, WIRRABARA. A small earthquake was distinctly felt here at 4 a.m. (about 18:30 UTC on 13 May) when most people are asleep so even if it was immediately beneath the town it can't have been less than magnitude about 2.5.
4. June 20, CALTOWIE and LAURA. 'Sharp' was how an earthquake was described in both towns at 10.50pm local time (13.20 UTC) on Tuesday night, 20 June 1911. Coincidently, a meteorite was spotted above Blyth with an associated tremor an hour earlier. Dix (2013) lists a small earthquake at Appila on the same day, 20 June, but at 1.20 UTC i.e. 12 hours earlier – an easily made and common mistake. The four towns are all within about 30km distance of each other.
5. June 21, WIRRABARA. Another small earthquake struck the town on June 21 at 11 p.m., (13:30 UTC) and was described as very severe and the worst for several years. It was obviously more intense than that in May. It is possible that this date is incorrect and that this was the same event described on the previous night at Laura and Caltowie.
6. August 20, WAUKARINGA. On Sunday (August 20) at a few minutes past 4 o'clock in the afternoon (06:35 UTC) two distinct earth tremors were experienced following in close succession and felt within a radius of seven miles (11km) corresponding to a magnitude of about 2.6.
7. September 16, MOONTA. A series of severe earthshocks known locally as 'bumps' occurred at Taylor's shaft, Moonta Mines, during Saturday morning, the effects of which were felt all over the district, the same as an earth tremor. A few minor shocks having occurred the previous night. In the morning, suddenly, without warning, a deafening roar was heard and a considerable quantity of ground came away in the stopes, and the levels appeared to lift and fall with the force of the explosion. A couple of men were rather badly bruised by falling

stones, but none were seriously hurt. Further bumps occurred during the day and on Sunday. (This seismic event is definitely mine related).

8. November 8, APOINGA. Wednesday 8 November 1911. During the past two or three weeks we have reported several earth shocks of a slight nature, and since our last issue other light disturbances have been felt in different parts of the district. A visitor to the town on Friday said a very distinct shock was felt in the Apoinga district early on Thursday morning; he put the time down as between 4 and 5 o'clock. He said at the time there was not the slightest wind, and everything was remarkably still.
9. November 17, MOUNT SERLE (~30km E Leigh Ck and ~30km W Arkaroola). An earthquake shock was felt here on Friday 17th November about mid-day. It lasted for several seconds, and appeared to travel in a south-westerly direction.
10. November 22, APOINGA (NEAR BURRA). Early on Thursday morning, 22 November local time, between 4 and 5 o'clock, a very distinct shock was felt in the Apoinga district. This event seems to be part of an earthquake swarm in the district that started in October.

The level of earthquake activity in South Australia for 1911 is well above average with 2 of magnitude 5 or more and another almost magnitude 5, 11 of magnitude 3 or more compared with an expected once per year earthquake of 4.2 and an average of about 7 per year above magnitude 3. The largest earthquake observed, magnitude 5.5 is expected in South Australia only once every 20 years or so and in the whole of Australia about every second year.

In 1911 by contrast, the other States seem to have experienced fewer earthquakes than expected.

VICTORIA

Neither GA nor McCue (2015) listed earthquakes in Victoria in 1911 but some small ones, including a possible swarm, have been revealed in this search.

The first earthquake occurred near Melbourne, on Friday 5 January at 3:55 am local time. Residents of St. Kilda, Balaclava, South Yarra, and Prahran heard a loud rumbling, then a severe jolt in bed. The crockery rattled simultaneously, whilst carelessly placed articles fell to the floor. Windows shook violently and articles of furniture were also moved by the earth tremor. In some cases residents were so alarmed that they rushed into the streets.

This was a very local earthquake under the southeast suburbs of Melbourne, like the next one.

A distinct shock of earthquake was felt at Berwick (40km east of Melbourne in 1911 but incorporated into the city in the late 20th century) on Tuesday morning 7 March at 10 minutes past 2 o'clock in the morning local time.

The third earthquake, on 11 June, was felt distinctly by several residents in various parts of Geelong in the small hours of the morning. A South Geelong resident states that he distinctly heard the approaching rumble, and, as it passed, the windows of his villa shook violently. He was so certain that it was a seismic wave that he went out of doors to see if any damage had been done. At East Geelong another gentleman plainly noticed the

rumble, and said he feared the roof of his house was lifting. The night duty police in Moorabool-street agreed that it was not thunder because they heard shop windows rattle for several seconds. This shock was at about 12.30.

The following extract from the *Age* newspaper of Wednesday 5 April 1911, page 8 is included for interest only as no dates, times or magnitudes can be imputed to any of the sounds. It was possibly a local, small, very shallow earthquake swarm.

> *Mysterious sounds resembling explosions, heard in the Daylesford district, which could not be traced to mining or quarrying operations, are the subject of a report made to the Mines department by Mr. W. H. Ferguson, of the geological survey branch. The sounds were noticed at Shepherd's Flat, Yandoit and the Pickpocket diggings, between Clydesdale and Newstead. The sounds have been heard during the present year and for several years previously, either singly or two in rapid succession, and occur more frequently in wet weather. They are said by residents to come from a portion of the Yandoit Hills known as the Stony Rises, near a branch of the Green Gully Creek. People of the locality believe they are due to explosions of gas, and state that birds and rabbits supposed to have been suffocated by gas have been found in hollows of the ground. Noises like those described have been heard in many other countries, and are generally known as brontidi ("like thunder"); different names being given them in India, Japan and Netherlands (barisal guns, uninari and mistpoeffers). In some cases they precede earthquake shocks or volcanic eruptions. In Mr. Ferguson's opinion the Yandoit noises are brontidi. They seem to proceed from localities traversed by a belt of disturbed country with a thin surface crust, indications of which are given by mineral springs. It is possible that the noises originate along a fault line where movements, are yet taking place. Another possible explanation is the presence in the district of three extinct volcanoes, indicating a line of fracture of the earth's crust. The noises might be caused by explosions of steam in underground fissures or by lava forcing its way to the surface.*

TASMANIA

The only Australian earthquake in the GA and ISAC databases in 1911 was that in north-western Tasmania on 4 November at 11:30 am. It was widely reported in contemporary newspapers throughout Australia even though no damage was done. Michael-Leiba (1989) used newspaper reports to draw an isoseismal map for this earthquake from which she estimated the magnitude as 4.5 to 4.8. One of the contemporary newspapers out of Zeehan reports a strong earthquake shock experienced throughout western Tasmania at 11.30 am on Saturday. The earthquake shook buildings considerably, especially wooden structures and alarmed many people. Underground in the mines the effect was pronounced. In a private house crockery rolled off the dressers. Between three and four years earlier a somewhat similar shock occurred, and it was noticed that both shocks appeared to follow the contact rock line of country. Saturday's shock lasted about 15 sec.

Several far-sighted observations are made here; the shock was alarming though no damage was done - most buildings were of timber, it was felt by miners underground which contradicted the belief at the time, and the shaking was influenced by the geology or topography.

The following description from Riana, about 100km WNW Launceston, may involve several earthquakes. It is surprising that trees were seen shaking yet there were no felt reports from Launceston or Davenport.

North West Post (Formby, Tas. : 1887 - 1916), Monday 26 June 1911, page 2

RIANA

Earth Tremors. — Mr. M. D. Hallett writes under date July 21:— "….. At about quarter to 4 on Wednesday, I was busy fencing, when I heard a lot of stones tumbling into a shaft about 24 feet deep. A rumbling noise seemed to be under my feet like as if two stone crushers were working. It lasted for several seconds. Then again at about 4 o'clock another rumbling noise was heard. The trees were all in motion. The sound seemed be about 10 or 12 feet deep where I stood, and it was followed by a noise, like the fall of water on a main reef of white granite. I thought my last hour had come."

Another earthquake is described in The *Sydney Morning Herald* (NSW : 1842 - 1954), Monday 18 December 1911, page 8: The superintendent of the Eddystone Point lighthouse reports that a slight earth tremor, lasting about two seconds, and accompanied by a very loud noise, occurred at 10.20 p.m. on the 12th instant. The vibration was distinctly felt in the tower and quarters.

But there was an earlier earthquake reported in the print media, also in the northwest, on 27 February at 09:40 UTC. It was distinctly felt at Smithton and Stanley, quite strongly at Smithton if the report is to be believed – *like a large object falling against the buildings*.

NEW SOUTH WALES

McCue (2014) and others listed no earthquakes in 1911 in NSW but there were indeed several.

The first on Tuesday 30 May at 7.30 am was reported as ‘severe’ in Burrowa by the local newspaper but only ‘slight’ in the *Sydney Morning Herald*! Who to believe? The rumbling sound lasted 20 seconds according to the local paper but there are no reports of it being felt elsewhere.

The Bathurst Times, Monday 26 June 1911, page 2 reports a slight earthquake tremor at Spring Hill last week and some people assert that a rumbling sound was audible, but without a date or time, nothing can be done with it.

The *Daily Mercury* (Mackay, Qld. : 1906 - 1954), Wednesday 28 June 1911, page 5, mentions a swarm of earthquakes west of Sydney: Tuesday. Eleven distinct shocks of earthquake were felt at Talwood, near Milthorpe, 184 miles west from Sydney on Sunday night. The third shock was a severe one. Millthorpe and Talwood are between Orange and Bathurst where small earthquakes are not infrequent, and swarms have been recorded in the vicinity as recently as July 2017.

The Gundagai Times and Tumut, Adelong and Murrumbidgee District Advertiser of Friday 28 July 1911, on page 4 stated that a distinct shock of earthquake was experienced at Murrumburrah about 1 o'clock on Friday, 21 July. The windows in the Council Chambers rattled and trembled as if they would break. The weather was densely dark and perfectly calm at the time.

There were 2 seismographs in NSW in 1911, both in Sydney but neither was designed to record local earthquakes. On 12th January Father Pigot S.J. read a paper at the Science Congress in Sydney on the recent installation of a 500kg Mainka seismograph at Riverview Observatory, both horizontal components, to complement the existing 1000kg Weichert seismograph, also two components. The following day a delegation of about 120 attendees at the Congress visited the Observatory at Riverview.

Politics and science clashed even then. In December Father Pigot S.J. was disappointed to hear that the Russian government had rejected the British Embassy's application for him to undertake research in seismology at Pulkowa (Pulkovo) Observatory at St. Petersburg. Jesuits were then black-banned by the Soviet government.

Father Pigot was able to give the following interview in 1911 about the likelihood of future earthquake predictions:

Daily Telegraph (Sydney, NSW : 1883 - 1923), Friday 9 June 1911, page 9.

IS PREDICTION LIKELY?

Steps In That Direction. What Father Pigot Expects.

