

Tremor Tracker

User Manual

iPhone

Version 1.3 | Build 181
17 October 2026

Motion monitoring and earthquake context

This manual explains local motion monitoring, detection scores, recent earthquake information, local sound and light controls, and alarm logs. Keep the App open in the foreground during measurement. False alarms and missed alarms are possible; follow official warnings and emergency instructions.

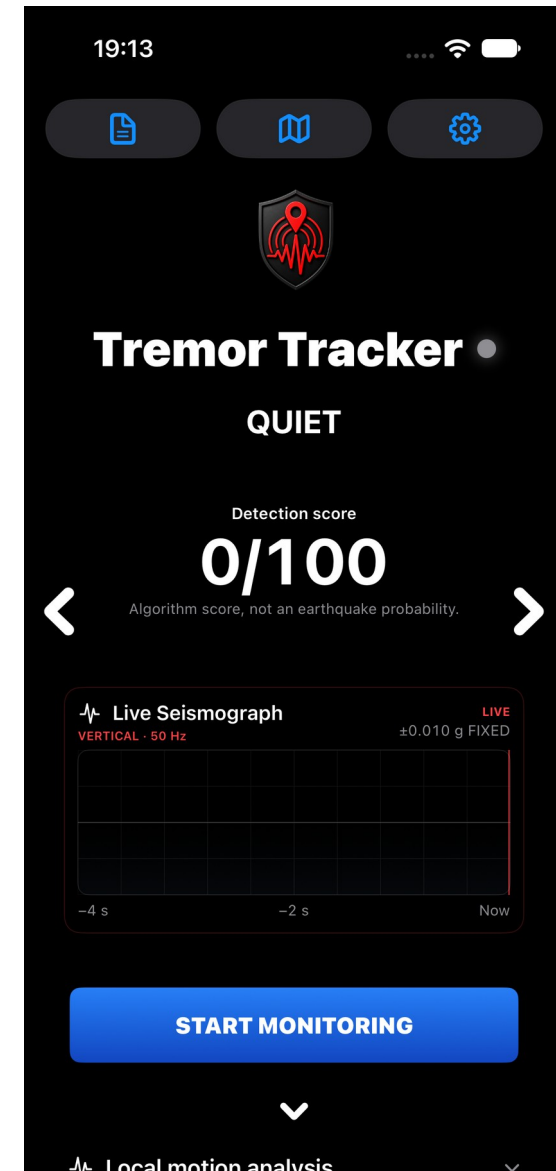
Start here

Place the iPhone on a stable surface, choose sensitivity and local shaking delay, then start monitoring. Keep the App open in the foreground. Global context independently checks USGS/NEIC, GFZ GEOFON and EMSC.

Requirements

iPhone with iOS 17 or later. Catalogue context requires network access and location permission. Local movement detection can operate without catalogue confirmation.

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Quick start

1. Place the iPhone flat on a stable surface or upright in a suitable charging stand. Use external power for longer sessions.
2. Open Settings. Choose sensitivity, the local shaking delay, initial alert volume and Sleep Delay.
3. Start monitoring and let orientation settling and calibration finish. Keep the App open in the foreground.
4. Read the live trace and calculated score. A score such as 55/100 is evidence points, not a 55% earthquake probability.
5. Use the alarm controls to snooze or stop. Sound output does not guarantee waking you. Follow official warnings and emergency instructions.

Reading the main display

Local motion and score

Core Motion supplies gravity-removed acceleration and rotation at 50 Hz. The detector estimates local background noise and looks for a sustained motion pattern. A detected event does not prove an earthquake or establish danger; a quiet display does not establish safety.

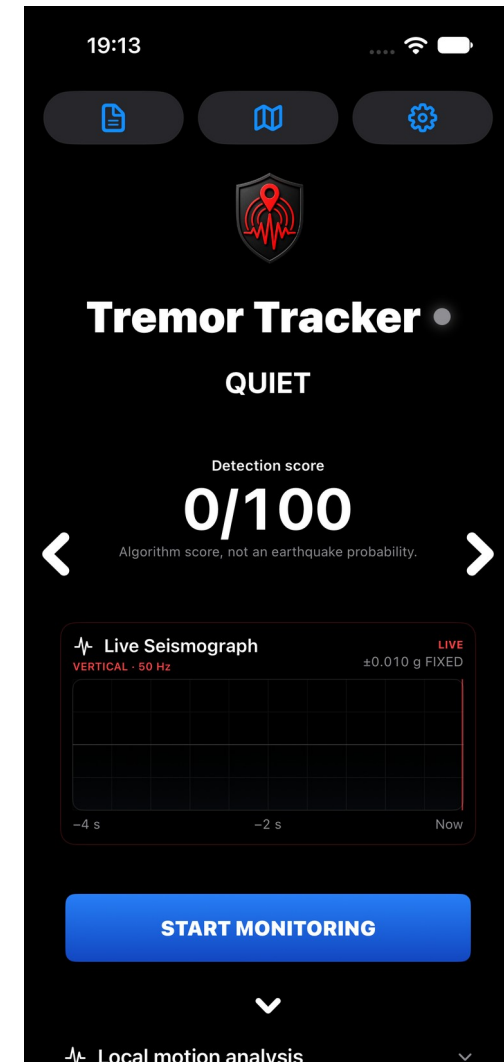
The calculated detection score is displayed unchanged when an alarm starts. It is evidence points out of 100, not a calibrated earthquake probability or accuracy percentage.

Expandable Main panels show local motion analysis, score components, catalogue context and the phone location used for earthquake context. The graph shows four seconds of device Z-axis acceleration; changing its display scale does not change alarm thresholds.

Alarm decisions

The local-only route uses the selected shaking delay. The catalogue-supported route can trigger after four seconds of qualifying local movement using any one of the three sources. A catalogue entry alone cannot trigger an alarm.

Swipe between Main, Tremor Alert, Signaling Function and the detailed measurement panels. Logs, Map and Settings are available through the top controls.

