\[ \ln(D_{0.05-t}) = \ln\left[ \left( \frac{\Delta \sigma(M)}{10^{1.5M+16.05}} \right)^{-1/3} \frac{4.9 \times 10^6}{\beta} + Sc_1 + c_2(r - r_e) \right] + \ln\left( \frac{D_{0.05-t}}{D_{0.05-0.75}} \right) \quad \text{for } r > r_e \]

\[ \ln(D_{0.05-t}) = \ln\left[ \left( \frac{\Delta \sigma(M)}{10^{1.5M+16.05}} \right)^{-1/3} \frac{4.9 \times 10^6}{\beta} \right] + \ln\left( \frac{D_{0.05-t}}{D_{0.05-0.75}} \right) \quad \text{for } r < r_e \]

where: \( D_{0.05-t} = \) Arias Duration (sec) from 0.05 to 1 Normalized Arias Intensity (typically, \( I = 0.95 \))

\( \Delta \sigma = \exp\{b_1 + b_2(M-6)\} \)

\( M = \) Moment Magnitude

\( b_1 = 5.204 \)

\( b_2 = 0.851 \)

\( \beta = 3.2 \)

\( S = 0 \) for rock sites, or \( S = 1 \) for soil sites

\( c_1 = 0.805 \)

\( c_2 = 0.063 \)

\( r = \) closest distance to the effective fault rupture plane in km

\( r_e = 10 \) km

\[ \ln\left( \frac{D_{0.05-t}}{D_{0.05-0.75}} \right) = a_1 + a_2 \ln\left( \frac{1-0.05}{1-I} \right) + a_3 \left( \ln\left( \frac{1-0.05}{1-I} \right) \right)^2 \]

\( a_1 = -0.532 \)

\( a_2 = 0.552 \)

\( a_3 = -0.0262 \)

SE = standard error = 0.493 for \( I = 0.95 \)