"Some of the most interesting earthquakes take place in the middle of the ocean," said Father Pigot, of Riverview Observatory, last night, "People sometimes say, 'It is only a submarine earthquake, and what is the use of it?' But that is a foolish way to look at the question. Earthquake shocks, wherever they occur, are most interesting to scientific men, and from a geological point of view it is extremely interesting to find out where are the weak spots on the land and in the ocean beds." "Seismology," observed Father Pigot, is a very young science. If it cannot now be said to be in its infancy, it is still in its childhood. Already an enormous amount of light has been thrown on the question of earthquakes, and no one can say what the results will be. "Will we ever be able to predict earthquakes? Well, I am not sanguine enough to say we will ever give an actual prediction, but it would be a great step towards it if we determine the weak points in the earth's crust. A great deal of patient investigation has been going on, and we may ultimately establish certain laws of recurrence of seismic disturbances. That, at least, is what we hope for."

QUEENSLAND

There were no seismographs in Queensland until 1935 despite a history of potentially damaging earthquakes along the east coast. The next two events are probably mine-related though not blasts.

Evening Telegraph (Charters Towers, Qld. : 1901 - 1921), Wednesday 5 April 1911, page 2.

EARTH TREMOR.

Another distinct tremor, though scarcely so violent as the last experienced some months ago, was felt on Charters Towers about 5.30 a.m. this morning. The effects were noticed at several widely separated points of the town.

Telegraph (Brisbane, Qld. : 1872 - 1947), Thursday 13 April 1911, page 9.

SEVERE EARTH TREMOR. A very severe earth tremor was experienced this morning (says the *Northern Miner*, Charters Towers, of 6th April). It was felt in many of the mines, and in the Brilliant Extended it was so severe that the men deserted the stopes for the levels. It is stated that several falls of earth occurred, and the timbering in places cracked under the strain. These tremors have been rather frequent of late.

This report is of man-made mining-induced tremors and whilst interesting cannot be considered a tectonic event. However the following report is of a typical earthquake near St George though assumed to be a meteorite by some without evidence and despite the time of day.

Balonne Beacon (St. George, Qld. : 1909 - 1954), Wednesday 2 August 1911, page 3.

A CURIOUS phenomenon occurred about 4.30 o'clock on Sunday afternoon when a loud explosion was distinctly heard immediately followed by a rumbling sound. The shock appeared to be travelling from north to south and was only of a few seconds duration, but it had the effect of frightening horses and cattle. The idea is that the cause of the disturbance was a falling meteorite; but there are others who are inclined to think there was also an earth tremor. One party who was driving in a buggy over a road he knew well relates that for a little distance, at the time of the occurrence the earth gave a distinct hollow sound, and the buggy appeared to be running over a large box drain lightly covered with earth. So impressed was the driver with the hollow sound that he turned and re-drove over that part of the road, with the idea of finding the cause, which was a failure. Other residents state that their houses shook with the disturbance.

NORTHERN TERRITORY

No newspaper reports were found of earthquakes in the Territory which is unusual for Darwin where, because of the proximity to Australia’s northern plate boundary, at least one earthquake per year is usually reported felt, if only by people in the taller buildings. The ISC lists no earthquake within 1000km of Darwin above magnitude 6.

WESTERN AUSTRALIA

A swarm of earthquakes near York initiated on 11 July and an earthquake in the Northwest, near Marble Bar, occurred on 30 July.

The Postmaster at Marble Bar telegraphed the Government Astronomer : "Heard rumbling sound and distinctly felt what is believed to be earthquake shock 7.30 Sunday evening. Lasted about twenty seconds." Telegram from Postmaster. Warrawoona "Earth

tremor about 7.30 p.m. Sunday evening." There was nothing recorded on the Perth seismograph so we can rule out a large earthquake to the north on the plate boundary. It must have been a small local event but big enough to last 20 seconds and be felt at places 75km apart.

The only earthquakes reported in local newspapers were in an energetic swarm near York and Northam in the South-west Seismic Zone, dozens of tremors were felt. At Quellington buildings were damaged and people were genuinely frightened, enough to think about leaving the district.

The first event notified occurred on 11 July, the last on 3 October.

The local people requested a visit by the Government Astronomer, Mr Cooke, the local expert who operated the Perth seismograph that was installed at the Observatory in 1901 (see report attachment). None of the swarm events were large enough to be recorded on the Milne seismograph as: *the period of swing of the boom is 14 seconds. It is thus tuned up to record the longer earth waves in accordance with the requirements of the seismological committee of the British Association for the Advancement of Science, and does not respond to the waves of shorter period due to small local earthquakes.* (from the *Advertiser* (Adelaide, SA : 1889 - 1931), Saturday 28 October 1911, page 18.)

They were occasionally felt out to 20 miles (32km, see map Figure 1) according to Mr Cooke and caused cracks in nearly every house in the district. Each quake starts with a sudden violent explosive noise followed by a rumbling noise, passing underfoot, accompanied by shaking of floor, cracking of buildings, rattle of crockery, etc. Each shock apparently lasts only a few seconds. A crack opened in the wall and a lot of plaster fell down. A window was smashed, and upon examination the walls were found to be cracked in several places. At the Government schoolhouse, built solidly of brick, Miss Kitchen saw a crack form during a shock, and this was found to be not merely a plaster crack but to go right through the wall.

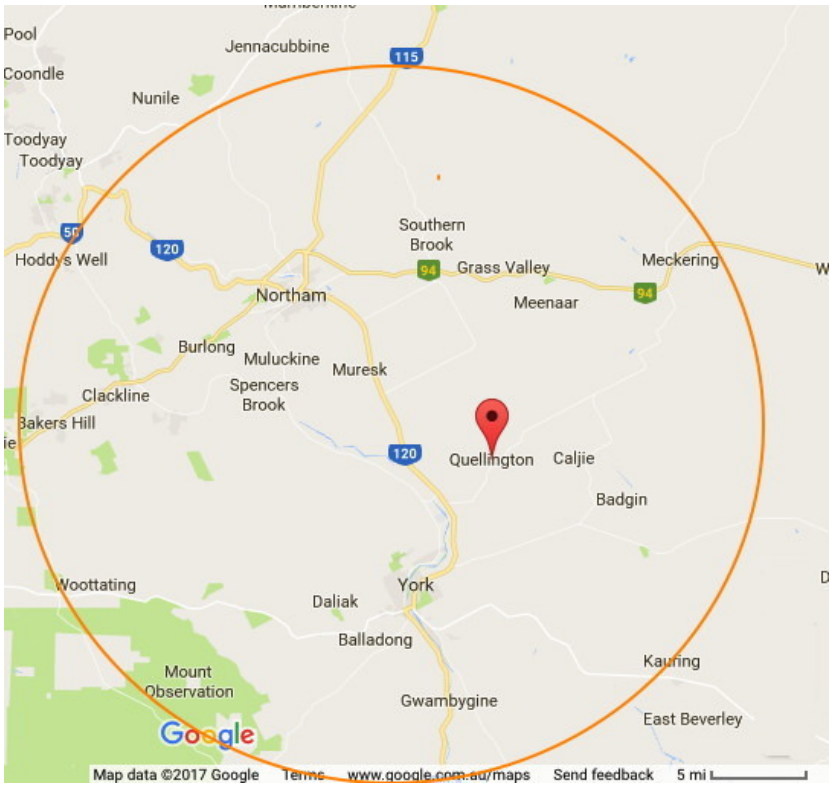


Figure 1. The orange circle outlines the approximate felt area of swarm events near Quellington, July-October 1911.

Notice that York, where some of the swarm events were felt, and Meckering, site of a magnitude 6.8 earthquake on 14 October 1968, are within that 20 mile radius. An earthquake felt over this distance would have a magnitude of about 3.5, an upper bound on the largest event of the swarm, but no less given the damage caused. Swarms are difficult to record in a database and people forget them quickly because they usually cause no damage and don't usually lead to larger earthquakes (the Northern Italy experience at L'Aquila on 2009 is a salutary lesson in prediction.)

THE WORLD

Large and damaging earthquakes worldwide in 1911 should have been incorporated into the ISC earthquake database. We have delved into Australian newspapers to see what was reported there and then compared it with the ISC catalogue, just for 1911.

The newspaper record includes earthquakes in the following countries: Turkestan (deaths and damage, surface faulting), New Zealand (buildings damaged, people killed), Turkey mosques down, Italy, Chile 20 dead, Mexico, San Francisco shaken, Greece damage, Philippines 400 dead, Hungary and Switzerland damaged, New Hebrides shaken.

The newspapers also report distant earthquakes recorded on local seismographs at Sydney, Melbourne, Adelaide, Perth and Christchurch, some with the P-phase arrival time. Some of these earthquakes are not listed by the ISC but a location could now be computed, and a magnitude determined if the station Bulletin can be found e.g.

Daily Telegraph (Sydney, NSW : 1883 - 1923), Monday 4 December 1911, page 13.

> *EARTHQUAKE.*
>
> *MELBOURNE, Sunday. — An examination of the seismograph at the Observatory yesterday gave a record of a sharp shock of earthquake on November 29. The recorded preliminary tremors began at 1.59 a.m., and at 2.6 a.m. the maximum waves occurred. The shock ceased altogether at 2.35 a.m. There were further shocks on the afternoon of the same day. The preliminary tremors began at 5.2 p.m., and the maximum amplitude was reached at 5.6 p.m. A minute later the disturbance ended. On November 30 a severe shock was recorded. The preliminary tremors began at 7.34 in the evening, and increased in force until 7.37 p.m., when four sharp distinct shocks were experienced. The disturbance ended at 7.49 p.m.*

Some of the large earthquakes were not reported in the newspapers (some were too deep to be felt strongly at the surface), others were reported in the newspapers that are not in the ISC listing but should be, the damaging earthquake in Belgium on 10 April for example.

A listing and map of M6.5+ earthquakes in the World in 1911 according to the ISC is included, the map plotted below, the listing appended. One great shallow earthquake occurred and there were 42 events of magnitude 6.5+, which is about average. From a glance at the map it is, in retrospect, a surprise that it took more than another 50 years before Plate Tectonics was conceived, more so that there were so many doubters, our own Professor Sam Carey an exponent of continental drift, most notably so.