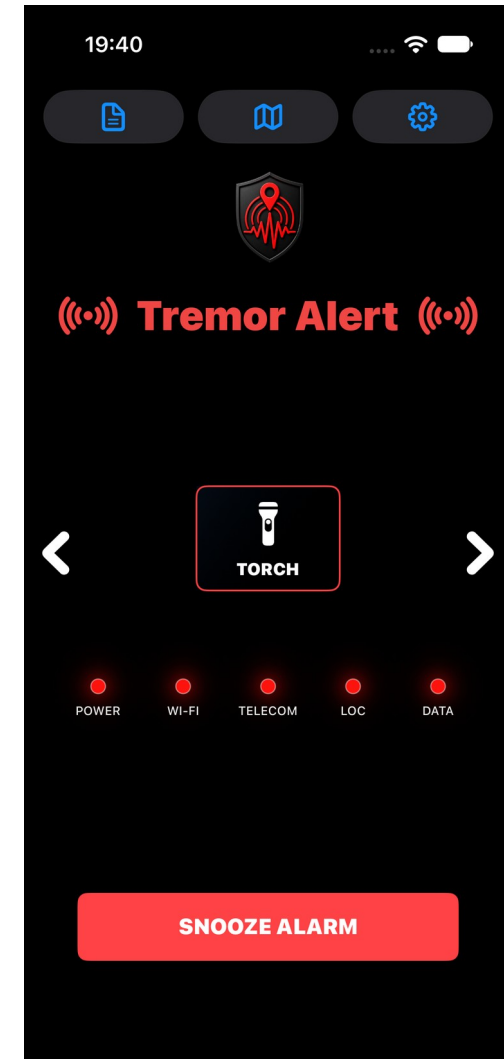


Tremor Alert

An actual detector alarm reports SUSTAINED MOVEMENT DETECTED and CAUSE NOT ESTABLISHED. TORCH controls the rear light when available. SNOOZE ALARM stops or snoozes alarm output. The configured volume is requested at alarm start; physical volume buttons remain usable afterwards. On snooze or stop, the App requests the pre-alarm playback volume. iOS and the active audio route determine actual output.

Shared status lights

Tremor Alert and Signaling Function use the same POWER, WI-FI, TELECOM, LOC and DATA indicators. LOC reports an available location/GPS fix; it does not mean local-network access. The lights show device services, not signal delivery or confirmation by earthquake catalogues.



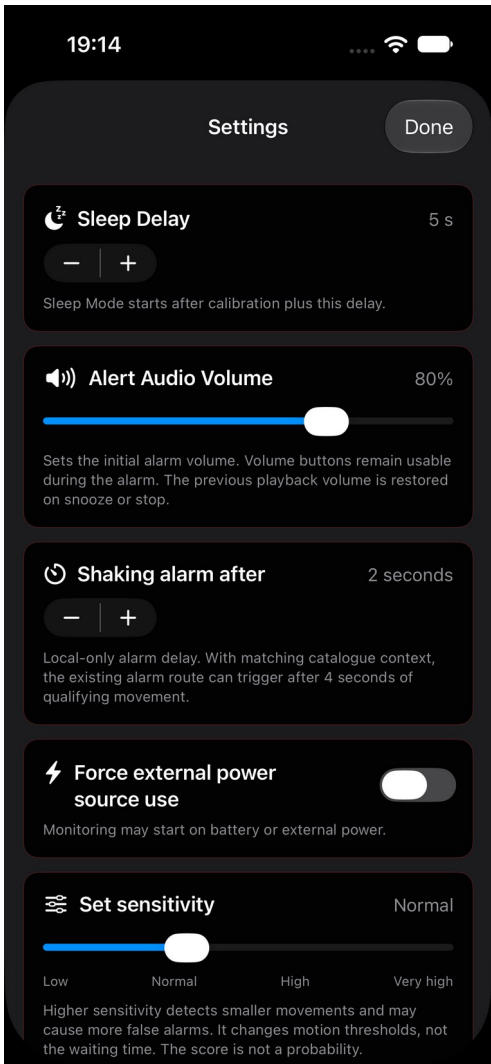
Settings and Sleep Mode

Choose sensitivity, local shaking delay, alert volume, display scale and the external-power preference in Settings. Changes apply to subsequent monitoring and alarm decisions.

Setting	Range or values	Effect
Sleep Delay	0 to 30 seconds; default 5 seconds	Delay after calibration and quiet state before Sleep Mode may start.
Alert Audio Volume	30 to 100 percent	Requests the configured volume at alarm start. Hardware volume buttons remain usable afterwards. On snooze or stop, the App requests the playback volume captured just before the alarm. iOS and the active audio route determine actual output.
Shaking alarm after	1 to 10 seconds; default 2 seconds	Delay for the local-only alarm route. The existing catalogue-supported route can trigger after four seconds of qualifying local movement even when a longer local delay is selected. A catalogue entry alone does not trigger an alarm. Both routes retain their motion and duration thresholds.
Force external power source use	On or Off	When on, monitoring starts only if the iPhone is charging or full. A later power interruption does not by itself recalibrate the detector.
Set sensitivity	Low, Normal, High, Very high	Changes motion thresholds, not waiting time. Low = 0.65 with an additional 2× threshold factor; Normal = 1.0, High = 1.4, Very high = 2.0. Low rejects more small movement and can miss weaker tremors.
Set seismograph display scale	plus or minus 0.001 g to 99.999 g	Changes the visible graph scale only. It does not change alarm thresholds.

Sleep Mode starts on a quiet Main screen after calibration and Sleep Delay. After Goodnight, the display is solid black at zero brightness. A tap or short motion uses the normal Sleep Delay. A real alarm disables sleep until you press DISARM ALARM, then START MONITORING. Snooze does not clear this pause; Main shows the reason. Settings, Logs, Map and Signaling Function keep the screen awake. Keep the App in the foreground; locking, calls and iOS interruptions can stop measurement.

The external-power preference can require charging or full battery before monitoring starts. It does not certify power continuity. Screen brightness, audio route and battery usage remain device-dependent.



Bedside setup

Place the iPhone flat on a stable bedside surface or upright in a suitable charging stand. Keep Tremor Tracker active in the foreground while monitoring.



Bedside placement and volume setup

The illustration is retained from the original manual and shows an earlier interface. The current app displays detection scores as points out of 100. Set Alert Audio Volume in Settings for the initial alarm volume; physical volume buttons remain available afterwards. Sleep Mode dims the app display while the app remains open.

Set up Focus in iPhone Settings

Do Not Disturb is optional. Tremor Tracker does not require Do Not Disturb or any other Focus. If you choose to use Do Not Disturb to reduce calls and notifications overnight, configure it through iPhone Settings > Focus using the steps below. This allows Tremor Tracker's background warning through while Do Not Disturb is on. If you do not use Do Not Disturb, skip this setup.

Tremor Tracker only works while it is open in the foreground. If you move it into the background, the warning tells you to return to Tremor Tracker. It is a reminder to bring the App back to the foreground so motion monitoring can work.

Open the iPhone Focus settings

1. Go to the iPhone Home Screen and open Settings, the app with the grey cogwheel icon.
2. In Settings, scroll down and tap Focus.
3. In the Focus list, tap Do Not Disturb. This is a built-in Focus; you do not need to create a new one.

Add Tremor Tracker to the allowed apps

4. On the Do Not Disturb settings screen, find Allow Notifications.
5. Under that heading, tap Apps (or Choose Apps).
6. On the Apps screen, select Allow Notifications From.
7. Tap Add Apps or the + button.
8. Find Tremor Tracker in the list and tap it to select it.
9. Tap Done to save the selection.

Go back to the Do Not Disturb settings screen. The Tremor Tracker icon should now appear under Apps, as in the screenshot on the right. This is the app exception that allows its background warning through Do Not Disturb.

Enable notification banners and sound

10. Return to the main iPhone Settings screen.
11. Tap Notifications, then scroll to and tap Tremor Tracker.
12. Turn on Allow Notifications and Sounds. Under Alerts, select Banners.

