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The Woods Point Earthquake: An Opportunity to Educate

Australia has relatively low seismicity, so the level of public awareness of earthquakes is often equally low or non-existent.

A significant proportion of the population in southeastern Australia felt the Mw5.9 Woods Point earthquake, and in many cases it was their first. When an earthquake like this occurs, public interest is high and presents a rare opportunity to educate a mass audience about earthquakes in Australia, to explain how the region differs from other parts of the world, and to remind people what to do during strong shaking.

Social media platforms allow information to be spread rapidly throughout the wider population, with scientists less reliant on news media cycles and platforms for science communication.

What is the key to effective science communication? How do we ensure the information is relevant and accessible to a diverse audience? Explaining scientific concepts needs to be done using analogies that are appropriate for the target audience. People are reassured when they understand what is happening, so good science communication is important for managing public anxiety during major events.

Effective science communication requires practice. The narrative can evolve based on questions from the public and media, but the messages must remain simple and consistent.

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1 The Earthquake

The magnitude Mw5.9 Woods Point earthquake occurred at 9:15am on 22 September 2021. At the time, COVID lockdowns were in place in Melbourne (130km from the epicentre) and many parts of regional Victoria and NSW, with many people working or schooling from home, so there was an opportunity for a much wider population to feel the ground shaking than if they were in transit or in noisier environments.

This is the largest earthquake ever recorded in Victoria, and the largest on-shore earthquake ever recorded in south-east Australia, home to around 17 million people. Intensity reporting indicates that it was felt across the entire of the state of Victoria, and there were even reports from Queensland, extending the reach of human perceptibility of this event to over 1000km. There were an estimated 8 million people within 550km of the epicentre (average radius of USGS Modified Mercalli Intensity 3.5 contour), so based on historical population numbers and the location of equivalent or larger magnitude past earthquakes, this event undoubtedly sets the record as the earthquake felt by the most people ever in Australia. In most cases this was the first earthquake people ever experienced, and to many it was a surprise that this could happen in Australia.

The infrequency of large or damaging earthquakes in Australia disconnects the public's consciousness from the possibility of it happening, creating uncertainty and concern when an event like this does eventually occur. A contribution to the impact may be "availability bias" - a heuristic whereby the human mind creates shortcuts to deal with the familiar, but has difficulty dealing with events where there is little to no recent experience to draw upon.

The fact that the earthquake caused only minor damage, very few injuries, and no deaths allowed our seismology community to focus on the science instead of an ongoing emergency response, which presented the perfect opportunity to educate the public about earthquakes in Australia.