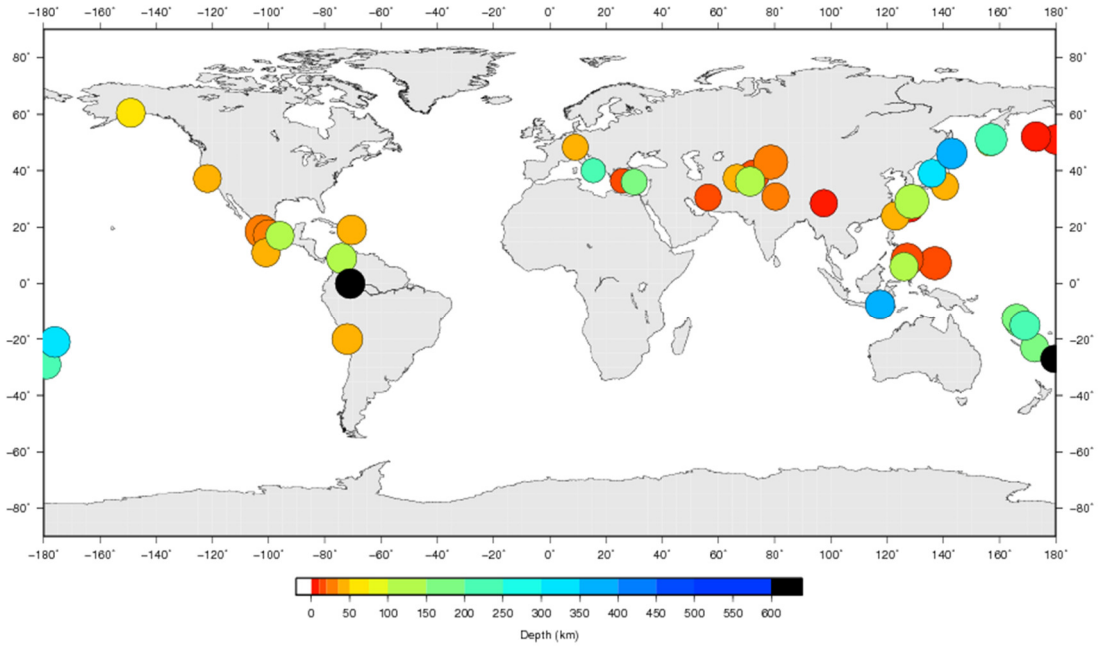


Figure 2 Magnitude 6.5+ earthquakes worldwide, 1911 according to the ISC.

Below are the listed ISC earthquakes with the accompanying Australian newspaper story, or a story with no ISC listing, or vice versa.

The largest shallow earthquake of the year occurred on 3 January north of Lake Issyk-Kul in what was then Russian Turkestan, its magnitude about Mw 7.8. Russian teams organised rescue and rehabilitation and reconnaissance mapping soon after the earthquake but information has only started to become more widely available since Central Asian countries were given their independence in 1991. Significant surface rupture was observed on six separate fault segments (Fugure 3) for about 175 ±25km through and along the Tien Shan mountains where there were multiple landslides (Arrowsmith and others, 2016).

The earthquake, surface faulting, landslides and large aftershocks through to March were widely reported in Australian newspapers as was the death toll of 450 and that 770 masonry buildings had been destroyed in Almaty.

DISCUSSION

The publicly-accessible media can contribute invaluable information to allow the reconstruction of historical, viable, earthquake databases. Such data can and should be used for earthquake hazard analyses, both PSHA and deterministic.

How rigorous are hazard assessments that don't include historical earthquakes can be assessed by the Australian example; northeastern Tasmania is rated very low hazard using just the instrumental data post-1960 whereas history shows that the area has the highest number of large magnitude 6 or greater earthquakes in eastern Australia prior to 1946, the sequence akin to Christchurch New Zealand post-2009. It is interesting that a damaging earthquake struck Canterbury NZ in 1911 but is not mentioned by Downes (1995), and

that it and other earthquakes causing damage in Christchurch seem to have had no impact on earthquake design there.

It is puzzling that some Australian earthquakes clearly described, analysed and published are not on the GA database, and other large distant earthquakes recorded on early Australian seismographs have not been located and added to the ISC database.

Table 1 Australian earthquakes (except South Australia), 1911. The 4 November earthquake the only Australian earthquake listed for the year by Geoscience Australia.

Date	UTC Time	Lat	Long	M	Place	Reference
1911 01 04	17:55	-37.9	144.9	2.5	Melbourne Vic	This paper
1911 02 27	09:40	-40.8	145.2	3.0	NW Coast Tas	This paper
1911 03 06	16:10	-38.03	145.34	2.5	Berwick Vic	This paper
1911 04 04	19:30	-20.1	146.25	2.5	Charters Towers Qld	This paper
1911 04 06		-20.1	146.25	3.2	Charters Towers Qld	This paper
1911 05 29	21:30	-34.4	148.7	2.5	Burrowa NSW	This paper
1911 06 10	14:30	-38.2	144.4	2.5	Geelong Vic	This paper
1911 06 25	-	-33.5	149.1	3.0	Talwood NSW	This paper
1911 07 21	03:00	-34.5	148.4	3.0	Murrumburrah NSW	This paper
1911 07 30	06:30	-28.0	148.6	3.0	St George Qld	This paper
1911 07 30	11:30	-21.2	119.7	4.0	Marble Bar WA	This paper
1911 09 30	-	-31.7	116.8	3.0	Quellington WA	This paper
1911 11 04	01:27	-42.1	145.1	4.8	West Coast Tas	Leiba, 1989
1911 12 12	12:20	-43.9	147.0	3.0	Eddystone Light Tasmania	This paper

Table 2 South Australian earthquakes, 1911, mostly from Dix (2013)

1911 01 15	21:24	-32.23	138.71	3.1	Carrieton	Dix
1911 01 27	12:30	-34.03	138.68	3.6	Auburn	Dix
1911 02 11	21:45	-33.6	138.9	2.5	Mt Bryan	This paper
1911 02 19	13:42:30	-34.0	138.5	5.0	Oodla Wirra/Auburn	Dix/This paper
1911 03 28	07:58	-34.09	139.17	3.1	Eudunda	Dix
1911 05 13	18:30	-33.03	138.27	2.5	Wirrabara	This paper
1911 06 20	13:20	-33.03	138.43	3.6	Caltowie and Laura	This paper
1911 06 21	13:20	-33.03	138.27	2.6	Wirrabara	This paper
1911 08 14	-	-34.15	138.42	2.8	Mt Templeton	Dix
1911 08 20	06:35	-32.30	139.44	2.6	Waukaringa	This paper
1911 09 06	04:40	-35.78	137.88	3.3	Penneshaw	Dix
1911 09 18	11:34	-33.05	138.43	3.6	Appila	Dix
1911 10 24	12:10	-33.92	136.73	4.8	Cleve	Dix

1911 10 26	09:40	-34.0	136.6	5.5	Cleve	Dix
1911 11 17	02:30	-30.4	138.8	3.0	Mt Serle	This paper
1911 11 21	19:00	-33.85	138.97	2.5	Apoinga swarm	This paper
1911 12 03	21:42	-30.07	138.28	3.1	Farina	Dix

REFERENCES

Ambraseys, N.N. 1985. Magnitude Assessment of Northwestern European Earthquakes. Earthq. Engng struct. Dyn. 1985, 13, pp. 307- 320.

Arrowsmith, J. R.; Crosby, C. J.; Korjenkov, A. M.; Mamyrov, E.; Povolotskaya, I. Surface rupture of the 1911 Kebin (Chon-Kemin) earthquake, Northern Tien Shan, Kyrgyzstan. Geological Society, London, Special Publications, 432, 20 July 2016, https://doi.org/10.1144/SP432.10.

Dix, K.L. 2013. South Australian Historical Earthquakes in the Pre-instrumental Period 1837-1963: A Comprehensive Chronicle and Analysis of Available Intensity Data. Thesis submitted for the degree of Master of Philosophy, University of Adelaide, South Australia.

Downes, G.L. 1995. Atlas of Isoseismal Maps of New Zealand Earthquakes. Institute of Geological and Nuclear Sciences Ltd., Monograph 11, 304 pp. Lower Hutt NZ.

Everingham, I.B., McEwin, A.J., and Denham, D., 1982. Atlas of isoseismal maps of Australian earthquakes. Bureau of Mineral Resources, Australia, Bulletin 214.

Kondorskaya N.V. and N.V. Shebalin, eds. 1982. New Catalog of Strong Earthquakes in the U.S.S.R. from Ancient Times through 1977, NOAA National Geophysical Data Center Report SE-31, Boulder, Colorado, 1982. (Update and English translation of Noviy Katalog Sil'nykh Zemlyetryaseniy na Territoriy SSSR s Drevneyshikh Vremyen do 1975 g., USSR Academy of Sciences, Moscow, 1977.)

Leiba, M.O., 1989. Macroseismic effects, locations and magnitudes of some early Tasmanian earthquakes. BMR Journal of Australian Geology and Geophysics, 11, 89- 99.

McCue, K.F. 2013 – Historical Earthquakes in the Northern Territory. www.aees.org.au/articles/page/9.

McCue, K.F. 2013 – Historical Earthquakes in South Australia. www.aees.org.au/articles/page/10.

McCue, K.F. 2014 – Historical Earthquakes in NSW. www.aees.org.au/articles/page/3

McCue, K.F. 2014 – Historical Earthquakes in Western Australia. www.aees.org.au/articles/page/8.

McCue, K.F. 2015 – Historical Earthquakes in Tasmania. www.aees.org.au/articles/page/2.

McCue, K.F. 2015 – Historical Earthquakes in Victoria. www.aees.org.au/articles/page/2.

Felt Reports South Australia (not listed by Dix (2013), or largely altered)

Advertiser (Adelaide, SA : 1889 - 1931), Wednesday 15 February 1911, page 11.

THE COUNTRY.

EARTHQUAKE AT MOUNT BRYAN.

MOUNT BRYAN, February 13.—Splendid rain fell last week, and the country is looking nice and green. Farmers have commenced breaking down the fallow in preparation for seeding. Wheat continues to be brought to the railway-station, but the rush is over.—A slight earthquake was felt here yesterday at about 7.15 a.m.

Advertiser (Adelaide, SA : 1889 - 1931), Wednesday 22 February 1911, page 14.

THE COUNTRY.

AN EARTHQUAKE SHOCK.

Our correspondents at Springton, Echunga, Palmer, Mount Bryan, Stockwell, Watervale, Hallett, Mintaro Central, Port Germein, Everard Central, and Whyte-Yarcowie state that they felt the earthquake shock on Sunday evening.

Advertiser (Adelaide, SA : 1889 - 1931), Monday 20 February 1911, page 8

AN EARTHQUAKE SHOCK.

At about 13 minutes past 11 o'clock on Sunday night an earthquake shock was experienced in Adelaide, and it was severe enough to shake crockery and furniture in houses. The movement was distinctly felt in "The Advertiser" office, and within five minutes telephone messages were received from the south and western suburbs enquiring whether the shock had been noticed. One resident of Mile-End was sitting in a chair reading, when he heard the rumbling noise, and almost immediately afterwards felt his chair swaying from east to west. He realised at once what was the cause of the trouble, when the shock became more intense and articles on shelves in the house and on cupboards began to rattle. He has an aviary full of small birds, and when he went outside the birds were in a state of wild excitement, evidently having been frightened off their perches by the severe shaking of the cage. The shock was one of the most distinct felt in Adelaide for some years. At both the old and the new telephone exchanges the boards shook violently, and at Port Adelaide shutters fell. Fortunately no damage resulted, and there was no dislocation of the service. From all parts of the city and suburbs, anxious

enquiries were made by subscribers, and for half an hour afterward the officers on duty had only a few seconds of spare time.