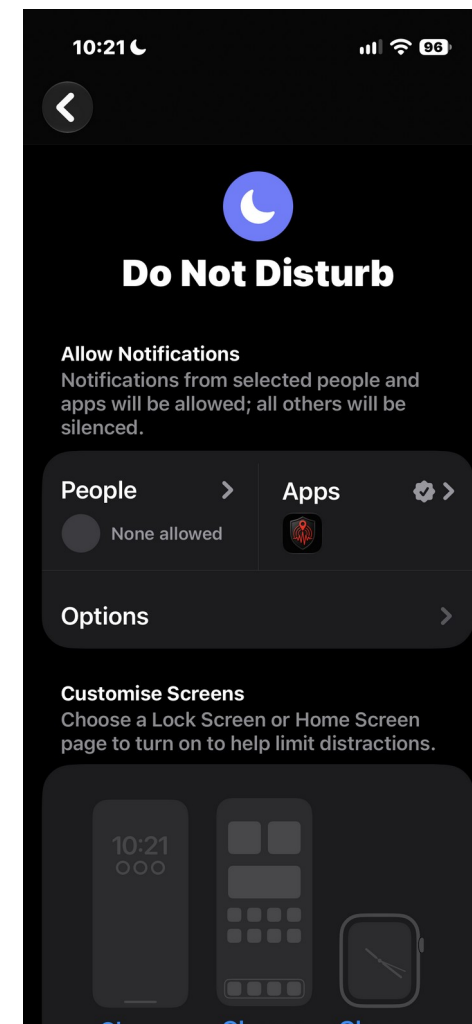
Choose immediate delivery where available and keep Tremor Tracker out of Scheduled Summary. These settings and the Focus app exception are both needed for the warning.

If you also use Sleep Focus

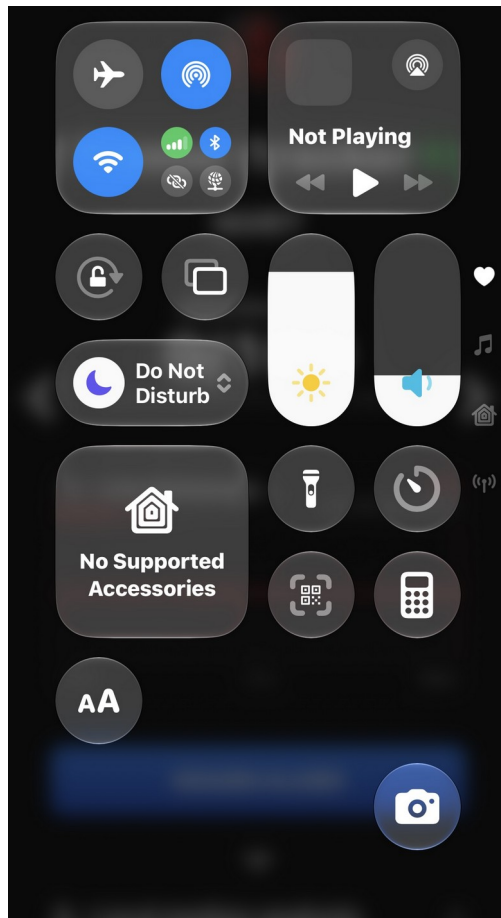
In iPhone Settings, tap Focus > Sleep > Apps. Select Allow Notifications From and add Tremor Tracker there too. Each Focus has its own app list. If an existing Focus uses Silence Notifications From instead, ensure Tremor Tracker is absent from that silence list.

The steps above configure the Focus. To switch Do Not Disturb on and test the warning, follow page 8. Focus does not enable background motion detection: Tremor Tracker must remain open while monitoring.

[Apple instructions: support.apple.com/guide/iphone/iph21d43af5b/ios](https://support.apple.com/guide/iphone/iph21d43af5b/ios)



Turn on Focus and test the warning



Switch on Do Not Disturb

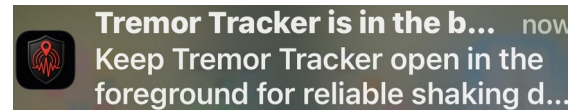
1. Open Control Center: swipe down from the top-right corner of the screen, or up from the bottom on an iPhone with a Home button.
2. Tap the text on the Focus control, next to the moon icon. It may say Focus or the name of the active Focus.
3. In the Focus list, tap Do Not Disturb if it is not already on.

The screenshot on the left shows Do Not Disturb already on. Its crescent moon also appears in the iPhone status bar. Close Control Center and return to Tremor Tracker.

Test the background warning

Purpose of this warning: Tremor Tracker needs to be in the foreground to work. The banner warns that you have left the App and asks you to bring it back to the foreground for motion monitoring.

1. In Tremor Tracker, open the App's Settings.
2. Tap Test background warning.
3. Immediately go to the Home Screen: swipe up from the bottom, or press the Home button.
4. Check that the warning banner appears and a sound plays.
5. Tap the banner or reopen Tremor Tracker to return to the App.



Example of the warning you should receive.

If the warning is missing, recheck steps 4–12 on page 7 for the Focus that is currently active. Repeat the test with Sleep Focus if you use it. After testing, start monitoring and leave Tremor Tracker open on your nightstand; use its own Sleep Mode for a black display.

Signaling Function

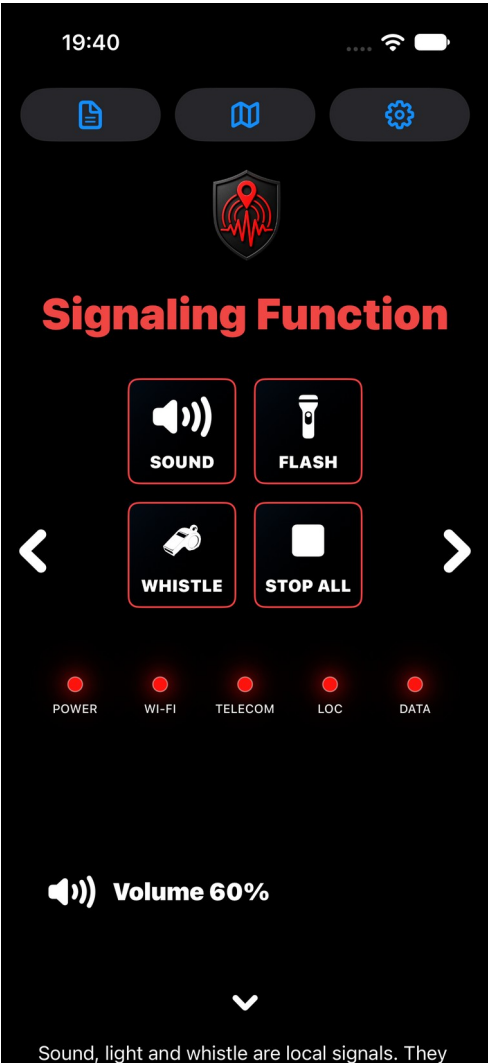
Signaling Function provides local sound, flash and whistle controls. Sound and light may attract attention, but they do not contact emergency services or confirm reception.