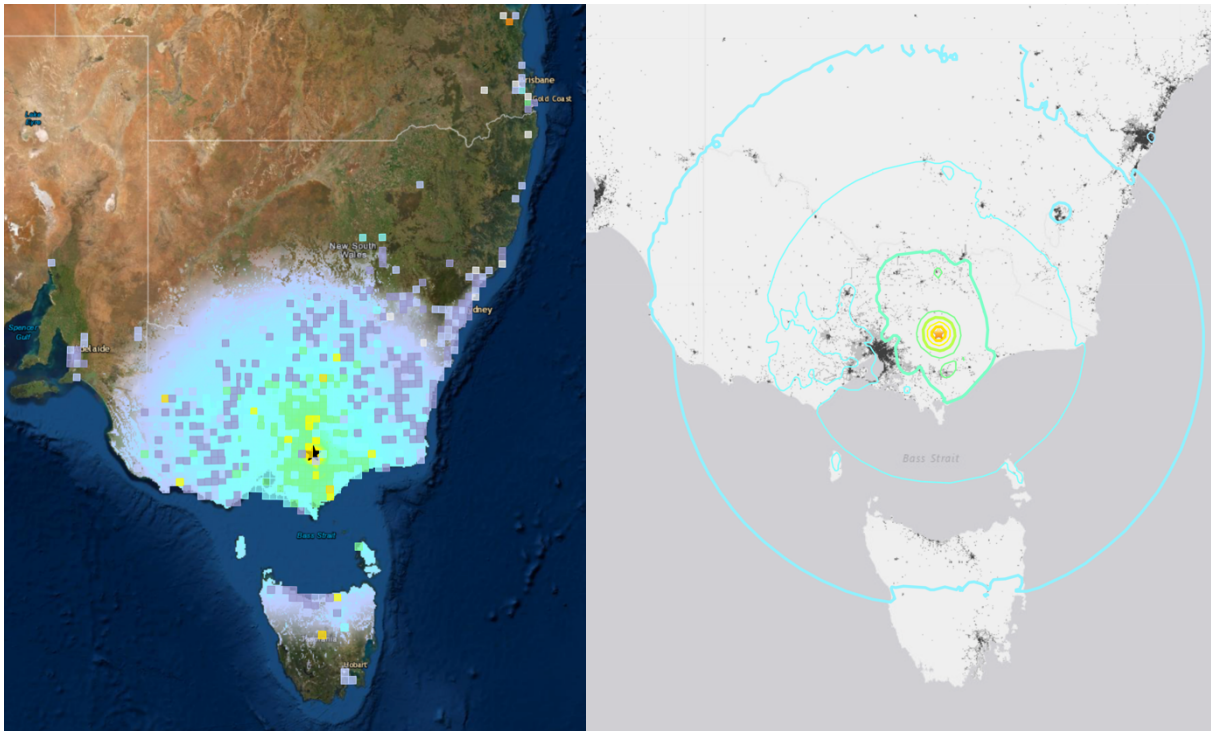

Figure 1. GA Shake Map with Felt Grid (left) shows that perceptible intensity over all of Victoria, spreading into neighbouring states. USGS Intensity Map (right) shows population density.

2 Public Reaction

The thirst for information about the earthquake was immediate. When people feel the earth shake under their feet, they have no way of knowing if they are at the epicentre of the earthquake or not. A lack of experience with the sensation and a lack of awareness of the correct actions to take can raise feelings of uncertainty, fear, or even induce panic. Gathering information is a natural way to allay these feelings to make sense of what is happening.

Due to Australia being a stable continental region, the crust is relatively old, cold and dense, meaning the energy waves from the earthquake can travel further than in more active parts of the world. This low attenuation of energy over distance resulted in the earthquake being widely felt 600km away in Sydney, and was even felt by residents in high rise apartments 1200km from the epicentre as tall buildings on the Gold Coast resonated with low frequency signals.

People immediately turned to media sources for information. Traditionally the media would seek information from seismologists to relay to the public, but with the advent of social media platforms the demand for instant direct information is high. This places the onus on the scientific authorities to actively distribute information, which is challenging while they are rapidly trying to process the available data and form a picture of what has happened. In the minutes after an event this picture can change rapidly.

3 News and Social Media

The largest populated area near the epicentre was at Mansfield, about 60km northwest of the epicentre, a location where a number of early reports of the earthquake being felt strongly originated. Geoscience Australia (GA) initially used “Mansfield” to identify the earthquake, but has since reidentified the earthquake as “N of Rawson” – a small township about 50km south of the earthquake. Global earthquake authority United States Geological Survey (USGS) identified the location as “Mount Buller” which is about 40km to the north of the epicentre. The Seismology Research Centre (SRC) used “Woods Point” to name the earthquake, a little-known township about 15km southwest of the epicentre. Mount Skene is the nearest identified feature, about 10km to the north of the epicentre.

While useful to orient the general public as to the general location of the earthquake, there was some confusion with the media and public thinking that the epicentre was close to Mansfield. GA’s initially reported magnitude of 6.0 being larger than the deadly magnitude 5.6 Newcastle earthquake (the main earthquake in the Australian consciousness), so understandably there were early questions about potential damage in Mansfield. Using “Mount Buller” to identify the earthquake may have produced similar confusion as there is a small ski resort community in the area, and using “Woods Point” or “Mount Skene” would not immediately communicate the location to the general public. Early national and international media coverage focused heavily on the impact to Melbourne, with some outlets initially erroneously referred to the earthquake as occurring in Melbourne.