Advertiser (Adelaide, SA : 1889 - 1931), Tuesday 21 February 1911, page 10

EARTHQUAKE SHOCKS. FELT THROUGHOUT THE STATE.

The seismic disturbance felt at Adelaide at about 11.15 on Sunday night appears to have been experienced over a considerable portion of South Australia, The duration of the shock was probably from 10 to 20 seconds. Many people are reported to have been awakened from slumber by the unusual occurrence, and not a few were more or less frightened by the uncanny rattling of crockery, windows, and various articles of household furniture. As far as can be ascertained, however, no serious damage has resulted. The tremors were not nearly so violent as those which occurred in this State in 1897 and 1902, the centres of which disturbances were considered to be a point in the ocean at the entrance to St. Vincent Gulf and Robe respectively.

Apparently Sunday night's shock was purely a local one. That is the opinion held by the Assistant Government Astronomer (Mr. W. L. Brown). A curious feature is that while it was felt most distinctly in some parts of the metropolitan area, people who were abroad at the time in other suburbs were unaware that anything uncommon had happened. At the Observatory, on West-terrace, the officials noticed nothing in the way of a shock, but at the Central Telephone Exchange business was temporarily interfered with. A resident of Woodville heard a rumbling sound shortly after 11 o'clock, which he thought was caused by a passing tram, but when his daughter, who was in an adjoining room, screamed and complained of having been disturbed by her bed vibrating, he concluded that an earth tremor was responsible for her fright. The superintendent of the Magill Reformatory (Mr. J. F. Button) was aroused from his slumbers by a severe earth shock, and another officer of that institution had a like experience.

About 40 or 50 telegraphic messages were received by the Meteorological Department, intimating that the shock had been felt over a wide area. The reports to hand are somewhat conflicting as to the apparent direction of the tremors, and the Assistant Government Astronomer prefers to wait for further particulars before expressing an opinion as to the probable centre of the disturbance. The telegrams show, however, that the greater part of the Mount Lofty Ranges was affected as far south as Strathalbyn. The whole of the Adelaide Plains were visited, and the northern agricultural areas up to Hammond and Petersburg. Shocks were also notified as far east as Morgan, and west as far as the Spencer's Gulf side of Yorke Peninsula, the mining towns being included among the places where the tremor was felt.

Mr. Brown reported on Monday afternoon that he had developed the seismographic record, and found that a very slight disturbance had been recorded at 12½ minutes past 11 o'clock on Sunday night. It lasted for about 30 seconds, and was evidently connected with the tremors experienced locally. The seismograph, he said, was specially designed for recording distant earthquakes, including submarine disturbances, which were not felt in Adelaide. For instance, the Adelaide seismograph gave a capital record of the devastating Turkestan earthquake, which recently did great damage on the other side of the globe.

SHOCKS IN THE COUNTRY.

SEVERE TREMORS FELT.

Letters received on Monday from our correspondents in various parts of the State showed that the shock had been felt over a wide area. Some of the correspondents compared the tremor to the sound of heavily-laden waggons dashing along the road. The residents in many of the country centres considered it the most severe ever recorded in their districts. At Oodla Wirra the schoolhouse, which has a foundation of solid rock, was seen to rock to and fro. The accompanying indications in the majority of cases were rattling windows and crockery. Country folk who retire early were awakened from their peaceful slumbers, and many made a hurried exit from their dwellings. The shock was severe in many places as to cause clocks to stop and doors to bang. Two distinct shocks were felt at Bute, with about 10 seconds intervening. At Eudunda, where the vibration was intense, it lasted, according to our correspondent, more than two minutes. In many of the country towns the residents who had been awakened gathered in awe-stricken groups in the main thoroughfares and eagerly discussed the experience. The names of the towns from which we have up to the present received word of the shock are as follow:—Callington, Aberdeen, Terowie, Belalie North, Oodla Wirra, Wirrabara, Nuriootpa, Spalding, Mount Barker, Balaklava, Woodside, Blyth, Koolunga, Burra, Yacka, Snowtown, Crystal Brook, Bute, Hamilton, Kapunda, Lyndoch, Eudunda, Greenock, Clare, Riverton, Waterloo, Hamley Bridge, Port Wakefield, Robertstown, Yorketown, Caltowie, Georgetown, Auburn, Kadina, Balhannah, Petersburg, and Yongala.

Daily Herald (Adelaide, SA : 1910 - 1924), Monday 20 February 1911, page 4

EARTHQUAKE SHOCK. RESIDENTS ALARMED.

CITY AND SUBURBS AFFECTED.

The inhabitants of Parkside, Payneham, North terrace, and College Park were somewhat alarmed by an earthquake shock which for some 10 seconds perturbed those who were not yet in bed. Furniture, and bedsteads are reported to have been shaken to an appreciable extent, and at the G.P.O. the switchboards in the operating room were also shaken.

Advertiser (Adelaide, SA : 1889 - 1931), Wednesday 22 February 1911, page 14

THE COUNTRY.

AN EARTHQUAKE SHOCK.

Our correspondents at Springton, Echunga, Palmer, Mount Bryan, Stockwell, Watervale, Hallett, Mintaro Central, Port Germein, Everard Central, and Whyte-Yarcowie state that they felt the earthquake shock on Sunday evening.

Quorn Mercury (SA : 1895 - 1954), Friday 24 February 1911, page 2

Petersburg News.

EARTH TREMOR.—On Sunday night last the residents of Petersburg, in common with many other places, were startled by what sounded like a rising wind accompanied by rain and a rumbling noise similar to thunder. Most people rushed to close doors and windows but before anything could be done the rattling of crockery and the creaking of furniture made it evident that a severe earth tremor was passing.

Kapunda Herald (SA : 1878 - 1951), Friday 24 February 1911, page 3

Eudunda

A severe earthquake shock was felt about 11.15 p.m. on Sunday. It appeared to be travelling from west to east. Crockery on shelves was shaken. This is the most severe shock that has been experienced here for years.

Daily Herald (Adelaide, SA : 1910 - 1924), Tuesday 21 February 1911, page 3

THE COUNTRY.

Riverton, February 20.—A severe shock of earthquake occurred last night at 11.11 o'clock. The residents were much alarmed.

MORGAN, February 20.—A sharp shock of earthquake was experienced here at about 20 minutes past 11 last night. It lasted about 15 seconds. Sitting on a chair, the sensation was one of being jolted. It shook the beds and crockeryware, and things on mantelpieces rattled considerably. It appeared to travel from south-west to north-east.

Areas' Express (Booyoolee, SA : 1877 - 1948), Friday 19 May 1911, page 3

WIRRABARA, May 14.

The rumbling of an earthquake, was distinctly heard here this morning at about 4 o'clock.

Daily Herald (Adelaide, SA : 1910 - 1924), Monday 26 June 1911, page 3.

WIRRABARA, (Thursday) June 22.— Last night at 11 o'clock a very severe shock of earthquake was experienced here. It was the most severe tremor that has visited us for some years, and appeared to be travelling in a north-easterly direction.

Areas' Express (Booyoolee, SA : 1877 - 1948), Friday 23 June 1911, page 3.

CALTOWIE, (Wednesday) June 21. Earthquake. At 10.50 on Tuesday night a sharp shock of earthquake was felt by several residents of the town. No particulars as to the direction can be obtained. Duration was about 20 seconds.

Laura Standard (SA : 1889 - 1917), Friday 23 June 1911, page 2.

A sharp shock of earthquake was felt in Laura on Tuesday night at 10.50 p.m. Buildings shook and windows rattled in a very uncanny manner.

Daily Herald (Adelaide, SA : 1910 - 1924), Saturday 26 August 1911, page 15

WAUKARINGA

Wednesday, August 23.

Earth Tremors.

On Sunday last at a few minutes past 4 o'clock in the afternoon two distinct earth tremors were experienced here, following in close succession. Inhabitants within a radius of seven miles also felt the shocks at about the same time. A low rumbling noise preceded the slight shaking of buildings.

Observer (Adelaide, SA : 1905 - 1931), Saturday 23 September 1911, page 29

AN EARTHSHOCK.

HORNSDALE, September 19.—At 8.30 last evening a sharp earthshock was felt here. It was travelling from, north to south, and lasted for about three seconds.

WIRRABARA, September 19.—The loud rumbling of an earthquake was heard last evening at 10 minutes past 9 o'clock.

This and the following stories refer to the same event on 18 September at 11:30 UTC and noted by Dix (2013), her epicentre at Appila.

Laura Standard (SA : 1889 - 1917), Friday 29 September 1911, page 3

Wirrabara Forest.

September 23, 1911.

The earthquake shock on Monday was the most severe felt here since 1897. The tremor was apparently travelling in a north-easterly direction and shook things to a remarkable way. The yarn that the shock "shook" two turkeys from a local resident is not generally credited.

Chronicle (Adelaide, SA : 1895 - 1954), Saturday 30 September 1911, page 1

DEMURRAGE ON GOODS.

KAPUNDA, September 26. —

BOOLEROO CENTRE, September 18.— An earth tremor was distinctly felt here this evening at 9 o'clock. It lasted for about half a minute, and there was a loud rumble as of a heavily laden waggon on a metal road, while a strong vibration could be felt in the houses. It was traveling from south to north.

Eyre's Peninsula Tribune (Cowell, SA : 1910 - 1950), Friday 3 November 1911, p. 2

CLEVE.

(From Our Correspondent).

Nov. 1. EARTHQUAKE SHOCK.

An earthquake shock was felt here on Thursday, Oct. 26th at 7.15 p.m. It lasted for 20 seconds, and seemed to be travelling north to south. There was a general exodus for the doors. Several buildings were cracked and Messrs Smallacombe's had their ceiling buckled, and crockery and glassware were smashed. The lights went out in Mr Gillings' store, and also at the hotel. Mr. Johnson (the local manager for the National Bank) had a good deal of glassware broken. It is considered to be the sharpest shock felt on Eyre's Peninsula.

North West Post (Formby, Tas. : 1887 - 1916), Wednesday 1 November 1911, page 4

EARTH TREMOR.

HOUSEHOLDERS ALARMED.

An earthquake shock the second within three days, was experienced in many parts of South Australia at 22 minutes past 7 o'clock last Thursday evening. It was not noticed at the Adelaide Observatory, but it was distinct in other parts of the city. In places there was a rumbling noise loud enough to cause dogs to bark and windows and walls shook so alarmingly that householders ran outside.

Information from Maitland, Moonta, and Port Lincoln shows that the tremor was rather severe there, and was sufficient to throw articles off shelves. Nowhere has any damage been reported. At Port Augusta, the lights in the Methodist manse were extinguished.

