PSCE NEWSLETTER

Earthquake Rocks Taiwan

Figure 1: A building in Hualien, Taiwan leans dangerously after a magnitude 7.4 earthquake on 3 April 2024. Credit: VCG via Getty

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INSIDE THIS ISSUE

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Editor-in-chief

A magnitude 7.4 earthquake struck 18 km SSW of Hualien City, Taiwan, on the 2nd April, 2024, at 23:58:11 UTC. The location 23.819°N 121.562°E, 18 km SSW of Hualien City, Taiwan.

The earthquake is the strongest that has occurred in Taiwan, during the past 25 years.

At least nine people died in the quake, which struck just before 8 a.m., according to Taiwan's national fire agency. The reported number of injured is less than 1,000. Around 72 persons are still reportedly trapped.

While much of Taiwan’s population lives on the west coast of the country, Hualien City is one of the largest population centres on the east coast. Its population is roughly 100,000.

Building damage has been reported in the region near the epicentre of the earthquake, including in Hualien City. Landslides also occurred along the mountainous central east coast.

A tsunami warning was issued for Taiwan and nearby countries including Japan and the Philippines. At the time of writing, a 30 cm tsunami was reported along the south coast of Japan. This would have shown up as a noticeable swell on the shore but is unlikely to cause significant damage. The biggest surge in a tsunami is not always the first surge so it is possible a larger tsunami wave may eventuate, but as time passes this becomes increasingly unlikely.

DEPTH

The source was 34.8 km deep.

LOCATION MAP

Following is a location map of the event, in a world map:

Figure 2: Location map of the event, in a world map

Following is a location map of the event, with isobars of expected intensity, superimposed:

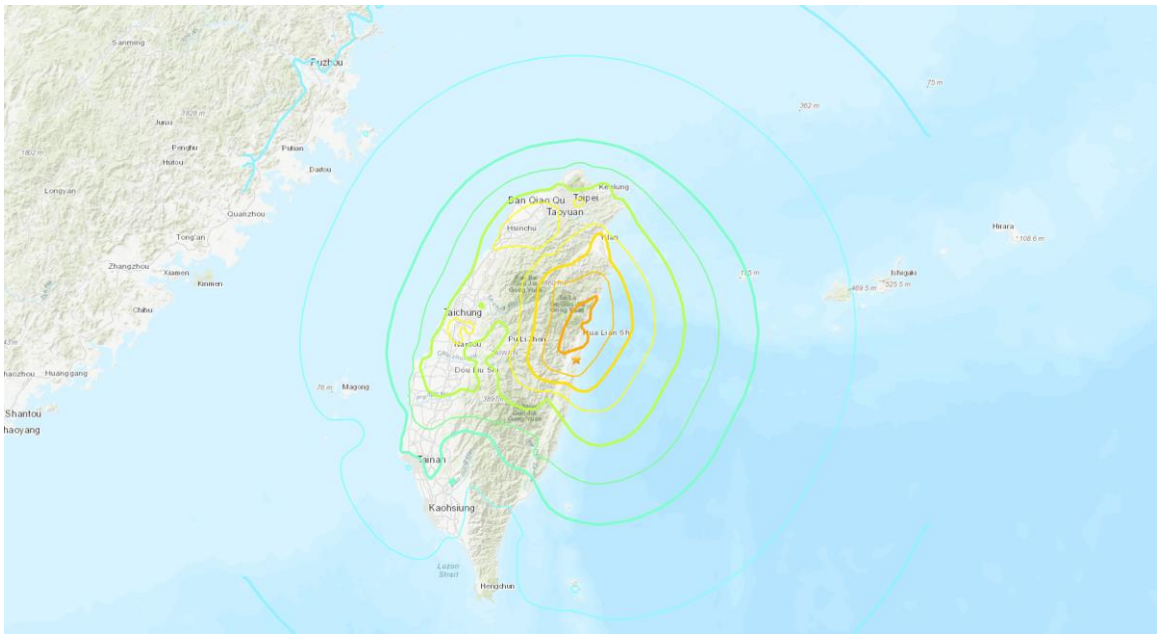
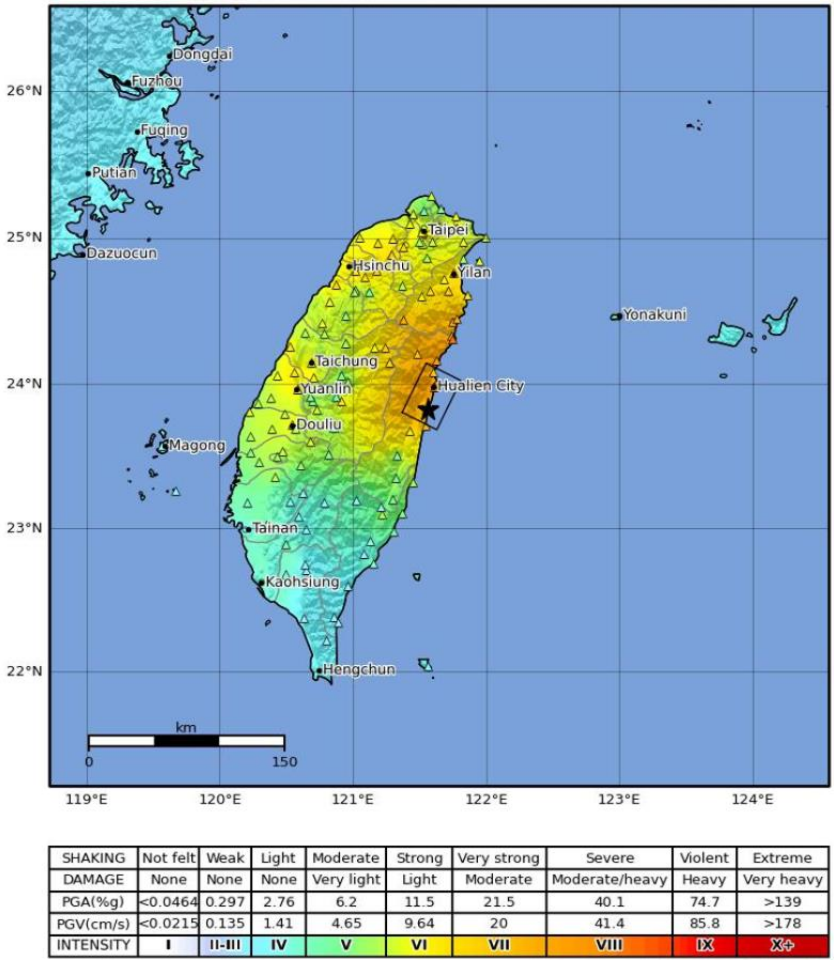


Figure 3: Location map of the event, with isobars of intensity

INTENSITY MAP

Following is an expected intensity map of the event:



SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
DAMAGE	None	None	None	Very light	Light	Moderate	Moderate/heavy	Heavy	Very heavy
PGA(%g)	<0.0464	0.297	2.76	6.2	11.5	21.5	40.1	74.7	>139
PGV(cm/s)	<0.0215	0.135	1.41	4.65	9.64	20	41.4	85.8	>178
INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+

Figure 4: An expected intensity map of the event

REGIONAL TECTONICS

The Philippine Sea plate is bordered by the larger Pacific and Eurasia plates and the smaller Sunda plate. The borders of Philippine Sea plate are nearly all zones of plate convergence.