This highlights the issues around naming an earthquake so that it can be identified as a unique historical event while communicating a relatable location to a broad audience.

The sheer volume of simultaneous website queries and felt report submissions caused GA and SRC websites to become rapidly overloaded as this IT infrastructure is not designed for such load spikes. Fortunately, volume and scalability are fundamental to the operation of social media platforms such as Twitter and Facebook, so information could still be disseminated through public-facing channels. Both SRC and GA had thousands of individuals following posts on these platforms, which were viewed and shared hundreds of thousands of times in the hours following the earthquake, demonstrating the speed and power of social information distribution.

Geoscience Australia collected over 43K felt reports, with a further 5.8K reported to USGS.

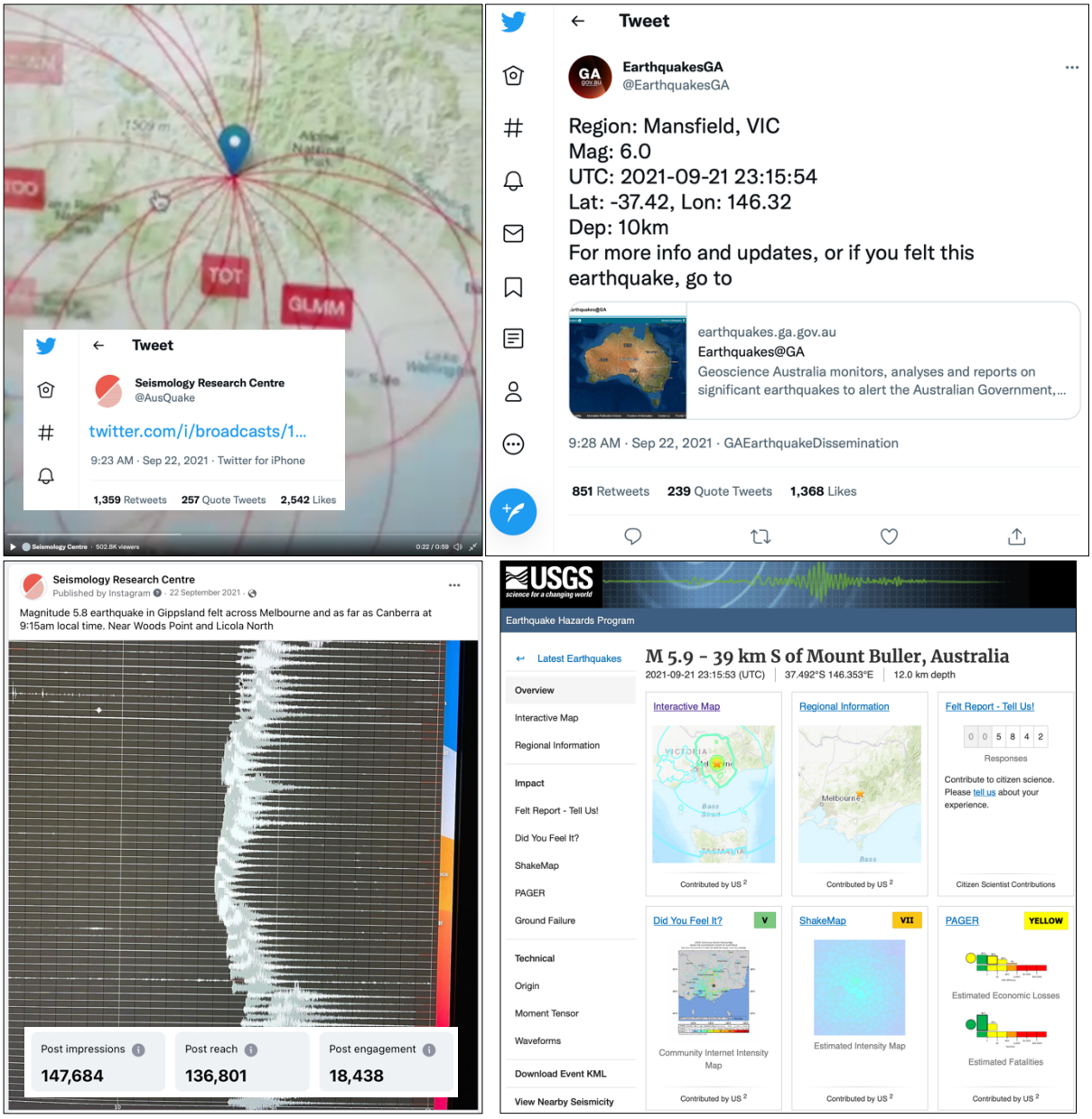

Figure 2. SRC Twitter broadcast (top left) was viewed over 500K times. GA Twitter post (top right). SRC Facebook/Instagram post (bottom left). USGS event page (bottom right).

This was a busy day for science communication, with the timing of the earthquake fitting well with the traditional news cycle, allowing television media interviews to be scheduled while managing radio interviews and posting updates via social media. It was clear that the appetite for information about the earthquake was high, so an effort to enhance public outreach was undertaken. After noticing that many videos about the earthquake were reaching an even wider audience on TikTok, the SRC established an account to also deliver content on this platform.

4 Inform and Educate

Interest in earthquakes tends to be fleeting, particularly those with limited ongoing impacts like the Woods Point event, so the window of opportunity to educate and raise awareness about Australian seismicity and earthquake safety was narrow. Throughout the day of the event, the core questions and concerns from the public and media became clear, and it was important to be able to address these in an understandable and consistent way.

Communicating with the media and the public is very different to the typical daily discussions scientists have with their peers about earthquakes, so it can be difficult to transition and avoid using jargon. The questions posed tend to be simple in nature, and we know that the answers are complex, but in this forum there is often no time for nuance, so we need to distil our responses to satisfy the question without too much qualification. The recurring questions faced were generally along the lines of:

- Why and how did this earthquake happen?
- Was this earthquake expected?
- Is this unusual earthquake activity?
- Will there be aftershocks?
- How long will this go on?