Controls

Control	Operation
SOUND	Plays the SOS sound at the available playback output volume. Tap again to stop.
FLASH	Flashes the rear light when supported and available. Tap again to stop.
WHISTLE	Loops the whistle sound. Tap again to stop.
STOP ALL	Stops sound, flash and whistle.
Volume	The native playback volume control and physical volume buttons control actual output; this is separate from the initial alert-volume preference.

POWER, WI-FI, TELECOM, LOC and DATA show the same states as on Tremor Alert. Sound, flash and whistle stop when leaving this screen or when the App moves to the background.

General help tips below the controls do not assess the surroundings or replace official instructions.



Global context and three catalogue sources

Three independent sources

USGS/NEIC, GFZ GEOFON and EMSC are checked independently every 20 seconds during normal monitoring and every 5 seconds during qualifying movement. A slow or unavailable source does not block the other two.

If a request fails, its cached entries are excluded from detector matching. That source is checked again after 60 seconds. The panel shows availability, last successful retrieval, count and any matching event for each provider. Cached counts are labelled when excluded.

Use the first plausible match

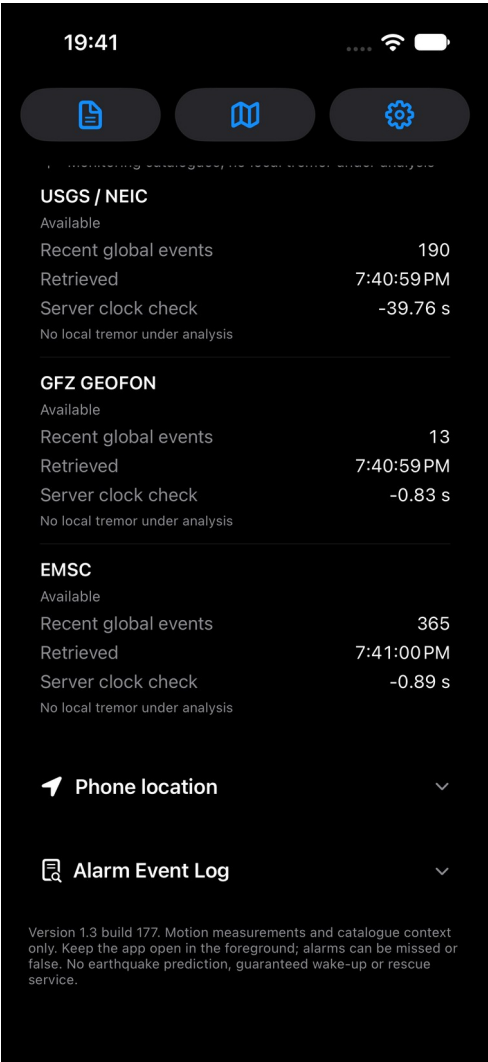
A GEOFON or EMSC match can support the catalogue-assisted alarm route before USGS reports an event. Matching uses event magnitude of at least 2.5, an epicentral distance within 500 km, depth and a plausible P- or S-wave arrival near the observed local event start.

The log records matching providers, providers without confirmation, their availability at the trigger and a confirmation note. Later post-alarm candidates are stored separately from the original trigger-time evidence.

Read the status

With no local tremor under analysis, the App reports catalogue monitoring. During local movement, it reports a possible match or that no matching P or S arrival has been found yet.

Only the best two catalogue scores count, plus agreement between sources describing the same event. Catalogue points remain capped at 40; the total remains out of 100.



Earthquake map and location

The earthquake map presents recent USGS/NEIC, GFZ GEOFON and EMSC-CSEM SeismicPortal entries. Core Location is used for the earthquake map, distances, alarm evidence and locally calculated timing checks.

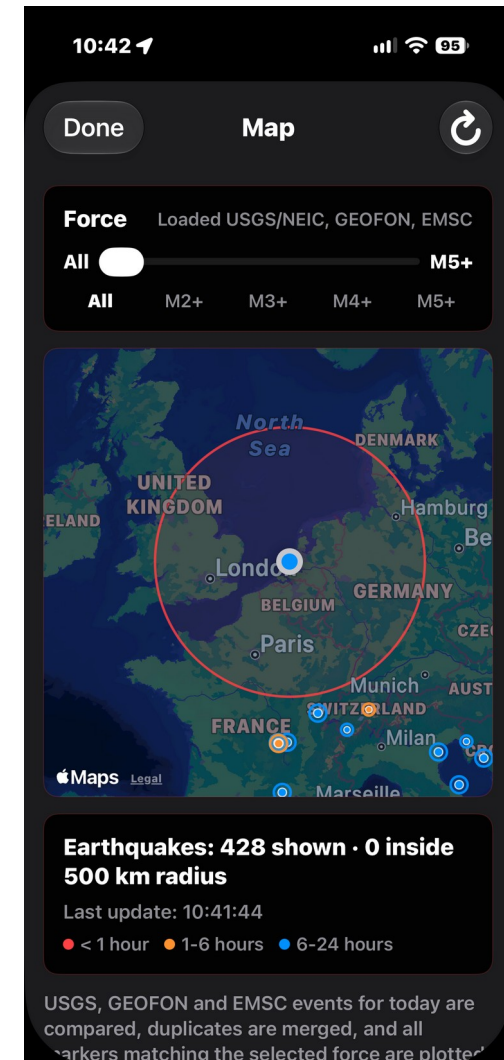
The earthquake map opens around the phone and a 500 km context radius. Refresh, magnitude filtering and merged source details help inspect events. The feeds can be delayed, incomplete, revised or unavailable. A USGS catalogue entry is not an emergency warning issued for this phone.

The App estimates P/S arrival times using simplified velocities of 6.0 and 3.5 km/s and distance/depth estimates. A possible catalogue match or apparent agreement between feeds does not establish that the event caused the measured motion.

Location and service limits

With permission, Core Location supplies the phone position used for distances and event timing. Denying location limits catalogue matching; it does not disable local motion measurement. The App requests When In Use permission and declares no background location mode.

The simplified velocities do not account for local geology or full Earth travel-time models. Both live detection and post-alarm checks accept a plausible P or S arrival. Map refresh and post-alarm requests use the same per-source 60-second failure backoff as monitoring. The Map refresh control remains available; the redundant global-feed refresh control has been removed.



