How Does Japan's Earthquake Early Warning Work?

在日本收到地震警報，它是怎麼來的？

When the ground breaks

從地震開始



Illustrative scene · 情境示意

The start

震源

An earthquake has already started underground when an early warning becomes possible. Instruments must first record some of the motion it produces.

先有地震，才有預警。地下已開始破裂，觀測儀器必須先量到它產生的震動。

First arrival

初動

A nearby seismometer can detect the faster primary wave, called a P wave. That early signal gives the system information to work with.

鄰近地震儀能先收到傳得較快的初達波，也叫 P 波，提供預警系統第一批線索。

The opportunity

時間差

A warning can travel electronically while stronger shaking is still on its way to a more distant place. How much time remains depends on location.

警報能透過通訊傳送；距離較遠的地方，較強震動此時可能仍在路上。能提前多久因地點而異。

[1] [2] [3]

From instruments to a forecast

從觀測到估算



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Wave records

震波紀錄

The Japan Meteorological Agency uses waveforms recorded by seismographs near the earthquake. These records describe motion that has already reached the instruments.

日本氣象廳利用震源附近地震儀量到的波形，資料反映已經傳到觀測點的震動。

Two questions

兩個問題

The analysis estimates where the earthquake began and its magnitude. Those estimates help forecast how strongly different places may shake.

分析先估地震發生的位置與規模，再推估不同地點可能感受到的震動強弱。

Magnitude and intensity

規模與震度

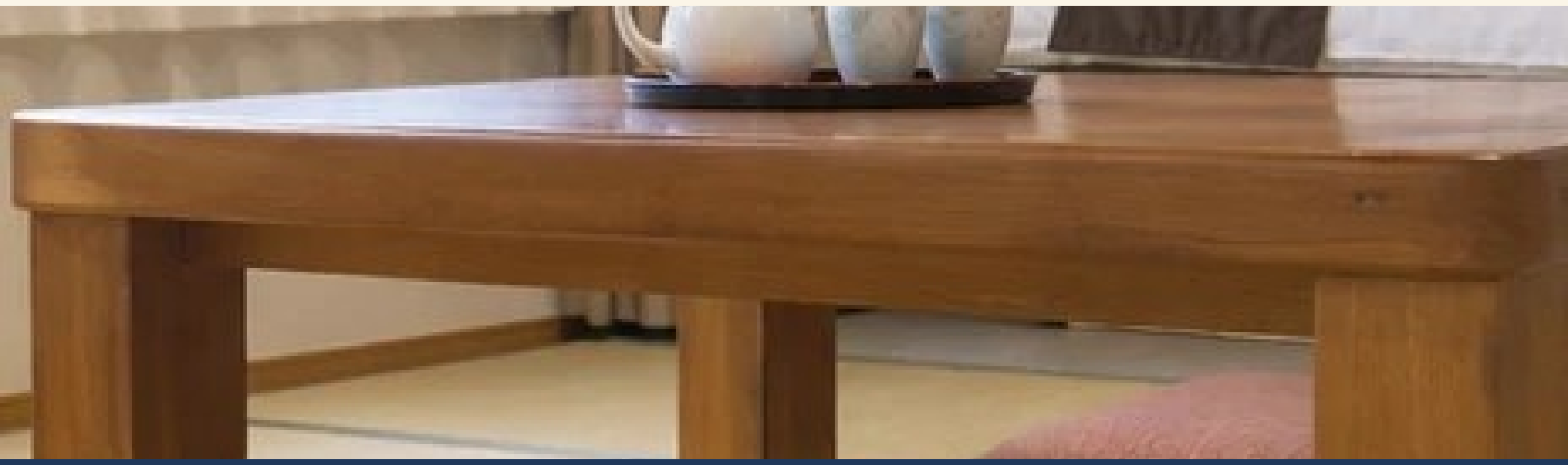
Magnitude describes the size of the earthquake. Seismic intensity describes shaking at an individual place, so two towns can experience the same earthquake differently.

規模描述這起地震本身的大小；震度描述某個地點的搖晃程度。同一場地震，兩個城鎮的震度可以不同。

[1] [2] [3]

Why lead time varies

為什麼有時來不及



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Near the source

接近震源

Close to the source, strong shaking may arrive at the same time as the warning or earlier. Protect yourself when you feel shaking.

靠近震源時，強烈搖晃可能與警報同時到達，也可能更早。感到搖晃就先保護自己。

Farther away

距離較遠

Farther away there may be a brief interval between the warning and strong motion. JMA describes this interval in seconds, with no fixed countdown for everyone.

