A review on scaling of earthquake faults

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Table 1. The observed values of n of scaling law of $M_o \sim A^n$ compiled from the text. SS = strike-slip fault; RE = reverse fault; NL = normal fault; DS = dip-slip fault (including reverse, normal, and oblique faults); All = all slip-type faults.

Regions	SS	RE	NL/DS	All	Authors
World-wide				1.5 (M_w = 5.8 - 8.5)	Wyss (1979)
World-wide	1.53	1.35	1.53	1.47 (M_w = 4.7 - 8.2)	Wells and Coppersmith (1994)
World-wide	1.75		1.33	1.39 ($M_o = 2.2 \times 10^{17}$ - 1.2×10^{22} Nm)	Mai and Beroza (2000)
World-wide				1.75 (M_w = 5.4 - 8.0)	Ichinose et al. (2006)
World-wide	1.02 (M_w = 5.8 - 8.5)	0.90 (M_w = 5.8 - 8.5)	1.02 (M_w = 5.8 - 8.5)	0.98 (M_w = 5.8 - 8.5)	Wells and Coppersmith (1994)
World-wide	1.58 (M_w = 5.7 - 7.9)				Somerville et al. (2006)
World-wide	1.83 (M_w = 6.0 - 8.0)		1.92 (M_w = 6.0 - 8.0; continental) 1.74 (M_w = 6.0 - 8.0; subduction)		Papazachos et al. (2004)
World-wide	2.42 (M_w = 5.3 - 8.1)	2.42 (M_w = 6.1 - 9.5)		2.78 (M_w = 5.3 - 9.5)	Hanks and Bakun (2002, 2008)
World-wide				1.685 (108 instrumental events) 1.923 (30 pre-instrumental events) 2.053 (censored data) (M_w = 6.1 - 8.1)	Stirling et al. (2002)
World-wide				1.5 (M_w < 6.52) 2.0 (M_w > 6.52)	Irikura and Miyake (2011)
World-wide	1.59 (M_w = 5.38-8.70)	1.43 (M_w = 5.59 - 7.69)	1.86 (M_w = 5.86 - 8.39)		Thingbaijam et al. (2017)
World-wide (subduction interface)				1.58 (M_w = 6.68 - 9.19)	Thingbaijam et al. (2017)
World-wide (subduction zones)				1.5 (M_w = 6.7 - 9.2)	Murotani et al. (2013)
World-wide (plate boundary)	1.5 (A > 0)		1.5 (A > 0)		Leonard (2010)
World-wide (stable continental regions)				1.5 (A > 0)	Leonard (2010)
World-wide (interplate)				1.30 (M_w = 6.3 - 9.4)	Strasser et al. (2010)
World-wide (intraslab)				1.47 (M_w = 6.3 - 9.4)	Strasser et al. (2010)
Japan			3.2		Stock and Smith (2000)
Taiwan	1.09 (M_w = 4.6 - 8.9)		1.25 (M_w = 4.6 - 8.9)	1.15 (M_w = 4.6 - 8.9)	Yen and Ma (2011)
California, USA				1.5 (M_w = 5.7 - 7.2)	Somerville et al. (1999)
New Zealand				1.99 (M_w = 5.9 - 7.1)	Villamor et al. (2001)
New Zealand				1.5 (M_w = 5.9 - 8.2)	Dowrick and Rhoades (2004)

Table 2. The observed values of n of scaling law of $M_o \sim L^n$ compiled from the text. SS = strike-slip fault; RE = reverse fault; NL = normal fault; DS = dip-slip fault (including reverse, normal, and oblique faults); All = all slip-type faults. L_o = surface rupture length and L_s = subsurface rupture length.