Alarm logs and exports

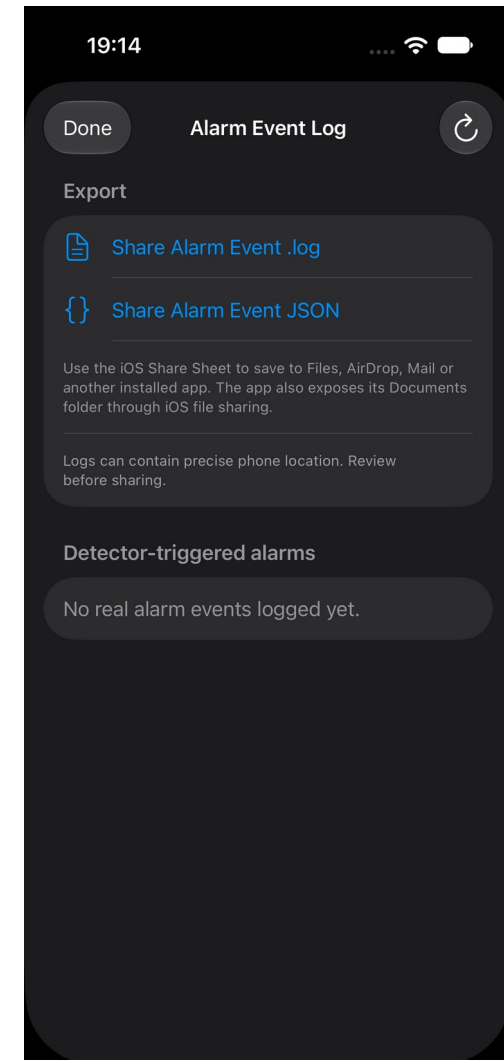
Alarm logs retain the newest 25 detector-triggered events. Review files before sharing because they can contain precise phone location. Delete individual events or all alarm logs in the Logs screen. Local deletion does not remove copies exported elsewhere.

Schema 7 and older records

Schema 7 retains EMSC evidence and source context and adds measured calibration noise, the zero-offset magnitude and a calibration movement flag. Schema 6 records the selected local delay, catalogue-route minimum and recovery time. Original trigger evidence remains separate from later candidates.

The historical JSON names `detectionConfidence`, `displayedAlarmConfidence` and `totalBeforeAlarmFloor` remain for compatibility. New values are actual score points. Older artificially raised display values remain labelled historical beside their original detection score.

Use Logs to inspect an event, export JSON or readable text, or delete records. Review exact coordinates and event times before sharing. Deleting local records does not delete exported copies.



Alarm record fields

Field	Meaning
Alarm ID / id	Unique UUID for the alarm record.
Schema version	Internal log schema number. Later schema versions may add fields while preserving older records.
App version	Tremor Tracker app version/build that wrote the record.
Trigger UTC	UTC time when the alarm was triggered.
Trigger epoch milliseconds	Same trigger time as Unix epoch milliseconds for sorting and filenames.
Reason	Human-readable reason for the alarm.
Trigger mode	Decision path that caused the alarm, for example strong local motion or motion with possible catalogue context.
Event start UTC	Estimated start time of the sustained local tremor candidate, if known.
Event duration	Duration of the sustained local tremor candidate in seconds.
Detection score	Original calculated detection score out of 100. No artificial increase is applied. This is not a probability or accuracy percentage.
Displayed detection score	Calculated score displayed on-screen as points out of 100, without an alarm minimum. In records from build 172 or earlier, the stored displayed value may have been raised; the separate original detection score remains available.
Sensitivity	Sensitivity multiplier selected in Settings when the alarm was triggered.
thirdPartyNotices	Earthquake-data credits, source/licence links and processing notices included in every alarm JSON export. Existing notices are retained when older records are rewritten.
sourceProvenance	Optional dictionary on earthquake evidence: supplied authors, catalogue, contributor, original contributor ID, magnitude author, feed notices or USGS network/source/event URL. Absent in older records unless originally retained.

Alarm evidence groups

Group	Fields	Meaning
Local sensor evidence	Instant acceleration, baseline noise, STA RMS, LTA RMS, STA/LTA, rolling peak, oscillations, rotation, handling suppressed.	Stores the sensor state that supported or suppressed the alarm decision.
Detector decision	Sample rate, startup lockout, calibration seconds, time windows, thresholds, strong-local condition and network-corroborated condition.	Stores the detector configuration and whether the local or network-assisted condition was met.
Detection score breakdown	Local signal, duration, wave pattern, phone stationary, USGS/NEIC, GEOFON, EMSC, dual-source and calculated total.	Stores the score components used to form the displayed score.
Location	Latitude, longitude, horizontal accuracy, altitude, vertical accuracy and location time UTC.	Stores the phone location captured at sustained movement or alarm time.
Catalogue context	Provider event counts, last update times, server clock offsets, provider errors dual-source deltas, matching/unconfirmed providers, trigger-time availability and confirmation note.	Stores the state of public catalogue checks at logging/correlation time.
Earthquake evidence	Provider, source ID, magnitude, place, origin, epicentre, depth, epicentral/hypocentral distance, predicted P/S, closest phase, residual, accepted window and score.	Included only for events inside the 500 km local evidence radius and plausible timing window.

Schema 5 source context

Field	Meaning
emscEvidence / confidence.emsc	Possible EMSC P/S arrival match and its evidence points. Absent in older records.
matchedProviders	Providers whose plausible arrival evidence belongs to the selected matching event at trigger time.
unconfirmedProviders	The other providers, whether unavailable or without a corresponding match at the trigger.
providerStatusAtTrigger	Source availability captured when the detector triggered. Failed sources are excluded from the decision.
confirmationNote	Explains the available possible match and any missing cross-source confirmation. Agreement does not establish causation.

Technical detector reference

Stage	Implementation
Sampling	CMMotionManager device motion at 50 Hz. Acceleration uses userAcceleration, with gravity removed by Core Motion.
Orientation	Gravity vector classifies flat, upright, angled or unknown phone placement.
Calibration	Three seconds of samples estimate a fixed zero offset and fluctuating noise. The lower 75 percent of corrected magnitudes give a working baseline limited to 0.0008–0.0028 g.
STA LTA	The app compares a 1 second short term RMS with a 10 second long term RMS ending 2 seconds before now.
Oscillation	Dominant axis sign crossings over a 4 second window reject many single impacts.
Handling filter	High rotation marks likely phone handling and clears the transient event windows.
Sustained event	Requires enough samples, active fraction, local signal and wave pattern. Impact dominated events are rejected.
Alarm decision	Network corroborated events or local sustained shaking can trigger, depending on thresholds and Shaking alarm after.

Detection score

Control or reading	What it means
Detection score	A calculated sum of local evidence points (up to 60) and available catalogue context (up to 40). It is displayed unchanged, including after alarm activation. It is not a calibrated probability or accuracy percentage.
Set sensitivity	Changes movement thresholds, not waiting time. Low = 0.65 with an extra 2× threshold factor; Normal = 1.0, High = 1.4, Very high = 2.0. Higher sensitivity can cause more false alarms.
Shaking alarm after	The configured delay for the local-only alarm route, from 1 to 10 seconds, default 2.
Catalogue-supported route	The existing separate route can trigger after four seconds of qualifying local movement when its catalogue conditions are met. A longer local-only delay does not add waiting to this route. A catalogue entry alone does not trigger an alarm.

Raw 50 Hz motion streams are not written into event exports. Event timestamps use absolute times; raw system uptime and its anchor are not exported. The bundled privacy manifest declares app-only preferences (CA92.1) and conversion of motion event times (8FFB.1).