較遠處可能有短暫空檔，通常以秒計。每個地點的時間不同，無法用同一個倒數秒數套用。

Early estimate

初步估算

The first estimate uses a short stretch of observations. What you actually feel can differ from the forecast, even when your area receives a warning.

最初的估算可用資料很短，即使所在地收到警報，實際感受的震動仍可能和估計不同。

[1] [2] [3]

Choose a nearby safe action

依所在位置採取行動



Illustrative scene · 情境示意

In a room

室內

Protect your head and get under a sturdy table if one is close. Stay away from furniture or objects that could topple onto you.

先保護頭部，旁邊若有堅固桌子就躲到桌下，避開會傾倒的家具與掉落物。

On a train

車廂內

If you are standing in a train or bus, hold a strap or handrail firmly. Once you are secure, listen for staff instructions.

在公車或電車上站著時，先牢牢抓住吊環或扶手。穩住身體後留意工作人員的指示。

On the street

街道上

Look for falling signs or glass above you and unstable block walls beside you. Move away from those immediate hazards as conditions allow.

留意上方可能掉落的招牌、玻璃及旁邊的磚牆。視現場情況，避開這些眼前的危險。

[1] [2] [3]

Trace the signal

沿著預警流程走一遍

Sensor

附近儀器量到震波

Start the diagram at a sensor that has measured a wave. A forecast for an earthquake that has not yet begun belongs to a different question.

流程從儀器量到震波開始。這張圖解釋的是已發生地震的速報，無法用來預知哪一天會有地震。

Analysis

估算震源、規模及各地震度

Move from the sensor to the analysis stage. Think of location and magnitude as inputs and expected shaking at different places as an output.

從觀測點移到分析階段。震源位置與規模是推估依據，各地可能有多大震動則是推估結果。

Broadcast

透過媒體等管道傳送警報

The warning is relayed through channels such as television and radio. Its purpose is to prompt immediate protective action when seconds matter.

警報透過電視、廣播等管道傳送，目的是讓收到訊息的人把握短暫時間，立刻保護自己。

Rehearse before you need it

平時先做一次情境練習

Room

護頭，靠近時可躲到堅固桌下

When you enter your room, look for a sturdy table and notice which shelves or windows are nearby. Decide where you could protect your head.

進房時先看看堅固桌子在哪裡，周圍有哪些層架或窗戶，想好可以就近護頭的位置。

Train or bus

抓緊吊環或扶手，留意指示

When standing on a bus or train, notice the nearest strap or rail. That is the first thing to reach for during sudden shaking.

搭公車或電車站著時，先注意伸手可及的吊環或扶手；突然搖晃時就知道該抓哪裡。

Street

避開招牌、玻璃與可能倒塌的牆

If shaking starts before you hear anything, use the same protective action immediately. Checking your phone can wait until you are in a safer position.

還沒聽見警報就開始搖晃時，一樣先採取防護動作，等身體處於較安全的位置再看手機。

[1] [2] [3]

What to do when the alert sounds

警報響起時，先做什麼？

In a room

在室內

Protect your head and take shelter in a nearby safe place such as under a sturdy table. Avoid rushing outside.

先護住頭，移到附近安全處，例如堅固桌子下。避免慌張往外跑。

On a train or bus

在列車或公車上

Hold a strap or handrail securely. In a staffed facility, follow the staff's instructions and avoid rushing the exit.

握牢吊環或扶手。在有工作人員的場館，照指示行動，避免往出口奔跑。

On a city street

在街上

Watch for falling glass or signs and the collapse of block walls. Choose a safer nearby position for your surroundings.

留意玻璃、招牌掉落和磚牆倒塌，依周遭狀況移到附近較安全的位置。

[4]

REFERENCES

Sources & links

資料來源與原文連結

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點選條目可開啟原文。版本日期為 2026 年 11 月 24 日。

01 **jma.go.jp**
日本氣象廳｜Earthquake Early Warning →

02 **jma.go.jp**
日本氣象廳｜Earthquake Early Warning leaflet →

03 **jma.go.jp**
日本氣象廳｜速報精度與時間限制 →

04 **Japan Meteorological Agency · When you hear an alert**
気象庁｜緊急地震速報を見聞きしたときは →



Illustrative scene · 情境示意

Diagrams redrawn for this edition. Scene images are illustrative.
圖解依資料重新編排。內頁影像用於說明情境。