ELECTRIC POWER RESEARCH INSTITUTE

Central and Eastern United States Seismic Source Characterization for Nuclear Facilities:

Maximum Magnitude Distribution Evaluation

2015 TECHNICAL REPORT

Central and Eastern United States Seismic Source Characterization for Nuclear Facilities

Maximum Magnitude Distribution Evaluation

All or a portion of the requirements of the EPRI Nuclear Quality Assurance Program apply to this product.

YES NO

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Product Description

In January 2012, the *Central and Eastern United States Seismic Source Characterization for Nuclear Facilities* report was jointly published by the Nuclear Regulatory Commission (NRC), Department of Energy (DOE), and the Electric Power Research Institute (EPRI) as NRC NUREG-2115, DOE/NE-0140, and EPRI 1021097. The report provided a new seismic source characterization (SSC) model for the central and eastern United States (CEUS).

Background

The CEUS SSC model was developed using an updated earthquake catalog, a full assessment and incorporation of uncertainties, and a range of diverse technical interpretations from the larger technical community. It was prepared using a Senior Seismic Hazard Analysis Committee (SSHAC) Level 3 assessment process in accordance with guidance in NUREG/CR-6372, "Recommendations for Probabilistic Seismic Hazard Analysis: Guidance on Uncertainty and Use of Experts."

In mid-2014, an error was identified in the published maximum magnitude (Mmax) distributions for a number of the CEUS SSC seismotectonic model zones. The error was promptly communicated to utility seismic hazard representatives, NRC and DOE representatives, and key technical experts involved in the development of the CEUS SSC model.

Objectives

The objective of this report is to document reviews performed to determine the extent of condition of the Mmax error and the potential impacts of the error on seismic hazard calculations. This report documents the originally published and corrected Mmax values and the results of evaluations performed to assess impacts on the recurrence parameters, seismic hazards, and ground motion response spectra (GMRS) estimates at two sites within or near the affected seismotectonic zones.

The evaluations were performed in close consultation with the three CEUS SSC sponsors (NRC, DOE, and EPRI) and represent consensus conclusions.

Approach

A review was performed for all of the seismotectonic zone Mmax distributions using the methodologies described in Section 5.2 of the CEUS SSC report. The calculations were repeated, and a corrected set of Mmax distributions was developed. The corrected Mmax distributions were then used to reevaluate the recurrence parameters following the methods described in Section 5.3 of the CEUS SSC report.

A sensitivity study was performed to determine the impacts of the corrected Mmax distributions. Two sites were selected in or near the zones with the greatest Mmax changes. Updated seismic hazards and GMRS estimates were computed for those sites using the corrected Mmax distributions and updated recurrence parameters. Comparisons were made for each site using uniform hazard response spectra (UHRS) at 10^{-4} and 10^{-5} mean annual frequencies of exceedance as well as the GMRS.

Results

Minor Mmax distribution corrections were identified for the PEZ-N, PEZ-W, IBEB, SLR, and MidC A through D seismotectonic zones.

Sensitivity studies at two sites showed that there are negligible impacts on the recurrence parameter results as well as calculated seismic hazard and GMRS results. These impacts are within the level of precision associated with the standard reporting of GMRS, which leads to the conclusion that it is not necessary to incorporate the corrected Mmax values into the CEUS model or the published CEUS SSC report.

Applications, Value, and Use

The evaluations in this report show that the identified Mmax errors in the CEUS SSC report produce negligible impacts on seismic hazard and GMRS calculations. Therefore, seismic hazard and GMRS calculations performed using the published Mmax distributions in the CEUS SSC report are not degraded by the Mmax changes, and the corrected Mmax values do not have to be incorporated into the CEUS model or the published CEUS SSC report.

Keywords

Central and eastern United States
Mmax
Probabilistic seismic hazard analysis
Seismic source characterization

List of Acronyms

AHEX	Atlantic highly extended crust (seismotectonic zone)
CEUS	central and eastern United States
DOE	Department of Energy
ECC-AM	extended continental crust–Atlantic margin (seismotectonic zone)
ECC-GC	extended continental crust–Gulf coast (seismotectonic zone)
EPRI	Electric Power Research Institute
GHEX	Gulf coast highly extended crust (seismotectonic zone)
GMH	great meteor hotspot (seismotectonic zone)
GMM	ground motion models
GMRS	ground motion response spectrum
IBEB	Illinois basin extended basement (seismotectonic zone)
M	moment magnitude
MAFE	mean annual frequency of exceedance
MESE-N	Mesozoic and younger extended crust, narrow
MESE-W	Mesozoic and younger extended crust, wide
MidC A-D	midcontinent-craton A through D (seismotectonic zone)
Mmax	maximum magnitude
NAP	northern Appalachian (seismotectonic zone)
NMESE-N	non-Mesozoic and younger extended crust, narrow
NMSES-W	non-Mesozoic and younger extended crust, wide
NRC	Nuclear Regulatory Commission
OKA	Oklahoma aulacogen (seismotectonic zone)
PEZ-N	Paleozoic extended crust, narrow (seismotectonic zone)
PEZ-W	Paleozoic extended crust, wide (seismotectonic zone)
PSHA	probabilistic seismic hazard analysis

RCG	Rough Creek graben
RLME	repeated large-magnitude earthquake
RR	Reelfoot rift zone
RSM	risk and safety management
SLR	St. Lawrence rift (seismotectonic zone)
SSC	seismic source characterization
UHRS	uniform hazard response spectrum

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Section 1: Introduction and Purpose

In January 2012, the Nuclear Regulatory Commission (NRC), Department of Energy (DOE), and the Electric Power Research Institute (EPRI) jointly published a report titled "Central and Eastern United States Seismic Source Characterization for Nuclear Facilities" with report numbers NRC NUREG-2115, DOE/NE-0140, and EPRI 1021097 [1]. The report provided a new seismic source characterization (SSC) model for the Central and Eastern United States (CEUS).

The model includes consideration of an updated database, full assessment and incorporation of uncertainties, and the range of diverse technical interpretations from the larger technical community. It was prepared using a Senior Seismic Hazard Analysis Committee (SSHAC) Level 3 assessment process in accordance with guidance in NUREG/CR-6372, "Recommendations for Probabilistic Seismic Hazard Analysis: Guidance on Uncertainty and Use of Experts" [2].

In mid-2014, an error was identified in the published Maximum Magnitude (Mmax) distributions for three of the CEUS SSC seismotectonic model zones. The error was promptly communicated to utility seismic hazard representatives, NRC and DOE representatives, and key technical experts involved in the development of the CEUS SSC model [3].

An extensive review was performed to determine the extent of condition of the Mmax error and the potential impacts of the error on seismic hazard calculations. This report documents the published and corrected Mmax values and the results of evaluations performed to assess impacts on the recurrence parameters, seismic hazards, and ground motion response spectra (GMRS) estimates at two sites within or near the affected seismotectonic zones.

The evaluations were performed in close consultation with the three CEUS SSC sponsors (NRC, DOE, and EPRI) and represent consensus conclusions.

Section 2: Published and Corrected Mmax Values

Mmax is defined as the upper truncation point of the earthquake recurrence curve for individual seismic sources, and the typically broad distribution for any given source reflects considerable epistemic uncertainty. Section 5.2 of the CEUS SSC report [1] describes the methods used to calculate the Mmax distributions and the final distributions for seismotectonic distributed seismicity sources are provided in Table H-4-4 of that report.

Errors were initially identified in the Mmax values for seismotectonic zones PEZ-N, PEZ-W, and IBEB [3]. A complete review of the CEUS SSC Mmax distributions was performed following the methodology described in Section 5.2 of EPRI 1021097 [1]. The calculations are summarized in Appendix A. The original and corrected Mmax values are shown in Tables 2-1 and 2-2 below. Values that have changed from the original values in the CEUS SSC report are indication in a bold italics font.

Table 2-1
Published and Corrected Mmax Values (PEZ-N, PEZ-W, and IBEB)

Weight	PEZ-N		PEZ-W		IBEB	
	CEUS SSC Report	Corrected Value	CEUS SSC Report	Corrected Value	CEUS SSC Report	Corrected Value
0.101	5.9	***6.0***	5.9	***6.0***	6.5	***6.4***
0.244	6.4	***6.5***	6.4	6.4	6.9	***6.7***
0.310	6.8	***6.9***	6.8	***6.9***	7.4	***7.1***
0.244	7.2	***7.4***	7.2	***7.4***	7.8	***7.5***
0.101	7.9	***8.0***	7.9	***8.0***	8.1	***8.0***

Table 2-2
Published and Corrected Mmax Values (MidContinent A through D and SLR)

Weight	MidC-A, MidC-B, MidC-C, MidC-D		SLR	
	CEUS SSC Report	Corrected Value	CEUS SSC Report	Corrected Value
0.101	5.6	5.6	6.2	***6.4***
0.244	6.1	6.1	6.8	6.8
0.310	6.6	6.6	7.3	7.3
0.244	7.2	7.2	7.7	7.7
0.101	8.0	***7.9***	8.1	8.1

Figures 2-1 through 2-4 are taken from the CEUS SSC report and show the seismotectonic zones. The IBEB and SLR zones are the same in each figure. The PEZ-N zone is shown in Figures 2-1 and 2-2 and the PEZ-W zone is shown in Figures 2-3 and 2-4. The MidC zones (A through D) are slightly different in each figure.

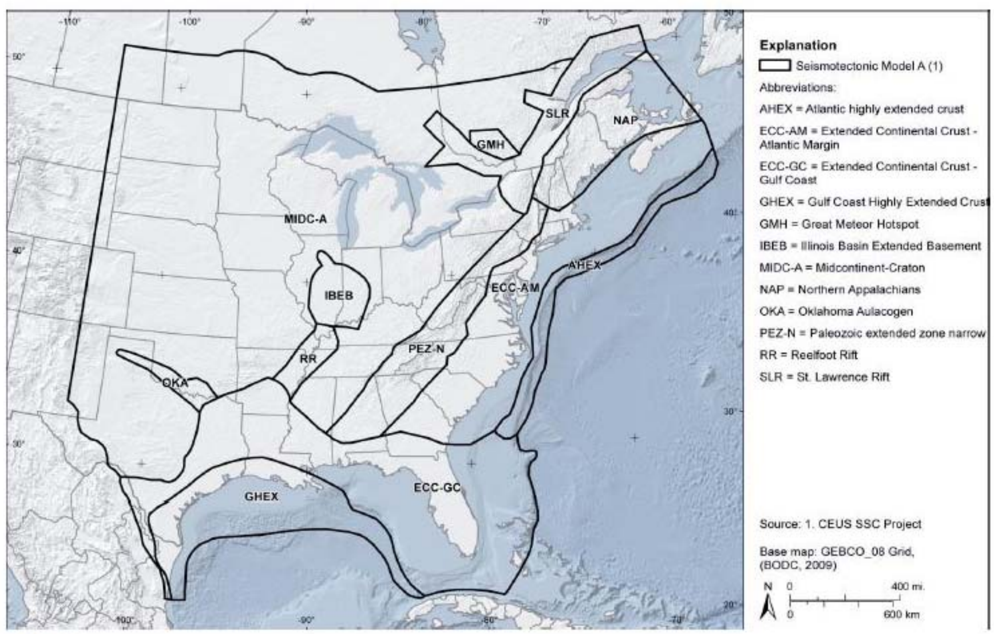

Figure 4.2.4-2
Seismotectonic zones shown in the case where the Rough Creek Graben is not part of the Reelfoot Rift (RR), and the Paleozoic Extended Zone is narrow (PEZ-N)

Figure 2-1
Copy of EPRI 1021097 Figure 4.2.4-2 with PEZ-N, IBEB, SLR, and MidC-A Seismotectonic Zones

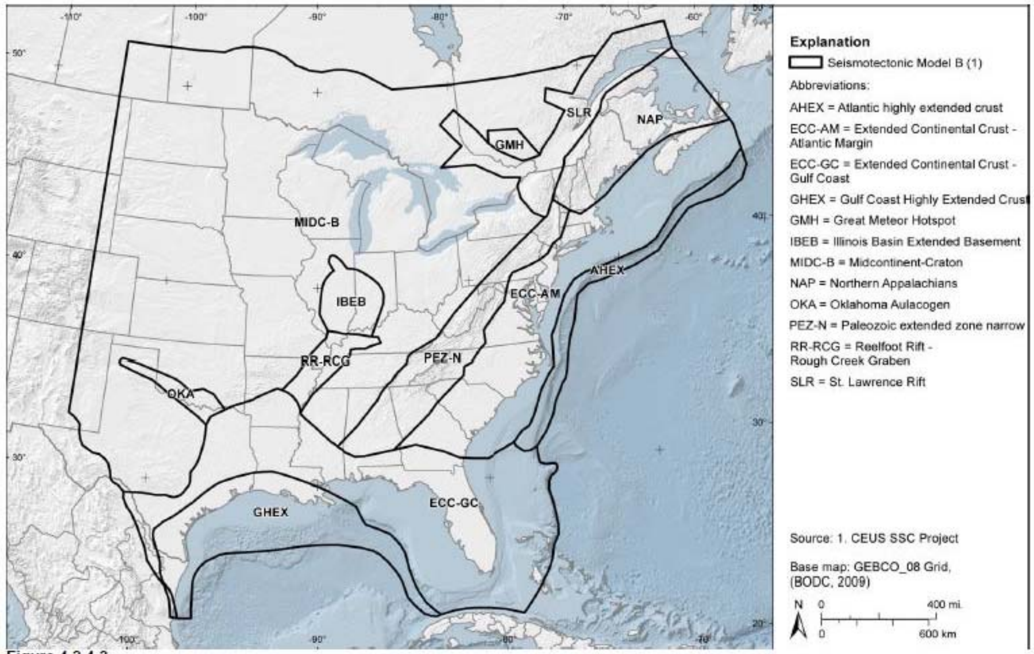

Figure 4.2.4-3
Seismotectonic zones shown in the case where the Rough Creek Graben is part of the Reelfoot Rift (RR-RCG), and the Paleozoic Extended Zone is narrow (PEZ-N)

Figure 2-2
Copy of EPRI 1021097 Figure 4.2.4-3 with PEZ-N, IBEB, SLR, and MidC-B Seismotectonic Zones

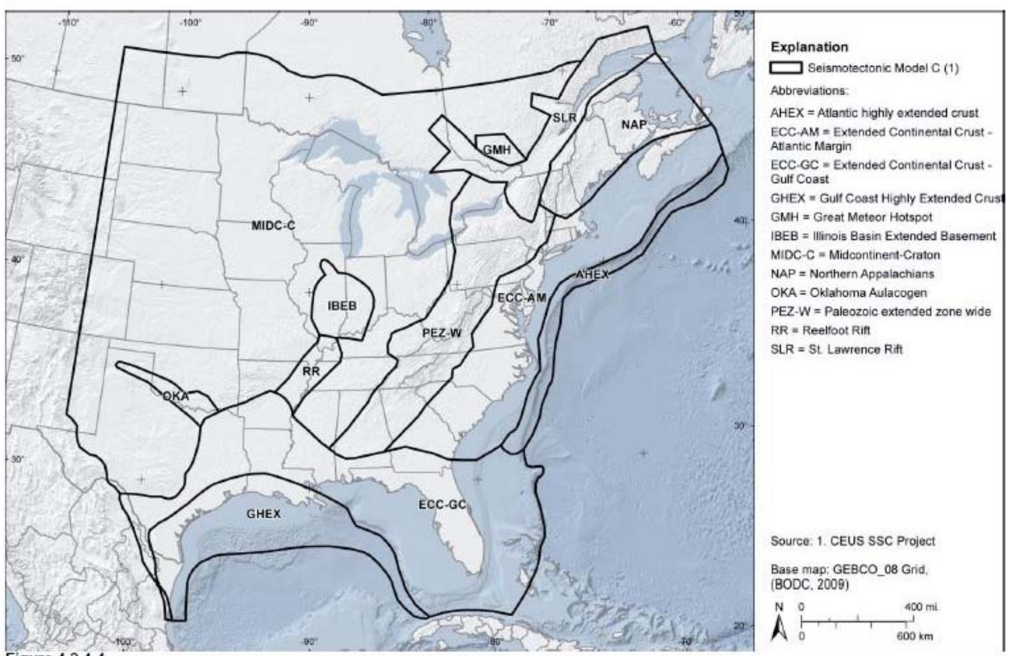

Figure 4.2.4-4
Seismotectonic zones shown in the case where the Rough Creek Graben is not part of the Reelfoot Rift (RR), and the Paleozoic Extended Crust is wide (PEZ-W)

Figure 2-3
Copy of EPRI 1021097 Figure 4.2.4-4 with PEZ-W, IBEB, SLR, and MidC-C Seismotectonic Zones

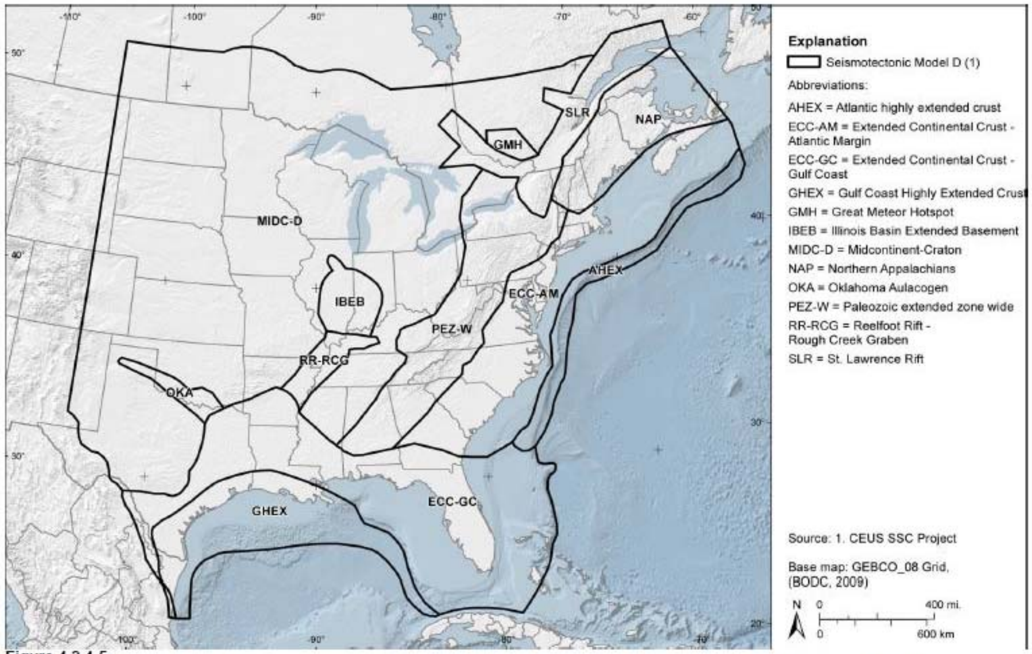

Figure 4.2.4-5
Seismotectonic zones shown in the case where the Rough Creek Graben is part of the Reelfoot Rift (RR-RCG), and the Paleozoic Extended Crust is wide (PEZ-W)

Figure 2-4
Copy of EPRI 1021097 Figure 4.2.4-5 with PEZ-W, IBEB, SLR, and MidC-D Seismotectonic Zones

Section 3: Recurrence Parameter Review

As described in Section 5.3 of the CEUS SSC report [1], a spatial smoothing operation is performed in the SSC model using a recurrence evaluation. The recurrence calculations divide each source zone into multiple cells, divide the magnitude axis into multiple magnitude bins (with a width of 0.6 **M** units), and work with the predicted and observed earthquake counts in each bin of each cell. The predicted counts in each bin of each cell are parameterized by the rate (ν) of earthquakes above **M** 2.9 and b value of the cell, with a goal of producing a balance between the predicted and observed earthquake counts. The recurrence calculations also capture the epistemic uncertainty in rate (ν) and b in each cell, as well as the cell-to-cell spatial correlation of ν and b, in order to capture the resulting uncertainty in hazard.