Detector constants and timing

Constant or rule	Build 181 value
Sample rate	50 Hz
Startup lockout	3 seconds
Orientation display	1 second after settling
Calibration duration	3 seconds
Calibration retained fraction	lower 75 percent after zero-offset correction
Working baseline range	0.0008 to 0.0028 g
STA window	1 second
LTA window	10 seconds ending 2 seconds before now
Oscillation window	4 seconds
Event gap tolerance	1.5 seconds
Minimum local event seconds	2 seconds
Handling rotation threshold	0.65 rad/s flat, higher for upright and angled placement
Sensitivity range	0.5 to 2.0
Local correlation radius	500 km
P velocity	6.0 km/s
S velocity	3.5 km/s
Timing acceptance window	8 seconds plus 0.02 seconds per kilometre of hypocentral distance, limited to a minimum of 12 seconds and a maximum of 50 seconds
Map auto refresh	60 seconds while Map view is active
Catalogue checks	20 seconds normally; 5 seconds during qualifying movement, independently for each source
Failure retry	60 seconds after a failed request; failed source data excluded until recovery
Catalogue score	Best two source scores, up to 15 each, plus 10 for matching-event agreement; maximum 40

Provider credits and redistribution

GEOFON earthquake parameters: GFZ (GEOFON), <https://geofon.gfz.de/>. Copyright (c) GFZ (GEOFON) 2026. Licensed under Creative Commons Attribution 4.0 International (CC BY 4.0): <https://creativecommons.org/licenses/by/4.0/>. Provider notice: <https://geofon.gfz.de/imprint/>.

Earthquake parameter data: EMSC-CSEM SeismicPortal, <https://www.seismicportal.eu/fdsn-wsevent.html>. Downloaded datasets and products are licensed under Creative Commons Attribution 4.0 International (CC BY 4.0): <https://creativecommons.org/licenses/by/4.0/>. Provider terms: <https://www.seismicportal.eu/terms.html>.

Earthquake information: U.S. Geological Survey / National Earthquake Information Center (USGS/NEIC), <https://earthquake.usgs.gov/>. USGS-produced data are in the U.S. public domain; this does not extend to all third-party contributions. Source and contributing-network identifiers are retained where supplied. Rights information: <https://www.usgs.gov/information-policies-and-instructions/copyrights-and-credits>.

Tremor Tracker normalizes fields and times, clamps negative depths to zero and filters events by time, magnitude, event type and, for alarm evidence, distance and timing. Duplicate events may be merged for map display; contributing source records remain identified. Modelled P/S arrivals, distances, detector scores and possible matches are Tremor Tracker estimates, not provider measurements or warnings. No provider endorsement is implied. Data may be incomplete, delayed or revised and are supplied without a guarantee of accuracy or fitness for a particular purpose. Consult the linked provider notices for their disclaimers.

CC BY 4.0 permissions for the earthquake datasets are not restricted by the App's proprietary software licence. Preserve credits, supplied notices and indications of changes when redistributing the data. These notices do not license waveform datasets, provider logos or the SeismicPortal website or service platform. Agency identifiers and supplied feed comments are preserved as reported, not as authenticated identities. Older logs may lack agency details that were not retained when recorded.

Offline Third-Party Notices are in Settings and selected map details. Source provenance and licence notices accompany alarm exports; keep them when redistributing data.

Permissions troubleshooting and support

Permission	Use
Motion	Local motion monitoring while the App is active.
Location	Earthquake map, earthquake distances and local alarm/catalogue context.
Notifications	A local warning when armed monitoring leaves the foreground; not a guaranteed background earthquake warning.
Files and sharing	Local logs and user-directed iOS Share Sheet exports.

The App does not record microphone audio, use an advertising identifier, provide a user account or automatically upload motion logs to a publisher server. Apple services and catalogue requests have their own data processing; see the Privacy Policy.

Troubleshooting

Question	What to check
A provider is unavailable	Continue with the other sources. The failed provider is automatically retried after 60 seconds; cached events are not used for detection.
No P or S match appears	A local event, usable location and a plausible event inside 500 km are needed. Feeds may report later or may not contain a matching event.
LOC is red	Check location permission and the availability of a location fix. Both alert and signaling screens use the same location status.
The screen locks or monitoring stops	Keep the App open in the foreground; calls, locking and iOS interruptions can stop measurement. Sleep Mode only dims the App display.
The alarm is quiet	Check media volume, the selected route and speakers/headphones. Audible output and waking are not guaranteed.

Languages and support

The App follows the iPhone language preferences. It supports English, Dutch, German, French, Spanish, Portuguese (pt-BR), Japanese, Indonesian, Greek, Turkish, Simplified Chinese and Traditional Chinese. No in-app language selector is provided. Unsupported or untranslated older strings fall back to English.

Tremor Tracker is not a certified seismometer, earthquake predictor, official warning system, person locator, navigation tool or emergency service. An absent alarm does not establish safety. No waking, range, positioning, signal reception or rescue outcome is guaranteed.

Support and privacy enquiries: support@stratakernl.nl. Publisher: stratakernl.nl. See the accompanying Privacy Policy and Legal and Copyright Notice for processing, third-party rights and consumer-law information.

Understanding sustained tremor detection

Tremor Tracker identifies patterns of sustained movement measured by the iPhone. It combines signal strength, repeated oscillation, active time and duration, then optionally adds earthquake-catalogue context. This chapter explains those decisions and how to adjust the user settings. A detected tremor describes phone movement; it does not establish its cause.



From a visible trace to a detected event

Core Motion supplies gravity-removed acceleration and rotation at 50 samples per second. Calibration estimates the device zero offset and background fluctuations. The detector uses corrected acceleration, a one-second short-term RMS (STA), a ten-second long-term RMS (LTA) ending two seconds before the current sample, and a four-second oscillation window. RMS is a measure of average signal strength, not the height of one graph peak.

An event can start when signal strength rises above its amplitude and STA/LTA criteria with repeated sign changes, or when a sustained oscillating component passes the separate wave-pattern criteria. The detector considers the device axes and gravity-relative vertical movement; the display shows only a selected presentation trace. The two are related but are not identical tests.

