

Magnitude

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Local magnitude

Richter scale

$$M_L = \log A + 2.76 \log \Delta - 2.48$$

A : amplitude of signal

Δ : distance

$\log = \log_{10}$

Body-wave magnitude

$$m_b = \log(A/T) + Q(h, \Delta)$$

A : amplitude of signal

T : dominant period

h : depth

Δ : distance

Surface-wave magnitude

$$M_s = \log(A/T) + 1.66 \log \Delta + 3.3$$

$$M_s = \log A_{20} + 1.66 \log \Delta + 2.0$$

A : amplitude of signal

T : dominant period

h : depth

Δ : distance

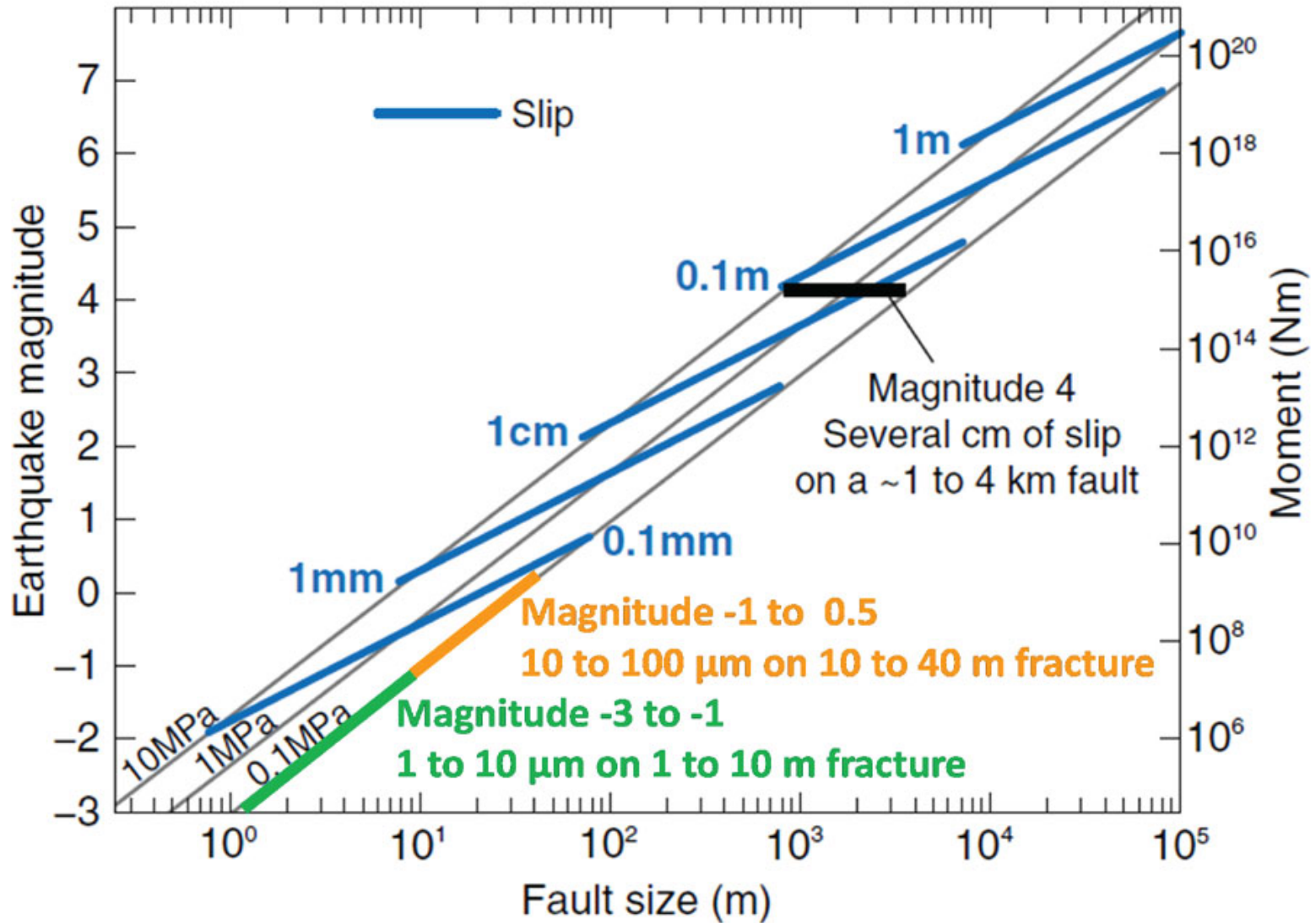
Moment magnitude

$$M_w = \frac{\log M_0}{1.5} - 10.73$$

M_0 : scalar seismic moment [dyn-cm]

$$1N = 10^5 \text{ dyn}$$

Magnitude - scale



Earthquake statistics

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b value

$$\log_{10} N = a - bM$$

N : number of earthquakes with magnitudes greater than *M*

a : total number of earthquakes

b : ratio between large and small earthquakes
(usually 0.8-1.2)