The Mmax distribution of a source zone can have a minor effect on the recurrence parameters; therefore, a review of the recurrence parameters was performed. New recurrence calculations were made for all source zones with corrected Mmax values, using the same catalog, starting values, and Markov-chain inputs as in the CEUS SSC report. In a few cases, it was necessary to alter the Markov-chain inputs in order to attain proper convergence. A summary comparison of differences between the recurrence parameters in the CEUS SSC report and the recurrence parameters calculated with the revised Mmax distributions is included in Attachment 2. Comparisons are made in terms of the relative change in the total ν_5 (rate of earthquakes above **M** 5) and average b for all cells in the source zone. The summary also includes, for the sake of reference, the epistemic uncertainty in the total ν_5 and average b, as calculated in the CEUS SSC report.

In all cases, these changes in recurrence parameters are small enough that they can be neglected. In the cases of the PEZ-N and PEZ-W, which were the source zones with the largest increase in the Mmax distribution, a slight conservatism is introduced by neglecting these recurrence parameter changes.

Section 4: Sensitivity Studies

Sensitivity studies were performed at two sites in the CEUS, Site A and Site B, to determine the impact of the correct Mmax values and recurrence parameters described above. Site A, which is close to sources PEZ-N and PEZ-W and in the southeastern U.S., was chosen to represent sites with significant hazard from the eastern Tennessee region. Site B, which is close to sources PEZ-N and PEZ-W and in the middle Atlantic region, was chosen to represent sites in that region that might be affected by changes in Mmax and seismicity in relevant background sources.

The sensitivity studies were performed by calculating new Probabilistic Seismic Hazard Analyses (PSHA) and ground motion response spectrum (GMRS) at each site using the Mmax values and recurrence parameters and comparing the results with previous calculations using the values in the CEUS SSC report. The complete sensitivity study is included in Appendix C.

The study results show that the Site A updated results are not significantly different from the Site A original results; with uniform hazard response spectra (UHRS) changes less than 1.2% at mean annual frequencies of exceedance (MAFEs) of 10^{-4} and 10^{-5} and GMRS changes less than 1%. The results at Site B were also not significantly different with UHRS changes less than 0.8% at MAFEs of 10^{-4} and 10^{-5} and GMRS changes less than 1%. Considering both sites, maximum GMRS difference is 1%, which is the level of precision associated with the standard reporting of GMRS to three significant figures.

Figures 4-1 and 4-2 show comparisons of the original and updated UHRS and GMRS at each site. In both cases, it is difficult to see a difference in the plotted results.

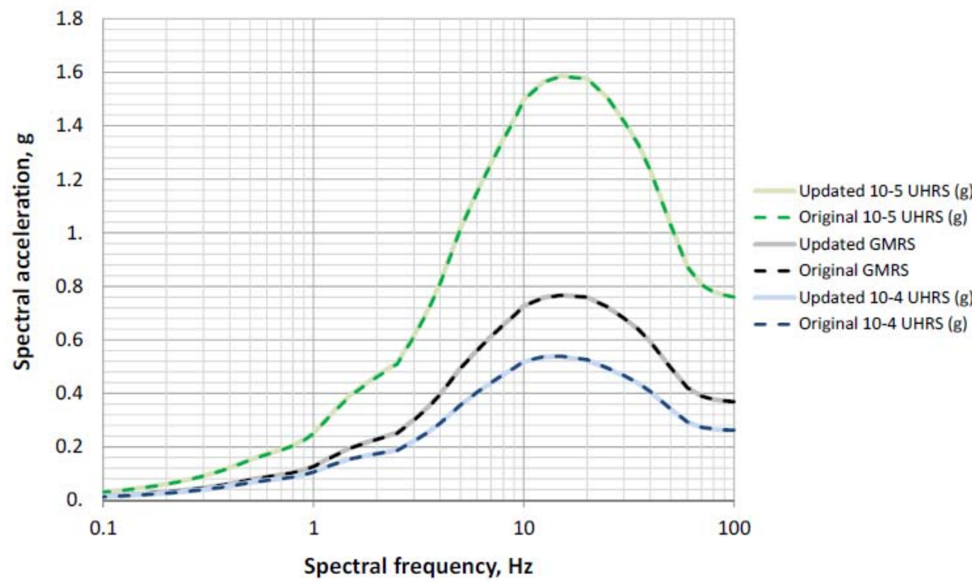

Figure 4-1
Site A: Comparison of Original and Updated UHRS and GMRS

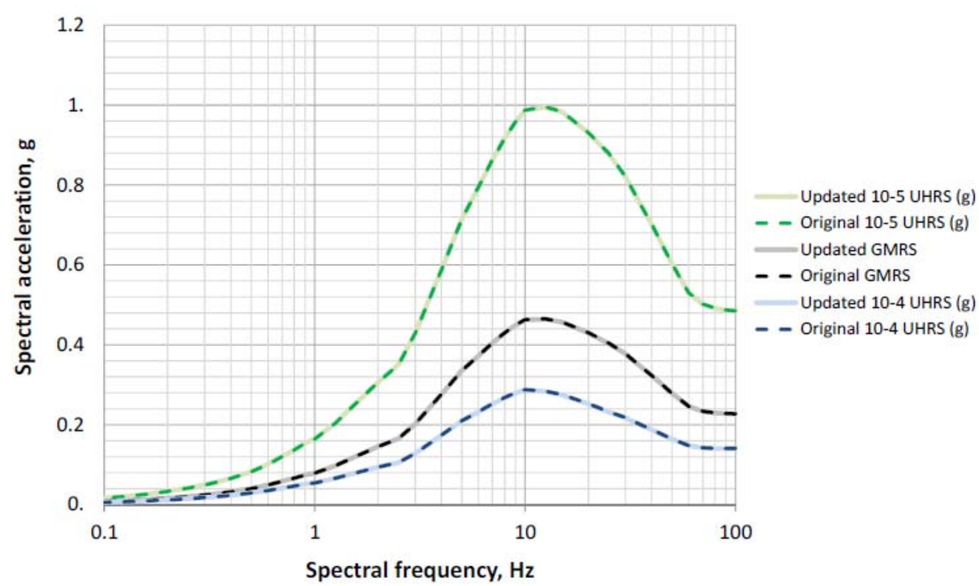

Figure 4-2
Site B: Comparison of Original and Updated UHRS and GMRS

Section 5: Conclusions

EPRI, in cooperation with representatives of the NRC and DOE, conducted a review of errors in the published Maximum Magnitude (Mmax) distribution values for seismotectonic model zones of the CEUS SSC report [1]. The results show that there are negligible impacts on the recurrence parameter results as well as calculated seismic hazard and GMRS results. These impacts are within the level of precision associated with the standard reporting of GMRS, which leads to the conclusion that it is not necessary to incorporate the corrected Mmax values into the CEUS model or the published CEUS SSC report [1].

Section 6: References

1. NUREG-2115, DOE/NE-0140, EPRI 1021097, "Central and Eastern United States Seismic Source Characterization for Nuclear Facilities," 6 Volumes, January 2012.
2. Budnitz, et al (1997), "Recommendations for Probabilistic Seismic Hazard Analysis: Guidance on Uncertainty and Use of Experts," Report NUREG/CR-6372, Lawrence Livermore National Laboratory. Sponsored by the U.S. Nuclear Regulatory Commission, U.S. Department of Energy, and the Electric Power Research Institute.
3. EPRI (J. Richards) Letter to Utility Seismic Hazard and GMRS Contacts, "Central and Eastern United States Seismic Source Characterization (CEUS SSC) for Nuclear Facilities," EPRI report number 1021097), RSM-07281 4-085, July 28, 2014.
4. *Ground-Motion Model (GMM) Review Project*. EPRI, Palo Alto, CA: 2013. 3002000717.
5. USNRC, Regulatory Guide 1.208, "A Performance-Based Approach to Define the Site-Specific Earthquake Ground Motion," 2007.

Appendix A: Updated Maximum Magnitude Distributions

A.1 Introduction

This Appendix summarizes the Mmax calculations for the seismic source zones conducted for NUREG-2115 [1]. The methodology used for the calculations is described in Section 5.2 of NUREG-2115. The calculations are performed discretely and the final Mmax distributions are developed using a magnitude bin width of 0.1 units. Because of this discretization, it is anticipated that minor differences in results may occur (on the order of 0.1 units or less) when utilizing other schemes for representing continuous distributions in the calculations. As part the review, minor errors were identified in the discrete Mmax distributions for several of the source zones. These errors are summarized at the end of this memo.

A.2 Summary of Approach

Two methods are used for the assessment of Mmax, the Bayesian approach and the Kijko approach (specifically the K-S-B approach). Both methods require the following information for each source zone: the b-value for the seismic source zone and its uncertainty, listed in Table A-1; the observed earthquake counts in the seismic source zones, listed in Tables A-2 and A-3; and the largest observed earthquake, $M_{max\text{-}obs}$, listed in Tables A-4 and A-5. Tables A-2 and A-3 contain the observed earthquake counts in each magnitude interval, the area averaged equivalent period of completeness for the source for each magnitude interval, and the equivalent cumulative earthquake counts adjusted for differences in completeness using Equation (5.2.1-3). The distributions for $M_{max\text{-}obs}$ listed in Tables A-4 and A-5 incorporate the uncertainty in the magnitude estimate for each earthquake and the bias adjustment given by Equation (5.2.1-4). The Bayesian approach also uses the prior distributions for Mmax defined in Section 5.2.1.1 of NUREG-2115. As described in Section 5.2.1.3, the weights assigned to the Mmax values computed using the Kijko approach are based on the computed probability that Mmax > 8.25. These are listed in Table A-6 for each source along with the corresponding weights assigned to the Bayesian approach results using the different priors.

The calculations for each source zone are described below.

Study Region Mmax Zone

The Mmax distribution for the Study Region Mmax Zone was based on only the Bayesian approach using the Composite prior. The earthquake counts and $M_{max-obs}$ were based on the paleoseismic catalog. Table A-7 lists the posterior Mmax distributions obtained for each applicable approach and the weighted composite posterior Mmax distribution.

MESE-N Mmax Zone

The Mmax distribution for the MESE-N Mmax Zone was based on a combination of the Kijko and Bayesian approaches. The Composite and MESE priors were used for the Bayesian approach. The earthquake counts and $M_{max-obs}$ were based on the historical earthquake catalog. Table A-8 lists the posterior Mmax distributions obtained for each applicable approach and the weighted composite posterior Mmax distribution.

MESE-W Mmax Zone

The Mmax distribution for the MESE-W Mmax Zone was based on only the Bayesian approach using the Composite and MESE priors. The earthquake counts and $M_{max-obs}$ were based on the paleoseismic catalog. Table A-9 lists the posterior Mmax distributions obtained for each applicable approach and the weighted composite posterior Mmax distribution.

NMESE-N Mmax Zone

The Mmax distribution for the MESE-N Mmax Zone was based on only Bayesian approach using the Composite and MESE priors. The earthquake counts and $M_{max-obs}$ were based on the paleoseismic catalog. Table A-10 lists the posterior Mmax distributions obtained for each applicable approach and the weighted composite posterior Mmax distribution.

NMESE-W Mmax Zone

The Mmax distribution for the NMESE-W Mmax Zone was based on a combination of the Kijko and Bayesian approaches. The Composite and MESE priors were used for the Bayesian approach. The earthquake counts and $M_{max-obs}$ were based on the historical earthquake catalog. The historical catalog contains the weighted possibility (0.5) that the 1882 earthquake occurred in the source. Table A-11 lists the posterior Mmax distributions obtained for each applicable approach and the weighted composite posterior Mmax distribution.

AHEX Seismotectonic Zone

The Mmax distribution for the AHEX Seismotectonic Zone was based on only the Bayesian approach. The Composite and MESE priors were used for the Bayesian approached. The earthquake counts and $M_{max\text{-}obs}$ were based on the historical earthquake catalog. Table A-12 lists the posterior Mmax distributions obtained for each applicable approach and the weighted composite posterior Mmax distribution.

ECC-AM Seismotectonic Zone

The Mmax distribution for the ECC-AM Seismotectonic Zone was based on a combination of the Kijko and Bayesian approaches. The Composite and MESE priors were used for the Bayesian approach. The earthquake counts and $M_{max\text{-}obs}$ were based on the historical earthquake catalog. The historical catalog contains the weighted possibility (0.6) that the 1755 earthquake occurred in the source. Table A-13 lists the posterior Mmax distributions obtained for each applicable approach and the weighted composite posterior Mmax distribution.

ECC-GC Seismotectonic Zone

The Mmax distribution for the ECC-GC Seismotectonic Zone was based on only the Bayesian approach using the Composite and MESE priors. The earthquake counts and $M_{max\text{-}obs}$ were based on a combination of the historical earthquake catalog (0.8) and the paleoseismic catalog (0.2). The historical catalog contains the weighted possibility (0.5) that the 1882 earthquake occurred in the source. Table A-14 lists the posterior Mmax distributions obtained for each applicable approach and the weighted composite posterior Mmax distribution.

GHEX Seismotectonic Zone

The Mmax distribution for the GHEX Seismotectonic Zone was based on only the Bayesian approach. The Composite and MESE priors were used for the Bayesian approach. The earthquake counts and $M_{max\text{-}obs}$ were based on the historical earthquake catalog. Table A-15 lists the posterior Mmax distributions obtained for each applicable approach and the weighted composite posterior Mmax distribution.

GMH Seismotectonic Zone

The Mmax distribution for the GMH Seismotectonic Zone was based on only the Bayesian approach. The Composite and MESE priors were used for the Bayesian approach. The earthquake counts and $M_{max\text{-}obs}$ were based on the historical earthquake catalog. Table A-16 lists the posterior Mmax distributions obtained for each applicable approach and the weighted composite posterior Mmax distribution.

IBEB Seismotectonic Zone

The Mmax distribution for the IBEB Seismotectonic Zone was based on only the Bayesian approach. The Composite, MESE, and NMESE priors were used for the Bayesian approach. The earthquake counts and $M_{max\text{-}obs}$ were based on the paleoseismic catalog. Table A-17 lists the posterior Mmax distributions obtained for each applicable approach and the weighted composite posterior Mmax distribution.

MidC-A Seismotectonic Zone

The Mmax distribution for the MidC-A Seismotectonic Zone was based on a combination of the Kijko and Bayesian approaches. The Composite and NMESE priors were used for the Bayesian approach. The earthquake counts and $M_{max\text{-}obs}$ were based on the historical earthquake catalog. Table A-18 lists the posterior Mmax distributions obtained for each applicable approach and the weighted composite posterior Mmax distribution.

MidC-B Seismotectonic Zone

The Mmax distribution for the MidC-B Seismotectonic Zone was based on a combination of the Kijko and Bayesian approaches. The Composite and NMESE priors were used for the Bayesian approach. The earthquake counts and $M_{max\text{-}obs}$ were based on the historical earthquake catalog. Table A-19 lists the posterior Mmax distributions obtained for each applicable approach and the weighted composite posterior Mmax distribution.

MidC-C Seismotectonic Zone

The Mmax distribution for the MidC-C Seismotectonic Zone was based on a combination of the Kijko and Bayesian approaches. The Composite and NMESE priors were used for the Bayesian approach. The earthquake counts and $M_{max\text{-}obs}$ were based on the historical earthquake catalog. Table A-20 lists the posterior Mmax distributions obtained for each applicable approach and the weighted composite posterior Mmax distribution.