What makes the movement sustained

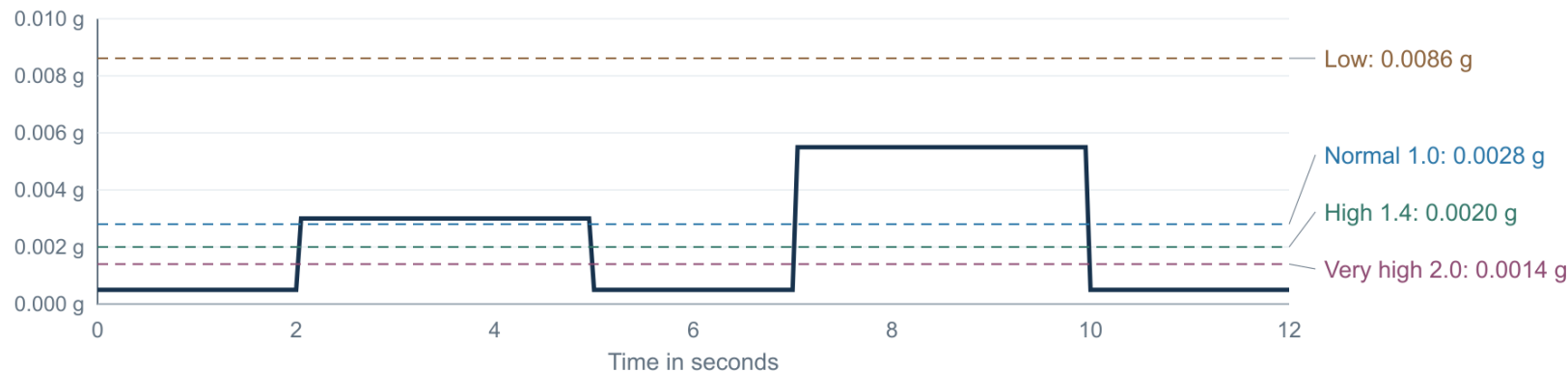
The sustained-event check needs at least 75 samples and at least 42 percent of the event samples above its activity threshold. It also checks signal and wave-pattern points. A single large impact is rejected when the peak dominates the event RMS. High rotation is treated as phone handling and clears the transient event windows. A brief lull of up to 1.5 seconds can remain part of the same event.

The Sustained shaking classification normally requires a detected event lasting at least two seconds. A configured local alarm delay can be shorter, but an alarm still needs enough samples, activity and oscillation evidence. Neither a visible wiggle nor reaching a selected time alone is sufficient.

Sensitivity and false alarms

Set sensitivity changes the movement thresholds. Higher sensitivity lowers those thresholds and can reveal smaller movement, while increasing the chance that fans, furniture, footsteps or other local vibration qualify. It does not change the number of seconds selected for the local alarm.

Illustrative one-second RMS signal and absolute amplitude floors



The diagram shows absolute amplitude floors. Low now uses twice its former thresholds: 0.0086 g instead of 0.0043 g. Its baseline-dependent and wave-pattern thresholds are also doubled. Normal, High and Very high retain their thresholds. The working threshold can rise with baseline noise. Crossing a line alone does not trigger an alarm; Low can miss weaker tremors.

Setting	Multiplier	Typical use and tradeoff
Low	0.65	Twice the former Low thresholds; about 3.08× Normal. Rejects smaller vibration but can miss weak tremors.
Normal	1.00	Starting point for a stable surface and a new measurement setup.
High	1.40	Lowers the threshold for smaller movements; inspect local vibration and handling first.
Very high	2.00	Lowest preset thresholds; greatest susceptibility to ordinary local vibration.

Reduce unwanted alarms

Use a firm surface, away from fans, loudspeakers, moving furniture and a bed or loose shelf. Recalibrate after placing the phone. Reduce sensitivity one step and, if appropriate, increase Shaking alarm after so short local events do not use the local alarm route. Catalogue-assisted alarms still have their separate four-second minimum. Change one setting at a time so the effect is clear.

Measure smaller movement

Start with a stable placement and valid calibration, then increase sensitivity one step. A shorter local delay can admit shorter sustained events; it does not make the sensor more sensitive to amplitude. Reducing the graph scale makes the trace look larger but does not improve detection.

Calibration placement and the graph

Set the phone down before starting. The startup sequence includes about three seconds of settling, one second for orientation and a three-second calibration window when normal sensor data are available. Build 181 completes that window without repeatedly restarting it solely because amplitude or rotation is high.

Quantity	What it means	Effect on detection
Zero offset	A fixed acceleration offset estimated from the median of each calibration component.	Subtracted from subsequent sensor values. A constant offset is separated from fluctuating noise.
Measured calibration noise	RMS of the lower 75 percent of corrected calibration magnitudes.	Retained for inspection. Movement or high noise during calibration is flagged.
Working baseline noise	The measured estimate, bounded between 0.0008 and 0.0028 g.	Used in the amplitude and wave-pattern thresholds. The upper bound prevents a noisy startup from creating an excessively high permanent threshold.
Seismograph display scale	The visible plus/minus g range chosen in Settings.	Presentation only. It does not alter sensor sensitivity, event duration or alarm thresholds.

Check calibration quality

In Local motion analysis, compare Baseline noise, Measured calibration noise and Calibration quality. The baseline is automatic; there is no separate manual noise control. If movement is reported, stop monitoring, place the phone on a stable surface and start again. Completing a bounded calibration is not proof that a moving or vibrating setup is suitable. The baseline limit prevents loss of sensitivity; it does not remove vibration from a bed, fan or unstable stand.

After handling and after Snooze

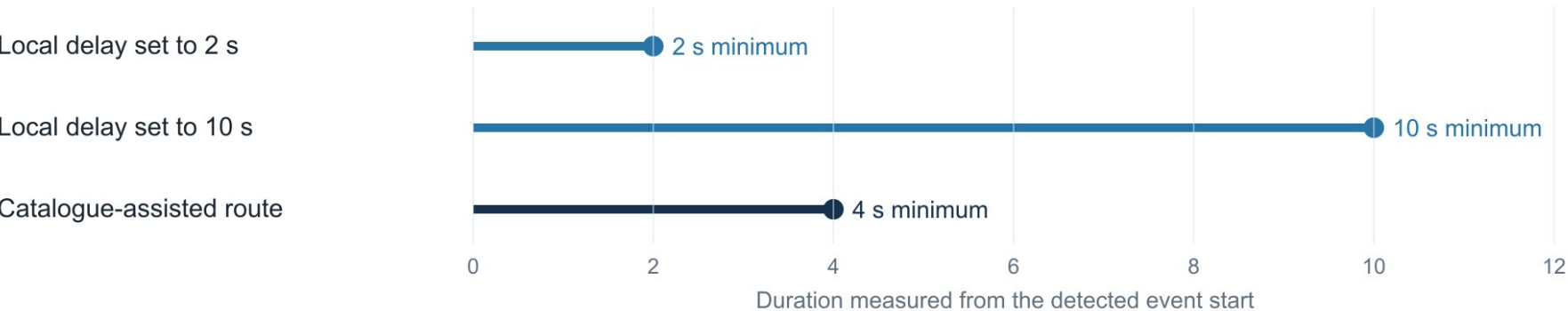
High rotation suppresses event detection for about two seconds after the latest handling sample. The handling limit is 0.65 rad/s when flat, 1.15 when upright, and 0.9 when angled or unknown. Shaking a phone in the hand can therefore be rejected as handling; it is not equivalent to surface vibration.

SNOOZE ALARM stops output, returns to Main and clears event windows. Calibration is retained; analysis resumes after one second and a new event may alarm. After a real alarm, sleep stays disabled until DISARM ALARM followed by START MONITORING. The Main screen explains this pause. A tap or short tremor uses only Sleep Delay. Snooze is not a timed alarm mute. Restart monitoring to recalibrate.

