

Title: A Theory of Earthquake Prediction

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Referee comments

The manuscript discusses a theory to predict the time to failure, moment, and location of the earthquake by monitoring precursory signals of strain rate increase in Earth's crust before the earthquake. The author also discusses various geochemical and geoelectric signals associated with the mechanical deformation of rocks due to the increase in the strain rate, which can be monitored as precursors before the earthquake.

I would like to recommend **rejecting** the manuscript for publication in its current version due to conceptual errors in reasoning. The detailed response is as follows:

The manuscript discuss three main results regarding time to failure, moment and location of an earthquake in Sec. 3.

(i) Time to failure (Sec 3.1): The author assumes a power law scaling of strain rate simplifying Eq. 4 (which is based on Voigt equation or quasi-static crack growth theory),

$$\dot{\epsilon}(t) \sim (t - t_f)^{1/(1-\alpha)},$$

by making assumption that magnitude of strain rate at failure time $\dot{\epsilon}(t_f)$ will be much larger than "1 strain /sec". This statement is simply wrong. The correct statement is

$$\dot{\epsilon}(t_f) \gg [a(\alpha - 1)t_f]^{1/(1-\alpha)},$$

which means it depends of a and α , the fitting parameters of the above power law.

Further, Eq. 8-11 is just explaining a way to obtain three parameters of model $\dot{\epsilon}(t_f)$, a , and α by fitting three data points. In natural observations, these precursory "quasi-static" strain rates can be monitored by GPS stations using ground deformations, which typically have a reading per day. This means these precursory signals need to be fitted against much more dense data, and elaborate methods will be required for that.

Apart from that, the Figures 1-4 used to explain these equations are shown without any information of units or using non-nondimensionalization. At least they should be shown on a log-scale to clearly see t_c , t_f , etc.

(ii) Moment of earthquake (Sec 3.2): (ii) Moment of earthquake (Sec 3.2): The author argues that the strain at time of failure $\epsilon(t_f) = \epsilon_f$ can be considered as average strain after failure (or an earthquake) as the duration of the earthquake is small. *This statement is completely wrong.* The co-seismic deformation during an earthquake is much larger than any "quasi-static" deformation during the precursory phase; therefore, Shaw 2023 scaling (line 305), which relates the co-seismic slip with the rupture length (not fault length), is simply not applicable here. Due to the conceptual mistake in this argument, the main result of this section, i.e. Eq. 18, is not correct, and all other discussions based on it in the rest of the manuscript are highly doubtful.

(iii) Location of earthquake (Sec 3.3): This section does not present any mechanical model or argument regarding the location of an impending earthquake with respect to observation points. A general discussion about how precursory signals can be utilized to locate earthquakes does not constitute a scientific argument that warrants publication.