Ages: Min vs Max Rates
Symmetrical Bias in Reporting Slip Rates: Asymmetric Probability Density Functions are Inherent Outcomes of Accounting for Uncertainties in Displacement and Age. Geophysical Research, Solid Earth, vol. 114, no. 12

References

Parkfield: Creep + Moderate Magnitude EQs, Fast Slip Rate

Displacement of Feature
Preferred Displacement: 20.75 m
Symmetrical Uncertainty: +/- 2.25 m
Minimum Displacement: 15.5 m
Maximum Displacement: 25.3 m
Preferred Age: 840 yrs BP
Symmetrical Uncertainty: +/- 280 yrs
Maximum Age: 1,120 yrs BP
Minimum Age: 560 yrs BP

Carrizo Plain: Large Magnitude Ruptures, Fast Slip Rate

Van Matre Ranch (VMR) Slip Rates
Mode (Most Probable Rate): 30.5 mm/yr
Median (50th percentile): 31.6 mm/yr
Midpoint (Most Reported): 31.8 mm/yr
Percent skewed: 8%
Minimum SR: 28.2 mm/yr
Maximum SR: 35.4 mm/yr

Wallace Creek (WC) Slip Rates
Mode (Most Probable Rate): 33.6 mm/yr
Median (50th percentile): 34.6 mm/yr
Midpoint (Most Reported): 34.7 mm/yr
Percent skewed: 3%
Minimum SR: 33.1 mm/yr
Maximum SR: 36.3 mm/yr

Wasatch: Large Magnitude Ruptures, Modest Slip Rate

Corner Canyon (CC) Slip Rates
Mode (Most Probable Rate): 1.15 mm/yr
Median (50th percentile): 1.17 mm/yr
Midpoint (Most Reported): 2.7 mm/yr
Percent skewed: 15%
Minimum SR: 0.7 mm/yr
Maximum SR: 3.5 mm/yr

CC Age of Displaced Feature
Preferred Age: 17,950 yrs BP
Symmetrical Uncertainty: +/- 750 yrs
Maximum Age: 19,700 yrs BP
Minimum Age: 17,200 yrs BP

Corner Canyon, Salt Lake City Segment: Wasatch Fault, Utah

WC Displacement of Feature
Preferred Displacement: 128 m
Symmetrical Uncertainty: +/- 1 m
Minimum Displacement: 127 m
Maximum Displacement: 129 m

WC Age of Displaced Feature
Preferred Age: 3,695 yrs BP
Symmetrical Uncertainty: +/- 155 yrs
Maximum Age: 3,840 yrs BP
Minimum Age: 3,550 yrs BP

Brief Exploration of Uncertainty Choices, PDFs and Asymmetry for the Parkfield Case

Gaussian (Displacement - 1)
Displacement: 20.6 +/- 2.25 m
T = 840 +/- 280 yrs
Midpoint = 25.9
Mode = 24.1
Median = 24.7 +/- 4.5

Gaussian (Displacement - 2)
Displacement: 20.6 +/- 2.25 m
T = 840 +/- 280 yrs
Midpoint = 27.5
Mode = 20.3
Median = 24.7 +/- 3.2

Convolved Gaussian (displacement) + Gaussian (age) Uncertainty PDFs Yield Less Asymmetry than Mixed Gaussian (displacement) + Boxcar (age) PDF convolutions.

As Boxcar (age) Uncertainty Range Decreases Asymmetry Decreases.

Slip Rate Asymmetry Gains Importance As Age Uncertainties Increase

% Age Uncertainty and % SR Asymmetry (Difference in Slip Rate Midpoint and Mode)

Slip Rate Magnitude

Below 10% age uncertainty (box car case) slip rate asymmetry is less than 4%. Thus, asymmetry is more important to consider for late Holocene offsets, especially if ages are not tightly constrained.

CONCLUSION:
Investigators should strive to report slip rate ranges as well as median or mode values with asymmetrical bounds rather than midpoint values with symmetrical bounds.