Regions	SS	RE	NL/DS	All	Authors
World-wide				3.65	Nuttli (1983a)
World-wide	1.68 (for L_o) 1.11 (for L_s)	1.83 (for L_o) 0.95 (for L_s)	1.98 (for L_o) 0.75 (for L_s)	1.74 (for L_o) 1.04 (for L_s) (M_w = 4.7 - 8.2)	Wells and Coppersmith (1994)
World-wide		2.7 (small events) 2.9 (large events)	3.1 (small events) 4.1 (large events)		Stock and Smith (2000)
World-wide	5.0 (L < 50 km) 1.3 (L > 50 km)				Stirling et al. (1996)
World-wide	2.20 (M_w = 5.38-8.70)	2.44 (M_w = 5.59 - 7.69)	3.09 (M_w = 5.86 - 8.39)		Thingbaijam et al. (2017)
World-wide (subduction interface)				2.57 (M_w = 6.68 - 9.19)	Thingbaijam et al. (2017)
World-wide				1.98 ± 0.14 ≈ 2 (M_w = 4.3 - 8.5)	Wang and Ou (1998)
World-wide				2.04 (M_w = 5.46 - 7.79)	Johnston et al. (1994)
World-wide			1.98 (M_w = 6.5 - 7.2)		Mason (1996)
World-wise				1.425 (167 instrumental events) 1.125 (49 pre-instrumental events) 1.3 (censored data) (M_w = 6.1 - 8.1)	Stirling et al. (2002)
World-wide	2.54 (M_w = 6.0 - 8.0)		3.00 (M_w = 6.0 - 8.0; continental) 2.73 (M_w = 6.0 - 8.0; subduction)		Papazachos et al. (2004)
World-wide	1.31 (M_w > 5.97)	2.82 (M_w > 5.97)	0.71 (M_w > 5.97)		Wesnousky (2008)
World-wide	2.42 (M_w = 5.3 - 8.1)	2.42 (M_w = 6.1 - 9.5)		2.78 (M_w = 5.3 - 9.5)	Blaser et al. (2010)
World-wide	3.0 (A = 0 - 5500 m^2) 2.5 (A = 3400 - 45500 m^2) 1.5 (A > 45500 m^2) (based on surface rupture length)		3.0 (A = 0 - 5500 m^2) 2.5 (A > 5500 m^2) (based on surface rupture length)		Leonard (2010)
World-wide (plate boundary)	2.27 (A = 0 - 5500 m^2) ~1 (A > 45500 m^2) (based on subsurface rupture length)		2.27 (A > 5500 m^2) (based on subsurface rupture length)		Leonard (2010)
World-wide (stable continental regions)				3.0 (A = 0 - 2500 m^2) 2.5 (A > 2500 m^2) (based on surface rupture length)	Leonard (2010)
World-wide (stable continental regions)				2.5 (A > 0) (based on subsurface rupture length)	Leonard (2010)
World-wide (continent)	3 (small events)		3 (small events)		Stock and Smith (2000)

Regions	SS	RE	NL/DS	All	Authors
	2 (large events)		2 (large events)		
World-wide (continent/interpolate)				1.20 (M_w > 5.5) 1.09 (M_w > 5.5)	Romanowicz and Ruff (2002)
World-wide (interplate)				2.09 (M_w = 6.3 - 9.4)	Strasser et al. (2010)
World-wide (intraplate)				2.17 (M_w = 6.3 - 9.4)	Strasser et al. (2010)
Japan				3 (M_w < 6.5) 2 (M_w > 6.5)	Shimazaki (1986)
Japan				2.1 (large events)	Stirling et al. (1996)
Japan			3.2		Stock and Smith (2000)
Eastern Russian			2.9		Stock and Smith (2000)
Taiwan	2.0 (M_w = 4.6 - 8.9)		2.38 (M_w = 4.6 - 8.9)	2.13 (M_w = 4.6 - 8.9) 2.00 (M_w < 6.5) 3.00 (M_w > 6.5)	Yen and Ma (2011)
California, USA	2.8 (small events) 2.1 (large events)				Stock and Smith (2000)
Other regions	2.9 (small events) 2.3 (large events)				Stock and Smith (2000)
New Zealand				3.0 (L < 6 km) 2.3 (L > 6 km)	Dowrick and Rhoades (2004)

Table 3. The observed values of n of scaling law of $M_o \sim W^n$ compiled from the text. SS = strike-slip fault; RE = reverse fault; NL = normal fault; DS = dip-slip fault (including reverse, normal, and oblique faults); All = all slip-type faults.

Regions	SS	RE	NL/DS	All	Authors
World-wide	2.24	2.24	3.45	2.24 (M_w = 4.7 - 8.2)	Wells and Coppersmith (1994)
World-wide	5.56 (M_w = 5.3 - 8.1)	3.33 (M_w = 6.1 - 9.5)		2.27 (M_w = 5.3 - 9.5)	Blaser et al. (2010)
World-wide	6.52 (M_w = 6.0 - 8.0)		5.36 (M_w = 6.0 - 8.0; continental) 5.00 (M_w = 6.0 - 8.0; subduction)		Papazachos et al. (2004)
World-wide	5.75 (M_w = 5.38-8.70)	3.45 (M_w = 5.59-7.69)	4.64 (M_w = 5.86 - 8.39)		Thingbaijam et al. (2017)
World-wide (subduction interface)				4.10 (M_w = 6.68 - 9.19)	Thingbaijam et al. (2017)
World-wide (stable continental regions)	3.75		3.75	3.75	Leonard (2010)
New Zealand				3.00 (L < 6 km) 4.29 (L > 6 km) (M_w = 5.9 - 8.2)	Dowrick and Rhoades (2004)
Taiwan	2.38 (M_w = 4.6 - 8.9)		2.70 (M_w = 4.6 - 8.9)	2.50 (M_w = 4.6 - 8.9)	Yen and Ma (2011)