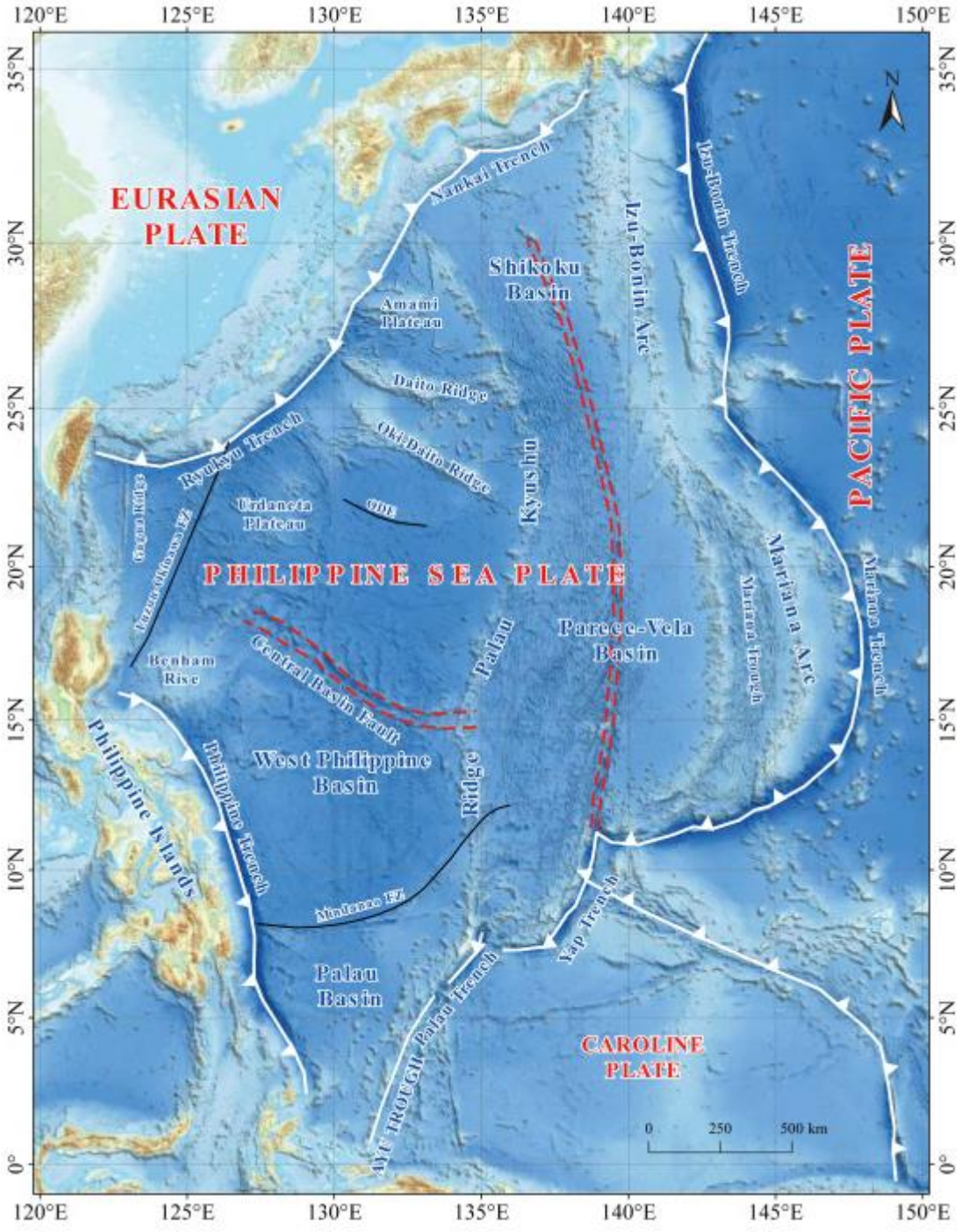


Figure 5: Seismologic setting of Philippines Sea Plate

Seismic activity along the boundaries of the Philippine Sea Plate (Allen et al., 2009) has produced 7 great (M>8.0) earthquakes and 250 large (M>7) events. Among the most destructive events were the 1923 Kanto, the 1948 Fukui and the 1995 Kobe (Japan) earthquakes (99,000, 5,100, and 6,400 casualties, respectively), the 1935 and the 1999 Chi-Chi (Taiwan) earthquakes (3,300 and 2,500 casualties, respectively), and the 1976 M7.6 Moro Gulf and 1990 M7.6 Luzon (Philippines) earthquakes (7,100 and 2,400 casualties, respectively). There have also been a number of tsunami-generating events in the region, including the Moro Gulf earthquake, whose tsunami resulted in more than 5000 deaths.