MidC-D Seismotectonic Zone

The Mmax distribution for the MidC-D Seismotectonic Zone was based on a combination of the Kijko and Bayesian approaches. The Composite and NMESE priors were used for the Bayesian approach. The earthquake counts and $M_{max\text{-}obs}$ were based on the historical earthquake catalog. Table A-21 lists the posterior Mmax distributions obtained for each applicable approach and the weighted composite posterior Mmax distribution.

NAP Seismotectonic Zone

The Mmax distribution for the NAP Seismotectonic Zone was based on only the Bayesian approach. The Composite and MESE priors were used for the Bayesian approach. The earthquake counts and $M_{max-obs}$ were based on the historical earthquake catalog. Table A-22 lists the posterior Mmax distributions obtained for each applicable approach and the weighted composite posterior Mmax distribution.

OKA Seismotectonic Zone

The Mmax distribution for the OKA Seismotectonic Zone was based on only the Bayesian approach. The Composite and NMESE priors were used for the Bayesian approach. The earthquake counts and $M_{max-obs}$ were based on the historical earthquake catalog. The historical catalog contains the weighted possibility (0.5) that the 1882 earthquake occurred in the source. Table A-23 lists the posterior Mmax distributions obtained for each applicable approach and the weighted composite posterior Mmax distribution.

PEZ-N Seismotectonic Zone

The Mmax distribution for the PEZ-N Seismotectonic Zone was based on only the Bayesian approach. The Composite, MESE, and NMESE priors were used for the Bayesian approach. The earthquake counts and $M_{max-obs}$ were based on the historic earthquake catalog. Table A-24 lists the posterior Mmax distributions obtained for each applicable approach and the weighted composite posterior Mmax distribution.

PEZ-W Seismotectonic Zone

The Mmax distribution for the PEZ-W Seismotectonic Zone was based on a combination of the Kijko and Bayesian approaches. The Composite, MESE, and NMESE priors were used for the Bayesian approach. The earthquake counts and $M_{max-obs}$ were based on the historic earthquake catalog. Table A-25 lists the posterior Mmax distributions obtained for each applicable approach and the weighted composite posterior Mmax distribution.

RR Seismotectonic Zone

The Mmax distribution for the RR Seismotectonic Zone was based on only the Bayesian approach. The Composite and MESE priors were used for the Bayesian approach. The earthquake counts and $M_{max-obs}$ were based on the historical earthquake catalog. Table A-26 lists the posterior Mmax distributions obtained for each applicable approach and the weighted composite posterior Mmax distribution.

RR-RCG Seismotectonic Zone

The Mmax distribution for the RR-RCG Seismotectonic Zone was based on a combination of the Kijko and Bayesian approaches. The Composite and MESE priors were used for the Bayesian approach. The earthquake counts and $M_{max-obs}$ were based on the historical earthquake catalog. Table A-27 lists the posterior Mmax distributions obtained for each applicable approach and the weighted composite posterior Mmax distribution.

SLR Seismotectonic Zone

The Mmax distribution for the SLR Seismotectonic Zone was based on a combination of the Kijko and Bayesian approaches. The Composite and MESE priors were used for the Bayesian approach. The earthquake counts and $M_{max-obs}$ were based on the historical earthquake catalog. Table A-28 lists the posterior Mmax distributions obtained for each applicable approach and the weighted composite posterior Mmax distribution.

A.3 Discrete Mmax Distributions

The combined posterior distributions for each source were represented discretely using the five-point distribution developed by Miller and Rice (1983) listed in Table A-29. The posterior distributions are computed at 0.1 magnitude unit intervals. The discrete magnitudes are selected by locating the magnitude for which the cumulative probability of the prior is generally closer to the values listed in Table A-29.

Table A-30 lists the cumulative distributions for the Mmax Source Zones and Table A-31 lists the selected discrete 5-point Mmax distributions. Table A-32 lists the cumulative distributions for the Seismotectonic Source Zones and Table A-33 lists the selected discrete 5-point Mmax distributions.

A.4 Identified Errors

The review of the Mmax distribution calculations identified errors in the Mmax Distributions published in NUREG-2115 for the following Seismotectonic Source Zones: IBEB, MidC(A-D), PEZ-N, PEZ-W, and SLR. Table A-34 compares the incorrect and corrected distributions for these sources.

Table A-1
b-Values Used For Mmax Calculations

Seismic Source	*b*-value	Sigma *b*-Value
AHEX	1.00	0.14
ECC-AM	1.08	0.27
ECC-GC	1.04	0.16
GHEX	0.98	0.15
GMH	1.12	0.15
IBEB	0.76	0.14
MESE-N	1.01	0.10
MESE-W	0.99	0.09
MIDC-A	1.06	0.15
MIDC-B	1.06	0.15
MIDC-C	1.05	0.16
MIDC-D	1.05	0.16
NAP	1.04	0.17
NMESE-N	1.02	0.12
NMESE-W	1.05	0.16
OKA	1.05	0.15
PEZ-N	1.08	0.19
PEZ-W	1.10	0.20
RR	0.98	0.20
RR-RCG	0.98	0.20
SLR	0.87	0.16
Study Region	1.00	0.08

Table A-2a
Equivalent Earthquake Counts Used for Mmax Sources (1 of 2)

Magnitude Interval	Study Region (Paleo)			MESE-N			MESE-W (Paleo)			NMESE-N (Paleo)		
	Count in Interval	Average Equivalent Period of Completeness	Equivalent Cumulative Count	Count in Interval	Average Equivalent Period of Completeness	Equivalent Cumulative Count	Count in Interval	Average Equivalent Period of Completeness	Equivalent Cumulative Count	Count in Interval	Average Equivalent Period of Completeness	Equivalent Cumulative Count
4.3 to 5.0	0	6000	5	90	126.28	130.8	0	6000	5	0	6000	4
5.0 to 5.7	1	6000	5	10	141.2	20.9	1	6000	5	0	6000	4
5.7 to 6.4	4	6000	4	10	154.12	10	4	6000	4	4	6000	4
6.4 and greater	0	6000	0	0	158.34	0	0	6000	0	0	6000	0

Table A-2b
Equivalent Earthquake Counts Used for Mmax Sources (2 of 2)

Magnitude Interval	NMESE-W without 1882			NMESE-W with 1882		
	Count in Interval	Average Equivalent Period of Completeness	Equivalent Cumulative Count	Count in Interval	Average Equivalent Period of Completeness	Equivalent Cumulative Count
4.3 to 5.0	35	111.71	52.8	35	111.71	53.8
5.0 to 5.7	8	130.71	9.5	9	130.71	10.5
5.7 to 6.4	1	138.27	1	1	138.27	1
6.4 and greater	0	144.52	0	0	144.52	0

Table A-3a
Equivalent Earthquake Counts Used for Seismotectonic Sources (1 of 6)

Magnitude Interval	AHEX			ECC-AM with 1755			ECC-AM without 1755			ECC-GC with 1882		
	Count in Interval	Average Equivalent Period of Completeness	Equivalent Cumulative Count	Count in Interval	Average Equivalent Period of Completeness	Equivalent Cumulative Count	Count in Interval	Average Equivalent Period of Completeness	Equivalent Cumulative Count	Count in Interval	Average Equivalent Period of Completeness	Equivalent Cumulative Count
4.3 to 5.0	0	81.84	0	23	166.93	28.8	23	166.93	23	3	105.72	4.4
5.0 to 5.7	0	81.84	0	0	179.46	1	0	179.46	0	1	119.25	1
5.7 to 6.4	0	100.25	0	1	201.83	1	0	201.83	0	0	121.09	0
6.4 and greater	0	112.41	0	0	207.7	0	0	207.7	0	0	122.84	0

Table A-3b
Equivalent Earthquake Counts Used for Seismotectonic Sources (2 of 6)

Magnitude Interval	ECC-GC without 1882			ECC-GC (Paleo)			GHEX			GMH		
	Count in Interval	Average Equivalent Period of Completeness	Equivalent Cumulative Count	Count in Interval	Average Equivalent Period of Completeness	Equivalent Cumulative Count	Count in Interval	Average Equivalent Period of Completeness	Equivalent Cumulative Count	Count in Interval	Average Equivalent Period of Completeness	Equivalent Cumulative Count
4.3 to 5.0	3	105.72	3	0	6000	1	3	76.64	4.9	1	152.88	2.3
5.0 to 5.7	0	119.25	0	1	6000	1	0	91.62	1	1	195.86	1
5.7 to 6.4	0	121.09	0	0	6000	0	1	100.37	1	0	204.8	0
6.4 and greater	0	122.84	0	0	6000	0	0	102.86	0	0	207.4	0

Table A-3c
Equivalent Earthquake Counts Used for Seismotectonic Sources (3 of 6)

Magnitude Interval	IBEB (Paleo)			MidC-A			MidC-B			MidC-C		
	Count in Interval	Average Equivalent Period of Completeness	Equivalent Cumulative Count	Count in Interval	Average Equivalent Period of Completeness	Equivalent Cumulative Count	Count in Interval	Average Equivalent Period of Completeness	Equivalent Cumulative Count	Count in Interval	Average Equivalent Period of Completeness	Equivalent Cumulative Count
4.3 to 5.0	0	6000	4	37	118.12	55.2	37	117.97	55.2	35	111.57	51.7
5.0 to 5.7	0	6000	4	7	136.51	8.6	7	136.34	8.6	7	130.47	8.4
5.7 to 6.4	4	6000	4	1	148.67	1	1	148.52	1	1	138.12	1
6.4 and greater	0	6000	0	0	154.64	0	0	154.51	0	0	144.44	0

Table A-3d
Equivalent Earthquake Counts Used for Seismotectonic Sources (4 of 6)

Magnitude Interval	MidC-D			NAP			OKA without 1882			OKA with 1882		
	Count in Interval	Average Equivalent Period of Completeness	Equivalent Cumulative Count	Count in Interval	Average Equivalent Period of Completeness	Equivalent Cumulative Count	Count in Interval	Average Equivalent Period of Completeness	Equivalent Cumulative Count	Count in Interval	Average Equivalent Period of Completeness	Equivalent Cumulative Count
4.3 to 5.0	35	111.39	51.8	6	156.7	12.9	0	135.73	1	0	135.73	2
5.0 to 5.7	7	130.28	8.4	3	183.43	5.3	1	162.94	1	2	162.94	2
5.7 to 6.4	1	137.94	1	2	200.26	2	0	162.94	0	0	162.94	0
6.4 and greater	0	144.28	0	0	205.23	0	0	162.94	0	0	162.94	0

Table A-3e
Equivalent Earthquake Counts Used for Seismotectonic Sources (5 of 6)

Magnitude Interval	PEZ-N			PEZ-W			RR			RR-RCG		
	Count in Interval	Average Equivalent Period of Completeness	Equivalent Cumulative Count	Count in Interval	Average Equivalent Period of Completeness	Equivalent Cumulative Count	Count in Interval	Average Equivalent Period of Completeness	Equivalent Cumulative Count	Count in Interval	Average Equivalent Period of Completeness	Equivalent Cumulative Count
4.3 to 5.0	12	205.26	20	14	215.3	24.6	27	161.99	35.9	27	163.46	35.8
5.0 to 5.7	5	231.14	6.1	5	234.79	6.8	2	188.89	4	2	189.61	4
5.7 to 6.4	1	237.24	1	1	273.53	1	2	191.52	2	2	192.57	2
6.4 and greater	0	237.24	0	0	273.53	0	0	191.52	0	0	192.57	0

Table A-3f
Equivalent Earthquake Counts Used for Seismotectonic Sources (6 of 6)

Magnitude Interval	SLR		
	Count in Interval	Average Equivalent Period of Completeness	Equivalent Cumulative Count
4.3 to 5.0	27	150.73	46.1
5.0 to 5.7	4	166.55	10.7
5.7 to 6.4	6	197.34	6
6.4 and greater	0	205.02	0

Table A-4
$M_{max\text{-}obs}$ Distributions for Mmax Source Zones

$M_{max\text{-}obs}$	**Weight on $M_{max\text{-}obs}$ for Source:**						
	Study Region (paleo)	**MESE-N with 1882**	**MESE-N without 1882**	**MESE-W (paleo)**	**NMESE-N (paleo)**	**NMESE-W without 1882**	**NMESE-W with 1882**
5.3						0.004	0.001
5.4						0.022	0.009
5.5						0.059	0.030
5.6						0.103	0.073
5.7						0.143	0.125
5.8						0.166	0.167
5.9						0.156	0.173
6.0	0.002	0.001	0.002	0.002	0.003	0.128	0.153
6.1	0.017	0.014	0.015	0.017	0.018	0.092	0.112
6.2	0.061	0.061	0.062	0.061	0.062	0.059	0.074
6.3	0.137	0.133	0.132	0.137	0.140	0.035	0.043
6.4	0.205	0.179	0.181	0.205	0.209	0.018	0.023
6.5	0.232	0.184	0.180	0.232	0.223	0.009	0.011
6.6	0.171	0.152	0.151	0.171	0.171	0.004	0.005
6.7	0.100	0.108	0.111	0.100	0.100	0.002	0.002
6.8	0.047	0.072	0.072	0.047	0.047		
6.9	0.019	0.043	0.042	0.019	0.019		
7.0	0.006	0.025	0.025	0.006	0.006		
7.1	0.002	0.014	0.014	0.002	0.002		
7.2		0.007	0.007				
7.3		0.004	0.004				
7.4		0.002	0.002				
7.5		0.001	0.001				

Table A-5a
$M_{max\text{-}obs}$ Distributions for Seismotectonic Source Zones (1 of 3)

$M_{max\text{-}obs}$	Weight on $M_{max\text{-}obs}$ for Source:							
	AHEX	**ECC-AM with 1755**	**ECC-AM without 1755**	**ECC-GC with 1882**	**ECC-GC without 1882**	**ECC-GC (paleo)**	**GHEX**	**GMH**
4.2								0.002
4.3								0.008
4.4							0.001	0.019
4.5							0.011	0.037
4.6							0.056	0.059
4.7					0.016		0.150	0.074
4.8			0.003	0.002	0.183		0.243	0.086
4.9			0.013	0.013	0.449		0.251	0.086
5.0			0.040	0.029	0.289	0.100	0.173	0.086
5.1			0.076	0.042	0.058		0.082	0.086
5.2			0.111	0.062	0.005		0.026	0.081
5.3			0.127	0.086			0.006	0.077
5.4		0.002	0.125	0.107				0.069
5.5		0.007	0.110	0.122		0.400		0.060
5.6		0.018	0.094	0.125				0.048
5.7		0.040	0.077	0.116				0.038
5.8		0.071	0.060	0.100				0.029
5.9		0.108	0.047	0.076				0.020
6.0		0.140	0.037	0.053		0.400		0.014
6.1		0.155	0.027	0.033				0.009
6.2		0.147	0.019	0.018				0.006
6.3		0.122	0.013	0.010				0.004
6.4		0.086	0.009	0.005				0.002
6.5		0.053	0.006	0.002		0.100		0.001
6.6		0.029	0.004					
6.7		0.013	0.002					
6.8		0.005	0.002					
6.9		0.002						
7.0								
7.1								
7.2								
7.3								
7.4								
7.5								

Table A-5b
$M_{max\text{-}obs}$ Distributions for Seismotectonic Source Zones (2 of 3)

$M_{max\text{-}obs}$	Weight on $M_{max\text{-}obs}$ for Source:						
	IBEB (paleo)	MidC-A	MidC-B	MidC-C	MidC-D	NAP without 1755	NAP with 1755
4.2							
4.3							
4.4							
4.5							
4.6							
4.7							
4.8							
4.9							
5.0							
5.1							
5.2							
5.3		0.007	0.007	0.007	0.007		
5.4		0.028	0.028	0.029	0.029	0.024	
5.5		0.067	0.067	0.067	0.067	0.114	0.003
5.6		0.109	0.109	0.109	0.109	0.124	0.008
5.7		0.145	0.145	0.144	0.144	0.145	0.026
5.8		0.159	0.159	0.159	0.159	0.153	0.057
5.9		0.149	0.149	0.147	0.147	0.139	0.101
6.0	0.003	0.123	0.123	0.124	0.124	0.113	0.148
6.1	0.018	0.087	0.087	0.088	0.088	0.082	0.169
6.2	0.062	0.058	0.058	0.058	0.058	0.051	0.165
6.3	0.140	0.034	0.034	0.033	0.033	0.030	0.132
6.4	0.209	0.019	0.019	0.018	0.018	0.016	0.091
6.5	0.223	0.009	0.009	0.009	0.009	0.008	0.054
6.6	0.171	0.004	0.004	0.004	0.004	0.003	0.028
6.7	0.100	0.002	0.002	0.002	0.002	0.001	0.013
6.8	0.047						0.004
6.9	0.019						0.002
7.0	0.006						
7.1	0.002						
7.2							
7.3							
7.4							
7.5							

Table A-5c
$M_{max\text{-}obs}$ Distributions for Seismotectonic Source Zones (3 of 3)

$M_{max\text{-}obs}$	Weight on $M_{max\text{-}obs}$ for Source:						
	OKA without 1882	**OKA with 1882**	**PEZ-N**	**PEZ-W**	**RR**	**RR_RCG**	**SLR**
4.2							
4.3	0.002						
4.4	0.004						
4.5	0.008						
4.6	0.016						
4.7	0.030						
4.8	0.048						
4.9	0.070	0.003					
5.0	0.095	0.008					
5.1	0.115	0.021					
5.2	0.126	0.042					
5.3	0.122	0.072	0.001	0.001			
5.4	0.109	0.107	0.007	0.007			
5.5	0.090	0.132	0.023	0.023			
5.6	0.067	0.145	0.057	0.056			
5.7	0.044	0.136	0.101	0.100	0.005	0.005	
5.8	0.026	0.115	0.137	0.138	0.030	0.030	
5.9	0.015	0.087	0.155	0.156	0.113	0.113	0.002
6.0	0.007	0.059	0.148	0.149	0.227	0.227	0.012
6.1	0.003	0.036	0.126	0.125	0.276	0.276	0.039
6.2	0.001	0.019	0.096	0.095	0.205	0.205	0.089
6.3		0.010	0.065	0.065	0.102	0.102	0.137
6.4		0.005	0.041	0.041	0.033	0.033	0.165
6.5		0.002	0.022	0.023	0.008	0.008	0.163
6.6			0.012	0.012	0.002	0.002	0.135
6.7			0.006	0.006			0.100
6.8			0.003	0.002			0.066
6.9							0.040
7.0							0.024
7.1							0.013
7.2							0.007
7.3							0.004
7.4							0.002
7.5							0.001