- Will there be larger earthquakes?
- Is this related to that other recent earthquake on the other side of the world?
- Was this caused by human activity?
- Why was there no damage at the epicentre?

These questions were initially difficult to answer concisely, but with so many opportunities to practice throughout the day a consistent response was formed, creating a script that was refined and repeated.

Without formal training in science communication or routine experience in answering such questions, many scientists can struggle to effectively get their message across. This is particularly true for earthquakes in Australia, where their infrequency means the opportunity to discuss the science is rare, and the fact that when information is required there is no time to prepare.

5 Empathy is Key

To be effective science communicators we must put ourselves in the position of the audience to help understand their perspective, commonly referred to as Theory of Mind, a concept familiar to those dealing with individuals that suffer from anxiety, Autism Spectrum Disorder, and other neurological conditions. As we try to communicate the science, we need to think about what our audience knows, what they don't know, how they feel, and what will satisfy their knowledge and anxiety.

In the case of an unexpected earthquake, people can become worried due to the unfamiliarity of the situation and an uncertainty of what will happen. By arming them with information, people can feel more in-control and able to deal with this anxiety. We need to acknowledge that what people are experiencing emotionally is normal, then provide them with positive actions and the possible scenarios that may play out. Woods Point was the perfect opportunity to repeat the "When you feel strong shaking: Drop! Cover! Hold On!" - the standard safety action of which most Australians are unaware.

6 Prepare and Practice

Useful points to have prepared for public/media response to an Australian earthquake:

- Acknowledge that it is unusual and probably a surprise to many
- Discuss aftershocks and the possibility of larger events
- Explain the decreasing likelihood of larger events over time

- Put the event in context for Australia – large earthquakes recur over large time scales
- Earthquakes can happen within tectonic plates too – look at those mountains!
- Clearly state that nobody can predict earthquakes in any practical time frame
- Reiterate “Drop! Cover! Hold On!” if you feel strong shaking – don’t run outside!
- Knowing that earthquakes are possible and knowing what to do is the best preparation

It is uncommon for individuals to be strong in both science and in communication, which is why we need to proactively move from one speciality toward the other to become an effective science communicator.