Burra Record (SA : 1878 - 1954), Wednesday 8 November 1911, page 3.

The Quivering Earth.

During the past two or three weeks we have reported several earth shocks of a slight nature, and since our last issue other light disturbances have been felt in different parts of the district. A visitor to the town on Friday said a very distinct shock was felt in the Apoinga (20km S Burra) district early on Thursday morning; he put the time down as between 4 and 5 o'clock. He said at the time there was not the slightest wind, and everything was remarkably still.

Chronicle (Adelaide, SA : 1895 - 1954), Saturday 2 December 1911, page 13.

MOUNT SERLE, November 21. —An earthquake shock was felt here on Friday last (Friday 17th November) about mid-day. It lasted for several seconds, and appeared to travel in a south-westerly direction.

OTHER AUSTRALIAN STATES

VICTORIA

Albury Banner and Wodonga Express (NSW : 1896 - 1938), Friday 13 January 1911, page 33.

Earthquake in Melbourne.

At 3.55 a.m. on Friday many persons who were at rest in the southern suburbs of Melbourne were disturbed by a sharp earthquake shock. Residents of St., Kilda were first aroused by hearing a loud rumbling, which seemed to travel over the Bay from west to east. It gave those who were conscious of it a severe jolt in bed. The crockery rattled simultaneously, whilst carelessly placed articles fell to the floor. A similar experience was reported by people living in Balaclava, South Yarra, and Prahran. Some testify to the occurrence of two shocks in succession, and to having felt a blow, as though their beds had been struck with considerable force. Articles of furniture were also moved by the earth tremor. In some cases persons were so alarmed that they rushed into the streets.

Geelong Advertiser (Vic. : 1859 - 1929), Tuesday 13 June 1911, page 2

THE EARTHQUAKE SHOCK.

In various parts of Geelong, the earth tremor, referred to in yesterday's "Advertiser" was felt. Mr. R. Purnell, president of the Chamber of Commerce states that in the early hours of Sunday morning the windows in his house in Hermitage Road rattled for a few minutes, and a rumbling noise was distinctly heard. He is positive it was not caused by the wind, as his house is on the lee-side, and is well sheltered. At tea time on Sunday evening, Mr. A. T. Curran, who lives in the eastern part of the city, states that the crockery on the table jumped about, and the windows shook violently. There was a decided tremor, which lasted over half a minute.

NEW SOUTH WALES

Sydney Morning Herald (NSW : 1842 - 1954), Wednesday 31 May 1911, page 15.

SHOCK OF EARTHQUAKE BURROWA, Tuesday.

A slight shock of earthquake occurred this morning at 7.30. The tremor was felt in all houses. No damage occurred.

Bathurst Times (NSW : 1909 - 1925), Monday 26 June 1911, page 2

Was It an Earthquake Tremor?

A slight earthquake tremor is reported as having occurred at Spring Hill last week. Some people go so far as to assert that a rumbling sound was audible.

Evening Telegraph (Charters Towers, Qld. : 1901 - 1921), Tuesday 25 July 1911, page 5.

EARTHQUAKE SHOCK.

SYDNEY, Tuesday.

A distinct shock of earthquake has been felt at Murrumburrah.

Daily Mercury (Mackay, Qld. : 1906 - 1954), Wednesday 28 June 1911, page 5.

EARTHQUAKE SHOCKS.

Sydney, Tuesday. Eleven distinct shocks of earthquake were felt at Talwood, near Milthorpe, 184 miles west from Sydney on Sunday night. The third shock was a severe one.

TASMANIA

Tasmania 6 Nov 2011.

North Western Advocate and the Emu Bay Times (Tas. : 1899 - 1919), Monday 18 December 1911, page 3.

1911 02 27 at 09:40 UTC, Smithton

The North Western Advocate and the Emu Bay Times Friday 3 March 1911, Page 2.

SMITHTON. On Monday evening, between 7.30 and 8 o'clock, a distinct earth tremor was experienced. At first there was a rumbling noise like thunder, and then the houses shook as if some large object had fallen against the buildings. A slight thunderstorm passed over the town on Monday, and rain followed.

Daily Telegraph Tuesday 28 February 1911, Page 4.

A distinct earth tremor was experienced at Stanley at 7.40 last evening, and startled the residents.

1911 11 04 at 01:27 UTC, Zeehan

Chronicle Saturday 11 November 1911, Page 37.

EARTHQUAKE IN TASMANIA.

Zeehan. November 5.

A strong earthquake shock was experienced throughout western Tasmania at 11.30 o'clock on Saturday morning. It passed along from north to south, and in some places proved severe. A low rumbling sound was heard. The earthquake shook the buildings, especially the wooden structures, considerably, and alarmed many people. Underground in the mines the effect was pronounced. In a private house crockery rolled off the dressers. Between three and four years ago a somewhat similar shock occurred, and it was noticed that both shocks appeared to follow the contact rock line of country. Saturday's shock lasted about 15 sec.

Michael-Leiba (1989) used newspaper reports to draw an isoseismal map for this earthquake from which she estimated the magnitude as 4.8 ± 0.3.

Daily Herald (Adelaide, SA : 1910 - 1924), Monday 6 November 1911, page 6

TASMANIA SHAKEN.

SHOCKS AT ZEEHAN AND STRAHAN.

PEOPLE RUSH FROM HOUSES.

HOBART, November 5.

There was a violent earth tremor at Zeehan yesterday morning lasting five seconds.

Windows rattled, and all the loose goods on the shelves were disturbed. Persons in the streets did not feel the shock. Those indoors rushed into the streets. No damage has been reported. There was great excitement among the residents.

A sharp tremor, which lasted several seconds, was felt at Strahan. A loud rumbling noise was heard, and the buildings were violently shaken. No damage was done.

Sydney Morning Herald (NSW : 1842 - 1954), Monday 18 December 1911, page 8

EARTHQUAKE TREMOR.

HOBART, Sunday.

The superintendent of the Eddystone Point lighthouse reports that a slight earth tremor, lasting about two seconds, and accompanied by a very loud noise, occurred at 10.20 p.m. on the 12th instant. The vibration was distinctly felt in the tower and quarters.

WESTERN AUSTRALIA

Geraldton Express (WA : 1906 - 1919), Friday 4 August 1911, page 3.

Earth Tremor in Nor'-West.

The Government Astronomer, Mr. W. E. Cooke, has received the following telegrams with respect to an earthquake shock in the North-West, but he states that there was no corresponding record on the seismograph at the Observatory : — From the Postmaster at Marble Bar : "Heard rumbling sound and distinctly felt what believed to be earthquake shock 7.30 Sunday evening. Lasted about twenty seconds." Telegram from Postmaster. Warrawarra "Earth tremor about 7.30 p.m. Sunday evening."

Eastern Districts Chronicle (York, WA : 1877 - 1927), Friday 20 October 1911, p. 3.

EARTH TREMORS AT QUELLINGTON.

REPORT BY GOVERNMENT ASTRONOMER.

The Government Astronomer (Mr. W. E. Cooke) in a report dated October 3 to the Colonial Secretary (Mr. J. Drew) regarding the earth tremors in the Eastern districts, states — " I went to York and Quellington in order to investigate the earth tremors which had been reported and find the reports apparently are not in the least exaggerated. The whole matter is extremely interesting and I propose to undertake further investigations A great deal of information was furnished by Mr. Gentle and by Miss Kitchen, the local public schoolmistress, but in addition I met a number of neighbouring residents who each corroborated the main features, and agreed also in most of the details. Whatever may be the cause, the outbreak appears to be quite recent and the present disturbance originated on July 11, 1911. Prior to that occasional noises had been heard, especially, I believe, at Wilberforce, and I have written to Mr. Hamersley for further particulars. But on the above date occurred the first of the violent tremors which are now alarming the entire neighbourhood. Since then they have been experienced frequently, but at irregular intervals. One of the most severe occurred on August 25, and was repeated over and over again at hourly intervals throughout the evening and night. The last ones were felt on Monday and Tuesday last (October 2 and 3), but these were comparatively mild, though recorded by several people. The last severe one occurred on the previous Saturday, September 30, and was felt all over the district. The effects seem to be confined mostly to within a radius of about 20 miles, though the most severe ones are felt farther. So far I have not heard of them to the west of the Great Southern or north of the Eastern railway, though they have been felt on both those lines, at York, Spencer's Brook, and Meenar.

" The following is a general description of the disturbance:—A sudden violent explosive noise is heard, apparently always from the same direction in any given locality. Then follows a rumbling noise, passing underfoot, accompanied by shaking of floor, cracking of buildings, rattle of crockery, etc., and then passing on. Each shock apparently only lasts a few seconds, and starts with a violent explosive sound, like the discharge of a great gun. On one occasion Mr. Gentle noticed a second dis-charge, in the direction towards which the rumble travelled. He says that it seemed to hit a certain hill and 'split it open.' That is merely a description of the impression produced. On another occasion he heard a terrific crash from his front verandah, as if the whole verandah had been blown up, and on investigation found that the foundations, made of granite, had been split from top to bottom. One of these quakes occurred during the progress of a meeting at the Agricultural Hall, and caused some consternation. The floor shook, and even the piano was seen to rock. A crack opened in the wall, and a lot of plaster fell down. A window was smashed, and upon examination the walls were found to be cracked in several places. In one instance I noticed the crack passing right through a solid block of stone. At the Government school house, built solidly of brick, Miss Kitchin actually saw a crack form during a shock, and this was found to be not merely a plaster crack but to go right through the sail. Every house I saw was cracked in several places, and I was told that not a house in the district had escaped. Many people have given up their sleeping quarters and moved their beds outside, and a few are talking seriously of leaving the neighbourhood. On one occasion Mr Gentle heard a noise in the direction towards which the vibration travelled, like a heavy gale, lasting for about half an hour, and yet it was an absolutely calm night, with not a quiver in the leaves."

TABLE 3 World Earthquakes 1911, from ISC and corresponding Australian newspaper stories.

International Seismological Centre, On-Line Bulletin.
Global search Start date: 1911-01-01 End date: 1911-12-31
Events found: 42

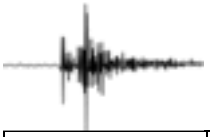
Event 16958129 Afghanistan-Tajikistan border region Central Asia

Date	Time	Latitude	Longitude	Depth	Nsta	Gap	Author
1911/01/01	10:18.00	38.0	66.0	50			GUTE
	10:18:01.4	37.33	66.57	35	23	205	ISC

Magnitude	Err	Nsta	Author
mB 7.0			ABE1
Ms 6.8			AN2
MS 7.2			PAS
Ms 7.2			GUTE
Ms 7.2			B&D
MS 6.7	0.1	7	ISC
Ms 7.0			

There don't appear to be any Australian newspaper reports of this earthquake in Central Asia which is well south of the following major earthquake, also in Central Asia, the year's largest shallow earthquake.