Table A-6
Weights Assigned to Mmax Approaches

Source	Probability Mmax > 8.25	Weight Assigned to Kijko Approach	Weight Assigned to Bayesian, Composite Prior	Weight Assigned to Bayesian, MESE Prior	Weight Assigned to Bayesian, NMESE Prior
Study Region (paleo)	0.84	0	1.000	0.000	0.000
MESE-N	0.44	0.06	0.376	0.564	0.000
MESE-W (paleo)	0.83	0	0.400	0.600	0.000
NMESE-N (paleo)	0.87	0	0.400	0.000	0.600
NMESE-W	0.27	0.23	0.308	0.000	0.462
AHEX	1.00	0	0.400	0.600	0.000
ECC-AM	0.46	0.04	0.384	0.576	0.000
ECC-GC	0.78	0	0.400	0.600	0.000
GHEX	0.80	0	0.400	0.600	0.000
GMH	0.81	0	0.400	0.600	0.000
IBEB (paleo)	0.72	0	0.400	0.120	0.480
MidC-A	0.26	0.24	0.304	0.000	0.456
MidC-B	0.26	0.24	0.304	0.000	0.456
MidC-C	0.26	0.24	0.304	0.000	0.456
MidC-D	0.26	0.24	0.304	0.000	0.456
NAP	0.58	0	0.400	0.600	0.000
OKA	0.69	0	0.400	0.000	0.600
PEZ-N	0.65	0	0.400	0.120	0.480
PEZ-W	0.49	0.01	0.396	0.119	0.475
RR	0.67	0	0.400	0.600	0.000
RR-RCG	0.43	0.07	0.372	0.558	0.000
SLR	0.48	0.02	0.392	0.588	0.000

Table A-7
Mmax Posterior Distributions for Study Region Mmax Source Zone

Mmax	Posterior Distributions		
	Kijko Approach (Weight 0)	Bayesian Composite Prior (Weight 1.0)	Weighted Average
5.5	0	0	0
5.6	0	0	0
5.7	0	0	0
5.8	0	0	0
5.9	0	0	0
6.0	0.00038	0.00002	0.00002
6.1	0.00307	0.00023	0.00023
6.2	0.01249	0.00126	0.00126
6.3	0.03382	0.00459	0.00459
6.4	0.06563	0.0118	0.0118
6.5	0.09922	0.02351	0.02351
6.6	0.1195	0.03737	0.03737
6.7	0.12077	0.05033	0.05033
6.8	0.10898	0.06079	0.06079
6.9	0.09179	0.06843	0.06843
7.0	0.07453	0.07356	0.07356
7.1	0.05949	0.07645	0.07645
7.2	0.04711	0.07726	0.07726
7.3	0.03727	0.07613	0.07613
7.4	0.02953	0.07324	0.07324
7.5	0.02344	0.06877	0.06877
7.6	0.01864	0.06303	0.06303
7.7	0.01483	0.05639	0.05639
7.8	0.01181	0.04924	0.04924
7.9	0.00941	0.04196	0.04196
8.0	0.00751	0.0349	0.0349
8.1	0.006	0.02833	0.02833
8.2	0.00478	0.02244	0.02244

Table A-8
Mmax Posterior Distributions for MESE-N Mmax Source Zone

Mmax	Posterior Distributions			
	Kijko Approach (Weight 0.06)	Bayesian Composite Prior (Weight 0.376)	Bayesian MESE Prior (Weight 0.564)	Weighted Average
5.5	0	0	0	0
5.6	0	0	0	0
5.7	0	0	0	0
5.8	0	0	0	0
5.9	0	0	0	0
6.0	0.00045	0.00008	0.00008	0.0001
6.1	0.00412	0.00076	0.00078	0.00097
6.2	0.01795	0.00361	0.00356	0.00444
6.3	0.04498	0.01037	0.00987	0.01217
6.4	0.07677	0.02099	0.01939	0.02344
6.5	0.10112	0.03363	0.03032	0.03581
6.6	0.11208	0.04615	0.04082	0.0471
6.7	0.11044	0.05695	0.04974	0.05609
6.8	0.10053	0.06532	0.05671	0.06257
6.9	0.08665	0.07104	0.06172	0.06672
7.0	0.07216	0.07433	0.0651	0.06899
7.1	0.05885	0.07547	0.06708	0.06974
7.2	0.04734	0.07465	0.06784	0.06917
7.3	0.03785	0.07217	0.06751	0.06748
7.4	0.03019	0.06827	0.06619	0.06481
7.5	0.02407	0.0632	0.06394	0.06127
7.6	0.0191	0.05715	0.06077	0.05691
7.7	0.01511	0.05051	0.05685	0.05197
7.8	0.01201	0.04369	0.05239	0.04669
7.9	0.00956	0.03695	0.04752	0.04127
8.0	0.00764	0.03055	0.04241	0.03587
8.1	0.00611	0.02468	0.03724	0.03065
8.2	0.0049	0.01948	0.03215	0.02575

Table A-9
Mmax Posterior Distributions for MESE-W Mmax Source Zone

Mmax	Posterior Distributions			
	Kijko Approach (Weight 0.0)	Bayesian Composite Prior (Weight 0.4)	Bayesian MESE Prior (Weight 0.6)	Weighted Average
5.5	0	0	0	0
5.6	0	0	0	0
5.7	0	0	0	0
5.8	0	0	0	0
5.9	0	0	0	0
6.0	0.00038	0.00002	0.00002	0.00002
6.1	0.00304	0.00023	0.00023	0.00023
6.2	0.01233	0.00126	0.00121	0.00123
6.3	0.03333	0.00459	0.00426	0.00439
6.4	0.06465	0.01182	0.01064	0.01111
6.5	0.09774	0.02353	0.0207	0.02183
6.6	0.11783	0.0374	0.03233	0.03436
6.7	0.11932	0.05036	0.04305	0.04597
6.8	0.108	0.06081	0.05176	0.05538
6.9	0.09134	0.06845	0.05841	0.06243
7.0	0.07454	0.07356	0.0634	0.06746
7.1	0.05984	0.07645	0.067	0.07078
7.2	0.0477	0.07725	0.06931	0.07249
7.3	0.03799	0.07612	0.07039	0.07268
7.4	0.03032	0.07322	0.07025	0.07144
7.5	0.02425	0.06875	0.0689	0.06884
7.6	0.01942	0.06301	0.06639	0.06504
7.7	0.01558	0.05637	0.06286	0.06026
7.8	0.01251	0.04922	0.05847	0.05477
7.9	0.01006	0.04194	0.05344	0.04884
8.0	0.00809	0.03489	0.04798	0.04274
8.1	0.00652	0.02832	0.04233	0.03673
8.2	0.00524	0.02243	0.03668	0.03098

Table A-10
Mmax Posterior Distributions for NMESE-N Mmax Source Zone

Mmax	Posterior Distributions			
	Kijko Approach (Weight 0)	Bayesian Composite Prior (Weight 0.4)	Bayesian NMESE Prior (Weight 0.6)	Weighted Average
5.5	0	0	0	0
5.6	0	0	0	0
5.7	0	0	0	0
5.8	0	0	0	0
5.9	0	0	0	0
6.0	0.00037	0.00002	0.00007	0.00005
6.1	0.00301	0.00023	0.00068	0.0005
6.2	0.01234	0.00127	0.00351	0.00261
6.3	0.03358	0.00464	0.01182	0.00895
6.4	0.06546	0.01196	0.02819	0.0217
6.5	0.09768	0.02351	0.05102	0.04001
6.6	0.11722	0.03721	0.0739	0.05922
6.7	0.11911	0.05017	0.09042	0.07432
6.8	0.10803	0.06065	0.09825	0.08321
6.9	0.09147	0.06832	0.09862	0.0865
7.0	0.07468	0.07349	0.09384	0.0857
7.1	0.05993	0.07642	0.08586	0.08208
7.2	0.04774	0.07726	0.07604	0.07653
7.3	0.03799	0.07615	0.06547	0.06974
7.4	0.03029	0.07327	0.05488	0.06224
7.5	0.02419	0.06882	0.04479	0.0544
7.6	0.01935	0.06309	0.0356	0.04659
7.7	0.0155	0.05644	0.02754	0.0391
7.8	0.01243	0.04929	0.02075	0.03217
7.9	0.00998	0.04201	0.01522	0.02594
8.0	0.00802	0.03494	0.01087	0.0205
8.1	0.00645	0.02837	0.00756	0.01588
8.2	0.00518	0.02247	0.0051	0.01205

Table A-11
Mmax Posterior Distributions for NMESE-W Mmax Source Zone

Mmax	Posterior Distributions			
	Kijko Approach (Weight 0.23)	Bayesian Composite Prior (Weight 0.308)	Bayesian NMESE Prior (Weight 0.462)	Weighted Average
5.5	0.02573	0.0014	0.00497	0.00864
5.6	0.04308	0.00278	0.00944	0.01513
5.7	0.06776	0.00504	0.01629	0.02467
5.8	0.09142	0.00821	0.02508	0.03514
5.9	0.10659	0.01218	0.03478	0.04434
6.0	0.11046	0.01671	0.0443	0.05102
6.1	0.10425	0.02158	0.05265	0.05495
6.2	0.09163	0.0266	0.05927	0.05665
6.3	0.07654	0.03167	0.06401	0.05693
6.4	0.06168	0.03673	0.06688	0.0564
6.5	0.04858	0.04172	0.06805	0.05546
6.6	0.03784	0.04655	0.06769	0.05431
6.7	0.02938	0.05108	0.06596	0.05296
6.8	0.02276	0.05507	0.0629	0.05126
6.9	0.01768	0.05831	0.05874	0.04916
7.0	0.01384	0.06061	0.05371	0.04666
7.1	0.01091	0.06176	0.04803	0.04372
7.2	0.00865	0.06163	0.04196	0.04036
7.3	0.00689	0.06019	0.03579	0.03666
7.4	0.00551	0.0575	0.02978	0.03274
7.5	0.00442	0.05369	0.02417	0.02872
7.6	0.00356	0.049	0.01912	0.02475
7.7	0.00287	0.04369	0.01474	0.02093
7.8	0.00232	0.03805	0.01108	0.01737
7.9	0.00188	0.03236	0.00811	0.01414
8.0	0.00152	0.02687	0.00578	0.0113
8.1	0.00124	0.02179	0.00401	0.00885
8.2	0.00101	0.01724	0.00271	0.0068

Table A-12
Mmax Posterior Distributions for AHEX Seismotectonic Source Zone

Mmax	Posterior Distributions			
	Kijko Approach (Weight 0)	Bayesian Composite Prior (Weight 0.4)	Bayesian MESE Prior (Weight 0.6)	Weighted Average
5.5	0.19583	0.00214	0.00319	0.00277
5.6	0.14414	0.00296	0.00404	0.00361
5.7	0.11794	0.00432	0.00546	0.00501
5.8	0.09665	0.00614	0.00725	0.00681
5.9	0.07927	0.00852	0.00946	0.00908
6.0	0.06506	0.01154	0.01212	0.01189
6.1	0.05347	0.01526	0.01525	0.01525
6.2	0.04392	0.01968	0.01885	0.01918
6.3	0.03616	0.02477	0.0229	0.02365
6.4	0.02985	0.03044	0.02732	0.02857
6.5	0.02454	0.0365	0.03202	0.03381
6.6	0.02026	0.04271	0.03688	0.03921
6.7	0.01677	0.04877	0.04172	0.04454
6.8	0.01382	0.05435	0.04637	0.04956
6.9	0.01145	0.05912	0.05063	0.05402
7.0	0.00952	0.06276	0.0543	0.05769
7.1	0.00782	0.06502	0.05722	0.06034
7.2	0.0065	0.06573	0.05924	0.06184
7.3	0.0054	0.06486	0.06025	0.06209
7.4	0.00447	0.06245	0.06019	0.0611
7.5	0.00377	0.05869	0.05908	0.05892
7.6	0.00309	0.05383	0.05697	0.05571
7.7	0.00257	0.04818	0.05397	0.05165
7.8	0.00215	0.04209	0.05022	0.04697
7.9	0.0018	0.03588	0.04592	0.0419
8.0	0.00149	0.02985	0.04124	0.03668
8.1	0.00127	0.02424	0.03639	0.03153
8.2	0.00103	0.01922	0.03155	0.02662

Table A-13
Mmax Posterior Distributions for ECC-AM Seismotectonic Source Zone

Mmax	Posterior Distributions			
	Kijko Approach (Weight 0.04)	Bayesian Composite Prior (Weight 0.384)	Bayesian MESE Prior (Weight 0.576)	Weighted Average
5.5	0.08456	0.00101	0.00082	0.00424
5.6	0.05963	0.00134	0.00111	0.00354
5.7	0.05248	0.00195	0.00163	0.00379
5.8	0.05126	0.00292	0.00246	0.00459
5.9	0.05448	0.00442	0.00378	0.00605
6.0	0.06056	0.00672	0.00581	0.00835
6.1	0.06703	0.01001	0.00876	0.01157
6.2	0.07123	0.01439	0.01272	0.0157
6.3	0.0717	0.01975	0.01766	0.02063
6.4	0.06822	0.02586	0.02339	0.02613
6.5	0.06163	0.03238	0.02964	0.03197
6.6	0.05344	0.03903	0.03614	0.03794
6.7	0.04497	0.0455	0.04263	0.04383
6.8	0.03718	0.05157	0.04891	0.04946
6.9	0.03049	0.057	0.05472	0.05462
7.0	0.02489	0.06149	0.05975	0.05902
7.1	0.02033	0.06482	0.06375	0.06243
7.2	0.01669	0.06678	0.06649	0.06461
7.3	0.01377	0.06723	0.06776	0.0654
7.4	0.01139	0.06612	0.06745	0.0647
7.5	0.00946	0.0635	0.06558	0.06254
7.6	0.00789	0.05956	0.06226	0.05904
7.7	0.00659	0.05453	0.05771	0.05444
7.8	0.00552	0.04875	0.05222	0.04902
7.9	0.00464	0.04254	0.04613	0.04309
8.0	0.00391	0.03624	0.03978	0.03698
8.1	0.0033	0.03013	0.03348	0.03099
8.2	0.00277	0.02444	0.02749	0.02533

Table A-14
Mmax Posterior Distributions for ECC-GC Seismotectonic Source Zone

Mmax	Posterior Distributions			
	Kijko Approach (Weight 0)	Bayesian Composite Prior (Weight 0.4)	Bayesian MESE Prior (Weight 0.6)	Weighted Average
5.5	0.18404	0.00161	0.00258	0.00219
5.6	0.13639	0.00243	0.00352	0.00308
5.7	0.11564	0.00367	0.00489	0.0044
5.8	0.09927	0.00538	0.00665	0.00614
5.9	0.08503	0.00764	0.0088	0.00834
6.0	0.07202	0.01111	0.01201	0.01165
6.1	0.06009	0.01524	0.0156	0.01546
6.2	0.04933	0.01968	0.01922	0.01941
6.3	0.03999	0.02475	0.02322	0.02383
6.4	0.03215	0.03032	0.02754	0.02865
6.5	0.02572	0.03677	0.03255	0.03424
6.6	0.02047	0.04328	0.0376	0.03987
6.7	0.01628	0.04929	0.04233	0.04512
6.8	0.01298	0.05482	0.04687	0.05005
6.9	0.01038	0.05953	0.05101	0.05442
7.0	0.00831	0.06311	0.05458	0.05799
7.1	0.00667	0.06531	0.05739	0.06056
7.2	0.00536	0.06598	0.05931	0.06198
7.3	0.00432	0.06505	0.06024	0.06217
7.4	0.00348	0.06261	0.06012	0.06112
7.5	0.00281	0.05882	0.05896	0.0589
7.6	0.00228	0.05393	0.05681	0.05566
7.7	0.00184	0.04826	0.05379	0.05157
7.8	0.00149	0.04214	0.05003	0.04688
7.9	0.00121	0.03592	0.04572	0.0418
8.0	0.00099	0.02988	0.04106	0.03659
8.1	0.0008	0.02426	0.03622	0.03143
8.2	0.00065	0.01922	0.03138	0.02652

Table A-15
Mmax Posterior Distributions for GHEX Seismotectonic Source Zone

Mmax	Posterior Distributions			
	Kijko Approach (Weight 0)	Bayesian Composite Prior (Weight 0.4)	Bayesian MESE Prior (Weight 0.6)	Weighted Average
5.5	0.11948	0.00131	0.00194	0.00169
5.6	0.08525	0.0018	0.00246	0.0022
5.7	0.08061	0.00293	0.0037	0.00339
5.8	0.09197	0.00509	0.00601	0.00564
5.9	0.10257	0.00833	0.00925	0.00888
6.0	0.09802	0.0121	0.01273	0.01248
6.1	0.08272	0.01614	0.01617	0.01616
6.2	0.0665	0.02062	0.0198	0.02013
6.3	0.05309	0.02568	0.0238	0.02455
6.4	0.04252	0.03128	0.02815	0.0294
6.5	0.03417	0.03725	0.03276	0.03456
6.6	0.02755	0.04334	0.03752	0.03985
6.7	0.02227	0.04928	0.04225	0.04507
6.8	0.01804	0.05473	0.0468	0.04997
6.9	0.01465	0.05936	0.05095	0.05432
7.0	0.01192	0.06287	0.05453	0.05787
7.1	0.00971	0.06502	0.05736	0.06042
7.2	0.00792	0.06564	0.05929	0.06183
7.3	0.00647	0.06469	0.06023	0.06202
7.4	0.0053	0.06224	0.06012	0.06097
7.5	0.00434	0.05844	0.05897	0.05876
7.6	0.00356	0.05357	0.05683	0.05553
7.7	0.00292	0.04793	0.05381	0.05146
7.8	0.0024	0.04185	0.05006	0.04678
7.9	0.00198	0.03567	0.04575	0.04172
8.0	0.00163	0.02967	0.04108	0.03652
8.1	0.00134	0.02408	0.03624	0.03138
8.2	0.00111	0.01908	0.03142	0.02648