Analogies are a useful tool in explaining complex ideas in a digestible way, and presenting information visually is even more easily understood. This leverages the “availability heuristic” by presenting a new concept framed around a familiar situation, assisting comprehension. Take the question of how such an earthquake can happen when we are not on a tectonic plate boundary for example. Dan Clark from GA explained that tectonic plates can be visualised as pavlova shells being pushed together – more often cracking at the edges, but also compressing and cracking on top, far from the edge of the plate.

If a picture tells a thousand words, a video is saying 24,000 words per second! Creating short explainer videos is a great way to practice making complex ideas concise. By using visual aids, infographics, and simple language, we can train ourselves to cut out the jargon and unnecessary information. Short form video analytics show that the average attention span is 20-40 seconds, with the first few seconds critical to capturing viewer interest, so careful consideration of the composition and impact of the content is import for effective messaging.

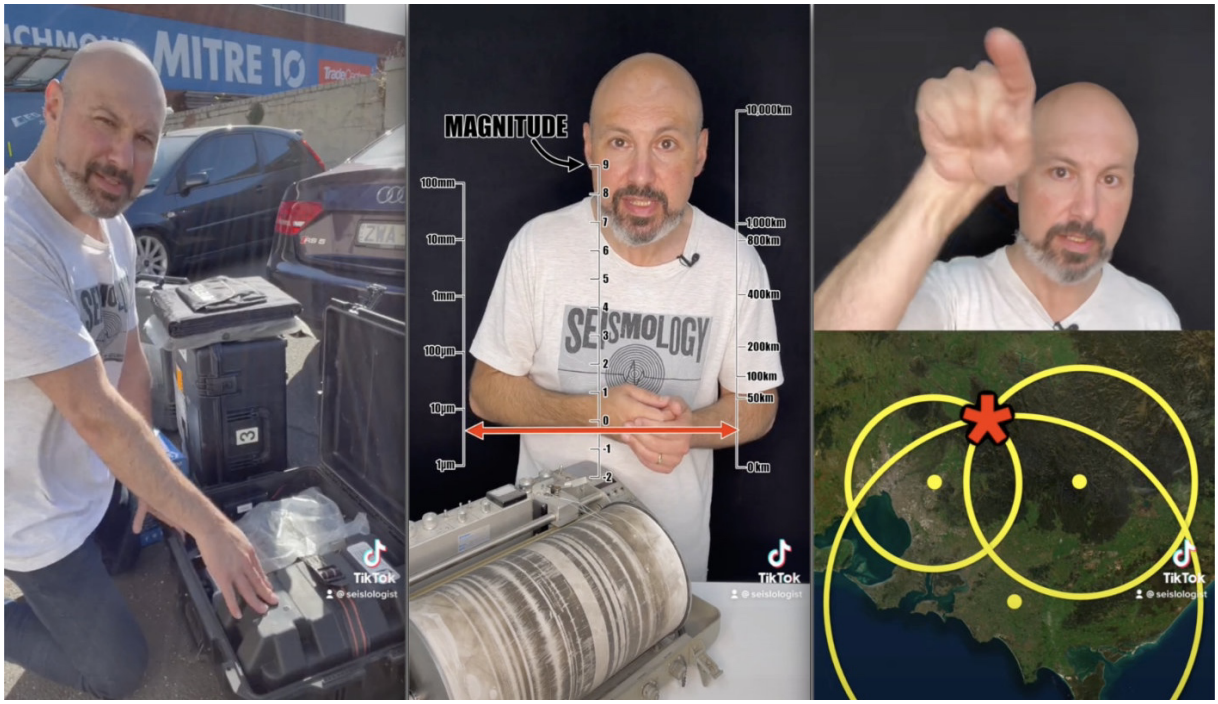

Figure 3. Posting videos regularly provides good practice for concise communication. One of the first videos posted to the author’s account explained the deployment of GA aftershock monitoring equipment (left), with subsequent videos simplifying concepts such as negative magnitudes (middle) and earthquake location determination (right) for general public consumption.

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