Event 16958130 Lake Issyk-Kul region Central Asia



Date	Time	Latitude	Longitude	Depth	Nsta	Gap	Author
1911/01/03	23:25.45	43.5	77.5	35			GUTE
	23:25:48	43.01	78.53	20	29	133	ISC

Magnitude	Err	Nsta	Author
mB 8.1			ABE1
MS 8.4			PAS
Ms 8.4			GUTE
Ms 7.8			AN2
MS 7.8			P&S
Mw 7.7			Arrowsmith et al
MS 8.1	0.1	6	ISC
Ms 7.7			

Figure 3 Faulting associated with the World's largest earthquake in 1911, in Central Asia (the yellow lines).

Register (Adelaide, SA : 1901 - 1929), Monday 13 February 1911, page 7.
GAPING CHASM.
RESULT OF EARTHQUAKE. ST. PETERSBURG, February 10.
Details have been received of the great earthquake reported from Russian Turkestan last mouth. The scene of the disaster was the town of Vyernyi, a region far remote from the capital. Seven hundred families were rendered homeless in the town and fled to the school and barracks for shelter. Not a house was left without damage. The earthquake caused a great fissure in the earth, and the chasm thus made was 24 ft. wide and stretched for a length of 33 miles. It was reported on January 5 that the town of Prshevalsk, in Turkestan, situated near Lake Issik-kul, had sunk with all its inhabitants, and that its site was occupied by a new lake. Some 10,000 persons perished in the foundering of the town. Prshevalsk and Yyernyi are the most western towns in Russian Turkestan towards the Chinese frontier. The former is named after the great Russian traveller and explorer, Nicholas Prshevalsky, who died in 1888. It is situated on the northern shore of Lake Issik-kul, an inland sea almost filling one of the valleys of the great Tienshan range. Its population numbers about 5,000. Vyernyi, a town of about equal size, is on the other side of the mountains to the north.
The 1911 Kebin earthquake, or Chon-Kemin earthquake, struck Russian Turkestan on 3 January. Registering at a 7.7 magnitude, it killed 452 people, destroyed more than 770 buildings (which was almost all of the city) in Almaty, Kazakhstan, and resulted in 125 miles (201 km) of surface faulting in the valleys of Chon–Kemin, Chilik and Chon-Aksu.
https://earthquake.usgs.gov/learn/today/index.php?month=1&day=3&submit=View+Date
More than 450 killed. Damage occurred in the Chong-Kemin (Bol'shoy Kemin) Valley as well as at Anan'yevo (Sazanovka) and Oytal (Urtal), Kyrgyzstan. Over 770 brick buildings were destroyed at Almaty (Vernyy, Alma-Ata), Kazakhstan. Faulting, fractures and large landslides were observed over an area 200 km (125 mi) long in the Chong-Kemin and Chilik Valleys and along the shore of Lake Issyk-Kul. Hanging objects swung in cities more than 1,000 km (625 mi) away in Kazakhstan and Russia and seiches were triggered in New Zealand (see below).
Advertiser (Adelaide, SA : 1889 - 1931), Friday 6 January 1911, page 7

Reuter's correspondent states that an earthquake shock, which lasted five minutes, was yesterday experienced in Russian Turkestan. The shock was so severe in the neighborhood of Vyernyi, the capital of the province of Semiryechensk, that half of the houses in the city were destroyed, and immense fissures appeared in the earth at Kopal, 170 miles to the north-east.
The seismograph at West Bromwich Observatory, in Staffordshire, England, recorded the shock, which proved to be far beyond the capacity of the instrument, the result being that the needle which causes the shadow on the photographic paper broke.

A LAKE FALLING AND RISING ALTERNATELY.
Auckland, January 5.
The Rotorua natives are greatly excited over the phenomenal rise and fall of Lake Rotoiti. The water is subsiding and rising again every five minutes, this being attributed to an underground disturbance.

AFTERSHOCKSProfessor Milne, telegraphed from the Isle of Wight to Grenwich recently: — "Since 11.30 p.m. on January 3, when several towns in Central Asia were destroyed by earthquake, earth movements have been going on. They have come along intermittently. We have recorded at least ten large disturbances and smaller ones in between. Little by little the world is coming to rest."

Event 16958134 Tajikistan, Central Asia

Date	Time	Latitude	Longitude	Depth	Nsta	Gap	Author
1911/02/18	18:41.03	40.0	73.0	35			GUTE
	18:41:09	38.33	72.63	15	164	22	ISC

Magnitude	Err	Nsta	Author
mB 7.3			ABE1
MS 7.8			PAS
Ms 7.8			GUTE
Ms 7.3			AN2
MS 7.3	0.2	9	ISC
Ms 7.4			

** Event
1911 02-18 at 21:36 Lake Ohrid, Macedonia, Magnitude 6.7, 40.9, 20.8, shallow, Imax X according to EMSC.

**Event Italy
Maryborough Chronicle, Wide Bay and Burnett Advertiser (Qld. : 1860 - 1947), Tuesday 21 February 1911, page 2.
EARTHQUAKE SHOCKS.
ROME, February 20.

Sharp earthquakes have occurred in Central Italy. A number of houses collapsed, injuring the inmates. Vesuvius erupted in March with associated seismicity. There were no deaths in Napoli. This earthquake was reportedly felt in Florence.

Register (Adelaide, SA : 1901 - 1929), Wednesday 22 February 1911, page 7

**Event TURKEY.
MOSQUES AND HOUSES COLLAPSED. CONSTANTINOPLE, February 21.
A severe earthquake has occurred in the district of Monastir, Turkey. Monastir is about 90 miles from the great port of Salonika. There are a number of fatalities. Several mosques and about 100 houses collapsed. The inhabitants are now camping out, fearing further shocks will take place.

Event 16958135 Ryukyu Islands

Date	Time	Latitude	Longitude	Depth	Nsta	Gap	Author
1911/02/23	11:14.12	27.0	128.0	5			CENT

Magnitude	Err	Nsta	Author
Mb 7.1			BJI
Mj 7.0			UTSU
Ms 6.9			B&D
Ms 6.9			

Event 914153 Mindanao

Date	Time	Latitude	Longitude	Depth	Nsta	Gap	Author
1911/03/06	17:30.00	6.0	126.0	100			GUTE

Magnitude	Err	Nsta	Author
MS 6.8			PAS
Ms 6.6			GUTE
Ms 6.8			BJI
Ms 6.7			

Northern Star (Lismore, NSW : 1876 - 1954), Friday 24 March 1911, page 3.
TAAL EARTHQUAKE DISASTER.

One of the most sensational and terrible earthquake disasters of modern times was that which resulted in the death of nearly 2000 people on the Island of Taal. This is one of the Philippines, and only a few miles from the island of Luzon, on which Manila is situated. Taal volcano erupted in March with associated seismicity. There were more than 2000 victims of the volcanic eruption and ensuing tsunami in the Philippines, mistakenly labelled an earthquake disaster by many Australian newspapers.

Event 16958137 Taiwan region

Date	Time	Latitude	Longitude	Depth	Nsta	Gap	Author
1911/03/24	03:18.00	24.0	123.0	35			CENT

Magnitude	Err	Nsta	Author
Mj 6.8			UTSU
Ms 6.7	Ms 7.0		

Event 16958138 Dodecanese Islands

Date	Time	Latitude	Longitude	Depth	Nsta	Gap	Author
1911/04/04	15:43:54	36.5	25.5	140			GUTE
	15:43:47.3	36.41	25.88	15	274	9	ISC

Magnitude	Err	Nsta	Author
MB 7.0			ABE1
MS 7.0			PAS
Ms 7.0			GUTE
MS 7.0			B&D

Event 914155 Southern Italy

Date	Time	Latitude	Longitude	Depth	Nsta	Gap	Author
1911/04/05	15:28:12	40.0	15.5	200			GUTE

Magnitude	Err	Nsta	Author

Ms 5.8			PAS

West Australian (Perth, WA : 1879 - 1954), Monday 10 April 1911, page 7.
EARTHQUAKE. SHOCK IN SPAIN. Madrid, April 7. At Murcia (in the south of Spain) yesterday a shock of earthquake was felt. The inhabitants of the city became panic stricken and took refuge in tents.
Farmer and Settler (Sydney, NSW : 1906 - 1955), Friday 14 April 1911, page 6.
Rome, Wednesday.
Two earthquake shocks have caused some alarm in the city. Several prisoners attempted to escape from one of the gaols during the uproar, but their efforts were quickly checked. At Messina, a sudden flash of light, rumbling earth noises, and an electrified atmosphere, were attributed to a falling meteor.

Event 914156 Northern Colombia

Date	Time	Latitude	Longitude	Depth	Nsta	Gap	Author
1911/04/10	18:42:24	9.0	-74.0	100			GUTE

Magnitude	Err	Nsta	Author
MB 7.0			ABE1
MS 7.2			PAS
Ms 7.2			GUTE
MS 7.2			B&D
Ms 7.2			

Event 16958141 Northern and central Iran

Date	Time	Latitude	Longitude	Depth	Nsta	Gap	Author
1911/04/18	18:14:36	32.0	56.0	50			GUTE
	18:14:27.5	30.46	56.30	15	174	31	ISC

Magnitude	Err	Nsta	Author
MB 6.9			ABE1
MS 6.7			PAS
Ms 6.5			GUTE
MS 6.4	0.3	7	ISC
Ms 6.6			

Event 914158 Colombia

Date	Time	Latitude	Longitude	Depth	Nsta	Gap	Author
1911/04/28	09:52:54	0.0	-71.0	600			GUTE

Magnitude	Err	Nsta	Author
MB 6.9			ABE1
MS 7.1			PAS
Ms 7.1			B&D
Ms 7.1			GUTE

Event 914159 South of Fiji Islands

Date	Time	Latitude	Longitude	Depth	Nsta	Gap	Author
1911/04/28	18:35:42	-27.0	179.5	600			GUTE

Magnitude	Err	Nsta	Author
MS 6.5			PAS

Event 914160 Turkey

Date	Time	Latitude	Longitude	Depth	Nsta	Gap	Author
1911/04/30	20:42:30	36.0	30.0	180			GUTE

Magnitude	Err	Nsta	Author
MS 6.2			PAS

**There were no reports in the newspapers of this earthquake in Turkey, perhaps because of the depth no one was killed.

Event 914161 Kamchatka Peninsula

Date	Time	Latitude	Longitude	Depth	Nsta	Gap	Author
1911/05/04	23:36:54	51.0	-157.0	240			GUTE

Magnitude	Err	Nsta	Author
MB 7.4			ABE1
MS 7.6			PAS
Ms 7.6			B&D
Ms 7.6			GUTE

**Event Southern California

Daily Telegraph (Launceston, Tas. : 1883 - 1928), Friday 12 May 1911, page 5.