Table A-16
Mmax Posterior Distributions for GMH Seismotectonic Source Zone

Mmax	Posterior Distributions			
	Kijko Approach (Weight 0)	Bayesian Composite Prior (Weight 0.4)	Bayesian MESE Prior (Weight 0.6)	Weighted Average
5.5	0.22558	0.0019	0.00283	0.00246
5.6	0.1572	0.00274	0.00374	0.00334
5.7	0.12477	0.00412	0.00521	0.00477
5.8	0.10018	0.00598	0.00707	0.00664
5.9	0.0806	0.00843	0.00935	0.00898
6.0	0.06481	0.01152	0.01209	0.01186
6.1	0.0519	0.0153	0.0153	0.0153
6.2	0.04142	0.01979	0.01897	0.01929
6.3	0.03293	0.02494	0.02306	0.02381
6.4	0.02609	0.03063	0.02751	0.02876
6.5	0.02057	0.03671	0.03223	0.03402
6.6	0.01613	0.0429	0.03707	0.0394
6.7	0.01261	0.04893	0.04188	0.0447
6.8	0.00988	0.05447	0.04649	0.04969
6.9	0.00773	0.0592	0.05072	0.05411
7.0	0.0061	0.0628	0.05437	0.05775
7.1	0.00478	0.06503	0.05727	0.06037
7.2	0.00377	0.06572	0.05926	0.06185
7.3	0.00301	0.06483	0.06025	0.06209
7.4	0.00235	0.06242	0.06019	0.06108
7.5	0.00186	0.05864	0.05907	0.0589
7.6	0.00148	0.05378	0.05695	0.05568
7.7	0.00117	0.04813	0.05394	0.05162
7.8	0.00093	0.04204	0.0502	0.04693
7.9	0.00073	0.03584	0.04589	0.04187
8.0	0.00059	0.02981	0.04121	0.03665
8.1	0.00047	0.02421	0.03636	0.0315
8.2	0.00037	0.01918	0.03152	0.02658

Table A-17
Mmax Posterior Distributions for IBEB Seismotectonic Source Zone

Mmax	Posterior Distributions				
	Kijko Approach (Weight 0)	Bayesian Composite Prior (Weight 0.4)	Bayesian MESE Prior (Weight 0.12)	Bayesian NMESE Prior (Weight 0.48)	Weighted Average
5.5	0	0	0	0	0
5.6	0	0	0	0	0
5.7	0	0	0	0	0
5.8	0	0	0	0	0
5.9	0	0	0	0	0
6.0	0.00034	0.00002	0.00002	0.00007	0.00005
6.1	0.00273	0.00025	0.00025	0.00072	0.00048
6.2	0.01104	0.00136	0.00131	0.0037	0.00248
6.3	0.02975	0.0049	0.00455	0.01234	0.00843
6.4	0.05772	0.01252	0.01129	0.02916	0.02036
6.5	0.08617	0.02438	0.02148	0.05237	0.03747
6.6	0.10418	0.03829	0.03315	0.07534	0.05546
6.7	0.10747	0.05127	0.0439	0.09161	0.06975
6.8	0.09978	0.06161	0.05252	0.09898	0.07846
6.9	0.08715	0.06903	0.05901	0.09884	0.08214
7.0	0.07388	0.0739	0.06379	0.09362	0.08215
7.1	0.06188	0.07653	0.06718	0.08531	0.07962
7.2	0.05165	0.07709	0.06928	0.0753	0.07529
7.3	0.04317	0.07576	0.07018	0.06462	0.06975
7.4	0.03623	0.07271	0.06988	0.05403	0.06341
7.5	0.0305	0.06814	0.0684	0.044	0.05659
7.6	0.02575	0.06235	0.0658	0.03491	0.04959
7.7	0.0218	0.05569	0.06221	0.02697	0.04269
7.8	0.0185	0.04857	0.0578	0.02029	0.0361
7.9	0.01573	0.04135	0.05277	0.01486	0.03001
8.0	0.0134	0.03436	0.04734	0.0106	0.02451
8.1	0.01143	0.02787	0.04173	0.00737	0.01969
8.2	0.00976	0.02206	0.03613	0.00497	0.01554

Table A-18
Mmax Posterior Distributions for MidC-A Seismotectonic Source Zone

Mmax	Posterior Distributions			
	Kijko Approach (Weight 0.24)	Bayesian Composite Prior (Weight 0.304)	Bayesian NMESE Prior (Weight 0.456)	Weighted Average
5.5	0.04395	0.00246	0.00871	0.01527
5.6	0.05992	0.00411	0.01385	0.02195
5.7	0.08168	0.00654	0.02094	0.03114
5.8	0.09861	0.00963	0.02904	0.03983
5.9	0.10667	0.0133	0.03748	0.04674
6.0	0.10555	0.01746	0.04561	0.05144
6.1	0.09669	0.02193	0.05266	0.05388
6.2	0.08357	0.02662	0.05831	0.05474
6.3	0.06935	0.03146	0.06248	0.0547
6.4	0.0558	0.03638	0.06508	0.05413
6.5	0.04395	0.04129	0.06616	0.05327
6.6	0.03422	0.04608	0.06581	0.05223
6.7	0.02655	0.05057	0.06414	0.051
6.8	0.02052	0.05455	0.0612	0.04941
6.9	0.01589	0.05778	0.05717	0.04745
7.0	0.0124	0.06007	0.05229	0.04508
7.1	0.00974	0.06123	0.04678	0.04228
7.2	0.00769	0.06112	0.04088	0.03907
7.3	0.0061	0.05971	0.03488	0.03552
7.4	0.00485	0.05705	0.02903	0.03175
7.5	0.00387	0.05329	0.02356	0.02787
7.6	0.0031	0.04864	0.01865	0.02403
7.7	0.00249	0.04337	0.01438	0.02034
7.8	0.002	0.03777	0.0108	0.01689
7.9	0.00161	0.03213	0.00791	0.01376
8.0	0.0013	0.02668	0.00564	0.01099
8.1	0.00105	0.02163	0.00391	0.00861
8.2	0.00086	0.01713	0.00266	0.00663

Table A-19
Mmax Posterior Distributions for MidC-B Seismotectonic Source Zone

Mmax	Posterior Distributions			
	Kijko Approach (Weight 0.24)	Bayesian Composite Prior (Weight 0.304)	Bayesian NMESE Prior (Weight 0.456)	Weighted Average
5.5	0.04395	0.00246	0.00872	0.01527
5.6	0.05992	0.00412	0.01386	0.02195
5.7	0.08168	0.00654	0.02094	0.03114
5.8	0.09861	0.00963	0.02904	0.03984
5.9	0.10667	0.0133	0.03749	0.04674
6.0	0.10555	0.01747	0.04561	0.05144
6.1	0.09669	0.02194	0.05266	0.05389
6.2	0.08357	0.02662	0.05832	0.05474
6.3	0.06935	0.03147	0.06248	0.0547
6.4	0.0558	0.03639	0.06508	0.05413
6.5	0.04395	0.04129	0.06616	0.05327
6.6	0.03422	0.04608	0.06581	0.05223
6.7	0.02655	0.05057	0.06414	0.05099
6.8	0.02052	0.05454	0.06119	0.04941
6.9	0.01589	0.05778	0.05717	0.04744
7.0	0.0124	0.06007	0.05229	0.04508
7.1	0.00974	0.06123	0.04677	0.04228
7.2	0.00769	0.06112	0.04087	0.03907
7.3	0.0061	0.05971	0.03487	0.03552
7.4	0.00485	0.05705	0.02903	0.03174
7.5	0.00387	0.05328	0.02356	0.02787
7.6	0.0031	0.04863	0.01864	0.02403
7.7	0.00249	0.04337	0.01438	0.02034
7.8	0.002	0.03777	0.0108	0.01689
7.9	0.00161	0.03212	0.00791	0.01376
8.0	0.0013	0.02668	0.00564	0.01099
8.1	0.00105	0.02163	0.00391	0.00861
8.2	0.00086	0.01713	0.00266	0.00663

Table A-20
Mmax Posterior Distributions for MidC-C Seismotectonic Source Zone

Mmax	Posterior Distributions			
	Kijko Approach (Weight 0.24)	Bayesian Composite Prior (Weight 0.304)	Bayesian NMESE Prior (Weight 0.456)	Weighted Average
5.5	0.04345	0.00226	0.00814	0.01483
5.6	0.05926	0.00386	0.01316	0.0214
5.7	0.08081	0.00623	0.02016	0.03048
5.8	0.09793	0.0093	0.0283	0.03924
5.9	0.10589	0.01297	0.03681	0.04614
6.0	0.10506	0.01717	0.04511	0.051
6.1	0.09678	0.02172	0.05244	0.05374
6.2	0.08397	0.02649	0.05836	0.05482
6.3	0.0696	0.03138	0.06262	0.0548
6.4	0.05586	0.03633	0.06526	0.05421
6.5	0.04403	0.04127	0.0664	0.05339
6.6	0.03441	0.04611	0.06613	0.05243
6.7	0.02679	0.05066	0.06452	0.05125
6.8	0.02078	0.05466	0.06158	0.04969
6.9	0.01616	0.05793	0.05755	0.04773
7.0	0.01266	0.06025	0.05266	0.04537
7.1	0.00999	0.06142	0.04711	0.04255
7.2	0.00792	0.06132	0.04117	0.03932
7.3	0.00631	0.0599	0.03513	0.03574
7.4	0.00505	0.05723	0.02924	0.03195
7.5	0.00405	0.05346	0.02374	0.02805
7.6	0.00326	0.04879	0.01878	0.02418
7.7	0.00263	0.04351	0.01448	0.02046
7.8	0.00213	0.03789	0.01088	0.01699
7.9	0.00172	0.03223	0.00797	0.01384
8.0	0.0014	0.02677	0.00568	0.01106
8.1	0.00114	0.0217	0.00394	0.00867
8.2	0.00094	0.01719	0.00268	0.00667

Table A-21
Mmax Posterior Distributions for MidC-D Seismotectonic Source Zone

Mmax	Posterior Distributions			
	Kijko Approach (Weight 0.24)	Bayesian Composite Prior (Weight 0.304)	Bayesian NMESE Prior (Weight 0.456)	Weighted Average
5.5	0.04345	0.00226	0.00814	0.01483
5.6	0.05926	0.00386	0.01316	0.0214
5.7	0.08081	0.00624	0.02016	0.03048
5.8	0.09793	0.00931	0.02831	0.03924
5.9	0.10589	0.01297	0.03681	0.04615
6.0	0.10506	0.01717	0.04511	0.051
6.1	0.09678	0.02172	0.05245	0.05375
6.2	0.08397	0.0265	0.05836	0.05482
6.3	0.0696	0.03138	0.06262	0.0548
6.4	0.05586	0.03633	0.06526	0.05421
6.5	0.04403	0.04127	0.06639	0.05339
6.6	0.03441	0.04611	0.06613	0.05243
6.7	0.02679	0.05066	0.06451	0.05125
6.8	0.02078	0.05466	0.06158	0.04968
6.9	0.01616	0.05793	0.05755	0.04773
7.0	0.01266	0.06024	0.05265	0.04536
7.1	0.00999	0.06142	0.04711	0.04255
7.2	0.00792	0.06131	0.04117	0.03932
7.3	0.00631	0.0599	0.03513	0.03574
7.4	0.00505	0.05723	0.02924	0.03194
7.5	0.00405	0.05346	0.02373	0.02805
7.6	0.00326	0.04879	0.01878	0.02418
7.7	0.00263	0.04351	0.01448	0.02046
7.8	0.00213	0.03789	0.01088	0.01699
7.9	0.00172	0.03223	0.00797	0.01384
8.0	0.0014	0.02676	0.00568	0.01106
8.1	0.00114	0.0217	0.00394	0.00867
8.2	0.00094	0.01719	0.00268	0.00667

Table A-22
Mmax Posterior Distributions for NAP Seismotectonic Source Zone

Mmax	Posterior Distributions			
	Kijko Approach (Weight 0)	Bayesian Composite Prior (Weight 0.4)	Bayesian MESE Prior (Weight 0.6)	Weighted Average
5.5	0.02338	0.00022	0.00033	0.00029
5.6	0.03777	0.00065	0.00088	0.00079
5.7	0.04986	0.00142	0.00179	0.00164
5.8	0.06212	0.00275	0.00325	0.00305
5.9	0.07337	0.00487	0.00541	0.00519
6.0	0.0825	0.00801	0.00843	0.00826
6.1	0.08802	0.01232	0.01236	0.01234
6.2	0.08872	0.01775	0.01709	0.01735
6.3	0.08438	0.02406	0.02235	0.02304
6.4	0.07608	0.0309	0.02788	0.02909
6.5	0.06558	0.03789	0.03343	0.03521
6.6	0.05453	0.04468	0.03879	0.04114
6.7	0.04425	0.05101	0.04386	0.04672
6.8	0.03539	0.05662	0.04855	0.05178
6.9	0.02812	0.06128	0.05274	0.05615
7.0	0.02232	0.06474	0.0563	0.05967
7.1	0.01775	0.0668	0.05908	0.06217
7.2	0.01417	0.06732	0.06097	0.06351
7.3	0.01134	0.06626	0.06185	0.06361
7.4	0.0091	0.06367	0.06167	0.06247
7.5	0.00732	0.05974	0.06044	0.06016
7.6	0.0059	0.05473	0.05821	0.05682
7.7	0.00477	0.04894	0.05509	0.05263
7.8	0.00386	0.04272	0.05123	0.04782
7.9	0.00313	0.03639	0.04681	0.04264
8.0	0.00254	0.03026	0.04202	0.03732
8.1	0.00206	0.02456	0.03706	0.03206
8.2	0.00169	0.01946	0.03213	0.02706

Table A-23
Mmax Posterior Distributions for OKA Seismotectonic Source Zone

Mmax	Posterior Distributions			
	Kijko Approach (Weight 0)	Bayesian Composite Prior (Weight 0.4)	Bayesian NMESE Prior (Weight 0.6)	Weighted Average
5.5	0.17061	0.0013	0.00646	0.00439
5.6	0.13274	0.00213	0.0096	0.00661
5.7	0.11757	0.0035	0.01437	0.01002
5.8	0.10369	0.00543	0.02025	0.01432
5.9	0.0899	0.00799	0.02703	0.01941
6.0	0.07623	0.01123	0.03436	0.02511
6.1	0.06311	0.01516	0.04183	0.03116
6.2	0.05118	0.01976	0.049	0.0373
6.3	0.04095	0.02498	0.05553	0.04331
6.4	0.03248	0.03072	0.06103	0.04891
6.5	0.02566	0.03683	0.06518	0.05384
6.6	0.0202	0.04305	0.0677	0.05784
6.7	0.0159	0.0491	0.06844	0.0607
6.8	0.01256	0.05467	0.06737	0.06229
6.9	0.00995	0.05942	0.06458	0.06252
7.0	0.0079	0.06304	0.06028	0.06138
7.1	0.00629	0.06527	0.05478	0.05898
7.2	0.00502	0.06597	0.04847	0.05547
7.3	0.00401	0.06507	0.04175	0.05108
7.4	0.00321	0.06265	0.03502	0.04607
7.5	0.00257	0.05886	0.0286	0.0407
7.6	0.00206	0.05398	0.02273	0.03523
7.7	0.00166	0.04831	0.0176	0.02988
7.8	0.00134	0.04219	0.01326	0.02483
7.9	0.00108	0.03597	0.00973	0.02022
8.0	0.00087	0.02992	0.00695	0.01614
8.1	0.0007	0.02429	0.00483	0.01262
8.2	0.00056	0.01925	0.00326	0.00966

Table A-24
Mmax Posterior Distributions for PEZ-N Seismotectonic Source Zone

Mmax	Posterior Distributions				
	Kijko Approach (Weight 0)	Bayesian Composite Prior (Weight 0.4)	Bayesian MESE Prior (Weight 0.12)	Bayesian NMESE Prior (Weight 0.48)	Weighted Average
5.5	0.00727	0.00012	0.00018	0.00055	0.00033
5.6	0.01704	0.00041	0.00056	0.00175	0.00107
5.7	0.0339	0.00115	0.00146	0.0045	0.00279
5.8	0.05467	0.00262	0.00309	0.0094	0.00593
5.9	0.07467	0.00506	0.00563	0.01669	0.01071
6.0	0.08939	0.0086	0.00907	0.02601	0.01702
6.1	0.09659	0.01323	0.01329	0.03655	0.02443
6.2	0.0964	0.0188	0.01812	0.04728	0.03239
6.3	0.09017	0.02504	0.02329	0.05707	0.0402
6.4	0.08022	0.03167	0.0286	0.06511	0.04735
6.5	0.06864	0.03838	0.03389	0.07084	0.05342
6.6	0.05719	0.04496	0.03906	0.07414	0.05826
6.7	0.04683	0.05113	0.044	0.07502	0.06174
6.8	0.03793	0.05664	0.0486	0.07364	0.06383
6.9	0.03044	0.06116	0.05268	0.07019	0.06448
7.0	0.02434	0.06448	0.05612	0.0651	0.06378
7.1	0.01953	0.06645	0.05883	0.05888	0.0619
7.2	0.01572	0.06691	0.06065	0.0519	0.05895
7.3	0.01268	0.0658	0.06148	0.04458	0.0551
7.4	0.01026	0.06321	0.06128	0.03731	0.05054
7.5	0.00831	0.05928	0.06003	0.03041	0.04551
7.6	0.00675	0.05429	0.05779	0.02414	0.04024
7.7	0.00549	0.04853	0.05468	0.01867	0.03493
7.8	0.00448	0.04236	0.05084	0.01405	0.02979
7.9	0.00365	0.03608	0.04645	0.0103	0.02495
8.0	0.00299	0.03	0.04169	0.00735	0.02053
8.1	0.00245	0.02435	0.03677	0.00511	0.01661
8.2	0.002	0.01929	0.03187	0.00346	0.0132