Two alarm routes and the user controls

Shaking alarm after is the selected minimum event duration for the local-only route, from 1 to 10 seconds, default 2. The clock measures the detector's event duration, which starts after movement meets its event-start criteria. It is not an exact delay from the first physical movement. At 50 Hz, the sustained-event requirement of 75 samples alone takes about 1.5 seconds.

Minimum event-duration gates — illustrative settings



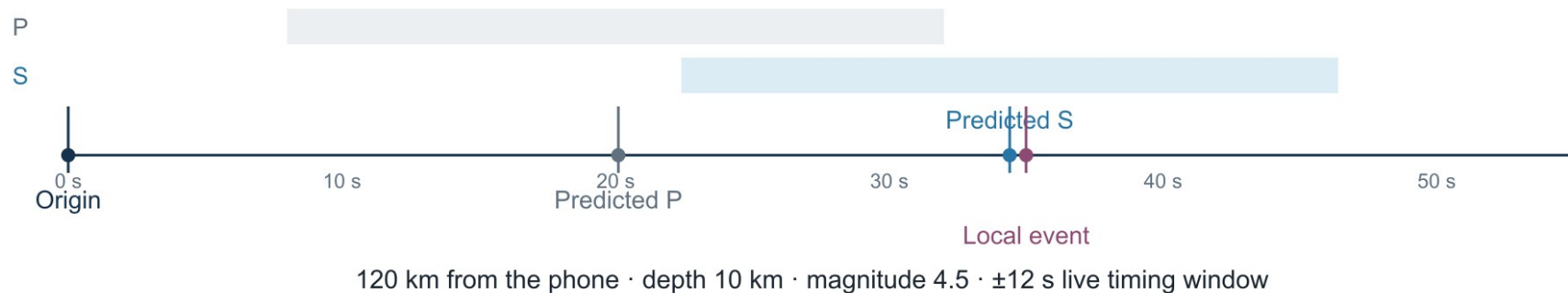
A separate catalogue-assisted route requires an event duration of at least four seconds, a qualifying local motion pattern and enough matching catalogue evidence. It can alarm before a longer selected local delay expires. A catalogue report alone never starts an alarm. Both routes require sufficient local signal, oscillation and sustained activity, and both reject impact-dominated events.

User control	Changes measurement or alarm decisions	Does not do
Set sensitivity	Changes amplitude and wave-pattern thresholds through the selected sensitivity multiplier.	Does not change the local delay or the catalogue four-second minimum.
Shaking alarm after	Changes the local route's minimum event duration. A longer delay rejects some short local events.	Does not override the separate catalogue-assisted route or guarantee an exact trigger time.
Display scale	Changes how large the live trace appears.	Does not change any detector threshold.
Alert Audio Volume	Requests the initial output volume when an alarm starts.	Does not affect the movement measurement.
Sleep Delay and external-power preference	Control display dimming and whether monitoring may start on battery.	Do not change motion thresholds. Sleep Mode still requires the app to remain in the foreground.

Matching the three earthquake catalogues

USGS/NEIC, GFZ GEOFON and EMSC are monitored independently: normally every 20 seconds and every 5 seconds during qualifying local movement. GEOFON or EMSC can supply a usable match before USGS. A failed provider is excluded from matching and retried after 60 seconds; the other providers continue. Catalogue requests do not send the phone's position or motion readings: the comparison is calculated on the phone.

Example of a possible S-wave arrival match



The local arrival-time comparison

For live alarm evidence, an entry must have magnitude at least 2.5 and lie within 500 km epicentral distance of the phone. The app estimates hypocentral distance R from the epicentral distance and event depth: $R = \text{square root of distance squared plus depth squared}$. Predicted P arrival is origin time plus $R/6.0$ seconds; predicted S arrival is origin time plus $R/3.5$ seconds. Either phase may match the detected local event start.

The accepted timing residual is $8 + 0.02 \times R$ seconds, limited to a minimum of 12 and a maximum of 50 seconds. In the illustrated example, a magnitude 4.5 entry at 120 km distance and 10 km depth predicts P near 20 seconds and S near 34 seconds. A local event starting 35 seconds after the origin is about one second from the predicted S arrival and falls outside the P window. It is a possible S match, not proof of causation.

Agreement and missing confirmation

Each provider contributes its best plausible arrival evidence. The app compares source entries using origin-time difference up to 90 seconds, epicentre separation up to 100 km and magnitude difference up to 0.8 to identify apparent agreement on an event. These tolerances are matching heuristics. Multiple catalogues may repeat reports from the same original agency; agreement is not necessarily independent physical confirmation.

If one source matches and the others do not, its evidence may still be used when all catalogue-route and local-motion conditions are met. The log records the matching providers, unconfirmed providers and each provider's availability at trigger time. A missing match can mean a late or absent catalogue entry, unavailable location, incompatible distance/timing, or a non-earthquake cause of phone movement.

Reading the evidence and testing your setup

The displayed score is a sum of evidence points out of 100. It is not a probability that an earthquake occurred, a measured earthquake magnitude or a validated accuracy percentage. Alarm activation uses the route conditions described above; it is not based on crossing a single overall score threshold.

Evidence component	Maximum points	Interpretation
Local signal	25	Signal strength relative to the working movement thresholds.
Duration	15	Detected event duration relative to the two-second scoring reference.
Wave pattern	15	Repeated oscillation evidence.
Phone stationary	5	No active handling suppression.
Catalogue evidence	30	The two highest individual provider scores, at most 15 each. Distance, depth, magnitude and timing affect each score.
Source agreement	10	Awarded when at least two providers' selected entries appear to describe the same event.

Live evidence and later candidates

The catalogue-assisted route needs at least 12 catalogue evidence points including any source-agreement points, as well as qualifying local motion. A weak timing match is therefore not automatically enough. Global context shows all retrieved events and any selected match; the global event count is not a count of confirmed local tremors.

After an alarm, a broader search can add catalogue candidates whose modelled P or S arrival falls between 60 seconds before the recorded local event start and 60 seconds after the trigger, still within 500 km. This later candidate search is not the live alarm decision. Its candidates can include smaller catalogue events and must not be read as confirmed causes. The original trigger-time evidence remains separate.

Use the logs to compare settings

Review event duration, selected local delay, trigger mode, calibration measurements and quality flag, handling state, STA/LTA, wave-pattern points and source status. Schema 7 retains calibration noise and zero-offset information; schema 6 added the separate local delay, catalogue minimum and recovery time. Older records may not contain these fields.

Start on a firm surface with Normal sensitivity, let calibration finish, and change one setting at a time. After stopping an alarm, leave a quiet interval and check that a later deliberate surface vibration produces a new event with a new event duration and record. A brief tap or rotating the phone is expected to behave differently. Such a functional test checks your setup and repeated operation; it does not establish earthquake detection accuracy.