SAN FRANCISCO, Wednesday. Night.— Earthquake shocks have been felt in Southern California.

**Event Belgium
West Australian (Perth, WA : 1879 - 1954), Monday 10 April 1911, page 7.
BRUSSELS, Sunday.— An earthquake occurred in the city yesterday, and cracked many walls and dislodged some chimneys. Great consternation was caused.

Event 16958148 Michoacan Mexico

Date	Time	Latitude	Longitude	Depth	Nsta	Gap	Author
1911/06/07	11:02:42	17.5	-102.5	35			GUTE
	11:02:50.1	18.52	-102.44	30	155	3	ISC

Magnitude	Err	Nsta	Author
MB 7.5			ABE1
MS 7.8			PAS
Ms 7.6			P&S
Ms 7.8			GUTE
Ms 7.7			AN2
MS 7.7		6	ISC
Ms7.7			

Armidale Express and New England General Advertiser (NSW : 1856 - 1861; 1863 - 1889; 1891 - 1954), Friday 9 June 1911, page 5
London, Wednesday Night.—A violent earthquake is reported from Mexico, the full force of same being concentrated on Mexico City. At 4 o'clock this morning the Artillery Barracks collapsed, and 70 soldiers were buried in the ruins. The walls of the gaol toppled over, and it is believed that many people were killed. Large numbers of buildings were also destroyed. All the triumphal arches erected, and decorated the previous night in honour of the arrival of General Madero, the leader in the late insurrection, are lying scattered over the streets. Latest reports state that 200 bodies have been recovered from the ruins.

Tumut and Adelong Times (NSW : 1864 - 1867; 1899 - 1950), Friday 23 June 1911, page 2.
Another severe shock of earthquake has occurred at Mexico. It opened a new crater in the volcano Colima, and both craters are now belching forth fire and lava.

**Event Spain
Bundaberg Mail and Burnett Advertiser (Qld. : 1892 - 1917), Thursday 8 June 1911, page 2.
MADRID, Wednesday.
Twenty two earth shocks have been experienced in Spain during the last 24 hours.

Event 16958149 Northwest of Ryukyu Islands

Date	Time	Latitude	Longitude	Depth	Nsta	Gap	Author
1911/06/15	14:26:00	29.0	129.0	160			GUTE
	14:26:00	28.0	130.0	90			CENT
	14:25:53.8	29.05	128.78	100	75	7	ISC

Magnitude	Err	Nsta	Author
MB 8.1			ABE1
MS 8.2			PAS
Ms 7.5			P&S
Ms 8.2			GUTE
Mj 8.0			UTSU

Sunday Times (Sydney, NSW : 1895 - 1930), Sunday 18 June 1911, page 7.

A MONSTER EARTHQUAKE.
THE RIVERVIEW SEISMOGRAPH TELLS A STARTLING STORY.
PROBABLY DISTANT 5000 MILES.
Yesterday's cables showed that an earthquake of world-wide intensity had occurred late in the week, and advices from Melbourne indicated that the record of a severe shaking had been made by the local observatory. Inquiries at St. Ignatius' College, Riverview,

yesterday elicited the information that a severe 'quake had been recorded on the college seismographs. In the absence of Father Pigot, the Rev. Monsignor Dalton S.J., stated: "The disturbance lasted from 10.56 p.m. on Friday evening until 1.30 a.m. on Saturday morning. The maximum amplitude of the waves was 4.5 c.m., and the longest period .5 cm. (corresponding to about 45 seconds' duration). "The waves recorded on the vertical Wiechert instrument, corresponding to the vertical mo-tion of the earth particle, were particularly large, amplitude being .3 cm., and the period .3 cm. "The records on five instruments showed striking resemblance, thus tending to prove that the graphs are really of scientific accuracy. "The centre of the disturbance would be probably 5000 miles in a northerly direction.

_____Eve
nt 602790114 Eastern Xizang-India border region

Date	Time	Latitude	Longitude	Depth	Nsta	Gap	Author
1911/07/01	00:00:00	28.5	97.5	0			CENT

Magnitude	Err	Nsta	Author
Ms 6.5			BJI
Ms 6.5			

_____Eve
nt 914164 Central California

Date	Time	Latitude	Longitude	Depth	Nsta	Gap	Author
1911/07/01	22:00:00	37.25	121.75	35			GUTE

Magnitude	Err	Nsta	Author
Ms 6.6			PAS

World's News (Sydney, NSW : 1901 - 1955), Saturday 12 August 1911, page 4

Earthquake Panic In San Francisco.
San Francisco was badly frightened at 2 o'clock on the afternoon of July 1 by an earthquake, which shook the city, but did little damage, though it caused a panic in the business and residential districts, where people feared that a repetition of the 1906 disaster was impending. The shock was also felt in many places in Cen-tral California, Arizona, and Nevada. The maximum intensity was in San Francisco, where the initial vibration lasted, a few seconds. This was followed by two sharp twisting quakes that wrenched the earth in an alarming manner. Skyscrapers shook ominously, and deep cracks were made in walls and in many structures, including the Hall of Justice, one of the few buildings

which survived the 1906 earthquake. A large part of the granite cornice of the Bank of California crashed to the ground, and pieces of stone, plaster, and cement from other buildings were showered into the streets.
Big crowds of women and children were entering the theatres; the departments of the stores were filled with women customers and clerks, and the restaurants were just emptying as the earth began to shake. There was an immediate panic. People, screaming wildly, rushed into the streets in huddled and excited groups, when the second double tremor came, which was more intense than the first. Hundreds of buildings rocked, and the crowd's excitement increased. The people, horrified, fled for the open spaces. Many women and children were knocked down and trampled upon. One man died of fright. Another was badly injured by jumping through a plate-glass window into the street, where, unable to rise, he almost bled to death because nobody paid any attention to him. About a score of people were taken to the hospitals suffering from shock and bruises.
Two fires broke out simultaneously, though quite unconnected, the sight of the fire engines dashing through the streets increasing the panic of the crowds. It was half an hour before normal conditions were restored, and during the interval all the police reserves turned out and were placed as guards around the stores, banks, and other buildings, which were entirely deserted by employees, and would have been rifled by thieves but for the prompt precautions taken by the police.
After the panic had subsided, people who telephoned to their homes could get no answers, as the girls on the telephone exchanges had deserted their posts, and declined to return. This caused further alarm. Thousands of people declined to continue their shopping or to attend the theatres, making their way homeward as best they could, and leaving San Francisco's down-town sections deserted.
Panics on a small scale occurred at Oakland and Sacramento. At the latter place the State Capitol building was cracked. The shock also caused great alarm at Carson City, Nevada, where the judge, jury, and all others concerned in the hearing of a civil action in the local court-house rushed into the street and joined the terrified citizens who were escaping from the swaying buildings.

_____Eve
nt 16958151 Afghanistan-Tajikistan border region

Date	Time	Latitude	Longitude	Depth	Nsta	Gap	Author
1911/07/04	13:33:26	36.0	70.5	190			GUTE
	13:33:18	36.23	71.28	100	141	29	

Magnitude	Err	Nsta	Author
MB 7.4			ABE1
MS 7.6			PAS
Ms 7.6			B&D
Ms 7.6			GUTE

Maitland Daily Mercury (NSW : 1894 - 1939), Thursday 6 July 1911, page 5.

An earthquake, extending over two hours, which occurred somewhere in Central Asia, has been recorded by seismographs in England.

** Event Hungary
Sunday Times (Perth, WA : 1902 - 1954), Sunday 16 July 1911, page 16
Earthquake shocks lasting 12 minutes were experienced in Keczkemet (Hungary) last Saturday week. Many persons were injured, and several women went mad, and had to be placed in an asylum. The railway station and the military barracks collapsed, and the town hall, the law courts, and a theatre were seriously damaged. A fissure opened outside the town, and threw up hot mud and sulphur. The damage caused is estimated at £100,000. A peasant and his nine children were killed in another part of Hungary through the collapse of a house. The shocks caused but little damage at Budapest, but they occasioned a great panic. Thousands of people rushed out in their night attire, expecting the houses to topple over every minute, and many of them spent the rest of the night in the street.

_____Eve
nt 914166 Bali Sea

Date	Time	Latitude	Longitude	Depth	Nsta	Gap	Author
1911/07/05	18:40:06	-7.5	117.5	370			GUTE

Magnitude	Err	Nsta	Author
MB 7.0			ABE1
MS 7.0			PAS
Ms 7.0			B&D
Ms 7.0			GUTE

_____Eve
nt 914167 Vanuatu Islands

Date	Time	Latitude	Longitude	Depth	Nsta	Gap	Author
1911/07/11	21:22:17	-14.0	167.0	150			GUTE

Magnitude	Err	Nsta	Author
Ms 6.7			GUTE
MS 6.9			PAS

Express and Telegraph (Adelaide, SA : 1867 - 1922), Saturday 15 July 1911, page 1
RECORDS IN ADELAIDE.

The seismograph at the Adelaide Observatory recorded two earthquakes on Wednesday last. The first one was not severe, its maximum amplitude being 1.7 m.m. The first preliminary tremor arrived at 6.58.5 a.m., the second tremor at 7.3.2 a.m., and the maximum phase at 7.9.3 a.m. The second one was more violent, its maximum amplitude being 9.5 m.m., its first preliminary tremor arrived, at 1.46.0 p.m., its second preliminary tremor at 1.51.8. attaining to a maximum at 2.5.3 p.m. Mr. Dodwell says both disturbances seem to have originated from the same place, probably in the New Hebrides.

_____Eve
nt 16958154 Philippine Islands region

Date	Time	Latitude	Longitude	Depth	Nsta	Gap	Author
1911/07/12	04:07:36	9.0	126.0	35			GUTE
	04:07:38	8.55	127.10	15	81	8	ISC

Magnitude	Err	Nsta	Author
MB 7.6			ABE1
MS 7.8			PAS
Ms 7.5			P&S
Ms 7.8			GUTE
Ms 7.5			AN2
Ms 7.7	0.1	7	ISC
Ms 7.7			

_____Eve
nt 914169 Kermadec Islands region

Date	Time	Latitude	Longitude	Depth	Nsta	Gap	Author
1911/07/19	10:01:00	-29.0	-179.0	200			GUTE

Magnitude	Err	Nsta	Author
Ms 6.7			GUTE
MS 6.9			PAS

_____Eve
nt 16958156 Western Caroline Islands

Date	Time	Latitude	Longitude	Depth	Nsta	Gap	Author
1911/08/16	16:22:41.2	7.0	137.0	35			GUTE
		7.24	136.94	15	84	17	ISC

Magnitude	Err	Nsta	Author
MB 7.6			ABE1
MS 7.9			PAS
Ms 7.7			P&S
Ms 7.9			GUTE
Ms 7.7			AN2
Ms 7.8	0.2	8	ISC
7.8			

Advertiser (Adelaide, SA : 1889 - 1931), Saturday 19 August 1911, page 20.
A GREAT SHOCK NOTED.
Melbourne, August 18.
The seismograph at the Melbourne Observatory recorded a great earthquake shock yesterday. The preliminary tremors began at 8 hr. 27 min. 30 sec. a.m. Six groups of waves, gradually increasing in amplitude, followed during the next 40 minutes, reaching a maximum at 9 hr. 13 min. These were succeeded by another series of six groups of large waves, gradually decreasing in amplitude and extending over a period of 15 min. Following these were a large number of smaller waves, which lasted until about noon, when the disturbance ceased. The earthquake was probably at no great distance from Australia.
A distinct earthquake of very large dimensions was recorded at both the Sydney and Perth Observatories on the morning of August 17.