SEISMOGRAM

Following is a seismogram of the earthquake:

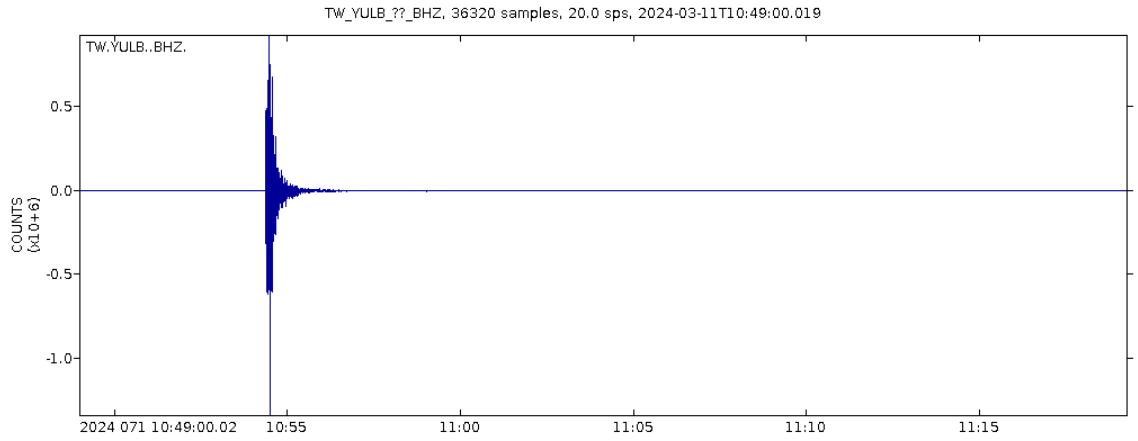


Figure 6: Seismogram of the event

The above image shows the vertical component of the event with bandpass filter applied: 0.2-10.0 Hz. The dotted line represents the time of the earthquake.

Upcoming Event

Pakistan Society of Civil Engineers
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▶Continuous Professional Development Initiative◀

PSCE LECTURE No. 65

Technical Lecture Counted Towards CPD Points Under
Professional Development of Engineers Byelaws, 2008, of the PEC

Geotechnical Aspects of Earthquake Engineering – Liquefaction, Soil-structure Interaction and Response Spectrum Analysis

Engr. Naeem ur-Rehman Durrani, CE
B. Sc. Civil Engineering, UET, Lahore
Chief Executive & Chief Structural Engineer, Noor Durrani & Associates

Saturday, 20th April, 2024
14.00 to 16:00, Pakistan Standard Time (PKT)
9:00 to 11:00, Universal Time Coordinated (UCT)

On-line lecture to be joined through ZOOM.
Details would be sent, by email, to the registered applicants, a day before the lecture.
For obtaining CPD points, live appearance of every participant is mandatory during the lecture.

Registration Fee:
PSCE associates: Free
Other engineers and allied professionals: PKR 500

Bank Details:
Account title: Pakistan Society of Civil Engineers
Account Number: 2008209912
Bank: Silk Bank Limited
Branch: Egerton Road Branch, Lahore 54000, Pakistan
Branch Code: 0003
IBAN: PK39 SAUD 0000 0320 0820 9912
Swift Code: SAUDPKKAXXX

Contact person for registration:
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PSCE Newsletter

Pakistan Society of Civil Engineers

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