Table A-25
Mmax Posterior Distributions for PEZ-W Seismotectonic Source Zone

Mmax	Posterior Distributions				
	Kijko Approach (Weight 0.01)	Bayesian Composite Prior (Weight 0.396)	Bayesian MESE Prior (Weight 0.119)	Bayesian NMESE Prior (Weight 0.475)	Weighted Average
5.5	0.01216	0.00014	0.00021	0.00064	0.00051
5.6	0.02342	0.00046	0.00063	0.00193	0.00141
5.7	0.0426	0.00125	0.00157	0.00481	0.00339
5.8	0.06467	0.00278	0.00328	0.00989	0.00684
5.9	0.08411	0.0053	0.0059	0.01735	0.01188
6.0	0.09655	0.00891	0.00939	0.02676	0.01832
6.1	0.10059	0.01357	0.01364	0.03727	0.02571
6.2	0.09722	0.01914	0.01844	0.04785	0.03347
6.3	0.08848	0.02534	0.02357	0.05745	0.04102
6.4	0.07679	0.03192	0.02884	0.06529	0.04785
6.5	0.06428	0.03859	0.03408	0.07087	0.05364
6.6	0.05239	0.04509	0.03918	0.074	0.05819
6.7	0.042	0.05119	0.04406	0.07475	0.06144
6.8	0.0333	0.05661	0.04859	0.07326	0.06333
6.9	0.02616	0.06106	0.0526	0.06972	0.06382
7.0	0.02051	0.06433	0.056	0.06463	0.06304
7.1	0.01617	0.06626	0.05866	0.05842	0.06113
7.2	0.01281	0.06668	0.06046	0.05147	0.05818
7.3	0.01018	0.06556	0.06127	0.0442	0.05435
7.4	0.00812	0.06296	0.06105	0.03698	0.04984
7.5	0.0065	0.05904	0.05979	0.03014	0.04488
7.6	0.00521	0.05406	0.05756	0.02392	0.03967
7.7	0.00419	0.04833	0.05446	0.01849	0.03444
7.8	0.00338	0.04217	0.05063	0.01392	0.02937
7.9	0.00273	0.03592	0.04625	0.01021	0.02461
8.0	0.00221	0.02987	0.04152	0.00729	0.02025
8.1	0.00179	0.02424	0.03662	0.00506	0.01638
8.2	0.00146	0.01921	0.03174	0.00344	0.01303

Table A-26
Mmax Posterior Distributions for RR Seismotectonic Source Zone

Mmax	Posterior Distributions			
	Kijko Approach (Weight 0)	Bayesian Composite Prior (Weight 0.4)	Bayesian MESE Prior (Weight 0.6)	Weighted Average
5.5	0	0	0	0
5.6	0	0	0	0
5.7	0.00083	0.00005	0.00006	0.00006
5.8	0.00598	0.00042	0.00049	0.00046
5.9	0.02422	0.00207	0.00231	0.00222
6.0	0.06036	0.00648	0.00685	0.0067
6.1	0.10237	0.01409	0.01424	0.01418
6.2	0.12751	0.02316	0.02247	0.02275
6.3	0.127	0.03146	0.02947	0.03027
6.4	0.11002	0.0382	0.03476	0.03614
6.5	0.08901	0.04386	0.03901	0.04095
6.6	0.07057	0.04904	0.04292	0.04536
6.7	0.05592	0.05384	0.04668	0.04954
6.8	0.04455	0.05811	0.05024	0.05339
6.9	0.03571	0.06161	0.05347	0.05673
7.0	0.02879	0.06408	0.0562	0.05935
7.1	0.02331	0.06532	0.05826	0.06109
7.2	0.01895	0.06519	0.05954	0.0618
7.3	0.01547	0.06366	0.05993	0.06142
7.4	0.01266	0.06079	0.05938	0.05995
7.5	0.01039	0.05676	0.0579	0.05744
7.6	0.00855	0.05178	0.05554	0.05404
7.7	0.00706	0.04615	0.05239	0.0499
7.8	0.00583	0.04018	0.0486	0.04523
7.9	0.00483	0.03416	0.04431	0.04025
8.0	0.00401	0.02836	0.03971	0.03517
8.1	0.00333	0.02299	0.03498	0.03018
8.2	0.00278	0.01819	0.03028	0.02545

Table A-27
Mmax Posterior Distributions for RR-RCG Seismotectonic Source Zone

Mmax	Posterior Distributions			
	Kijko Approach (Weight 0.07)	Bayesian Composite Prior (Weight 0.372)	Bayesian MESE Prior (Weight 0.558)	Weighted Average
5.5	0	0	0	0
5.6	0	0	0	0
5.7	0.00098	0.00005	0.00006	0.00012
5.8	0.00693	0.00042	0.00049	0.00091
5.9	0.02741	0.00207	0.00231	0.00398
6.0	0.06654	0.00647	0.00684	0.01088
6.1	0.1099	0.01407	0.01421	0.02086
6.2	0.13333	0.02313	0.02244	0.03046
6.3	0.12943	0.03144	0.02945	0.03718
6.4	0.10941	0.03818	0.03474	0.04125
6.5	0.08658	0.04385	0.039	0.04413
6.6	0.0674	0.04902	0.0429	0.04689
6.7	0.05265	0.05383	0.04667	0.04975
6.8	0.04149	0.05811	0.05024	0.05255
6.9	0.03302	0.06162	0.05347	0.05507
7.0	0.02649	0.06409	0.0562	0.05706
7.1	0.0214	0.06533	0.05827	0.05832
7.2	0.01739	0.0652	0.05955	0.0587
7.3	0.01421	0.06367	0.05994	0.05813
7.4	0.01166	0.06081	0.0594	0.05658
7.5	0.0096	0.05677	0.05792	0.05411
7.6	0.00793	0.05179	0.05556	0.05082
7.7	0.00658	0.04617	0.05241	0.04688
7.8	0.00547	0.04019	0.04861	0.04246
7.9	0.00456	0.03417	0.04432	0.03776
8.0	0.0038	0.02837	0.03972	0.03299
8.1	0.00318	0.023	0.03499	0.0283
8.2	0.00267	0.0182	0.03029	0.02386

Table A-28
Mmax Posterior Distributions for SLR Seismotectonic Source Zone

Mmax	Posterior Distributions			
	Kijko Approach (Weight 0.02)	Bayesian Composite Prior (Weight 0.392)	Bayesian MESE Prior (Weight 0.588)	Weighted Average
5.5	0	0	0	0
5.6	0	0	0	0
5.7	0	0	0	0
5.8	0	0	0	0
5.9	0.00045	0.00005	0.00006	0.00006
6.0	0.00295	0.00038	0.00041	0.00045
6.1	0.01012	0.00158	0.00161	0.00176
6.2	0.02523	0.00474	0.00464	0.00509
6.3	0.04697	0.01078	0.01019	0.01116
6.4	0.06977	0.01979	0.01816	0.01983
6.5	0.08768	0.03093	0.02771	0.03017
6.6	0.0969	0.04267	0.03755	0.04075
6.7	0.09739	0.0536	0.0466	0.05036
6.8	0.09138	0.0627	0.0542	0.05827
6.9	0.08159	0.06941	0.06008	0.06417
7.0	0.07055	0.07369	0.06431	0.06811
7.1	0.05983	0.07567	0.06704	0.07028
7.2	0.05011	0.07548	0.06837	0.07079
7.3	0.04173	0.07342	0.06847	0.06988
7.4	0.03472	0.06977	0.06743	0.06769
7.5	0.02889	0.06477	0.06534	0.06439
7.6	0.02397	0.05869	0.06223	0.06008
7.7	0.01988	0.05195	0.05829	0.05504
7.8	0.01656	0.04496	0.05376	0.04956
7.9	0.01383	0.03804	0.04878	0.04387
8.0	0.01159	0.03146	0.04355	0.03817
8.1	0.00973	0.02541	0.03823	0.03264
8.2	0.00819	0.02005	0.033	0.02743

Table A-29
Miller and Rice (1983) 5-point Discrete Representation of Arbitrary Continuous Distribution

Percentile of Continuous Distribution	Assigned Weight
0.035	0.101
0.212	0.244
0.500	0.310
0.788	0.244
0.965	0.101

Table A-30
Cumulative Distributions for the Weighted Combination Posteriors for the Mmax Source Zones

Mmax	Cumulative Weighted Posterior Distributions for Mmax Zone				
	Study Region	MESE-N	NMESE-N	MESE-W	NMESE-W
5.5	0	0	0	0	0.00864
5.6	0	0	0	0	0.02377
5.7	0	0	0	0	0.04844
5.8	0	0	0	0	0.08358
5.9	0	0	0	0	0.12792
6.0	0.00002	0.0001	0.00005	0.00002	0.17894
6.1	0.00025	0.00107	0.00055	0.00025	0.23389
6.2	0.00151	0.00551	0.00316	0.00148	0.29054
6.3	0.0061	0.01768	0.01211	0.00587	0.34747
6.4	0.0179	0.04112	0.03381	0.01698	0.40387
6.5	0.04141	0.07693	0.07382	0.03881	0.45933
6.6	0.07878	0.12403	0.13304	0.07317	0.51364
6.7	0.12911	0.18012	0.20736	0.11914	0.5666
6.8	0.1899	0.24269	0.29057	0.17452	0.61786
6.9	0.25833	0.30941	0.37707	0.23695	0.66702
7.0	0.33189	0.3784	0.46277	0.30441	0.71368
7.1	0.40834	0.44814	0.54485	0.37519	0.7574
7.2	0.4856	0.51731	0.62138	0.44768	0.79776
7.3	0.56173	0.58479	0.69112	0.52036	0.83442
7.4	0.63497	0.6496	0.75336	0.5918	0.86716
7.5	0.70374	0.71087	0.80776	0.66064	0.89588
7.6	0.76677	0.76778	0.85435	0.72568	0.92063
7.7	0.82316	0.81975	0.89345	0.78594	0.94156
7.8	0.8724	0.86644	0.92562	0.84071	0.95893
7.9	0.91436	0.90771	0.95156	0.88955	0.97307
8.0	0.94926	0.94358	0.97206	0.93229	0.98437
8.1	0.97759	0.97423	0.98794	0.96902	0.99322
8.2	1.0	1.0	1.0	1.0	1.0

Table A-31
Discrete Mmax Distributions for the Mmax Source Zones

Miller and Rice CDF Point	Weight	Mmax Value for Zone				
		Study Region	MESE-N	NMESE-N	MESE-W	NMESE-W
0.035	0.101	6.5	6.4	6.4	6.5	5.7
0.212	0.244	6.9	6.8	6.8	6.9	6.1
0.500	0.310	7.2	7.2	7.1	7.3	6.6
0.788	0.244	7.7	7.7	7.5	7.7	7.2
0.965	0.101	8.1	8.1	8	8.1	7.9

Table A-32a
Cumulative Distributions for the Weighted Combination Posteriors for the Seismotectonic Source Zones (1 of 4)

Mmax	Cumulative Weighted Posterior Distributions for Seismotectonic Zone				
	AHEX	ECC-AM	ECC-GC	GHEX	GMH
5.5	0.00277	0.00424	0.00219	0.00169	0.00246
5.6	0.00638	0.00778	0.00527	0.00389	0.0058
5.7	0.01139	0.01157	0.00967	0.00728	0.01057
5.8	0.0182	0.01616	0.01581	0.01292	0.01721
5.9	0.02728	0.02221	0.02415	0.0218	0.02619
6.0	0.03917	0.03056	0.0358	0.03428	0.03805
6.1	0.05442	0.04213	0.05126	0.05044	0.05335
6.2	0.0736	0.05783	0.07067	0.07057	0.07264
6.3	0.09725	0.07846	0.0945	0.09512	0.09645
6.4	0.12582	0.10459	0.12315	0.12452	0.12521
6.5	0.15963	0.13656	0.15739	0.15908	0.15923
6.6	0.19884	0.1745	0.19726	0.19893	0.19863
6.7	0.24338	0.21833	0.24238	0.244	0.24333
6.8	0.29294	0.26779	0.29243	0.29397	0.29302
6.9	0.34696	0.32241	0.34685	0.34829	0.34713
7.0	0.40465	0.38143	0.40484	0.40616	0.40488
7.1	0.46499	0.44386	0.4654	0.46658	0.46525
7.2	0.52683	0.50847	0.52738	0.52841	0.5271
7.3	0.58892	0.57387	0.58955	0.59043	0.58919
7.4	0.65002	0.63857	0.65067	0.6514	0.65027
7.5	0.70894	0.70111	0.70957	0.71016	0.70917
7.6	0.76465	0.76015	0.76523	0.76569	0.76485
7.7	0.8163	0.81459	0.8168	0.81715	0.81647
7.8	0.86327	0.86361	0.86368	0.86393	0.8634
7.9	0.90517	0.9067	0.90548	0.90565	0.90527
8.0	0.94185	0.94368	0.94207	0.94217	0.94192
8.1	0.97338	0.97467	0.9735	0.97355	0.97342
8.2	1.0	1.0	1.0	1.0	1.0

Table A-32b
Cumulative Distributions for the Weighted Combination Posteriors for the Seismotectonic Source Zones (2 of 4)

Mmax	Cumulative Weighted Posterior Distributions for Seismotectonic Zone				
	NAP	RR	RR-RCG	SLR	IBEB
5.5	0.00029	0	0	0	0
5.6	0.00108	0	0	0	0
5.7	0.00272	0.00006	0.00012	0	0
5.8	0.00577	0.00052	0.00103	0	0
5.9	0.01096	0.00274	0.00501	0.00006	0
6.0	0.01922	0.00944	0.01589	0.00051	0.00005
6.1	0.03156	0.02362	0.03675	0.00227	0.00053
6.2	0.04891	0.04637	0.06721	0.00736	0.00301
6.3	0.07195	0.07664	0.10439	0.01852	0.01144
6.4	0.10104	0.11278	0.14564	0.03835	0.0318
6.5	0.13625	0.15373	0.18977	0.06852	0.06927
6.6	0.17739	0.19909	0.23666	0.10927	0.12473
6.7	0.22411	0.24863	0.28641	0.15963	0.19448
6.8	0.27589	0.30202	0.33896	0.2179	0.27294
6.9	0.33204	0.35875	0.39403	0.28207	0.35508
7.0	0.39171	0.4181	0.45109	0.35018	0.43723
7.1	0.45388	0.47919	0.50941	0.42046	0.51685
7.2	0.51739	0.54099	0.56811	0.49125	0.59214
7.3	0.581	0.60241	0.62624	0.56113	0.66189
7.4	0.64347	0.66236	0.68282	0.62882	0.7253
7.5	0.70363	0.7198	0.73693	0.69321	0.78189
7.6	0.76045	0.77384	0.78775	0.75329	0.83148
7.7	0.81308	0.82374	0.83463	0.80833	0.87417
7.8	0.8609	0.86897	0.87709	0.85789	0.91027
7.9	0.90354	0.90922	0.91485	0.90176	0.94028
8.0	0.94086	0.94439	0.94784	0.93993	0.96479
8.1	0.97292	0.97457	0.97614	0.97257	0.98448
8.2	1.0	1.0	1.0	1.0	1.0

Table A-32c
Cumulative Distributions for the Weighted Combination Posteriors for the Seismotectonic Source Zones (3 of 4)

Mmax	Cumulative Weighted Posterior Distributions for Seismotectonic Zone				
	MidC-A	MidC-B	MidC-C	MidC-D	OKA
5.5	0.01527	0.01527	0.01483	0.01483	0.00439
5.6	0.03722	0.03722	0.03623	0.03623	0.011
5.7	0.06836	0.06836	0.06671	0.06671	0.02102
5.8	0.10819	0.1082	0.10595	0.10595	0.03534
5.9	0.15493	0.15494	0.15209	0.1521	0.05475
6.0	0.20637	0.20638	0.20309	0.2031	0.07986
6.1	0.26025	0.26027	0.25683	0.25685	0.11102
6.2	0.31499	0.31501	0.31165	0.31167	0.14832
6.3	0.36969	0.36971	0.36645	0.36647	0.19163
6.4	0.42382	0.42384	0.42066	0.42068	0.24054
6.5	0.47709	0.47711	0.47405	0.47407	0.29438
6.6	0.52932	0.52934	0.52648	0.5265	0.35222
6.7	0.58032	0.58033	0.57773	0.57775	0.41292
6.8	0.62973	0.62974	0.62742	0.62743	0.47521
6.9	0.67718	0.67718	0.67515	0.67516	0.53773
7.0	0.72226	0.72226	0.72052	0.72052	0.59911
7.1	0.76454	0.76454	0.76307	0.76307	0.65809
7.2	0.80361	0.80361	0.80239	0.80239	0.71356
7.3	0.83913	0.83913	0.83813	0.83813	0.76464
7.4	0.87088	0.87087	0.87008	0.87007	0.81071
7.5	0.89875	0.89874	0.89813	0.89812	0.85141
7.6	0.92278	0.92277	0.92231	0.9223	0.88664
7.7	0.94312	0.94311	0.94277	0.94276	0.91652
7.8	0.96001	0.96	0.95976	0.95975	0.94135
7.9	0.97377	0.97376	0.9736	0.97359	0.96157
8.0	0.98476	0.98475	0.98466	0.98465	0.97771
8.1	0.99337	0.99336	0.99333	0.99332	0.99033
8.2	1.0	1.0	1.0	1.0	1.0