_____Eve
nt 914171 Fiji Islands region

Date	Time	Latitude	Longitude	Depth	Nsta	Gap	Author
1911/08/21	16:28:55	-21.0	-176.0	300			GUTE

Magnitude	Err	Nsta	Author
MB 7.2			ABE1
Ms 7.3			PAS
Ms 7.3			GUTE
Ms 7.3			B&D

_____Eve
nt 914172 Oaxaca

Date	Time	Latitude	Longitude	Depth	Nsta	Gap	Author
1911/08/27	10:59:18	17.0	-96.0	100			GUTE

Magnitude	Err	Nsta	Author
Ms 6.6			GUTE
Ms 6.8			PAS

_____Eve
nt 914173 Sakhalin Island

Date	Time	Latitude	Longitude	Depth	Nsta	Gap	Author
1911/09/06	00:54:18	46.0	143.0	350			GUTE

Magnitude	Err	Nsta	Author
MB 7.0			ABE1
Ms 7.3			PAS
Ms 7.3			GUTE
Mj 7.1			UTSU

_____Eve
nt 914174 Kuril Islands

Date Time Err RMS Latitude Longitude Smaj Smin Az Depth Err Ndef Nsta Gap mdist Mdist Qual Author OrigID
1911/09/08 22:44:00 50.0000 156.5000 80.0
uk GUTE 1961805

Magnitude Err Nsta Author OrigID
MS 6.5 PAS 1961805

_____Eve
nt 914175 Southeast of Loyalty Islands

Date	Time	Latitude	Longitude	Depth	Nsta	Gap	Author
1911/09/12	12:53:18	-23.0	172.5	0			GUTE

Magnitude	Err	Nsta	Author
Ms 6.6			GUTE
Ms 6.8			PAS
Ms 6.7			

_____Eve
nt 914176 Off coast of northern Chile

Date	Time	Latitude	Longitude	Depth	Nsta	Gap	Author
1911/09/15	13:10:00	-20.0	-72.0	35			GUTE

Magnitude	Err	Nsta	Author
MB 7.3			ABE1
Ms 7.1			P&S
Ms 7.1			AN2
Ms 7.3			GUTE
Ms 7.3			PAS
Ms 7.2			

Brisbane Courier (Qld. : 1864 - 1933), Tuesday 19 September 1911, page 5

EARTHQUAKE IN CHILE. STRONGEST SINCE 1876.
SANTIAGO DE-CHILE, Sunday,
A violent earthquake has occurred on the nitrate fields at Iquigue, and the telegraph lines have been interrupted.
SANTIAGO DE CHILE, Monday.
The earthquake at Iquique was the strongest that has been experienced since 1876. Some damage has been done in the nitrate district, and railway traffic is suspended.

_____Eve
nt 16958163 Rat Islands

Date	Time	Latitude	Longitude	Depth	Nsta	Gap	Author
1911/09/17	03:26:00	51.0	180.0	0			CENT

Magnitude	Err	Nsta	Author
MB 7.0			ABE1
Ms 7.0			P&S
Ms 7.1			AN2

Ms 7.0			

_____Eve
nt 914177 Kenai Peninsula

Date	Time	Latitude	Longitude	Depth	Nsta	Gap	Author
1911/09/22	05:01:24	60.5	-149.0	60			GUTE

Magnitude	Err	Nsta	Author
Ms 6.7			GUTE
Ms 6.9			PAS

_____Eve
nt 914178 Dominican Republic region

Date	Time	Latitude	Longitude	Depth	Nsta	Gap	Author
1911/10/06	10:16:12	19.0	-70.5	35			GUTE

Magnitude	Err	Nsta	Author
MB 7.0			ABE1
Ms 7.0			GUTE
Ms 7.0			PAS
Ms 6.8			AN2
Ms 7.0			

_____**
Event New Zealand
Bairnsdale Advertiser and Tambo and Omeo Chronicle (Vic. : 1882 - 1918), Saturday 7 October 1911, page 2.
An earthquake at Hastings, a town near Wellington, N.Z., on Thursday night, caused some of the buildings to rock alarmingly, and displaced some of the brickwork. While it stopped the post office clock it set the striking apparatus going, and for an hour afterwards the clock chimed continuously.

_____Eve
nt 16958167 Western Xizang-India border region

Date	Time	Latitude	Longitude	Depth	Nsta	Gap	Author

1911/10/14	23:24:00	31.0	80.5	35			GUTE
		30.76	80.28	20	194	35	ISC

Magnitude	Err	Nsta	Author
Ms 6.9			BJI
Ms 6.6			GUTE
Ms 6.8			PAS
Ms 6.5	0.1	6	ISC
Ms 6.6			

Event 914180 Santa Cruz Islands

Date	Time	Latitude	Longitude	Depth	Nsta	Gap	Author
1911/10/20	17:44:00	-12.5	166.0	160			GUTE

Magnitude	Err	Nsta	Author
MB 7.0			ABE1
Ms 7.1			B&D
Ms 7.1			PAS
Ms 7.1			GUTE

***Mercury** (Hobart, Tas. : 1860 - 1954), Friday 27 October 1911, page 5.
EARTHQUAKE IN TURKEY.
BERLIN, October 25.
Advices received in Berlin from Salonika, in European Turkey, state that disastrous earthquakes have occurred at Vodena, to the south-east of Monastir, and that 17 people have been killed and many houses destroyed. This would seem to contradict the focal depth of 180km.

Event 914181 Northern East Pacific Rise

Date	Time	Latitude	Longitude	Depth	Nsta	Gap	Author
1911/10/29	18:09:00	11.0	-101.0	35.0			GUTE

Magnitude	Err	Nsta	Author
Ms 6.8			PAS
Ms 6.6			GUTE
Ms 6.7			

_____Eve
nt 16958171 Near east coast of eastern Honshu

Date	Time	Latitude	Longitude	Depth	Nsta	Gap	Author
1911/11/08	14:12:00.0	34.5	140.5	35.0			CENT

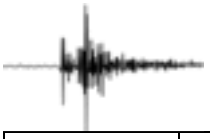
Magnitude	Err	Nsta	Author
Mj 6.5			UTSU
Ms 6.5			

_____Eve
nt 16958172 Near Islands

Date	Time	Latitude	Longitude	Depth	Nsta	Gap	Author
1911/11/13	16:13:12.0	52.0	173.0	0.0			CENT

Magnitude	Err	Nsta	Author
Ms 6.9			AN2
MB 7.0			ABE1
Ms 6.9			

_____Eve
nt 914182 Germany



Date	Time	Latitude	Longitude	Depth	Nsta	Gap	Author
1911/11/16	21:25:48	48.3	9.1	40.0			GUTE

Magnitude	Err	Nsta	Author
MS6.2			PAS

Week (Brisbane, Qld. : 1876 - 1934), Friday 24 November 1911, page 13.
LONDON. November 16.

Shocks of earthquake were experienced yesterday at Vienna, Milan, and along the valley of the Rhine. The inhabitants of Stuttgart and Frankfort were alarmed so greatly that they rushed from their houses into the streets. Several houses were cracked, and the telephone system at Frankfort was damaged.
Evening Journal (Adelaide, SA : 1869 - 1912), Saturday 18 November 1911, page 1.
EUROPE IN PANIC.
GREAT EARTH SHOCK. Castles and Churches Damaged. BERLIN, November 17.
Europe has experienced one of the severest earthquakes in its history. Reports which have come to hand, although of only a meagre character, indicate that people throughout Central Europe are panic stricken, and that considerable damage to property has resulted. The shock was of a sustained and terrifying nature, and was felt in Belgium and France. The disturbance occurred in the evening, when all the places of amusement were crowded. The audiences and actors in the theatres in Mulhouse, Alsace-Lorraine, Augsburg, Stuttgart, and other towns fled wildly from the buildings, and many people were injured in the scramble to get to the doors. The residents of the various cities where the shock was felt more severely were afraid to remain indoors, and they spent the night in open squares. The Hohenzollern Castle, in Helchingen, was badly damaged by the disturbance, and so were other buildings and many churches.
[Epicentre near Albstadt, M 6.1]

_____Eve
nt 602790143 Sea of Japan

Date	Time	Latitude	Longitude	Depth	Nsta	Gap	Author
1911/11/21	07:36:00	39.0	136.0	300.0			CENT

Magnitude	Err	Nsta	Author
Mj 6.6			UTSU

_____Eve
nt 914183 Vanuatu Islands

Date	Time	Latitude	Longitude	Depth	Nsta	Gap	Author
1911/11/22	23:05:24	-15.0	169.0	200.0			GUTE

Magnitude	Err	Nsta	Author
MB 7.3			ABE1
Ms 7.2			B&D
Ms 7.2			PAS
Ms 7.2			GUTE

Sydney Morning Herald (NSW : 1842 - 1954), Tuesday 28 November 1911, page 10

THE NEW HEBRIDES.
VILA, New Hebrides, Nov. 19.
A great number of earthquake shocks have been experienced here during the past three days, some of them shaking the houses to their centre, but no damage occurred.

_____**

Event New Zealand
Laverton Mercury (Laverton, WA : 1899 - 1919), Saturday 16 December 1911, p3.
Earthquake Shock. Christchurch, Friday. A heavy shock of earthquake, which occurred at Cheviot, Canterbury, shortly after midnight, did considerable damage. One settlement reports that not a chimney was left standing

_____Eve
nt 16958175 Guerrero

Date	Time	Latitude	Longitude	Depth	Nsta	Gap	Author
1911/12/16	19:14:32.8	17.159	-99.99	30.0			GUTE

Magnitude	Err	Nsta	Author
MB 7.6			ABE1
Ms 7.6			AN2
Ms 7.6			P&S
Ms 7.5			GUTE
Ms 7.3	0.1	7	ISC
Ms 7.5			

Figure 4 Distribution of felt reports, 1911-02-19, Oodla Wirra earthquake, South Australia. The epicentre and magnitude were derived fom this figure.