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Not My Fault: Japan earthquake highlights learning from past experience

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In this aerial image taken with a drone, responders work outside AEON Mall Kumamoto after an explosion occurred following an earthquake, in Kashima, Kumamoto Prefecture, southern Japan, Thursday, July 30, 2026. (Koji Harada/Kyodo News via AP)

On July 28, a M6.8* earthquake struck Japan's southernmost large island, Kyushu. It was centered only 9 miles from Kumamoto, a city of about 740,000 people and the third largest urban center on the island. The USGS estimates 1.8 million people experienced strong to violent shaking. The earthquake caused major damage to a mall, a factory, and many older homes. As I write, the death toll is 36 with 134 reported injuries.

The Uto earthquake, named for the town closest to the epicenter, is worthy of a close look. Japan is the most earthquake prepared country in the world with building codes arguably more rigorous than those in the U.S. and a far higher degree of earthquake awareness and preparedness. It is tempting to discount the damage from June's earthquakes in the Philippines and Venezuela as due to poorly constructed buildings and think such impacts are unlikely here. The Uto earthquake struck a region with built infrastructure comparable if not more earthquake

resilient as California's and gives us a glimpse of what we will experience in a similar-sized earthquake here.

The Uto earthquake occurred on the Hinagu fault at a depth of six miles beneath the surface. The Hinagu fault is a strike-slip fault with horizontal slip similar to faults in the San Andreas system. The USGS finite fault model inferred that slip occurred along a 25-mile-long section of the fault with a maximum displacement of nearly 8 feet. While most of this slip occurred miles beneath the surface, there were several places where the rupture breached the ground and satellite imagery analysis by NHK the Japan Broadcasting Corporation revealed 6 miles of surface faulting. A California earthquake in the upper 6 magnitude range will be similar.

The earthquake was felt throughout Kyushu, by some in Hiroshima and Osaka in western Honshu, across the Korea Strait in South Korea, and by a few in Tokyo over 500 miles away. Damage was concentrated in Kumamoto Prefecture in the central part of Kyushu. Nearly half of the casualties occurred at two locations, 7 deaths in Kashima when the second floor of a mall collapsed and 9 in Yatsushiro where factory towers fell. Both locations were in the Hinagu fault zone, Kashima about 6 miles to the northeast and Yatsushiro 14 miles to the southwest, the area where recorded ground shaking exceed 35% of gravity.

The Aeon Mall Kumamoto in Kashima apparently withstood the earthquake with no significant damage and the 3000 shoppers and staff in the building evacuated to an outside parking lot after the shaking stopped. Some of the employees re-entered the building to assess impacts when, about an hour after the earthquake, an explosion rocked the structure causing the second floor to collapse. The cause of the explosion is still being investigated but officials surmise that the earthquake triggered a slow gas leak that suddenly ignited when the gas reached a critical level.

The Nippon Paper Industries factory in Yatsushiro experienced violent shaking in the earthquake and media reported that multiple tall narrow smokestacks collapsed. The factory was over 100 years old and apparently no recent seismic retrofits had focused on the chimneys even though much of the factory had been upgraded following a major earthquake in 2016. Authorities are now calling this oversight a regulatory blind spot and all operations at the factory have now stopped while structural engineers determine why so many chimneys failed at the roof line.

Even though most factories and businesses did not experience significant structural damage in the earthquake, loss of power, non-structural damage, and the time needed to thoroughly complete safety checks shut down at least 15 major factories and many other businesses. The four major Japanese automotive companies, three semiconductor plants, two chip-equipment facilities and a number of other factories suspended operations in the region. Southwestern Kyushu contributes to the global supply chain in a number of industries and is a major export hub for the automotive and semiconductor sectors. The U.S. and other parts of the world are likely to experience tightened supplies with some economic impacts for the rest of the year.

The biggest impacts on residents were damages to homes and infrastructure. Like California, Japan features a mix of construction types. Newer buildings meet very stringent regulations and perform well in earthquakes, but some older homes do not. Over 1200 homes reported damage and 179 collapsed. Nearly 50,000 homes and businesses lost power and 84,000 customers experienced water supply disruptions. Temperatures have hovered in the upper 90s

since the earthquake, exacerbating the earthquake impacts and landing dozens of survivors and responders in hospital with heat stroke.