Table A-32d
Cumulative Distributions for the Weighted Combination Posteriors for the Seismotectonic Source Zones (4 of 4)

Mmax	Cumulative Weighted Posterior Distributions for Seismotectonic Zone	
	PEZ-N	PEZ-W
5.5	0.00033	0.00051
5.6	0.0014	0.00192
5.7	0.00419	0.00531
5.8	0.01012	0.01215
5.9	0.02083	0.02403
6.0	0.03785	0.04235
6.1	0.06228	0.06806
6.2	0.09467	0.10153
6.3	0.13487	0.14255
6.4	0.18222	0.1904
6.5	0.23564	0.24404
6.6	0.2939	0.30223
6.7	0.35564	0.36367
6.8	0.41947	0.427
6.9	0.48395	0.49082
7.0	0.54773	0.55386
7.1	0.60963	0.61499
7.2	0.66858	0.67317
7.3	0.72368	0.72752
7.4	0.77422	0.77736
7.5	0.81973	0.82224
7.6	0.85997	0.86191
7.7	0.8949	0.89635
7.8	0.92469	0.92572
7.9	0.94964	0.95033
8.0	0.97017	0.97058
8.1	0.98678	0.98696
8.2	1.0	1.0

Table A-33a
Discrete Mmax Distributions for the Seismotectonic Source Zones (1 of 4)

Miller and Rice CDF Point	Weight	Mmax Value for Zone				
		AHEX	ECC-AM	ECC-GC	GHEX	GMH
0.035	0.101	6.0	6.0	6.0	6.0	6.0
0.212	0.244	6.7	6.7	6.7	6.7	6.7
0.500	0.310	7.2	7.2	7.2	7.2	7.2
0.788	0.244	7.7	7.7	7.7	7.7	7.7
0.965	0.101	8.1	8.1	8.1	8.1	8.1

Table A-33b
Discrete Mmax Distributions for the Seismotectonic Source Zones (2 of 4)

Miller and Rice CDF Point	Weight	Mmax Value for Zone				
		NAP	RR	RR-RCG	SLR	IBEB
0.035	0.101	6.1	6.2	6.1	6.4	6.4
0.212	0.244	6.7	6.7	6.6	6.8	6.7
0.500	0.310	7.2	7.2	7.1	7.3	7.1
0.788	0.244	7.7	7.7	7.6	7.7	7.5
0.965	0.101	8.1	8.1	8.1	8.1	8.0

Table A-33c
Discrete Mmax Distributions for the Seismotectonic Source Zones (3 of 4)

Miller and Rice CDF Point	Weight	Mmax Value for Zone				
		MidC-A	MidC-B	MidC-C	MidC-D	OKA
0.035	0.101	5.6	5.6	5.6	5.6	5.8
0.212	0.244	6.1	6.1	6.1	6.1	6.4
0.500	0.310	6.6	6.6	6.6	6.6	6.9
0.788	0.244	7.2	7.2	7.2	7.2	7.4
0.965	0.101	7.9	7.9	7.9	7.9	8.0

Table A-33d
Discrete Mmax Distributions for the Seismotectonic Source Zones (4 of 4)

Miller and Rice CDF Point	Weight	Mmax Value for Zone	
		PEZ-N	PEZ-W
0.035	0.101	6.0	6.0
0.212	0.244	6.5	6.4
0.500	0.310	6.9	6.9
0.788	0.244	7.4	7.4
0.965	0.101	8.0	8.0

Table A-34
Corrections to Mmax Distributions for Seismotectonic Source Zones Published in NUREG-2115

Weight	IBEB		MidC-A, MidC-B, MidC-C, MidC-D		PEZ-N		PEZ-W		SLR	
	Incorrect Mmax Values	Correct Mmax Values	Incorrect Mmax Values	Correct Mmax Values	Incorrect Mmax Values	Correct Mmax Values	Incorrect Mmax Values	Correct Mmax Values	Incorrect Mmax Values	Correct Mmax Values
0.101	6.5	***6.4***	5.6	5.6	5.9	***6.0***	5.9	***6.0***	6.2	***6.4***
0.244	6.9	***6.7***	6.1	6.1	6.4	***6.5***	6.4	6.4	6.8	6.8
0.310	7.4	***7.1***	6.6	6.6	6.8	***6.9***	6.8	***6.9***	7.3	7.3
0.244	7.8	***7.5***	7.2	7.2	7.2	***7.4***	7.2	***7.4***	7.7	7.7
0.101	8.1	***8.0***	8.0	***7.9***	7.9	***8.0***	7.9	***8.0***	8.1	8.1

Appendix B: Effect of Mmax Correction in NUREG-2115 on Recurrence Parameters

B.1 Introduction

Appendix A documents corrections to the probability distributions of maximum magnitude (Mmax) published in NUREG-2115 [1]. This Appendix investigates the effect of these corrections on the NUREG-2115 recurrence parameters for the affected source zones and concludes that these effects are small and can be neglected.

B.2 Background

The Mmax distribution of a source zone has a mild effect on the recurrence parameters calculated in NUREG-2115, as contained in the xyab files. There are 24 xyab files for each source zone, corresponding to three input cases (named A, B, and E) and 8 equally-likely realizations per case (there is an additional mean xyab file for each case, but this file is not used in the hazard calculations).

Owing to the complexity of the recurrence calculations, the effect of changing the Mmax distribution on the recurrence parameters is difficult to quantify without actually repeating the calculations, but it is useful to determine the anticipated effects using a simplified case.

The recurrence calculations divide the source zone into multiple cells, divide the magnitude axis into multiple magnitude bins (with a width of 0.6 **M** units), and work with the predicted and observed earthquake counts in each bin of each cell. The predicted counts in each bin of each cell are parameterized by the rate ν of earthquakes above **M** 2.9 and b value of the cell. Consider, for the sake of explanation, that there is only one Mmax value and we want to investigate the anticipated effect of increasing its value by a moderate amount, so that both the original and increased Mmax fall on the same magnitude bin. Consider also one cell, although the same effect will take place at all cells in the source zone. The likelihood function indicates which values of ν and b provide the best overall balance between observed and predicted counts in all bins. For given ν and b, the effect of increasing Mmax is to increase the predicted count in the bin containing Mmax. Because the previous values of ν and b led to a balance between the predicted and observed counts, the algorithm tends to restore that balance by changing ν and b so that the predicted count in the bin is reduced. This is done mainly by increasing b, which in turn causes a decrease in ν_5 (the rate of earthquakes above **M** 5, which is the rate used as input to the hazard calculations). This change is generally small because the predicted counts in other bins are unchanged and the lower bins have a larger effect on the likelihood because they contain greater counts. In summary, increasing Mmax has a small tendency to decrease ν_5 and increase b.

In practice, the recurrence calculations are more complicated because they must capture the epistemic uncertainty in ν and b in each cell, as well as the cell-to-cell spatial correlation of ν and b, in order to capture the resulting uncertainty in hazard. The Markov-Chain Montecarlo algorithm used to generate the eight realizations is stochastic in nature and it is sensitive to hardware and compiler differences. Thus, small differences (of the order of a few percent) in the average ν_5 and b values from the xyab files sometimes occur, even when the same inputs are used and the algorithm has converged to a proper solution. This inherent variability makes it difficult to isolate the effect of changing the Mmax distribution (which is anticipated to be small) from these other stochastic effects.

B.3 Recurrence Calculations and Results

Recurrence calculations were performed for all source zones with corrected Mmax values, using the same catalog, starting values, and Markov-chain inputs as in NUREG-2115. In a few cases, it became necessary to alter the Markov-chain inputs in order to attain proper convergence. Table B-1 summarizes the comparison of differences between the xyab files in NUREG-2115 and the xyab files calculated with the revised Mmax distributions (Table A-34). Comparisons are made in terms of the relative change in the total ν_5 and average b for all cells in the source zone. The table also includes, for the sake of reference, the epistemic uncertainty in the total ν_5 and average b, as calculated from the eight xyab files in NUREG-2115. For all sources, the size of the changes in ν_5 are commensurate with the changes in Mmax, generally in the anticipated direction, and small relative to the epistemic uncertainty contained in the eight realizations of the xyab files. As indicated earlier, it is difficult to isolate the effect of Mmax from effects due to the stochastic nature of the Markov-Chain Montecarlo algorithm. Changes in the b values are also generally small relative to the epistemic uncertainty contained in the eight realizations of the xyab files, but show less of a trend. In all cases, these changes in recurrence parameters are small enough that they can be neglected. In the cases of the PEZ-N and PEZ-W, which were the source zones with the largest increase in the Mmax distribution, a slight conservatism is introduced by neglecting these changes in recurrence.

Table B-1
Comparison of Zone-Wide Recurrence Parameters Calculated Before and After Correction of the Mmax Distributions

Source Zone	Case	Total Rate (M>5)		Average b value	
		Relative Change	Coefficient of Variation (8 realizations)	Change	Standard Deviation (8 realizations)
IBEB	A	0.0%	21%	0.002	0.03
	B	-0.1%	17%	0.000	0.03
	E	-0.8%	20%	-0.007	0.04
MIDC_A	A	-0.5%	4%	0.000	0.01
	B	-0.1%	6%	0.000	0.02
	E	-1.0%	9%	-0.009	0.02
MIDC_B	A	-0.1%	5%	-0.001	0.01
	B	0.0%	5%	0.000	0.02
	E	-0.1%	5%	-0.001	0.01
MIDC_C	A	-1.3%	5%	-0.006	0.03
	B	0.0%	7%	-0.001	0.02
	E	-1.1%	9%	-0.010	0.03
MIDC_D	A	3.4%	6%	-0.005	0.03
	B	-2.8%	6%	0.007	0.03
	E	-0.2%	9%	0.005	0.01
PEZ_N	A	-5.3%	10%	0.000	0.01
	B	-0.8%	14%	0.002	0.02
	E	-5.0%	25%	-0.030	0.06
PEZ_W	A	-4.6%	11%	-0.003	0.02
	B	-0.5%	7%	-0.006	0.04
	E	1.6%	8%	-0.019	0.02
SLR	A	2.5%	21%	-0.038	0.08
	B	-1.4%	19%	0.073	0.10
	E	-2.2%	25%	-0.010	0.16

Appendix C: Sensitivity to Corrected Mmax Distribution Values and CEUS-XYAB Recurrence Files

C.1 Introduction

A Probabilistic Seismic Hazard Analysis (PSHA) sensitivity study is performed at two sites, Site A and Site B, with updated maximum magnitude (Mmax) distribution values from Appendix A and updated recurrence parameters (that is, XYAB files) from Appendix B. The purpose of this sensitivity study is to evaluate the updates made to the 2012 central and eastern United States (CEUS) seismic source characterizations (SSC) at sites A and B against their original PSHA results which were developed using the 2012 CEUS SSC [1] and the 2013 EPRI ground motion models (GMMs) in EPRI 3002000717 [4]. This sensitivity will address potential differences in seismic hazard and spectra for both sites.

Site A is in the southeastern U.S. and was chosen to represent sites in that region with significant hazard from the eastern Tennessee region. Site B is in the middle Atlantic region, close to sources PEZ-N and PEZ-W, and was chosen to represent sites in that region that might be affected by changes in Mmax and seismicity in relevant background sources.

C.2 Assumptions and Inputs

It is assumed that the specific background and repeated large-magnitude earthquake (RLME) sources included in this calculation and the manner in which they are modeled are adequate to characterize the hazard at Sites A and B.

The inputs to this sensitivity, including the background and RLME sources and how each source was modeled, are identical to their original hazard with the exception of background sources IBEB, MidContinent A, B, C, D; PEZ-N; PEZ-W; and SLR which have updated Mmax distribution values (Appendix A) and updated recurrence parameters (that is, XYAB files).

Seismic sources:	2012 CEUS-SSC [1], with Mmax distribution values updated as described in Appendix A)
Seismicity catalog:	2012 CEUS-SSC [1]
Ground motion models:	2013 EPRI GMMs [4]

C.3 Calculations

The Lettis Consultants International seismic hazard software "THAZ" was used to calculate seismic hazard for Sites A and B.

The steps used in performing seismic hazard calculations for this PSHA sensitivity are the same as the steps performed for the original hazard. The only differences between these calculations are the corrected Mmax distribution values and associated XYAB files for the background sources listed above.

The ground motion response spectrum (GMRS) is developed using uniform hazard response spectra (UHRS) at mean annual frequencies of exceedance (MAFEs) of 10^{-4} and 10^{-5} according to the approach in Regulatory Guide 1.208 [5].

C.4 Sensitivity Results

Site A original and updated UHRS values at MAFEs of 10^{-4} and 10^{-5}, and GMRS are reported in Tables C-1 and C-2, respectively. Site B original and updated UHRS values at MAFEs of 10^{-4} and 10^{-5}, and GMRS are reported in Tables C-4 and C-5, respectively. Percent differences between Site A and Site B original and updated for UHRS at MAFEs of 10^{-4}, 10^{-5}, and GMRS are provided in Tables C-3 and C-6. Note that these percent differences were calculated using 4 significant figures for UHRS and GMRS, whereas Tables C-1, C-2, C-4, and C-5 show results with 3 significant figures. Plots of UHRS and GMRS for Sites A and B are shown in Figures C-1 and C-2, respectively.

C.5 Conclusions

Table C-3 shows that the Site A updated results are not significantly different from the Site A original results; the percent change is less than 1.2% for UHRS at MAFEs of 10^{-4}, 10^{-5}, and less than 1% for GMRS. Table C-6 shows that the Site B updated results are not significantly different from the Site B original results; the percent change is less than 0.8% for UHRS at MAFEs of 10^{-4}, 10^{-5}, and less than 0.8% for GMRS.

The maximum difference in GMRS at either site is 1%, which is the level of precision associated with the standard reporting of GMRS to 3 significant figures.

Table C-1
Site A Original Mean Soil UHRS at MAFEs of 10^{-4} and 10^{-5}, and GMRS

Ground Motion Freq. (Hz)	Original 10-4 UHRS (g)	Original 10-5 UHRS (g)	Original GMRS
100	2.62E-01	7.60E-01	3.68E-01
90	2.63E-01	7.66E-01	3.71E-01
80	2.66E-01	7.79E-01	3.77E-01
70	2.73E-01	8.06E-01	3.89E-01
60	2.93E-01	8.73E-01	4.21E-01
50	3.42E-01	1.03E+00	4.95E-01
40	4.07E-01	1.23E+00	5.93E-01
35	4.39E-01	1.33E+00	6.40E-01
30	4.66E-01	1.42E+00	6.80E-01
25	4.95E-01	1.51E+00	7.23E-01
20	5.26E-01	1.58E+00	7.59E-01
15	5.39E-01	1.58E+00	7.66E-01
12.5	5.37E-01	1.56E+00	7.58E-01
10	5.19E-01	1.50E+00	7.26E-01
9	4.95E-01	1.42E+00	6.90E-01
8	4.71E-01	1.35E+00	6.55E-01
7	4.40E-01	1.26E+00	6.12E-01
6	4.04E-01	1.15E+00	5.60E-01
5	3.56E-01	1.01E+00	4.93E-01
4	2.88E-01	8.09E-01	3.95E-01
3.5	2.54E-01	7.08E-01	3.46E-01
3	2.21E-01	6.11E-01	2.99E-01
2.5	1.86E-01	5.10E-01	2.50E-01
2	1.74E-01	4.61E-01	2.28E-01
1.5	1.54E-01	3.91E-01	1.95E-01
1.25	1.34E-01	3.30E-01	1.65E-01
1	1.05E-01	2.49E-01	1.26E-01
0.9	9.54E-02	2.24E-01	1.13E-01
0.8	8.73E-02	2.04E-01	1.03E-01
0.7	8.08E-02	1.87E-01	9.51E-02
0.6	7.45E-02	1.71E-01	8.71E-02
0.5	6.61E-02	1.51E-01	7.67E-02
0.4	5.29E-02	1.21E-01	6.13E-02

Table C-1 (continued)
Site A Original Mean Soil UHRS at MAFEs of 10^{-4} and 10^{-5}, and GMRS

Ground Motion Freq. (Hz)	Original 10-4 UHRS (g)	Original 10-5 UHRS (g)	Original GMRS
0.35	4.63E-02	1.05E-01	5.37E-02
0.3	3.97E-02	9.04E-02	4.60E-02
0.25	3.31E-02	7.54E-02	3.83E-02
0.2	2.64E-02	6.03E-02	3.07E-02
0.15	1.98E-02	4.52E-02	2.30E-02
0.125	1.65E-02	3.77E-02	1.92E-02
0.1	1.32E-02	3.01E-02	1.53E-02

Table C-2
Site A Updated Mean Soil UHRS at MAFEs of 10^{-4} and 10^{-5}, and GMRS

