Additional file 1
Here, we describe, in detail, our model for the inelastic strain rate change and how we estimate errors for the decay rate.

1. Power-law fluid model
We show the temporal changes in the inelastic strain rate based on the methods reported in Nanjo (2007). Considering the constitutive relation for a power-law fluid, the total strain rate, $\dot{\varepsilon}_t$, can be expressed by the stress, $\bar{\sigma}$, as follows:

$$\dot{\varepsilon}_t = \frac{1}{E} \frac{d\sigma}{dt} + \frac{1}{\tau_c} \left( \frac{\sigma - \sigma_y}{E} \right)^n, \quad (A1)$$

where $E$ is Young’s modulus, $\sigma_y$ is the yielding stress, and $\tau_c$ is a constant. If we consider that elastic strain is instantly added at $t = 0$ and $\varepsilon_t$ is constant for $t > 0$, inelastic strain gradually replaces elastic strain. Then, Eq. (A1) can be rewritten as follows for $t > 0$:

$$0 = \frac{1}{E} \frac{d\sigma}{dt} + \frac{1}{\tau_c} \left( \frac{\sigma - \sigma_y}{E} \right)^n. \quad (A2)$$

Under the initial conditions, i.e., $\bar{\sigma} = \sigma_0$, $\varepsilon_0 = \frac{\sigma_0}{E}$ at $t = 0$, Nanjo (2007) obtained the solution of Eq. (A2) as follows:

$$\frac{\bar{\sigma} - \sigma_y}{\sigma_0 - \sigma_y} = \left[ 1 + (n - 1) \left( \frac{\sigma_0 - \sigma_y}{E} \right) \frac{t}{\tau_c} \right]^{-1/(n-1)}. \quad (A3)$$

Inelastic strain, $\varepsilon_{it}$, is defined as the discrepancy between the elastic strain and total strain, thus:

$$\varepsilon_{it} = \varepsilon_t - \varepsilon_e = \varepsilon_t - \frac{\bar{\sigma}}{E}$$

$$= \frac{\sigma_0 - \sigma_y}{E} \left\{ 1 - \left[ 1 + (n - 1) \left( \frac{\sigma_0 - \sigma_y}{E} \right) \frac{t}{\tau_c} \right]^{-1/(n-1)} \right\}. \quad (A4)$$
Therefore, the temporal change in the inelastic strain becomes:

\[
\dot{\varepsilon}_i = \frac{d\varepsilon_i}{dt} = \frac{\sigma_0 - \sigma_Y}{E} \left\{ \left( \frac{\sigma_0 - \sigma_Y}{E} \right) \frac{1}{\tau_c} \left[ 1 + (n - 1) \left( \frac{\sigma_0 - \sigma_Y}{E} \right) \frac{t}{\tau_c} \right] \right\}^\frac{n}{n-1}.
\]  

(A5)

We set \( P = \frac{n}{n-1}, n > 1 \), then we have the following:

\[
\dot{\varepsilon}_i = \frac{\Delta \varepsilon^2}{\tau_c} \left[ 1 + (n - 1) \frac{\Delta \varepsilon}{\tau_c} \right]^{-\frac{n}{n-1}} \propto t^{-\frac{n}{n-1}} = t^{-P},
\]  

(A6, 5 in the main text)

where \( \Delta \varepsilon = \left( \frac{\sigma_0 - \sigma_Y}{E} \right) \).

Next, we consider another elastic strain step, \( \Delta \varepsilon^1 \), added at \( t_1 \) to the medium (step duration \( \ll \tau_c \)). The total strain then becomes as follows:

\[
\varepsilon_t^1 = \varepsilon_t + \Delta \varepsilon^1 = \Delta \varepsilon + \Delta \varepsilon^1.
\]  

(A7)

Then, the response of the medium may be similar to Eq. (A7), except that \( t' = t - t_1 \) and the initial inelastic strain is \( \varepsilon_t^1 \) instead of \( \Delta \varepsilon \) as follows:

\[
\dot{\varepsilon}_i = (\Delta \varepsilon + \Delta \varepsilon^1)^2 \frac{1}{\tau_c-t_1} \left[ 1 + (n - 1)(\Delta \varepsilon + \Delta \varepsilon^1) \frac{t}{\tau_c-t_1} \right]^{-\frac{n}{n-1}} \text{ for } t > t_1.
\]  

(A8)

Figure S1 schematically shows the inelastic strain rate change and apparent \( P \)-value from data at only two lapse times of \( t = 0.01 \) and a variable lapse time. The original \( P \)-value is set as 1.2. Additional strain is added at \( t_1 = 1 \). The \( P \)-value depends on the lapse time after the strain increment. For large lapse times, the \( P \)-value becomes asymptotic from the original value.
Figure S1. Schematic of the apparent change in the $P$-value. a) Change in the inelastic strain rate for a strain step added to the medium at a lapse time of 1. b) $P$-value estimated from two points at lapse times of 0.01 and an arbitrary lapse time on the horizontal axis. For example, the $P$-value is lower than 0.4 estimated from data at lapse times of 0.01 and 1.01.

2. $P$-value error estimation

We evaluated the standard error in the inelastic strain rate estimation in the two periods using boot strap random sampling for the moment tensor data. Performing 1,000
instances of sampling, we obtained the standard error. Then, the $P$ and $n$ values that characterize the inelastic strain rate were estimated. Figure S2 shows the results of this process.

Figure S2. Estimation of the error for the inelastic strain rate, $P$, and $n$ value for each block. a) Map showing the location of the block. The number adjacent to the circle indicates the block ID number. b) The upper plot shows the standard error in the inelastic strain rate estimation for the earlier (blue) and later (orange) aftershock sequences (see main text). Solid bars show the standard error estimated by bootstrap random sampling
from the moment tensor dataset for each block. $P$ and $n$ values (crosses) and their standard errors (solid bars) in the estimation are shown in the lower two figures. The values are estimated for the blocks whose strain rate is estimated in both periods. The average $n$ value is calculated from blocks with $n < 100$. 