Japan has the most highly developed earthquake early warning system in the world. With over 4000 seismic sensors on the four main islands and offshore, most earthquakes can be detected within a few seconds and alerts sent to people likely to feel strong shaking soon after. On July 28, the system worked exactly as designed and people outside of the immediate epicentral region received a phone alert to expect strong shaking. The system automatically shut down the Shinkansen (bullet train) system, opened fire station doors, and triggered switches to emergency power generating systems in hospitals, factories and other critical facilities. But no earthquake early warning system is capable of alerting people close to the epicenter. In the two or three seconds it takes to collect enough seismic data to locate and determine the size of an earthquake, the seismic waves have already traveled 5 to 10 miles from the source.

The Uto earthquake did not cause a tsunami. The epicenter was on land, but close to the Ariake Sea, the largest bay on Kyushu and less than ten miles from the Yatsushiro Sea, a large inland waterway. Japanese authorities issued a tsunami warning for waves as high as three feet along nearby shorelines, disseminated on phones and over media outlets within minutes after the earthquake. The alert was cancelled two hours later when no tsunami was observed. Japan's tiered tsunami warning system informs people immediately that the tsunami threat is limited to the immediate shoreline and reduces over evacuations.

The impacts in the Kumamoto region have been significant but not catastrophic in large part to preparedness measures taken by the government, communities and individuals. Japan suffers frequent large earthquakes and expends more of its national resources on seismic resilience than any other country in the world. The 2026 Uto earthquake illustrates both the benefits of this approach and a few of its limitations.

Only a decade ago, the same area of Kyushu was struck by a similar-sized earthquake. The April 16, 2016, M7.1 Kumamoto earthquake was centered less than 7 miles north of this week's quake and produced a similar pattern and level of ground shaking. The impacts were far greater: 277 deaths, 2809 injuries, and over 155,000 structures damaged. Local government mandates resulted in many structures being rebuilt or retrofitted to more rigorous standards. In 2016, several medical facilities suffered partial collapses and had to evacuate patients. By the time of this week's earthquake over 95% of critical facilities like hospitals and schools had been reinforced and were able to fully operate during the emergency period.

One of the structures that was retrofitted after 2016 was the Aeon Mall Kumamoto. The strengthening appears to have helped the Mall withstand the shaking, but unfortunately not the explosion. There are likely many discussions now taking place on how to better monitor gas lines or other infrastructure failures in the minutes after strong shaking. Japan is the model for learning from past earthquakes and making improvements before the next one comes.

Japan also instituted policies to reduce the vulnerability of older homes after 2016. Local municipalities enforced strict zoning laws and subsidized relocation away from mapped fault zones. The new homes were built without the heavy tile roofs of traditional buildings that made them particularly vulnerable to collapse. A quantitative measure of the effectiveness of this approach was the more than ten-fold reduction in structural crush injuries in 2026.

2016 also focused resources on response planning. Kyushu streamlined agency coordination with a standardized mutual aid framework between neighboring prefectures. Digitized Disaster Medical Assistance Teams now get real-time data to optimize triage sites, track hospital bed availability, and victim conditions. Emergency supplies were dispatched based on modeled needs for the actual event rather than waiting for individual requests. The result was food and water deliveries to the most affected areas in less than 12 hours and a complete restoration of electricity and water to areas not severely damaged in two days.

California is at a disadvantage when compared to Japan in terms of earthquake resilience incentives. Our deadly earthquakes recur on a scale of decades to centuries, just long enough to forget how important it is to plan and build for earthquake residence. When our ground starts shaking, we won't get a second chance to do it over and be better prepared.

*Note: I am using the USGS magnitudes throughout. Japan has very accomplished seismologists and their own magnitude scale. The 2026 Uto earthquake registered 7.1 on the Japan Meteorological Agency scale and the 2016 Kumamoto earthquake had a JMA magnitude of 7.3

Lori Dengler is an emeritus professor of geology at Cal Poly Humboldt, and an expert in tsunami and earthquake hazards. The opinions expressed are hers and not the Times--Standard's. All Not My Fault columns are archived online at <https://kamome.humboldt.edu/taxonomy/term/5> and may be reused for educational purposes. Leave a message at (707) 826-6019 or email Kamome@humboldt.edu for questions and comments about this column or to request copies of the preparedness magazine "Living on Shaky Ground."