Ground Motion Freq. (Hz)	Updated 10-4 UHRS (g)	Updated 10-5 UHRS (g)	Updated GMRS
100	2.61E-01	7.61E-01	3.69E-01
90	2.62E-01	7.68E-01	3.72E-01
80	2.65E-01	7.80E-01	3.77E-01
70	2.72E-01	8.07E-01	3.90E-01
60	2.92E-01	8.74E-01	4.21E-01
50	3.41E-01	1.03E+00	4.95E-01
40	4.06E-01	1.23E+00	5.93E-01
35	4.37E-01	1.33E+00	6.40E-01
30	4.64E-01	1.42E+00	6.80E-01
25	4.93E-01	1.51E+00	7.23E-01
20	5.24E-01	1.58E+00	7.59E-01
15	5.37E-01	1.59E+00	7.67E-01
12.5	5.36E-01	1.57E+00	7.59E-01
10	5.18E-01	1.50E+00	7.27E-01
9	4.94E-01	1.42E+00	6.91E-01
8	4.70E-01	1.35E+00	6.56E-01
7	4.40E-01	1.26E+00	6.13E-01
6	4.03E-01	1.15E+00	5.61E-01
5	3.56E-01	1.02E+00	4.95E-01
4	2.88E-01	8.13E-01	3.97E-01

Table C-2 (continued)
Site A Updated Mean Soil UHRS at MAFEs of 10^{-4} and 10^{-5}, and GMRS

Ground Motion Freq. (Hz)	Updated 10-4 UHRS (g)	Updated 10-5 UHRS (g)	Updated GMRS
3.5	2.54E-01	7.12E-01	3.48E-01
3	2.21E-01	6.15E-01	3.01E-01
2.5	1.87E-01	5.14E-01	2.52E-01
2	1.75E-01	4.65E-01	2.29E-01
1.5	1.55E-01	3.95E-01	1.96E-01
1.25	1.35E-01	3.33E-01	1.67E-01
1	1.06E-01	2.52E-01	1.27E-01
0.9	9.56E-02	2.27E-01	1.14E-01
0.8	8.75E-02	2.06E-01	1.04E-01
0.7	8.11E-02	1.89E-01	9.59E-02
0.6	7.48E-02	1.73E-01	8.78E-02
0.5	6.63E-02	1.52E-01	7.73E-02
0.4	5.31E-02	1.22E-01	6.18E-02
0.35	4.64E-02	1.06E-01	5.41E-02
0.3	3.98E-02	9.13E-02	4.64E-02
0.25	3.32E-02	7.61E-02	3.87E-02
0.2	2.65E-02	6.08E-02	3.09E-02
0.15	1.99E-02	4.56E-02	2.32E-02
0.125	1.66E-02	3.80E-02	1.93E-02
0.1	1.33E-02	3.04E-02	1.55E-02

Table C-3
Percent Differences Between Site A Updated and Original Mean Soil UHRS and GMRS

Ground Motion Freq. (Hz)	10-4 UHRS (g)[1]	10-5 UHRS (g)[1]	GMRS[1]
100	-0.31%	0.16%	0.07%
90	-0.31%	0.15%	0.06%
80	-0.31%	0.14%	0.05%
70	-0.32%	0.13%	0.04%
60	-0.33%	0.12%	0.03%
50	-0.33%	0.11%	0.02%
40	-0.34%	0.10%	0.01%
35	-0.35%	0.09%	0.00%
30	-0.36%	0.08%	-0.01%
25	-0.36%	0.07%	-0.02%
20	-0.34%	0.10%	0.01%
15	-0.30%	0.14%	0.05%
12.5	-0.28%	0.17%	0.08%
10	-0.25%	0.20%	0.11%
9	-0.22%	0.23%	0.14%
8	-0.18%	0.26%	0.17%
7	-0.14%	0.30%	0.21%
6	-0.09%	0.34%	0.26%
5	-0.03%	0.39%	0.31%
4	0.05%	0.53%	0.44%
3.5	0.10%	0.62%	0.51%
3	0.15%	0.71%	0.60%
2.5	0.21%	0.82%	0.70%
2	0.23%	0.91%	0.77%
1.5	0.25%	1.0%	0.86%
1.25	0.27%	1.1%	0.92%
1	0.28%	1.2%	0.99%
0.9	0.29%	1.1%	0.96%
0.8	0.30%	1.1%	0.93%
0.7	0.30%	1.0%	0.90%

[1] Note that these percent differences were calculated using 4 significant figures for UHRS and GMRS, whereas Tables C-1, C-2, C-4, and C-5 show results with 3 significant figures.

Table C-3 (continued)
Percent Differences Between Site A Updated and Original Mean Soil UHRS and GMRS

Ground Motion Freq. (Hz)	10-4 UHRS (g)[1]	10-5 UHRS (g)[1]	GMRS[1]
0.6	0.31%	0.99%	0.85%
0.5	0.32%	0.93%	0.81%
0.4	0.32%	0.93%	0.81%
0.35	0.32%	0.93%	0.81%
0.3	0.32%	0.93%	0.81%
0.25	0.32%	0.93%	0.81%
0.2	0.32%	0.93%	0.81%
0.15	0.32%	0.93%	0.81%
0.125	0.32%	0.93%	0.81%
0.1	0.32%	0.93%	0.81%

[1] Note that these percent differences were calculated using 4 significant figures for UHRS and GMRS, whereas Tables C-1, C-2, C-4, and C-5 show results with 3 significant figures.

Table C-4
Site B Original Mean Soil UHRS at MAFEs of 10^{-4} and 10^{-5}, and GMRS

Ground Motion Freq. (Hz)	Original 10-4 UHRS (g)	Original 10-5 UHRS (g)	Original GMRS
100	1.41E-01	4.85E-01	2.27E-01
90	1.41E-01	4.87E-01	2.28E-01
80	1.41E-01	4.92E-01	2.30E-01
70	1.42E-01	5.02E-01	2.34E-01
60	1.48E-01	5.30E-01	2.46E-01
50	1.64E-01	6.02E-01	2.79E-01
40	1.88E-01	7.02E-01	3.24E-01
35	2.01E-01	7.56E-01	3.48E-01
30	2.18E-01	8.21E-01	3.78E-01
25	2.32E-01	8.79E-01	4.04E-01
20	2.53E-01	9.31E-01	4.30E-01
15	2.75E-01	9.83E-01	4.57E-01
12.5	2.84E-01	9.96E-01	4.65E-01
10	2.88E-01	9.87E-01	4.63E-01

Table C-4 (continued)
Site B Original Mean Soil UHRS at MAFEs of 10^{-4} and 10^{-5}, and GMRS

Ground Motion Freq. (Hz)	Original 10-4 UHRS (g)	Original 10-5 UHRS (g)	Original GMRS
9	2.80E-01	9.58E-01	4.49E-01
8	2.69E-01	9.17E-01	4.30E-01
7	2.53E-01	8.63E-01	4.05E-01
6	2.33E-01	7.95E-01	3.73E-01
5	2.10E-01	7.14E-01	3.35E-01
4	1.74E-01	5.87E-01	2.76E-01
3.5	1.52E-01	5.13E-01	2.42E-01
3	1.28E-01	4.28E-01	2.02E-01
2.5	1.06E-01	3.50E-01	1.65E-01
2	9.42E-02	3.06E-01	1.45E-01
1.5	7.69E-02	2.43E-01	1.16E-01
1.25	6.56E-02	2.03E-01	9.73E-02
1	5.44E-02	1.64E-01	7.89E-02
0.9	5.14E-02	1.53E-01	7.39E-02
0.8	4.65E-02	1.37E-01	6.62E-02
0.7	4.14E-02	1.20E-01	5.82E-02
0.6	3.53E-02	1.01E-01	4.90E-02
0.5	2.94E-02	8.23E-02	4.02E-02
0.4	2.36E-02	6.58E-02	3.21E-02
0.35	2.06E-02	5.76E-02	2.81E-02
0.3	1.77E-02	4.94E-02	2.41E-02
0.25	1.47E-02	4.11E-02	2.01E-02
0.2	1.18E-02	3.29E-02	1.61E-02
0.15	8.83E-03	2.47E-02	1.21E-02
0.125	7.36E-03	2.06E-02	1.00E-02
0.1	5.89E-03	1.65E-02	8.04E-03

Table C-5
Site B Updated Mean Soil UHRS at MAFEs of 10^{-4} and 10^{-5}, and GMRS

Ground Motion Freq. (Hz)	Updated 10-4 UHRS (g)	Updated 10-5 UHRS (g)	Updated GMRS
100	1.41E-01	4.85E-01	2.27E-01
90	1.40E-01	4.87E-01	2.28E-01
80	1.41E-01	4.91E-01	2.30E-01
70	1.42E-01	5.01E-01	2.34E-01
60	1.48E-01	5.30E-01	2.46E-01
50	1.64E-01	6.02E-01	2.78E-01
40	1.87E-01	7.01E-01	3.23E-01
35	2.01E-01	7.55E-01	3.48E-01
30	2.17E-01	8.21E-01	3.77E-01
25	2.32E-01	8.78E-01	4.04E-01
20	2.52E-01	9.30E-01	4.30E-01
15	2.74E-01	9.82E-01	4.57E-01
12.5	2.83E-01	9.95E-01	4.64E-01
10	2.87E-01	9.87E-01	4.62E-01
9	2.79E-01	9.57E-01	4.49E-01
8	2.68E-01	9.17E-01	4.30E-01
7	2.52E-01	8.63E-01	4.05E-01
6	2.32E-01	7.94E-01	3.73E-01
5	2.09E-01	7.14E-01	3.35E-01
4	1.74E-01	5.87E-01	2.76E-01
3.5	1.52E-01	5.13E-01	2.41E-01
3	1.28E-01	4.28E-01	2.02E-01
2.5	1.06E-01	3.50E-01	1.65E-01
2	9.43E-02	3.06E-01	1.45E-01
1.5	7.72E-02	2.44E-01	1.16E-01
1.25	6.59E-02	2.04E-01	9.76E-02
1	5.46E-02	1.65E-01	7.92E-02
0.9	5.17E-02	1.54E-01	7.43E-02
0.8	4.68E-02	1.38E-01	6.66E-02
0.7	4.16E-02	1.21E-01	5.85E-02
0.6	3.56E-02	1.01E-01	4.93E-02
0.5	2.97E-02	8.28E-02	4.05E-02
0.4	2.37E-02	6.63E-02	3.24E-02

Table C-5 (continued)
Site B Updated Mean Soil UHRS at MAFEs of 10^{-4} and 10^{-5}, and GMRS

Ground Motion Freq. (Hz)	Updated 10-4 UHRS (g)	Updated 10-5 UHRS (g)	Updated GMRS
0.35	2.08E-02	5.80E-02	2.83E-02
0.3	1.78E-02	4.97E-02	2.43E-02
0.25	1.48E-02	4.14E-02	2.02E-02
0.2	1.19E-02	3.31E-02	1.62E-02
0.15	8.90E-03	2.48E-02	1.21E-02
0.125	7.42E-03	2.07E-02	1.01E-02
0.1	5.93E-03	1.66E-02	8.09E-03

Table C-6
Percent Differences Between Site B Updated and Original Mean Soil UHRS and GMRS

Ground Motion Freq. (Hz)	10-4 UHRS (g)[2]	10-5 UHRS (g)[2]	GMRS[2]
100	-0.28%	-0.06%	-0.11%
90	-0.28%	-0.06%	-0.11%
80	-0.29%	-0.06%	-0.11%
70	-0.29%	-0.07%	-0.11%
60	-0.29%	-0.07%	-0.11%
50	-0.29%	-0.07%	-0.11%
40	-0.30%	-0.07%	-0.12%
35	-0.30%	-0.08%	-0.12%
30	-0.30%	-0.08%	-0.12%
25	-0.30%	-0.08%	-0.12%
20	-0.30%	-0.08%	-0.12%
15	-0.31%	-0.07%	-0.12%
12.5	-0.31%	-0.07%	-0.11%
10	-0.31%	-0.06%	-0.11%
9	-0.29%	-0.05%	-0.10%
8	-0.27%	-0.05%	-0.09%
7	-0.25%	-0.04%	-0.08%

[2] Note that these percent differences were calculated using 4 significant figures for UHRS and GMRS, whereas Tables C-1, C-2, C-4, and C-5 show results with 3 significant figures.

Table C-6 (continued)
Percent Differences Between Site B Updated and Original Mean Soil UHRS and GMRS

Ground Motion Freq. (Hz)	10-4 UHRS (g)[2]	10-5 UHRS (g)[2]	GMRS[2]
6	-0.22%	-0.03%	-0.07%
5	-0.19%	-0.01%	-0.05%
4	-0.13%	0.00%	-0.03%
3.5	-0.09%	0.01%	-0.01%
3	-0.05%	0.02%	0.00%
2.5	0.00%	0.03%	0.02%
2	0.13%	0.11%	0.11%
1.5	0.29%	0.22%	0.23%
1.25	0.39%	0.28%	0.30%
1	0.52%	0.37%	0.40%
0.9	0.55%	0.42%	0.44%
0.8	0.59%	0.48%	0.50%
0.7	0.63%	0.54%	0.56%
0.6	0.69%	0.62%	0.63%
0.5	0.75%	0.71%	0.71%
0.4	0.75%	0.71%	0.71%
0.35	0.75%	0.71%	0.71%
0.3	0.75%	0.71%	0.71%
0.25	0.75%	0.71%	0.71%
0.2	0.75%	0.71%	0.71%
0.15	0.75%	0.71%	0.71%
0.125	0.75%	0.71%	0.71%
0.1	0.75%	0.71%	0.71%

[2] Note that these percent differences were calculated using 4 significant figures for UHRS and GMRS, whereas Tables C-1, C-2, C-4, and C-5 show results with 3 significant figures.

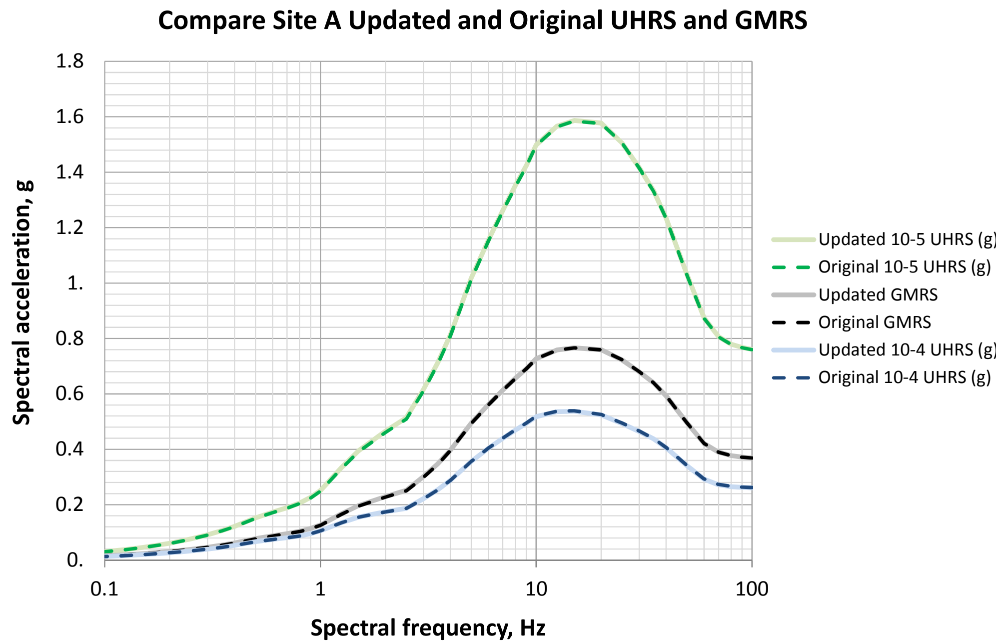

Figure C-1
Site A updated (solid) and original (dashed) sensitivity to UHRS at 10^{-4}, 10^{-5}, and GMRS

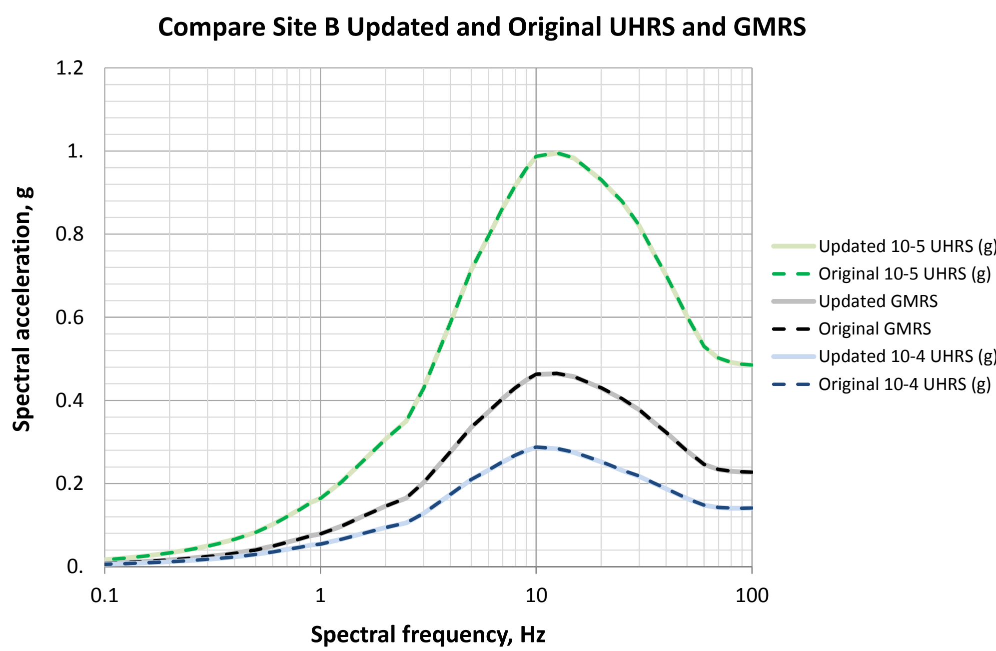

Figure C-2
Site B updated (solid) and original (dashed) sensitivity to UHRS at 10^{-4}, 10^{-5}, and GMRS

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